TAPERA AMAZONAS REDD+

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(CCB) GHG accounting period	01st-March-2021 to 28th-February-2121; 100-year lifetime
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CCB Standards version	3.0
Project location	Urucará & Nhamundá municipalities, state of Amazonas – Brazil
Project proponent(s)	Orgânica Consulting – Fortaleza – Brazil
Validation/verification body	EPIC Sustainability Services PVT. Ltd, NO. 41, Anugraha, 1st Cross Road, Sundarnagar, Near BEL Circle, Gokula Extension, Bengaluru - 560 054, Karnataka State, India. Email-enquiries@epicsustainability.com epicsustainability@gmail.com Phone No- +91 95909 29936, +91 94827 59072
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1 SUMMARY OF PROJECT BENEFITS

1.1 Unique Project Benefits

Table 01: Outcome or impact estimated by the end of project lifetime

Outcome or impact estimated by the end of project lifetime	Section reference
1) Provide water security and access to electricity to improve the quality of life of local communities, based on the pillars of sustainability.	4.5.2
2) Increase the number of children, youth and adults with internet connection, and more access to information, and increase the offer in training and education.	4.5.2
3) Avoid the emission of 49.251.426 tons of Greenhouse Gases (GHG) (tCO2e), contributing to the mitigation of climate change.	2.1.5
4) Maintenance of ecosystem functions (e.g., nutrient cycling), as well as the provision of ecosystem services (e.g., carbon sequestration) performed by living organisms.	5.1.5

1.2 Standardized Benefit Metrics

Table 02: Standardized benefit metrics

Category	Metric	Estimated by the end of project lifetime	Section reference
GHG emission reductions or carbon dioxide removals	Net estimated removals in the project area, measured against the without-project scenario	Not applicable	-
	Net estimated reductions in the project area, measured against the without-project scenario	49.251.426	G1.9

Forest[1] cover	For REDD[2] projects: Estimated number of hectares of reduced forest loss in the project area measured against the without-project scenario	80,619 ha	G1.3
	For ARR[3] projects: Estimated number of hectares of forest cover increased in the project area measured against the without-project scenario	not applicable	
Improved land management	Number of hectares of existing production forest land in which IFM[4] practices are expected to occur as a result of project activities, measured against the without-project scenario	not applicable	
	Number of hectares 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	
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	400	G1.5
	Number of female community members who are expected to have improved skills and/or knowledge resulting from training as part of project activities	200	G1.5

[1] Land with woody vegetation that meets an internationally accepted definition (e.g., UNFCCC, FAO, or IPCC) of what constitutes a forest, which includes threshold parameters, such as minimum forest area, tree height and level of crown cover, and may include mature, secondary, degraded and wetland forests (VCS Program Definitions)

[2] Reduced emissions from deforestation and forest degradation (REDD) - Activities that reduce GHG emissions by slowing or stopping conversion of forests to non-forest land and/or reduce the degradation of forest land where forest biomass is lost (VCS Program Definitions)

[3] Afforestation, reforestation and revegetation (ARR) - Activities that increase carbon stocks in woody biomass (and in some cases soils) by establishing, increasing and/or restoring vegetative cover through the planting, sowing and/or human-assisted natural regeneration of woody vegetation (VCS Program Definitions)

[4] Improved forest management (IFM) - Activities that change forest management practices and increase carbon stock on forest lands managed for wood products such as saw timber, pulpwood, and fuelwood (VCS Program Definitions)

Employment	Total number of people expected to be employed in project activities, expressed as number of full-time employees	6	G1.5
	Number of women expected to be employed as a result of project activities, expressed as number of full-time employees	3	G1.5
Livelihoods	Total number of people expected to have improved livelihoods or income generated as a result of project activities	400	G1.5
	Number of women expected to have improved livelihoods or income generated as a result of project activities	200	G1.5
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	400	G1.5
	Number of women for whom health services are expected to improve as a result of project activities, measured against the without-project scenario	200	G1.5
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	400	G1.5
	Number of women and girls for whom access to, or quality of, education is expected to improve as result of project activities, measured against the without-project scenario	200	G1.5
Water	Total number of people who are expected to experience increased water quality and/or improved access to drinking water as a	562	2.1.11

	result of project activities, measured against the without-project scenario		
	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	281	2.1.11
Well-being	Total number of community members whose well-being is expected to improve as a result of project activities	562	2.1.11
	Number of women whose well-being is expected to improve as a result of project activities	281	2.1.11
Biodiversity conservation	Expected change in the number of hectares managed significantly better by the project for biodiversity conservation, measured against the without-project scenario	80,619 ha	2.1.11
	Expected number of globally Critically Endangered or Endangered species benefiting from reduced threats as a result of project activities, measured against the without-project scenario	Fauna:12 fauna species; Flora: 6 (VU) and 2 (EN).	2.1.11

2 PROJECT DETAILS

2.1 Project Goals, Design and Long-Term Viability

2.1.1 Summary Description of the Project (VCS, 3.2, 3.6, 3.10, 3.11, 3.13, 3.14; CCB, G1.2)

The Tapera Amazonas REDD+ Project is located in the municipalities of urucará and Nhamundá in the state of Amazonas, Brazil, an area facing significant deforestation pressures. In 2021, Amazonas lost 4,913 km² of forest, equivalent to 239 megatons of CO2 emissions, and in 2022, this reduced to 2,741

km². The main drivers of deforestation in the region include legal and illegal logging, land clearance for agriculture and cattle ranching, and infrastructure development, particularly along roads like the Urucará–São Sebastião route, which facilitates timber extraction.
rá–São Sebastião route, which facilitates timber extraction.

With 94.85% and 85.91% forest cover in Urucará and Nhamundá respectively, the region remains ecologically rich and dense biodiversity. The Tapera project will implement measures to prevent further deforestation, support sustainable forest management, and bolster local communities' resilience. As a Verified Carbon Standard (VCS) project under the REDD+ framework, the project aims to avoid planned deforestation and degradation (APD) and will contribute to significant carbon sequestration, potentially reducing 53.541.543,07 tons of CO2 emissions.

The project will enhance local governance, improve deforestation control, and support environmental education and awareness. It will also create alternative income sources for local communities by introducing solar power, underground water collection systems, satellite internet, and training programs on sustainable forest product harvesting and agroforestry. A factory will be established in Urucará to process these products, offering long-term financial opportunities for the surrounding communities, with Operations set to begin in 2025.

Located within a Key Biodiversity Area (KBA), the Tapera project plays a crucial role in preserving species endemic to the Brazilian Amazon and others classified as Vulnerable, Endangered, or Critically Endangered by the IUCN. The project ensures the continuity of vital ecosystem services, such as nutrient cycling and carbon sequestration, by maintaining forest cover, mitigating habitat loss, and protecting biodiversity. It also promotes the conservation of large, continuous forest environments, which is critical for maintaining gene flow among species and the provision of essential services to local communities, such as food, fresh water, and timber.

Monitoring will be carried out using satellite images, drones, and innovative photogrammetry techniques (e.g., drone LiDAR), combined with fire prevention and firefighting efforts, biodiversity protection, and social outreach. In the absence of such a project, deforestation and degradation would lead to the fragmentation of ecosystems and further species loss. The Tapera Amazonas project guarantees the conservation of this vital region, reinforcing the protection of Amazonian biodiversity and ensuring the continued provision of ecosystem services for future generations.

The development, implementation, monitoring, and certification of the Tapera project is the responsibility of Orgânica Consultoria. The counterpart of the landowners is to allow the project activities to be implemented on their properties and to freely commit to its long-term conservation.

Figure 1: The annual increase in deforestation (2008-2021) in the Municipalities of Urucará and Nhamundá, where the Tapera project is located.

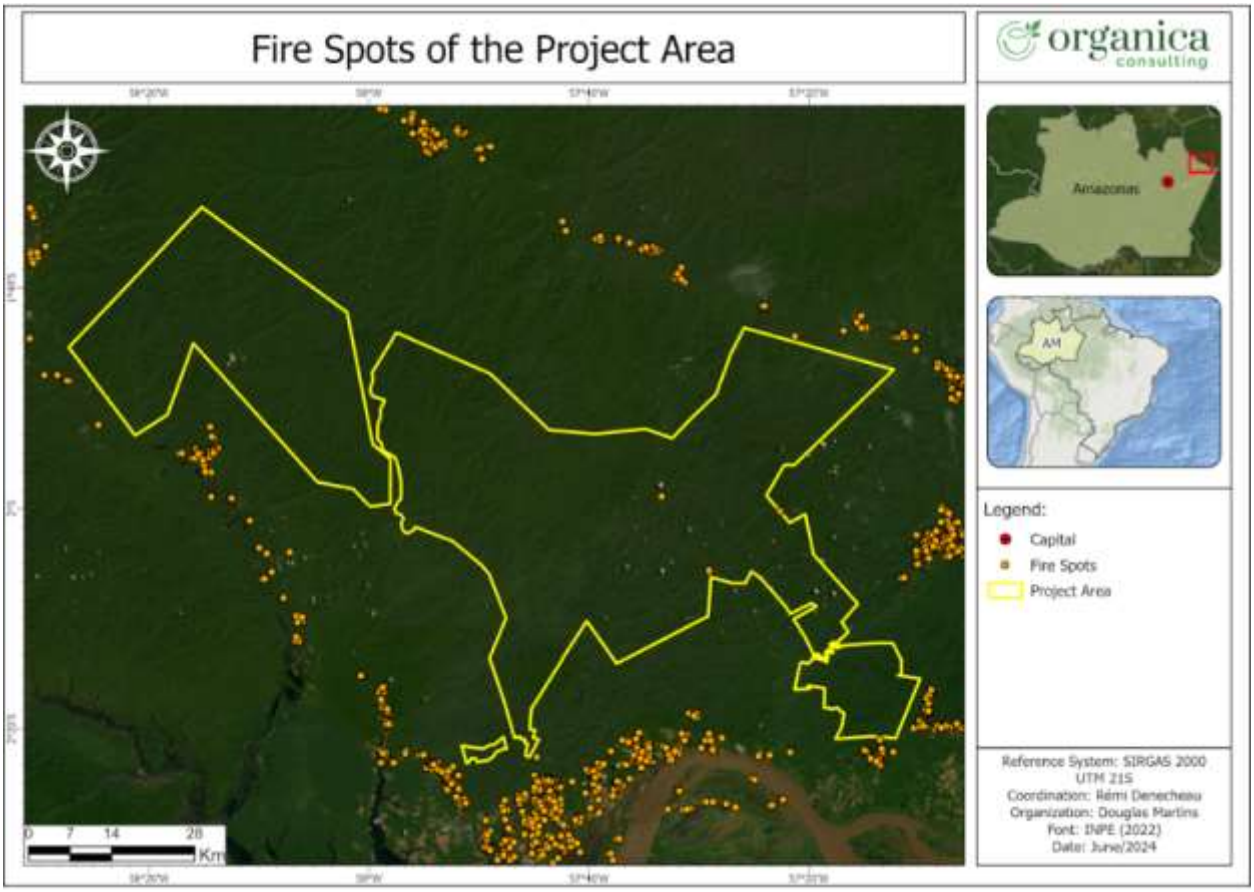
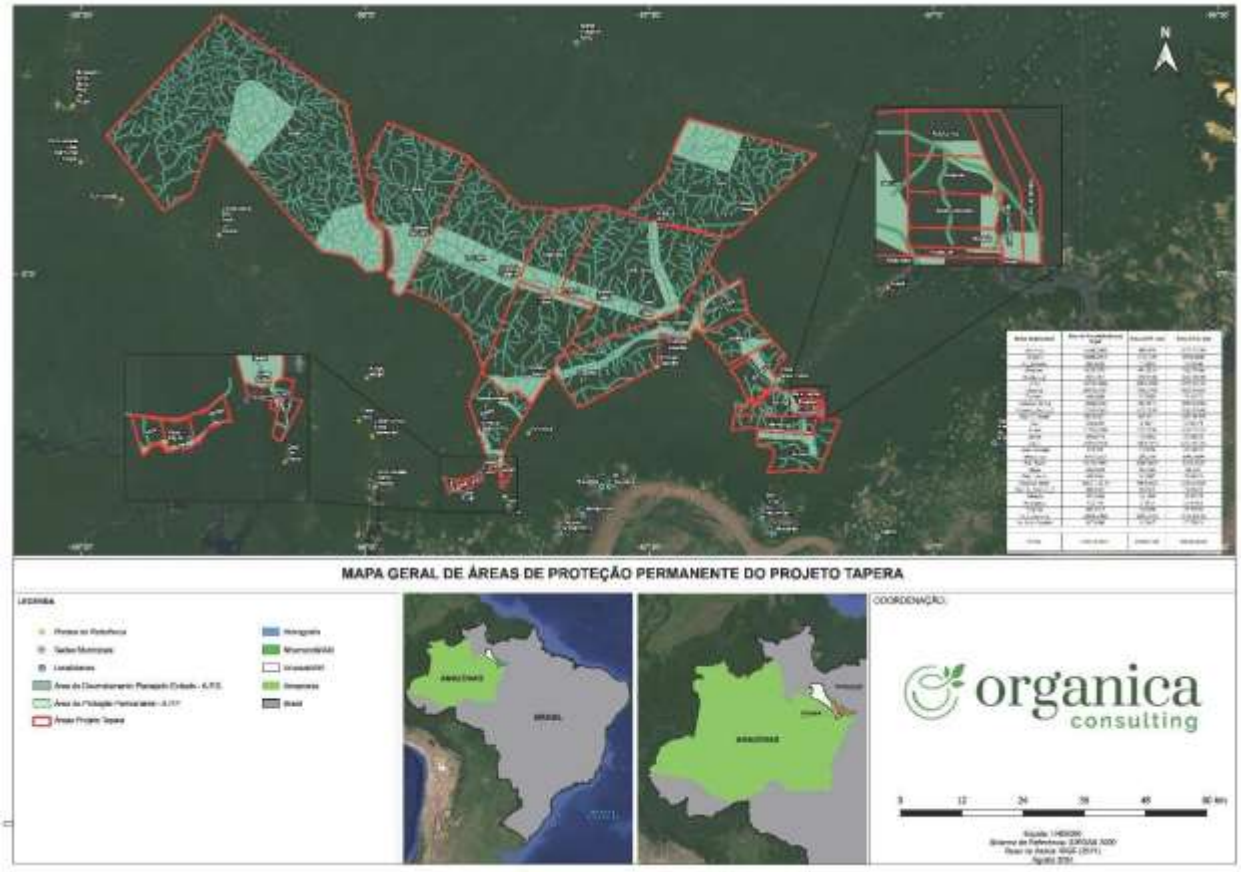


Figure 2. The twenty-seven properties that make up the Tapera project, with their respective permanently protected areas (APP), legal reserve areas (ARL), and planned deforestation areas (APD) in

hectares.



2.1.2 Audit History (VCS, 4.1)

Audit type	Period	Program	Validation/verification body name	Number of years
Validation/ verification	*(DD-Month-YYYY– DD-Month-YYYY)*		*Validation/verification body name*	*One year*

2.1.3 Sectoral Scope and Project Type (VCS, 3.2)

Sectoral scope	14: Agriculture, forestry, and other land use
AFOLU project category	REDD+ (Reducing Emissions from Deforestation and Forest Degradation)

Project activity type	APD (Avoided Planned Deforestation)

2.1.4 Project Eligibility (VCS, 3.1, 3.6, 3.8, 3.18, 4.1; CCB Program Rules, 4.2.4, 4.6.4)

According to the VCS Standard v4.7 and considering the Tapera project characteristics, some topics presented in section three must be followed by this project so it can be eligible. All the points of the next paragraphs have, in their beginning, the VCS Standard section that sets a specific requirement and then a brief description of how this project attends it.

General Requirements

The project attends to all the applicable requisites of Section 3.1 listed below.

Section 3.1.1: The project meets all applicable rules and requirements set out under the VCS program. More details about the methodologies used are given in Section 3.2 of Applicability of Methodology.

Section 3.1.2: A methodology eligible under the VCS Program is applied in full, namely, the VM0007, REDD+ Methodology Framework v1.8

Section 3.1.3: Implementation is legal under Brazilian legislation. All laws considered during the compliance processes are presented in Section 1.14 of this document.

Section 3.1.7: Rules and requirements of the VCS program take precedence over other approved GHG Program when there is a conflict between them.

Section 3.2 AFOLU-Specific Matters- All applicable minor sections of the 3.2. section have requirements followed by the project:

Section 3.2.1. The project is within an AFOLU project category eligible under the VCS Program (Reduced Emissions from Deforestation and Degradation).

Section 3.2.2: The project is not located within a region covered by a jurisdictional REDD+ program, then it is not necessary to follow the requirements related to nested projects set out in the VCS Program document called Jurisdictional and Nested REDD+ Requirements.

Section 3.2.3: All implementation partners are identified in Section 1.6, Other Entities Involved in the Project, of this document.

Section 3.2.4: Project activities do not convert native ecosystems to generate GHG credits. As stated in Section 1.13 and confirmed by geospatial data, the land has not been cleared of native ecosystems within 10 years of the project start date. The geospatial analysis also concludes that fauna and flora of the project area are part of the Amazon Biome.

Section 3.2.5: Project activities do not drain or degrade hydrological functions to generate GHG credits. Their resources are not used, and their riparian forest remains intact.

Section 3.2.6. The project activities and its time implementation, which will be confirmed in each verification, are described in Section 5.3 of this PD.

Section 3.2.7: The project is going to reassess the defined baseline every six years to consider possible methodologies updates and changes in the drivers and/or behaviour of agents that cause changes in the reference area.

Section 3.2.8: Project activities do not occur on wetlands, then specific requirements for WRC projects are not necessary to be followed.

Project Overview:

The Tapera Amazonas REDD+ Project is managed by Orgânica Consultoria.

Located in Urucará & Nhamundá municipalities in Amazonas, Brazil.

Spans an area of 434,010 hectares dedicated to preventing deforestation and fostering conservation.

Project Scope:

The project operates under VCS Scope 14, covering Agriculture, Forestry, and Other Land Use (AFOLU) sectors.

Focuses on Avoided Planned Deforestation (APD), protecting 80,619 hectares of Amazon rainforest.

Alignment with AFOLU:

The project adheres to AFOLU guidelines, contributing to carbon sequestration and biodiversity conservation.

Helps combat climate change and habitat destruction.

Stakeholder Engagement:

A public comment period was initiated early, allowing community feedback before formal meetings with the validation/verification body (EPIC).

Feedback from the public comment period was integrated into the project design.

Timely Compliance:

The project submitted the validation report and statement within one year of the public comment period's initiation.

All relevant deadlines for pipeline listing, validation, and public comment period expiry were met, ensuring compliance with VCS and CCB standards.

Methodology:

Utilizes an approved methodology under the VCS Program tailored to the Amazon ecosystem.

Ensures accurate quantification of GHG emission reductions and robust monitoring mechanisms.

Additional Project Elements:

Incorporates risk assessments, financial viability analyses, and stakeholder engagement strategies.

Contributes to community development through initiatives such as water collection systems, solar panels, and internet service provision.

Supports biodiversity conservation through these initiatives.

2.1.5 Transfer Project Eligibility (VCS, 3.23, Appendix 2)

The Tapera Amazonas REDD+ project is not registered in another GHG program with activities included in the scope of the VCS program.

2.1.6 Project Design (VCS, 3.6)

Indicate if the project has been designed as:

☐ Single location or installation

☐ Multiple locations or project activity instances (but not a grouped project)

☒ Grouped project

2.1.6.1 Eligibility Criteria for Grouped Projects (VCS, 3.6; CCB, G1.14)

As Tapera Grouped REDD+ Project is a grouped project, all new project activity instances of the project will adopt the same requirements for the initial instances PAIs#1-27, as per the VCS Standard v.4.7, the Project meets the Baseline and Additionality requirements for a grouped Project as below:

VCS Standard Eligibility for Grouped Projects	Tapera project
3.6.10. Grouped projects shall have one or more clearly defined geographic areas within which	This grouped project only include the project areas to compose its instances located inside the

project activity instances may be developed.	Brazilian Amazon Biome.
3.6.11. Determination of baseline scenario and demonstration of additionality are based upon the initial project activity instances. The initial project activity instances are those that are included in the project description at validation and shall include all project activity instances currently implemented on the issue date of the project description,	The determination of the baseline scenario and the additionality is based upon the initial activities' instances described in this PD. Major cause of the deforestation agent is the landowners themselves whao has the legal rights to supress 20 percent of the forest area in their properties. Most of them does that with the intention of implementing business as usual (BAU) activities, such as livestock and/or agriculture.
3.6.12: As with non-grouped projects, grouped projects may incorporate multiple project activities. Where a grouped project includes multiple project activities, the project description shall designate which project activities may occur in each geographic area.	This project does not have any other project activities besides the APD.
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.	The Tapera project at this validation process has PAIs# 1-27 inside the geographic area of the Brazilian Amazon Biome, then, the additionality and the baseline scenario will be assessed only once for the project instances.
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.	All the project instances PAIs# 1-27 is inside the Brazilian Amazon Biome and are the baseline and additionality are presented in the sections of this PD.
3.6.15 - Where factors relevant to the determination of the baseline scenario or demonstration of additionality require assessment	Tapera Grouped REDD+ Project is a grouped project, all new project activity instances of the project will adopt the same requirements for the initial instances PAIs#1-27, as per the VCS Standard v.4.7.

For the CCB grouped project eligibility criteria the Tapera project included the adoption of project activities specified in the project description and applied in the same manner as specified in the project

description; subject to the climate, community and biodiversity without project scenarios as determined for the project and have the similar characteristics with respect to additionality; subject to the same processes for stakeholder engagement described in G3 and respect for rights to lands, territories and resources including free, prior and informed consent described in G5; and have similar monitoring elements as well.

2.1.7 Project Proponent (VCS, 3.7; CCB, G1.1)

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2.1.9 Project Ownership (VCS, 3.2, 3.7, 3.10; CCB, G5.8)

The Tapera Amazonas REDD+ Project demonstrates clear project ownership, as required by the VCS Standard v4.7, section 3.7, through well-established legal rights to control and operate the project

activities. This includes securing contractual rights over the land, vegetation, and conservation management processes that contribute to GHG emission reductions or removals. In compliance with VCS requirement 3.7.1, the project proponent(s) have entered into enforceable and irrevocable agreements with the holders of statutory, property, or contractual rights in the land, ensuring that project ownership is vested in the proponent(s). These agreements guarantee the transfer of carbon rights and project management responsibilities, reinforcing the legitimacy of the project's ownership structure.

To support these claims, the project provides robust documentation, including land titles and property deeds for the initial 27 properties involved. The crediting period is 40 years from the start date, renewable for the full project duration of 100 years, and is supported by signed conservation agreements. These documents clearly outline the legal framework and the transfer of carbon rights. The Tapera Amazonas REDD+ Project also ensures that any new project instances, as part of its grouped structure, comply with ownership requirements by securing similar documentation and agreements for additional properties. This includes the signing of new conservation agreements and the maintenance of a centralized registry for easy verification and auditing, ensuring ongoing compliance with VCS ownership standards.

The project is located in the municipalities of Urucará and Nhamundá in the state of Amazonas, encompassing several properties within these areas.

Project ownership per property name

Instance	Property name	Owner
Instance 1	Ipê	Urupolpas
Instance 2	Jatobá	Urupolpas
Instance 3	Piquiá	Urupolpas
Instance 4	Itaúba	Urupolpas
Instance 5	Louro	Urupolpas
Instance 6	Louro Gamela	Odiélio Nascimento
Instance 7	Pau Rosa	Urupolpas
Instance 8	Curupira	Agrofrut
Instance 9	Andiroba	Nat'Organico
Instance 10	Angelin	Nat'Organico
Instance 11	Breu	Gerliane da Paz
Instance 12	Fazenda Roberto	Roberto Camargo Quevedo
Instance 13	Fazenda Andre	André Evaristo Marcondes Cesar
Instance 14	Fazenda Antônio Roberto	Antônio Roberto Quevedo
Instance 15	Fazenda Vô Luiz Geraldo	Evaristo Marcondes Cesar
Instance 16	Fazenda Evaristo	Evaristo Marcondes Cesar
Instance 17	Fazenda Rodriguez	Ricardo Jose Rodriguez Ferreira

Instance 18	Fazenda Ricardo Ferreira 2	Ricardo Jose Rodriguez Ferreira
Instance 19	Reserva Bacurau	Ismar Luis Reis Lemos
Instance 20	Imóvel Bacurau 2	Ismar Luis Reis Lemos
Instance 21	Fazenda Mendonça	Aline de Abreu Mendonça Martins
Instance 22	Andre Marcondes II	Marco Q Participacoes Ltda
Instance 23	Reserva Reis Lemos	Alcino Luis Da Costa Lemos Junior
Instance 24	Fazenda Gabi E Andre Marcondes	Marco Q Participacoes Ltda
Instance 25	Tucumã	Urupolpas
Instance 26	Reserva Buriti	Urupolpas
Instance 27	Copaíba	Nat'Organico

These properties are owned as per informed in Section 2.5. The legal documents proving the land title and ownership of the properties (Environmental Registry for Rural Properties, Land Registry Certificate, Certificate from the Institute for Agrarian Reform) will be made available to the auditors during the validation process. Organica Consulting a Brazilian company and the project proponent, provides all support, organization, and guidance to the landowners of the areas in which APD Project activities will be implemented. The respective legal documents will be produced for the review of auditors during the validation process.

2.1.10 Project Start Date (VCS, 3.8)

Project Start Date	01-March-2021
Justification	The REDD+ Tapera Jungle Project underwent a carefully planned and executed preparation period throughout 2020, culminating in its official start date on March 1, 2021. This start date is justified by a series of crucial steps that occurred in the preceding months, establishing the legal, technical, and operational foundations necessary for the effective launch of the project. Three key events mark the formal beginning of the project's preparatory activities: 1. On October 29, 2020, the contract between Organica Consulting and Agrofrut was signed, establishing the fundamental partnership for local project implementation. 2. The following day, October 30, 2020, a contract was signed with Dr.

	André Evaristo Marcondes César, the landowner, securing the necessary legal commitment for project execution in the designated areas. 3. On November 5, 2020, Rodrigo Batalha from CR Agropecuária was hired to perform essential topography, georeferencing, and monitoring services for the project areas. A contract has been done. These formal agreements marked the beginning of the project's intensive preparation phase. In the following months, several crucial activities were carried out, including visits to communities for alignment and engagement (December 16-21, 2020), detailed project activity planning, and logistical and technical preparations. The project's chronology demonstrates a systematic development process, from initial discussions in January 2020 to the official launch. This preparation period was essential to ensure that all aspects of the project - legal, technical, social, and operational - were properly aligned and ready for implementation. March 1, 2021, was therefore strategically chosen as the official project start date, marking the transition from the preparation phase to the active implementation phase. This date represents the moment when all necessary elements were in place, allowing for the effective commencement of REDD+ project activities on the ground, with a solid foundation established through the agreements, planning, and preparations carried out in the preceding months.

2.1.11 Benefits Assessment and Project Crediting Period (VCS, 3.9; CCB, G1.9)

Crediting period	The crediting period of the Tapera Amazonas REDD+ Project will be from March 1, 2021 (start date) to February 28, 2061, covering a 40-year period.
Start date of first or fixed crediting period	01-March-2021 to 28-February-2061
CCB benefits assessment period	01-March-2021 to 28-February-2061 Benefits to climate, communities and biodiversity will be continuously

monitored and submitted to the CCB for verification throughout the project lifetime.

2.1.12 Differences in Assessment/Project Crediting Periods (CCB, G1.9)

The crediting period for the Tapera Project is marked by the formalization of the land regularization proposal, as mentioned in Section 2.1.14. After formalizing the budget for the georeferencing of the land, the project begins and, consequently, the first major investments will be made.

The development of activities related to the climate, community, and biodiversity scope, along with the monitoring of parameters related to these scopes, started to be planned in 2020, and has been developed constantly from the start date of the project until the validation audit period (August 2024).

2.1.13 Project Scale and Estimated Reductions or Removals (VCS, 3.10)

Indicate the estimated annual GHG emission reductions/carbon dioxide removals (ERRs) of the project:

☐ < 300,000 tCO2e/year (project)

☒ ≥ 300,000 tCO2e/year (large project)

Ano	Período	tCO2e
1	01-Mar-2021 to 31-Dez-2021	1648834,17
2	01-Jan-2022 to 31-Dez-2022	2009107,53
3	01-Jan-2023 to 31-Dez-2023	2059636,05
4	01-Jan-2024 to 31-Dez-2024	2110164,56
5	01-Jan-2025 to 31-Dez-2025	2160693,07
6	01-Jan-2026 to 31-Dez-2026	2211221,59
7	01-Jan-2027 to 31-Dez-2027	2261750,10
8	01-Jan-2028 to 31-Dez-2028	2312278,61
9	01-Jan-2029 to 31-Dez-2029	2362807,12
10	01-Jan-2030 to 31-Dez-2030	2413335,64
11	01-Jan-2031 to 31-Dez-2031	2424946,22
12	01-Jan-2032 to 31-Dez-2032	2429053,03
13	01-Jan-2033 to 31-Dez-2033	2433159,83
14	01-Jan-2034 to 31-Dez-2034	2437266,64
15	01-Jan-2035 to 31-Dez-2035	2441373,44
16	01-Jan-2036 to 31-Dez-2036	2445480,25
17	01-Jan-2037 to 31-Dez-2037	2449587,05
18	01-Jan-2038 to 31-Dez-2038	2453693,86
19	01-Jan-2039 to 31-Dez-2039	2457800,66

20	01-Jan-2040 to 31-Dez-2040	2461907,47
21	01-Jan-2041 to 31-Dez-2041	813737,13
22	01-Jan-2042 to 31-Dez-2042	453463,77
23	01-Jan-2043 to 31-Dez-2043	402935,26
24	01-Jan-2044 to 31-Dez-2044	352406,75
25	01-Jan-2045 to 31-Dez-2045	301878,23
26	01-Jan-2046 to 31-Dez-2046	251349,72
27	01-Jan-2047 to 31-Dez-2047	200821,21
28	01-Jan-2048 to 31-Dez-2048	150292,69
29	01-Jan-2049 to 31-Dez-2049	99764,18
30	01-Jan-2050 to 31-Dez-2050	49235,67
31	01-Jan-2051 to 31-Dez-2051	37625,08
32	01-Jan-2052 to 31-Dez-2052	33518,28
33	01-Jan-2053 to 31-Dez-2053	29411,47
34	01-Jan-2054 to 31-Dez-2054	25304,67
35	01-Jan-2055 to 31-Dez-2055	21197,86
36	01-Jan-2056 to 31-Dez-2056	17091,06
37	01-Jan-2057 to 31-Dez-2057	12984,25
38	01-Jan-2058 to 31-Dez-2058	8877,45
39	01-Jan-2059 to 31-Dez-2059	4770,64
40	01-Jan-2060 to 31-Dez-2060	663,84
41	01-Jan-2061 to 28-Fev-2061	0,00
	Total	**49251426,10**

2.1.14 Physical Parameters (CCB, G1.3)

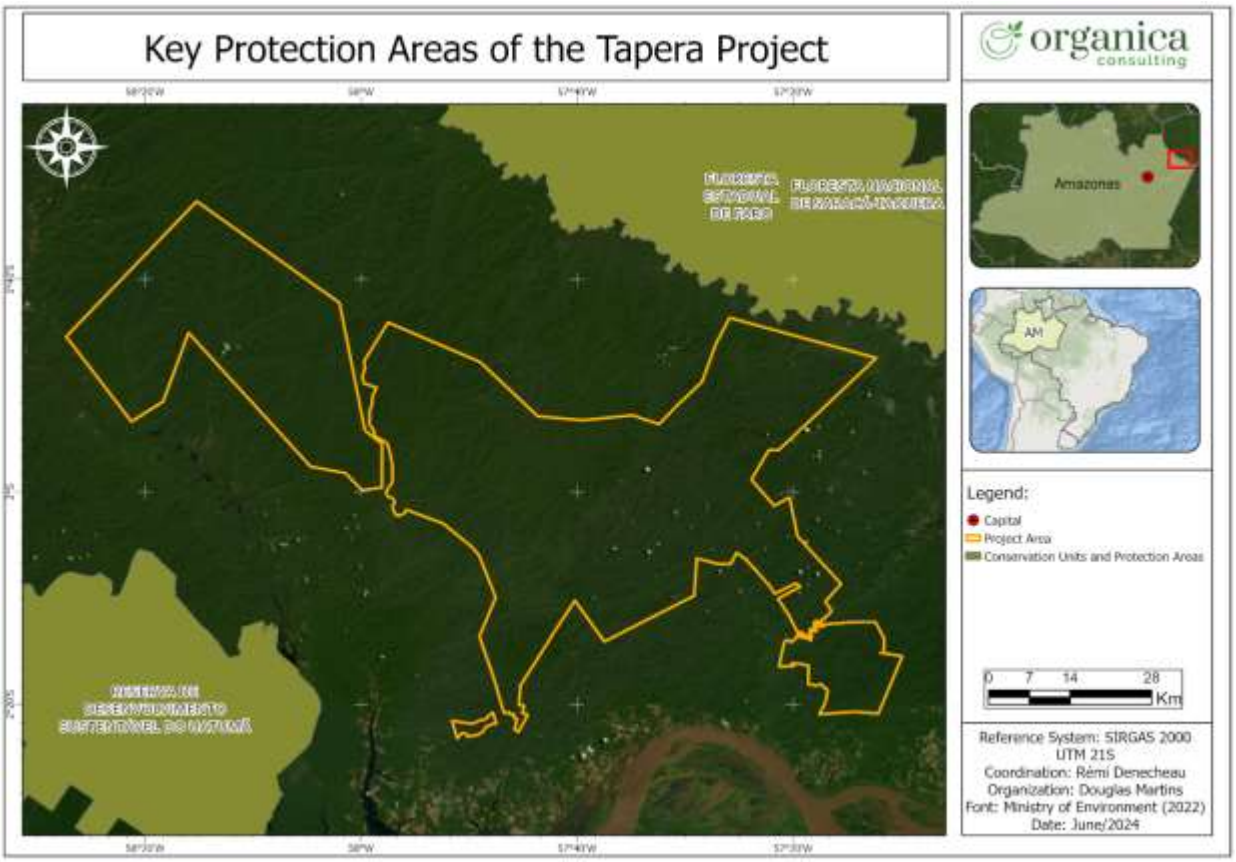
Project Location

The Tapera Amazonas REDD+ Project covers a total area of 434,010 hectares, with 80,619 hectares designated for Avoided Planned Deforestation (APD). The project is situated in the southeast region of Urucará municipality (Latitude 2°10'14"S to 2°23'09"S, Longitude 57°51'23"W to 57°42'23"W) and the central region of Nhamundá municipality (Latitude 1°43'38"S to 2°13'40"S, Longitude 57°59'53"W to 52°12'18"W). These municipalities are located within the Amazonian Centre Mesoregion of the Amazonas state, near the border of Pará state. Urucará covers an area of 27,901.962 km², with only 4.59 km² urbanized, and has a population of 18,631 people, yielding a low population density of 0.67 inhabitants per km² (IBGE, 2022). It is situated 270 km by air and 281 km by river from Manaus, the capital of Amazonas. The municipality lies in the 9th Lower Amazon subregion at an elevation of 27 meters above sea level, with an average annual temperature of around 30°C. Urucará is bordered by the municipalities of Nhamundá, Urucuri tuba, Itapiranga, São Sebastião do Uatumã, Presidente Figueiredo, Itacoatiara, and

Silves. Nhamundá municipality has an area of 14,107.040 km², with only 3.86 km² urbanized, and a population of 20,136, which results in a population density of 1.43 inhabitants per km² (IBGE, 2022). Both municipalities suffer from poor road and transport accessibility, though the Urucará-São Sebastião road is the closest route to the project area, linking Urucará to São Sebastião do Uatumã. Another access point is via the Paracatu River from the Nhamundá port.

Deforestation in the Tapera Project Area is primarily driven by legal forest conversion, illegal logging, timber harvest, and land clearance for agricultural expansion. Illegal deforestation is particularly high along the road connecting Urucará and S ão Sebastião, where access to the forest is easier. The region's extremely low population density of 0.5 people per km² and poor infrastructure complicate efforts to control deforestation. The Paratucu River, known for its suitability for commercial navigation also poses an environmental challenge by providing easy access to forested areas vulnerable to illegal logging and conversion into pasture. Within the Tapera project area, key environmental protection zones include the Uatumã Biological Reserve (RDS Uatumã) in Urucará, covering 938,720 hectares, and the Nhamundá Environmental Protection Area (APA Nhamundá), which spans 19,500 hectares in Nhamundá. The Uatumã Biological Reserve was established in 2002 to protect the biological diversity of the dense rainforest ecosystem in the Uatumã and Jatapu River basins. The reserve, predominantly composed of Terra Firme Forest, also includes areas of Igapó, Baixio, Campinas, and Campinaranas. It is home to a number of endangered species, including the rare and endemic primate Sauim (Saguinus martinsi ochraceus), as well as several species of endangered chelonians. Approximately 20 riverside communities live in the reserve, with access available by river or via land from Manaus. Economically, Urucará relies heavily on agriculture, cultivating over 40 species of crops, including bananas, watermelon, cupuaçu, and cassava. Artisanal fishing and plant extraction activities, such as rubber and Brazil nut harvesting, are also important economic activities. The APA Nhamundá, situated at the confluence of the Nhamundá and Amazon rivers, is predominantly covered by Lowland Dense Alluvial Rainforest, a habitat adapted to the area’s flooding regime. While the area supports agriculture and artisanal fishing, there is increasing interest in the commercial production of species like peacock bass in the Balbina reservoir. Furthermore, the APA is a significant site for sustainable forestry, agriculture, and tourism, with over 450 families living within the protected area. Additionally, the reserve is home to important wildlife, including the Amazonian turtle (Podocnemis expansa), and is recognized for its potential to host scientific research. The construction of the Balbina Dam between 1985 and 1989 flooded much of the region, displacing indigenous communities, and contributing to significant environmental concerns, including the dam’s high methane emissions relative to its energy output. Despite these challenges, the surrounding region’s biodiversity remains crucial for the conservation of aquatic species, such as the endangered manatee (Trichechus inunguis).

Figure 3: Key protection areas of the Tapera project



Forest ecosystems in Urucará and Nhamundá municipalities currently suffer rapid levels of planned and illegal deforestation driven by increasing global demand for timber, expansion of agriculture and cattle ranching, and poor enforcement of forest protection laws. The Project will play a significant role in reducing the cumulative rates of deforestation occurring across the region. Mobility of illegal timber companies is enabled primarily by the road network from Urucará township to São Sebastião, as well as bridges allowing access into forested areas. These existing bridges and roads, as well as others constructed through the forest, are used by illegal logging companies to access merchantable trees. Logging typically occurs along roads and rivers.

Figure 4: Location of the Tapera Project

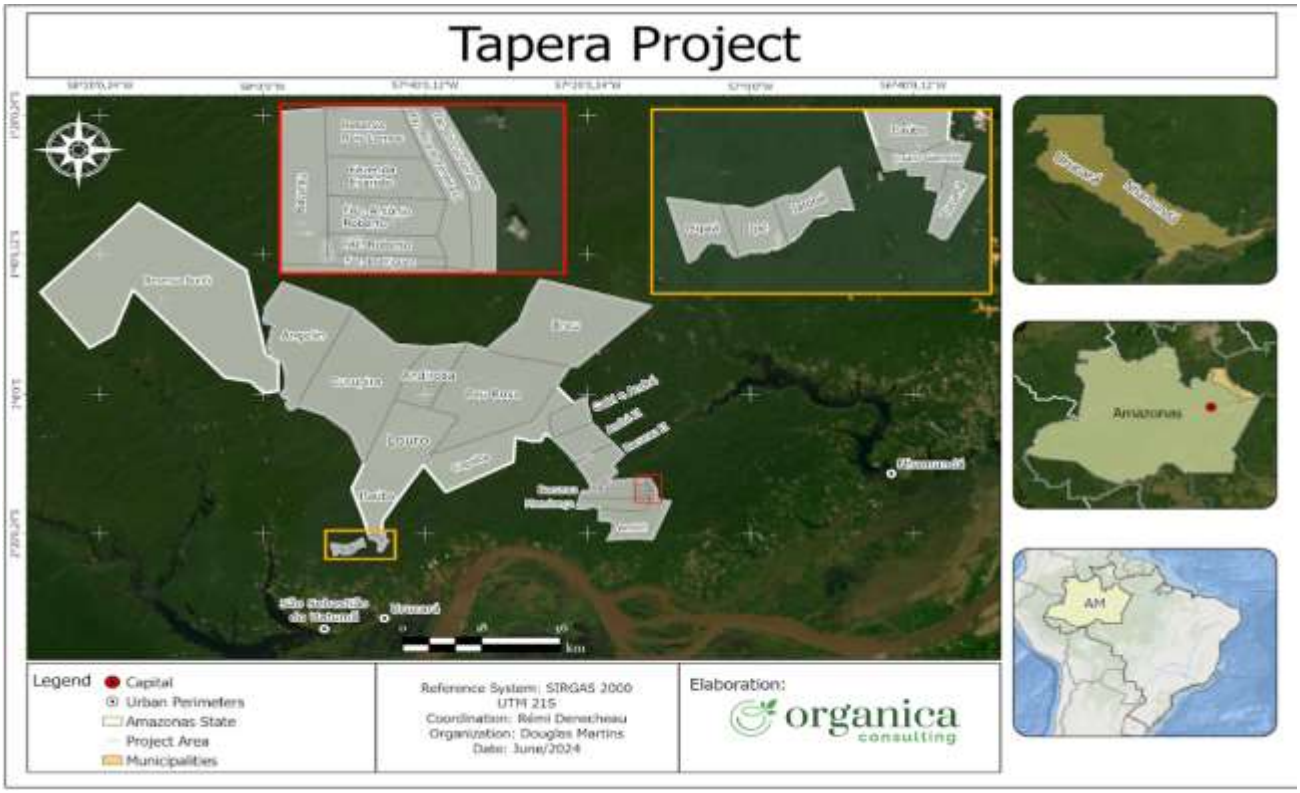
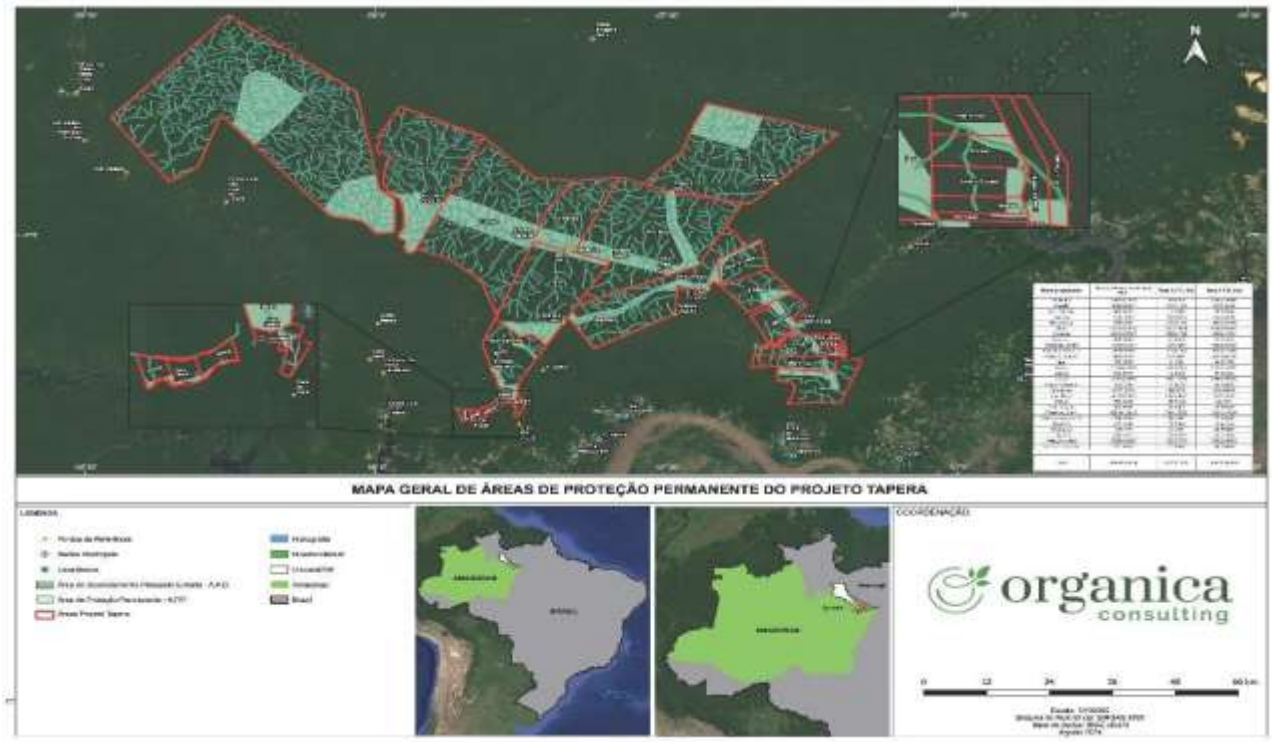


Figure 05: Tapera Project Properties



Urucará has about 94.87% of its territory of natural forest formations, 1.54 % of areas dedicated to agriculture and pastures, and 2.34% of area in water bodies (Figure 6). Nhamundá has about 85.91%

of its territory of natural forest formations, 7.95% of areas dedicated to agriculture and pastures, and 2.46% of area in water bodies5. The twenty-seven properties, as well as the project area, are predominantly composed of forested areas.

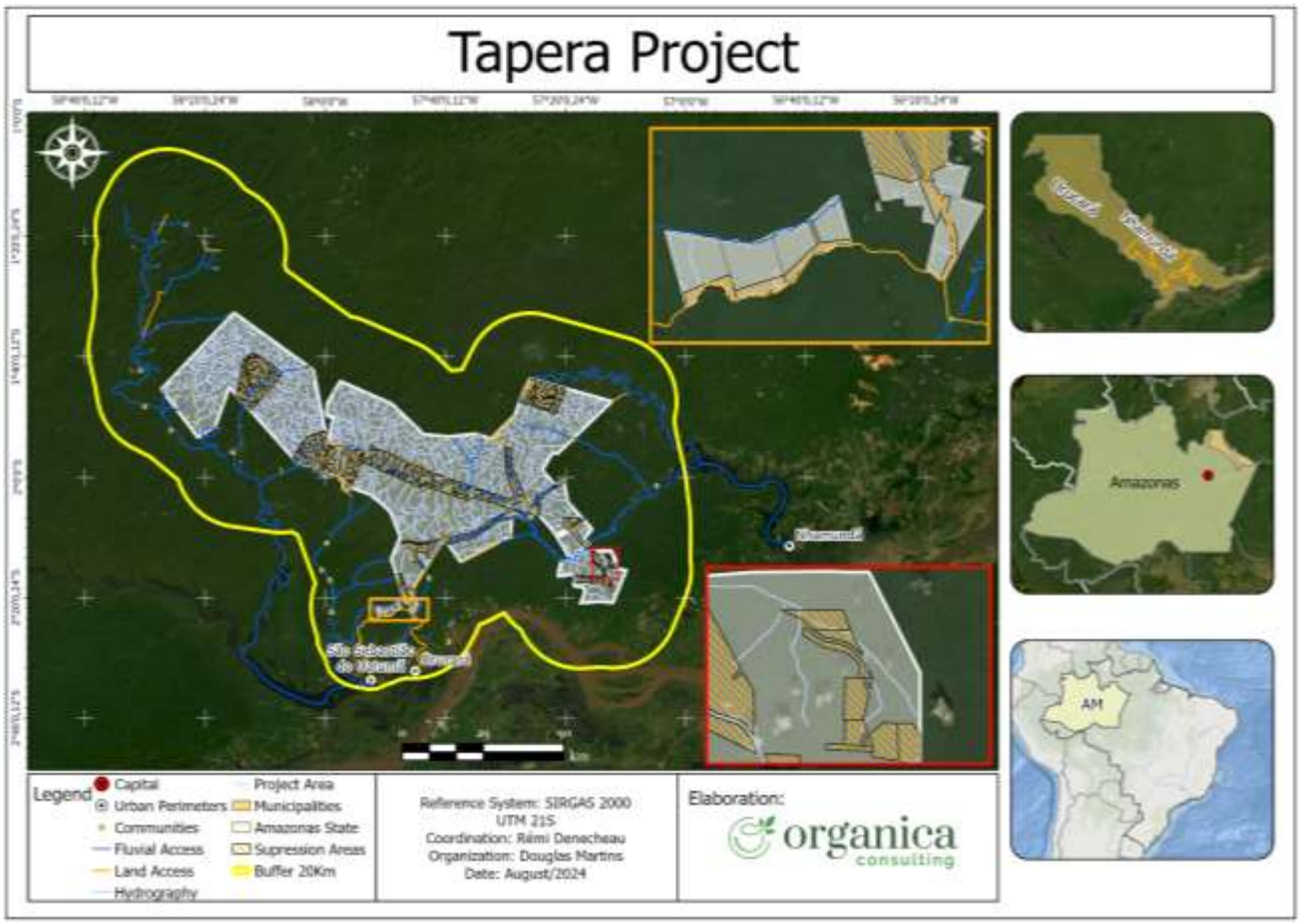
The figure 6, seen below, analyzes the distribution of various land cover types within and around the project area, which is essential for planning, management, and conservation activities. It is possible to notice the presence of different ecosystems, such as forests, wetlands, and grasslands, as well as human developments like urban areas and pastures. South of the project area, there is presence of pasture, which shows the risk of encroachment in a scenario without the Tapera project.

Figure 06: Types of occupation and land use in the Tapera project region.



[5] Available at: http://www.dpi.inpe.br/prodesdigital/prodesmunicipal.php

Figure 07: Tapera Project Area Map – June 2024



The data in Table below outlines the specifics of various land parcels within the Tapera APD Project activity area. This data is organized by land parcel ID and includes the size of each parcel in hectares, ownership details, and the geographical coordinates in terms of longitude and latitude.

Land parcel ID	Size (ha)	Ownership	Code	Coordinates	
				Longitude	Latitude
1	470	Urupolpas	M-0672	-57°50'22,573"	-2°21'42,877"
			M-0673	-57°49'26,584"	-2°21'42,911"
			M-A0322	-57°49'06,971"	-2°22'50,258"

			M-0397	-57°49'12,425"	-2°22'48,382"
			M-0323	-57°49'59,777"	-2°23'01,140"
2	500,5	Urupolpas	M-0689	-57°51'34,114"	-2°21'31,135"
			M-0672	-57°50'22,573"	-2°21'42,877"
			M-0676	-57°49'59,644"	-2°23'01,595"
			M-0690	-57°51'05,943"	-2°23'09,696"
3	500,7	Urupolpas	M-0668	-57°47'46,085"	-2°20'44,660"
			M-0669	-57°47'27,686"	-2°21'48,326"
			M-0670	-57°48'54,112"	-2°22'41,068"
			M-0671	-57°49'13,193"	-2°21'35,699"
4	11740,2	Urupolpas	M-0316	-57°45'14,189"	-2°18'12,497"
			M-0317	-57°45'21,946"	-2°20'02,615"

			M-0318	-57°46'08,722"	-2°20'25,473"
			M-0319	-57°46'56,357"	-2°20'12,397"
			M-0320	-57°47'40,014"	-2°17'36,963"
			M-0321	-57°49'01,946"	-2°13'35,686"
5	27870,7	Urupolpas	M-A0314	-57°43'44,542"	-2°00'50,006"
			M-0315	-57°35'50,681"	-2°03'15,104"
6	423,5	Odiélio	M-0317	-57°45'21,946"	-2°20'02,615"
			M-0324	-57°44'52,150"	-2°20'06,549"
			M-0325	-57°45'03,759"	-2°20'43,304"
			M-0326	-57°45'05,059"	-2°20'47,422"
			M-0327	-57°45'23,872"	-2°20'41,880"
			M-0328	-57°45'32,462"	-2°21'20,297"

			M-0329	-57°45'51,383"	-2°21'15,901"
			M-A0330	-57°45'48,075"	-2°20'54,480"
			M-0331	-57°46'14,415"	-2°20'54,554"
			M-0332	-57°46'14,468"	-2°20'43,159"
			M-0333	-57°46'45,280"	-2°20'48,388"
			M-0319	-57°46'56,357"	-2°20'12,397"
			M-0318	-57°46'08,722"	-2°20'25,473"
7	50412,1	Urupolpas	M-0024	-57°34'51,970"	-1°52'47,844"
			M-0025	-57°22'14,180"	-1°56'04,558"
			M-0026	-57°26'46,080"	-2°03'47,851"
			M-0027	-57°39'18,217"	-2°08'45,688"
			M-0315	-57°35'50,681"	-2°03'15,104"

			M-0028	-57°39'33,509"	-2°02'06,867"
8	52924,3	Agrofrut	M-0019	-57°48'54,091"	-1°47'50,719"
			M-0020	-57°39'27,417"	-1°53'15,970"
			M-A0314	-57°43'44,542"	-2°00'50,006"
			M-0021	-57°47'31,124"	-2°09'56,625"
			M-0022	-57°52'22,746"	-2°02'58,799"
			M-0023	-57°55'47,977"	-2°01'40,715"
9	14396	Nat'Organico	M-0024	-57°34'51,970"	-1°52'47,844"
			M-0028	-57°39'33,509"	-2°02'06,867"
			M-A0314	-57°43'44,542"	-2°00'50,006"
			M-0020	-57°39'27,417"	-1°53'15,970"
10	35158,7	Nat'Organico	M-0139	-57°57'29,785"	-1°44'03,737"

			M-0140	-57°48'51,568"	-1°47'45,659"
			M-0019	-57°48'54,091"	-1°47'50,719"
			M-0023	-57°55'47,977"	-2°01'40,715"
			M-0141	-57°55'55,720"	-2°01'58,216"
			M-0142	-57°56'30,965"	-2°02'17,872"
			M-0143	-57°56'54,977"	-2°01'59,296"
			M-0144	-57°57'04,877"	-2°01'22,503"
			M-0145	-57°56'50,189"	-2°00'56,691"
			M-0146	-57°57'05,561"	-2°00'33,759"
			M-0147	-57°57'29,573"	-2°00'29,079"
			M-0148	-57°57'41,561"	-2°00'02,547"
			M-0149	-57°57'25,865"	-1°59'33,026"

			M-0150	-57°57'04,481"	-1°59'04,874"
			M-0151	-57°57'04,301"	-1°57'44,198"
			M-0152	-57°57'13,193"	-1°56'46,022"
			M-0153	-57°57'23,957"	-1°55'59,077"
			M-0154	-57°57'35,585"	-1°55'24,409"
			M-0155	-57°58'44,993"	-1°54'42,937"
			M-0156	-57°58'50,285"	-1°54'08,089"
			M-0157	-57°59'13,578"	-1°53'42,816"
			M-0158	-57°59'11,202"	-1°52'19,872"
			M-0159	-57°58'57,809"	-1°51'46,500"
			M-0160	-57°58'56,513"	-1°51'01,716"
			M-0161	-57°58'32,357"	-1°50'11,891"

			M-0162	-57°59'43,566"	-1°49'47,987"
			M-0163	-57°59'53,178"	-1°49'10,259"
			M-0164	-57°59'36,473"	-1°48'20,003"
			M-0165	-57°59'42,342"	-1°47'46,379"
			M-0166	-57°59'43,669"	-1°47'44,871"
11	46400,8	Gerliane	M-0172	-57°25'52,285"	-1°43'37,760"
			M-5503	-57°12'17,590"	-1°47'24,759"
			M-5502	-57°21'19,223"	-1°56'04,485"
			M-0025	-57°22'14,180"	-1°56'04,558"
			M-0173	-57°32'24,959"	-1°53'38,523"
12	10006,8724	André Evaristo Marcondes Cesar	M-0037	-57°12'18,941"	-2°15'04,147"
			M-0038	-57°09'52,743"	-2°15'27,127"

			M-0039	-57°12'05,554"	-2°20'50,403"
			M-0040	-57°14'21,012"	-2°20'40,875"
			M-0043	-57°17'34,758"	-2°20'54,716"
			M-0044	-57°16'46,034"	-2°18'48,218"
			M-0045	-57°17'22,856"	-2°18'04,323"
			M-0046	-57°18'37,367"	-2°18'04,308"
			M-0051	-57°18'33,213"	-2°16'32,555"
			M-0042	-57°12'50,471"	-2°16'56,525"
13	402,2835	Antônio Roberto Quevedo	M-0047	-57°14'08,529"	-2°13'46,832"
			M-0034	-57°12'18,653"	-2°13'51,718"
			M-0035	-57°12'27,398"	-2°14'30,413"
			M-0048	-57°14'08,051"	-2°14'28,399"

14	227,4598	Roberto Camargo Quevedo	M-0048	-57°14'08,051"	-2°14'28,399"
			M-0035	-57°12'27,398"	-2°14'30,413"
			M-0036	-57°12'18,652"	-2°14'53,719"
			M-0049	-57°14'09,024"	-2°14'50,706"
15	408,4966	Evaristo Marcondes Cesar	M-0032	-57°14'09,598"	-2°13'04,433"
			M-0033	-57°12'38,930"	-2°13'07,430"
			M-0034	-57°12'18,653"	-2°13'51,718"
			M-0047	-57°14'08,529"	-2°13'46,832"
16	347,4006	Evaristo Marcondes Cesar	M-0082	-57°12'22,037"	-2°12'13,475"
			M-0083	-57°11'34,785"	-2°13'46,125"
			M-0084	-57°11'34,789"	-2°15'11,087"
			M-0081	-57°11'54,536"	-2°15'07,983"

			M-0080	-57°11'57,375"	-2°13'47,786"
			M-0079	-57°12'39,551"	-2°12'13,605"
17	109,718	Ricardo Jose Rodriguez Ferreira	M-0049	-57°14'09,024"	-2°14'50,706"
			M-0036	-57°12'18,652"	-2°14'53,719"
			M-0037	-57°12'18,941"	-2°15'04,147"
			M-0050	-57°14'05,594"	-2°15'01,665"
18	396,7924	Ricardo Jose Rodriguez Ferreira	M-0041	-57°13'00,314"	-2°12'12,919"
			M-0079	-57°12'39,551"	-2°12'13,605"
			M-0080	-57°11'57,375"	-2°13'47,786"
			M-0081	-57°11'54,536"	-2°15'07,983"
			M-0037	-57°12'18,941"	-2°15'04,147"
			M-0036	-57°12'18,652"	-2°14'53,719"

			M-0035	-57°12'27,398"	-2°14'30,413"
			M-0034	-57°12'18,653"	-2°13'51,718"
			M-0033	-57°12'38,930"	-2°13'07,430"
19	7083,6748	Marco Q Participacoes Ltda	M-0133	-57°19'34,465"	-2°04'11,331"
			M-0137	-57°16'56,623"	-2°07'08,322"
			M-0138	-57°21'41,015"	-2°09'35,223"
			M-0134	-57°24'23,445"	-2°06'18,973"
20	5978,8631	Marco Q Participacoes Ltda	M-0132	-57°20'19,433"	-2°00'31,395"
			M-0133	-57°19'34,465"	-2°04'11,331"
			M-0134	-57°24'23,445"	-2°06'18,973"
			M-0135	-57°24'47,361"	-2°03'00,756"
21	4787,2533	Aline de Abreu Mendonça Martins	M-0056	-57°20'58,368"	-2°14'53,680"

			M-0050	-57°14'05,594"	-2°15'01,665"
			M-0037	-57°12'18,941"	-2°15'04,147"
			M-0042	-57°12'50,471"	-2°16'56,525"
			M-0051	-57°18'33,213"	-2°16'32,555"
			M-0052	-57°18'32,800"	-2°16'20,153"
			M-0053	-57°20'05,458"	-2°16'06,403"
			M-0054	-57°19'55,498"	-2°16'22,468"
			M-0055	-57°21'17,532"	-2°16'26,106"
22	400,8364	Alcino Luis Da Costa Lemos Junior	M-0041	-57°13'00,314"	-2°12'12,919"
			M-0033	-57°12'38,930"	-2°13'07,430"
			M-0032	-57°14'09,598"	-2°13'04,433"
			M-0031	-57°14'10,616"	-2°12'13,687"

23	4533,4787	Ismar Luis Reis Lemos	M-0031	-57°14'10,616"	-2°12'13,687"
			M-0032	-57°14'09,598"	-2°13'04,433"
			M-0047	-57°14'08,529"	-2°13'46,832"
			M-0048	-57°14'08,051"	-2°14'28,399"
			M-0049	-57°14'09,024"	-2°14'50,706"
			M-0050	-57°14'05,594"	-2°15'01,665"
			M-0056	-57°20'58,368"	-2°14'53,680"
			M-0057	-57°20'49,640"	-2°14'11,586"
			M-0058	-57°16'56,286"	-2°12'27,080"
24	6557,951	Ismar Luis Reis Lemos	M-0137	-57°16'56,623"	-2°07'08,322"
			M-0189	-57°15'33,039"	-2°08'39,511"
			M-0190	-57°17'00,223"	-2°10'19,258"

			M-0191	-57°16'26,034"	-2°11'13,159"
			M-0192	-57°19'36,393"	-2°13'11,319"
			M-0193	-57°20'24,769"	-2°11'32,694"
			M-0186	-57°21'23,396"	-2°10'03,051"
			M-0185	-57°19'18,144"	-2°08'53,812"
			M-0184	-57°19'45,369"	-2°08'35,494"
25	392,73	Urupolpas	M-0327	-57°45'23,872"	-2°20'41,880"
			M-0326	-57°45'05,059"	-2°20'47,422"
			M-0136	-57°44'32,750"	-2°20'57,488"
			M-0137	-57°45'23,915"	-2°22'33,427"
			M-0138	-57°45'31,783"	-2°22'33,427"
			M-0139	-57°45'41,783"	-2°22'24,155"

			M-0140	-57°45'46,601"	-2°22'23,574"
			M-0328	-57°45'32,462"	-2°21'20,297"
26	125.311,29	Urupolpas	M-0109	-58°26'20,621"	-1°16'22,747"
			M-0110	-58°22'48,741"	-01°45'44,13"
			M-0111	-58°20'31,676"	-1°20'29,053"
			M-0112	-58°17'20,698"	-1°22'23,886"
			M-0113	-58°18'11,823"	-1°25'26,943"
			M-0114	-58°15'12,164"	-1°32'40,959"
			M-0115	-58°01'58,912"	-1°42'13,329"
			M-0116	-57°59'38,331"	-1°54'12,343"
			M-0117	-57°58'02,699"	-1°55'30,756"
			M-0118	-57°58'03,633"	-1°59'36,471"

			M-0119	-57°59'54,501"	-1°59'50,195"
			M-0120	-58°01'26,393"	-1°58'13,687"
			M-0121	-58°04'39,257"	-1°57'37,885"
			M-0122	-58°07'22,515"	-1°58'21,694"
			M-0123	-58°14'07,690"	-1°57'25,226"
			M-0124	-58°13'47,327"	-1°54'36,745"
			M-0125	-58°14'01,457"	-1°51'33,497"
			M-0126	-58°17'53,688"	-1°51'52,066"
			M-0127	-58°23'10,173"	-1°47'31,217"
27	26092,71	Nat'Organico	M-0141	-57°23'51,781"	-1°58'50,921"
			M-0142	-57°21'44,007"	-2°01'18,505"
			M-0135	-57°24'47,361"	-2°03'00,756"

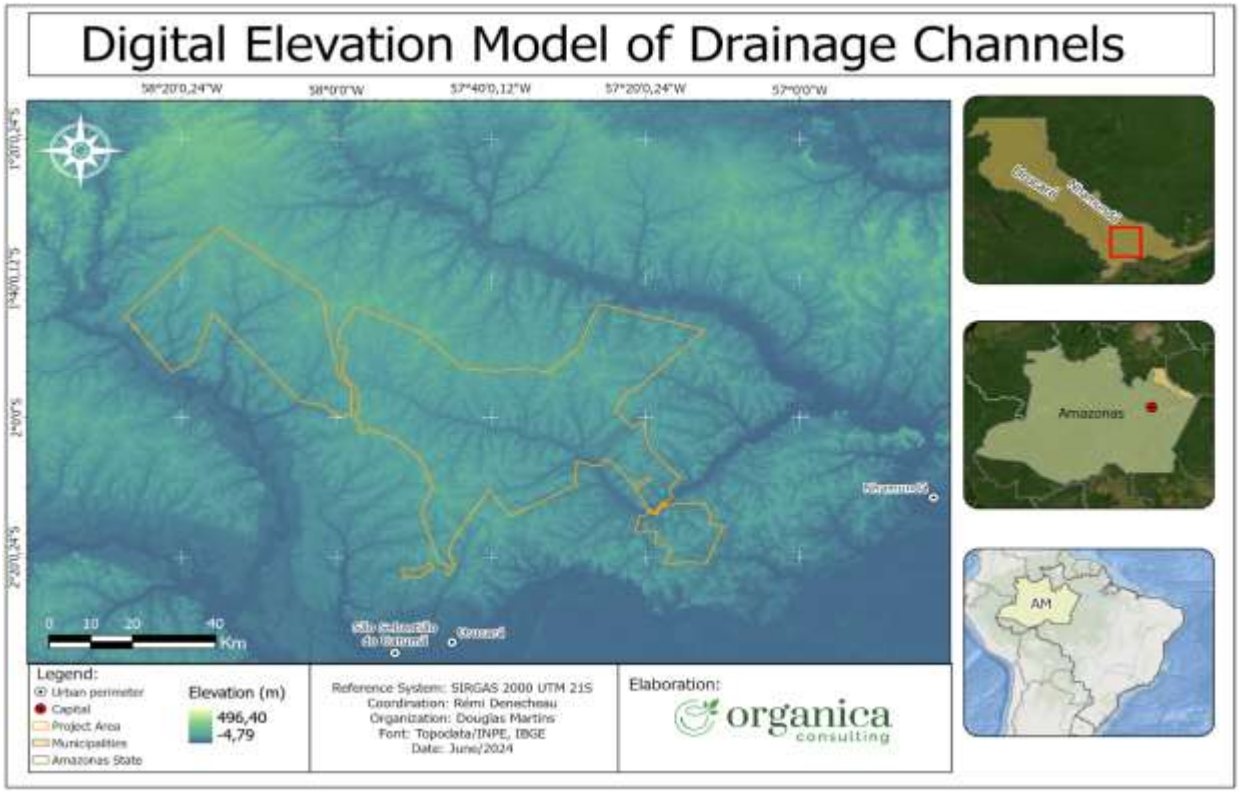
			M-0134	-57°24'23,445"	-2°06'18,973"
			M-0114	-57°25'12,776"	-2°05'42,630"
			M-0117	-57°25'46,147"	-2°06'46,857"
			M-0143	-57°26'51,866"	-2°06'47,532"
			M-0144	-57°28'54,378"	-2°06'15,229"
			M-0145	-57°29'08,673"	-2°09'45,960"
			M-0146	-57°37'27,993"	-2°14'05,101"
			M-0147	-57°40'11,433"	-2°10'13,245"
			M-0027	-57°39'18,217"	-2°08'45,688"
			M-0028	-57°26'46,080"	-2°03'47,851"

Geology, Geomorphology and Topography

The state of Amazonas is characterized by an extensive Phanerozoic sedimentary cover (covering the last 542 million years) deposited on a Precambrian rocky substrate (spanning from 4.5 billion years ago to the Phanerozoic). Urucará municipality is a low-lying area with average elevation of approximately

58 meters above sea level (m asl). The Project Area has an elevation of approximately 69 m asl (Figure 8).

Figure 8: Digital elevation model of the project Area.



General aspects

The project is located within the Amazon Basin, which is of the intracontinental type. This basin is situated in the Amazon Craton between the shields of Guiana and Central Brazil, covering an area of approximately 500,000 km2, encompassing parts of the states of Amazonas and Pará. To the west, it is bounded by the Solimões Basin through the Purus Arch, and to the east, it is limited by the Marajó Basin through the Gurupá Arch. Its sedimentary stack, along with igneous intrusions, can reach approximately 5,000 m in thickness in some locations of the basin.

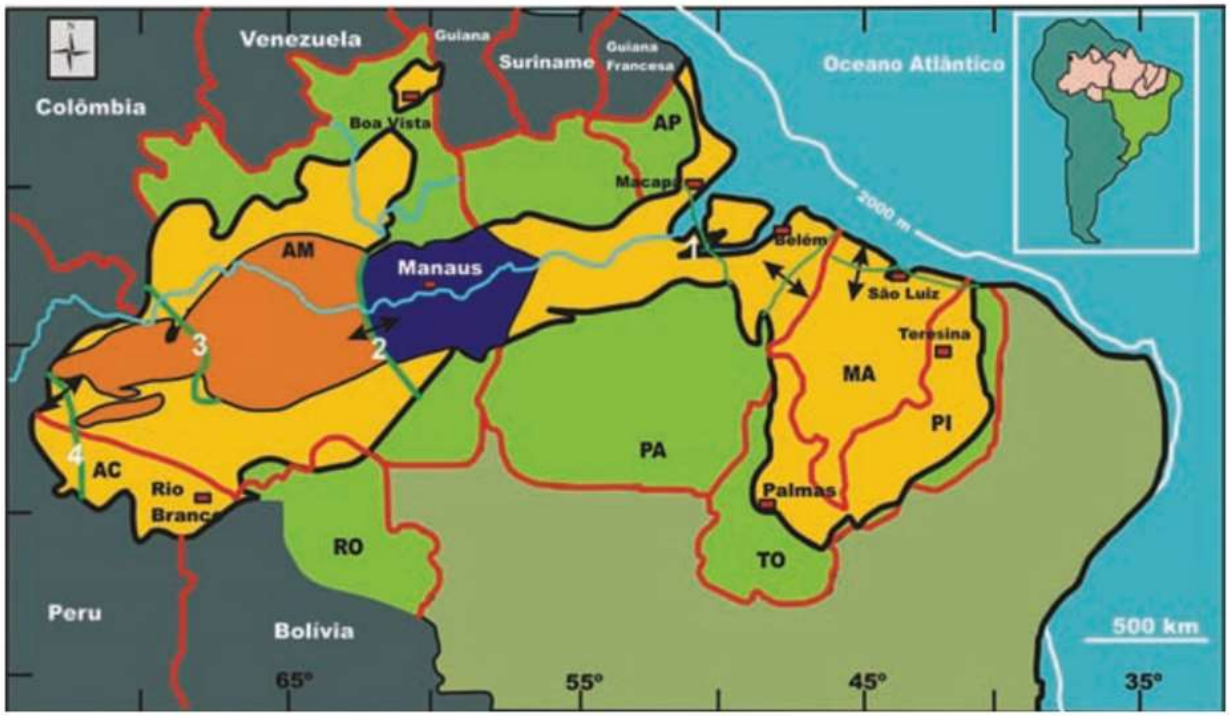
Figure 9: Location of the Amazon Basin where the project is inserted (blue square)



Regional geology

The project area is situated within the Amazon Basin, located in the Amazon Craton, and is bounded by two fundamental rock formations: to the north, the Guiana Shield, and to the south, the Brazil-Central Shield. This extensive area, covering approximately 480,000 km2, spans the states of Pará to the east and Amazonas to the west. It is characterized by the Gurupá Arch to the east and the Purus Arch to the west, which delineate the boundaries with the Marajó Trench and the Solimões and Acre basins.

Figure 10: Situation of the Amazon basin (Domínio Médio Amazonas) in the state of Amazonia (in blue) Motta Marcelo Batista, 2020

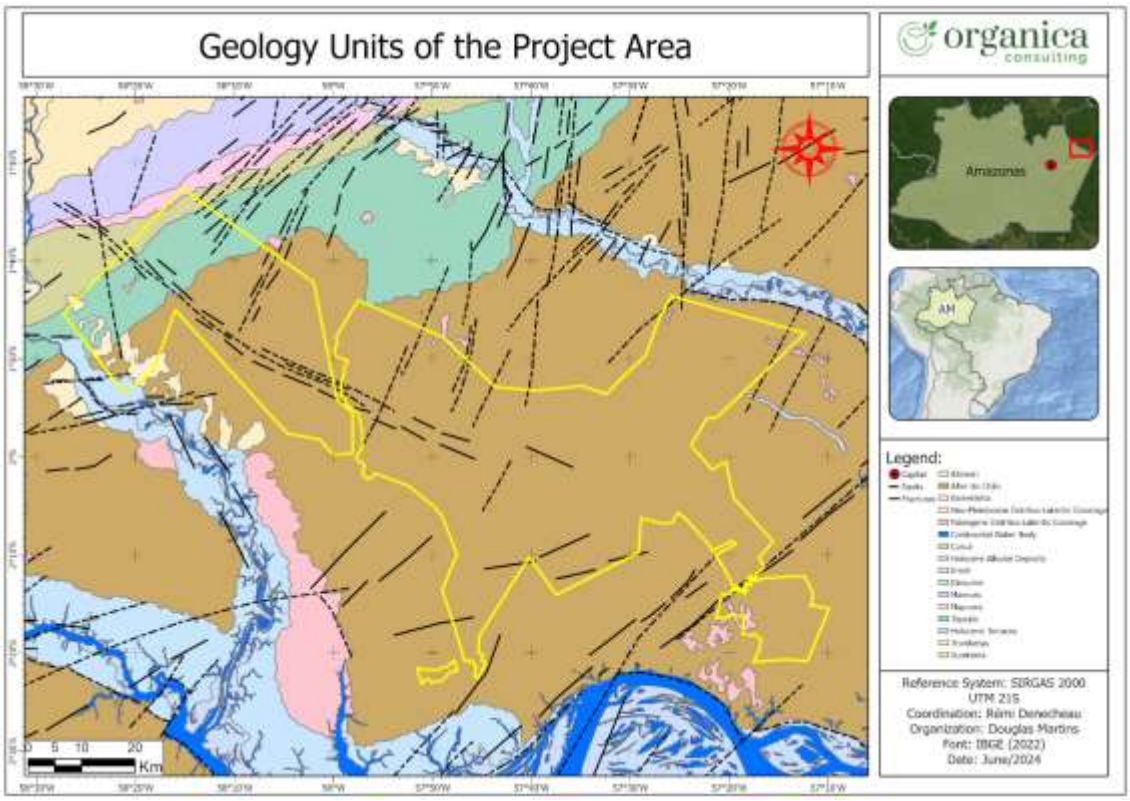


The geological evolution of the Amazon Basin was shaped by tectonic movements during the Palaeozoic era, particularly the separation of the Gondwana supercontinent. This led to the formation of fault systems oriented in NW-SE, NE-SW, and E-W directions, creating structural highs and regional unconformities. These tectonic features resulted in the division of the basin into distinct structural blocks, including the Amazonas, Solimões, Acre, and Cachimbo basins. In the Mesozoic era, the separation of South America and Africa triggered magmatic events and sedimentation processes. The reactivation of NW-SE faults during this time led to the deposition of the Alter do Chão Formation in the Upper Cretaceous period. By the Paleogene, the uplift of the Andes isolated the Alter do Chão basin, transforming it into a system of lakes fed by meandering rivers. In the Neogene, further tectonic activity reorganized the basin, contributing to the deposition of the Novo Remanso Formation.
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activity reorganized the basin, contributing to the deposition of the Novo Remanso Formation.

The Tapera Project area is situated within the Middle Amazon region and is characterized by four main sedimentary compartments. The base unit, the Alter do Chão Formation (Upper Cretaceous), is widespread throughout the project area and serves as the sedimentary basement. This formation

consists of feldspathic to kaolinitic sandstones, kaolins, quartz sandstones (known as "Manaus Sandstone"), and subordinate siltstones, claystones, and conglomeratic sandstones. It exhibits sedimentary structures such as trough crossbedding and cross-lamination. The region is marked by significant tectonic features, including normal faults and major fractures aligned with the regional fault systems. Additionally, the project area features Pleistocene alluvial terrace deposits along the Amazon and Jatapu rivers, with unique lake formations and "fish scale" point bars. Holocene alluvial deposits, particularly along river channels, form islands with distinctive morphostructural patterns. The late Paleogene and Miocene-Pliocene periods saw significant lateralization of the Alter do Chão unit, further shaping the landscape.

Figure 11: Geology of the region where Tapera's project is located



Geomorphology of the region where the Tapera project

Figure 12 displays the morphostructural units of the Tapera project, comprising three main components: Phanerozoic Sedimentary Basins and Covers, Quaternary Sedimentary, and Continental Water Body, which includes the major rivers. The Uatumã-Jani Plateau unit predominates as the primary vegetative cover of the basin. The Amazon Plain (Nascimento et al., 1976) corresponds to the lower areas, typically inundated during river flood seasons, where numerous lakes, paranás, and channels coexist. It corresponds to Pleistocene alluvial terraces and Holocene alluvium (Fig. 12).

Figure 12. Morpho-Structural Domains of the Tapera Project Area

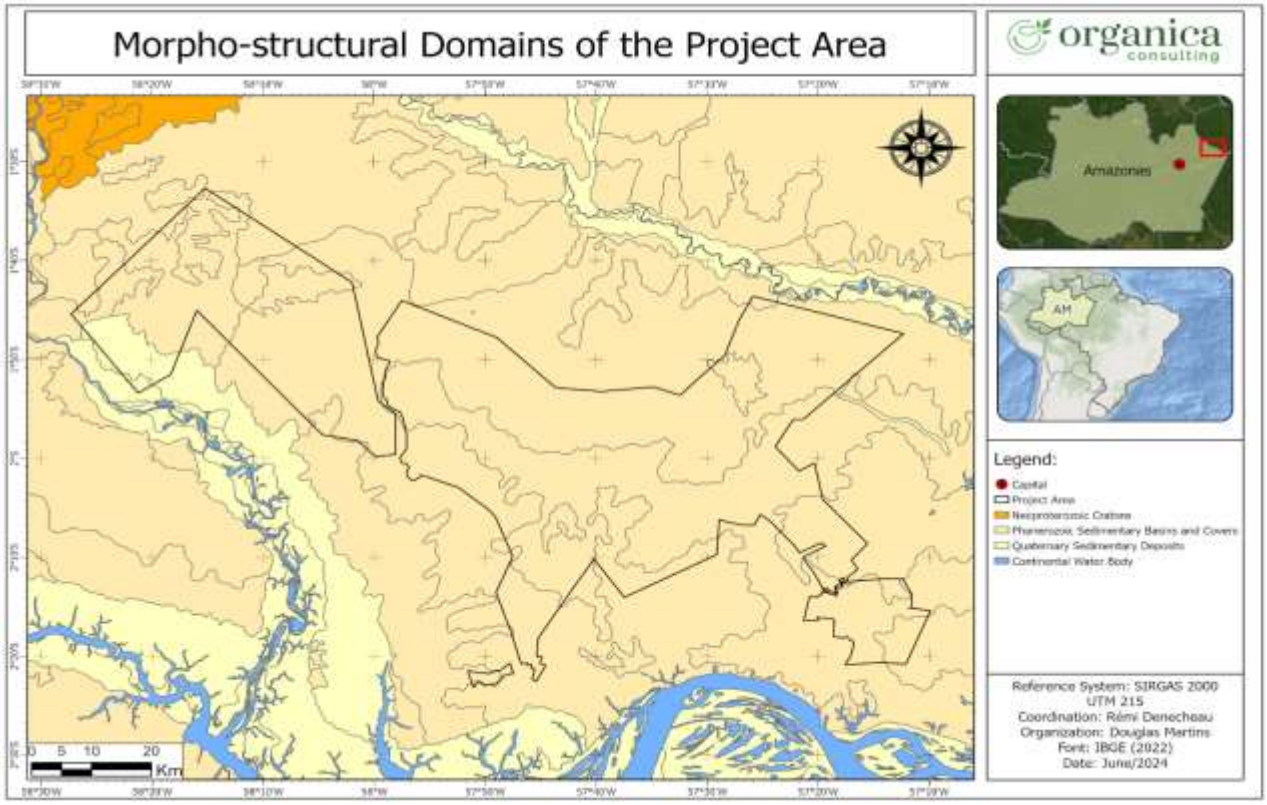
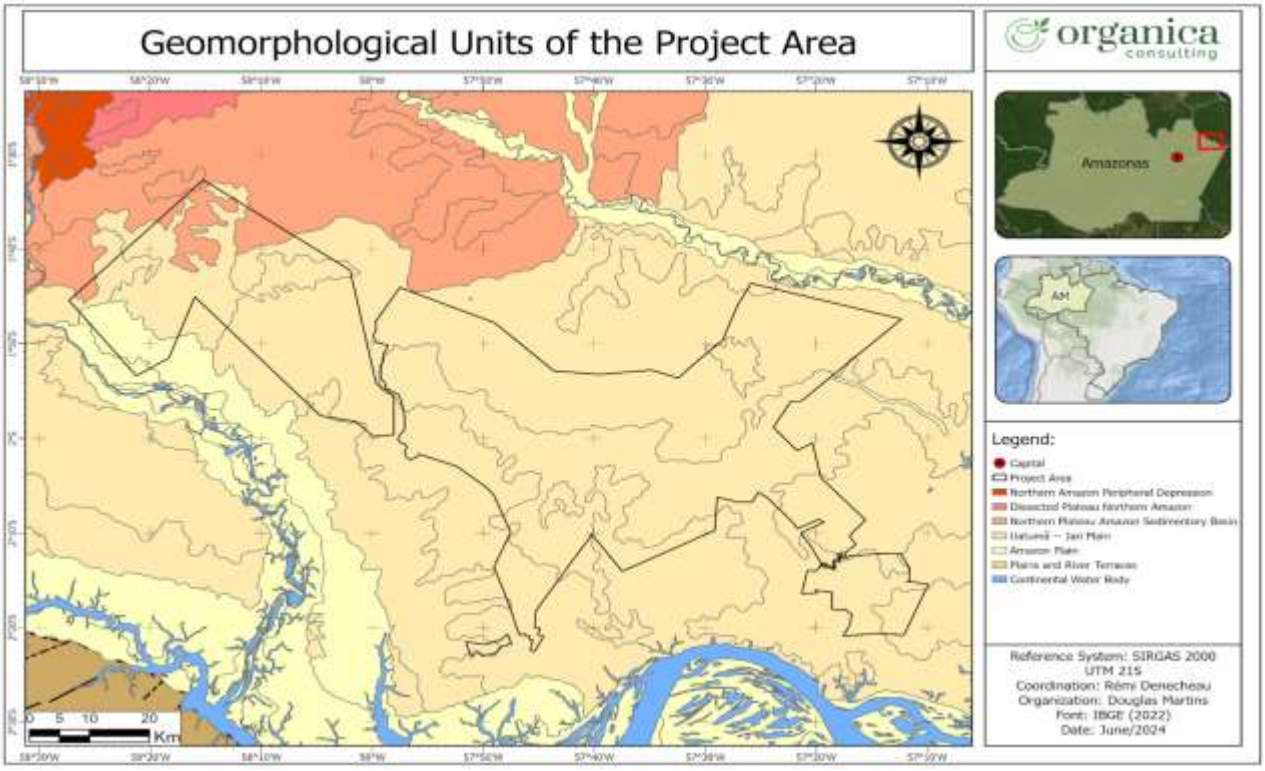


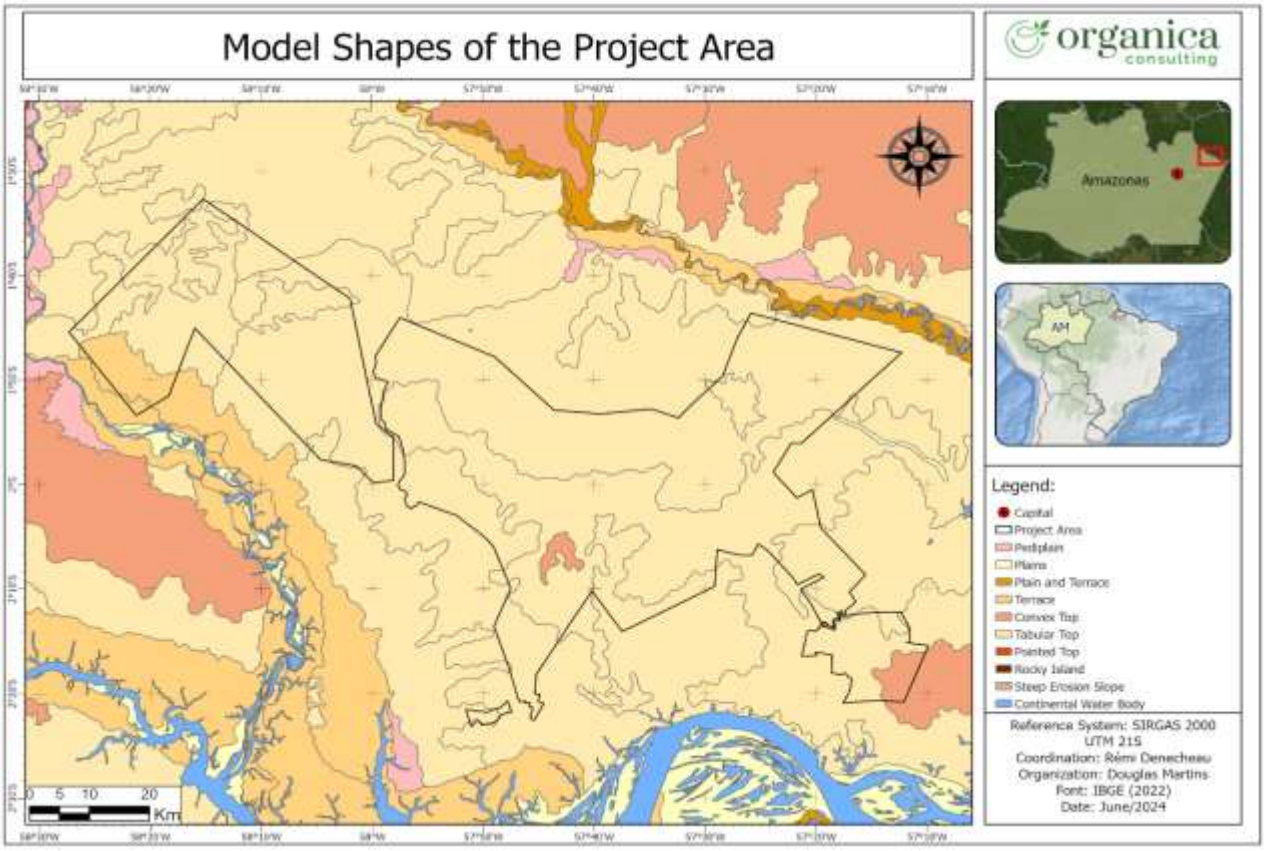
Figure 13. Geomorphological Units of the Tapera Project area



The Amazon Rainforest thrives in clayey lateritic soils, displaying reddish and yellowish hues due to the presence of aluminium and iron oxides. These soils are characterized by their acidity and the scarcity of essential nutrients such as phosphorus, potassium, calcium, and magnesium. Due to the absence of recent volcanic activity in the region, these soils are notably old and depleted, limiting nutrient replenishment. As indicated in Figure 11, the most common pedogenetic types in the region include Dystrophic Yellow Oxisol (with more than 90% presence in the area), Dystrophic Haplic Plinthosol, Fluvic Ta Eutrophic Neosol, and Continental Water Body, among others. This diversity reflects the unique soil conditions influenced by the region's long geological history and its interaction with natural elements[6].

Figure 14. Model shape of the project area

[6] Available at: https://rainforests.mongabay.com/0502.htm

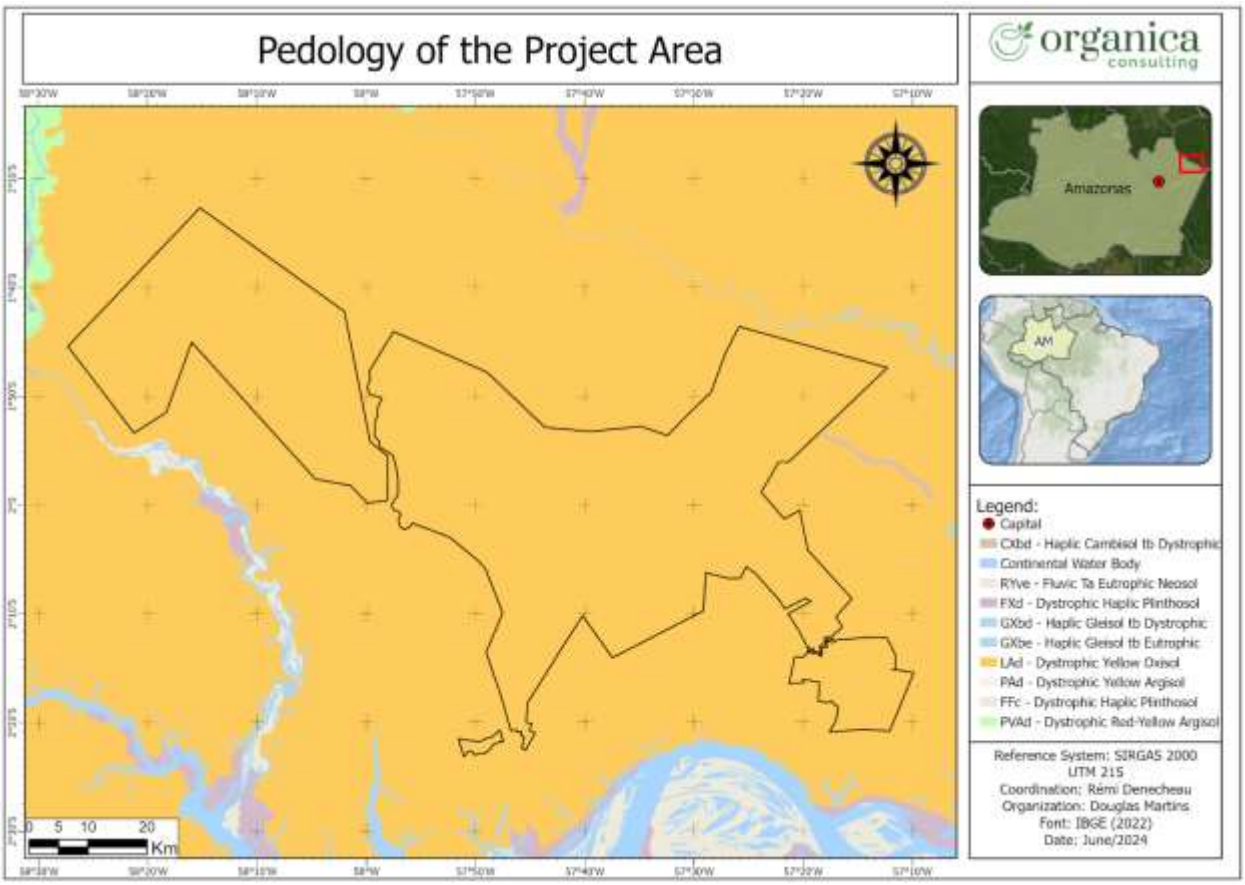


Pedology of the Tapera Project Area

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Figure 15. Soil types of the region where the Tapera project is located

[7] Available at: https://rainforests.mongabay.com/0502.htm



The geology of the Project Area is characterized by sediment deposition of the Adean provenance that changing sea levels have influenced. The formations in this region have been intensively weathered, a common occurrence in humid tropical climates throughout the Quaternary. As a result, flood plains formed in the western Amazonian Lowland corresponded to different Pleistocene sea-level heights. During periods of low sea level, erosion in drainage areas increased, and water levels in the central Amazon River system decreased. During high sea-level stages, valleys were drowned, and lakes formed in the lower reaches of rivers and creeks.

Climate

The Project Area is located in a humid tropical environment categorized as a mega thermal and is characterized by continuous high temperatures and an abundance of rainfall. The average temperature throughout the year is 24°C with maximum average air temperatures of 33ºC in October and minimum average air temperatures of 24°C in July. There is only slight temperature variation throughout the year (Figure 14).

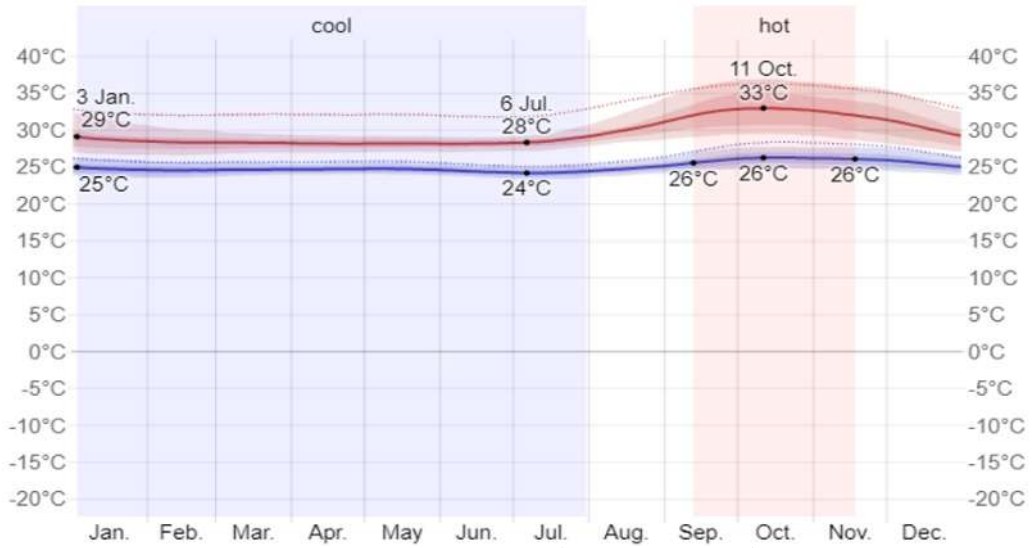
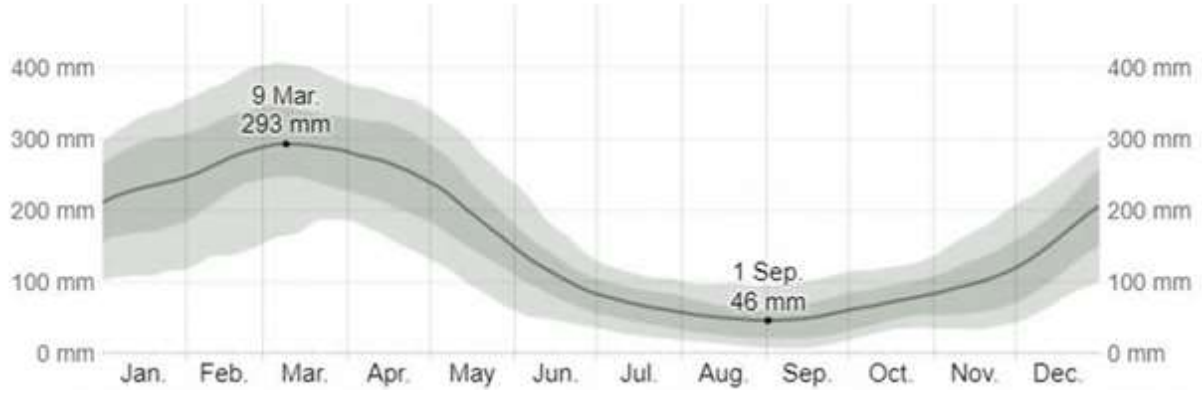


Figure 16. Average monthly temperature in Urucará and Nhamundá.

The Project Area experiences extreme variations of seasonal rainfall. The highest average monthly rainfall of 293mm/month occurring in March. Average monthly rainfall is lowest in August and September with average monthly rainfall of approximately 70mm/month during this period (Figure 15). The average rainfall in Urucará and Nhamundá municipalities is approximately 2,400 mm/year. Evapotranspiration is approximately 1,500mm/year due to the hot tropical climate.

Figure 17. Average monthly rainfall in Urucará and Nhamundá



Hydrology

The Project Area is located within the Amazon River Basin. The Amazon Basin is the largest basin on the planet and one of the least understood. Its drainage area covers more than one-third of the South American continent, and its discharge contributes to almost one-fifth of the total discharge of all the

world's rivers. The Amazon River is located approximately 40 km south of the Project Area. At a regional scale, the Project is situated between two major tributaries of the Amazon River: The Rio Negro and River Trombetas. Closer to the Project Area, the Uatumã River, located to the west, has numerous tributaries, such as Rio Jatapu, with a north-west trend. To the east are numerous south-west trending tributaries of the Nhamundá River that separate Amazonas State from Para State. Figure 16 shows the drainage systems within the Project Area and surrounding region. Due to the numerous rivers in the Amazon's lowlands, floods and rising water levels are hydrological hazards in the broader Project Area. Specifically:

Negro and River Trombetas. Closer to the Project Area, the Uatumã River, located to the west, has numerous tributaries, such as Rio Jatapu, with a north-west trend. To the east are numerous south-west trending tributaries of the Nhamundá River that separate Amazonas State from Para State. Figure 16 shows the drainage systems within the Project Area and surrounding region. Due to the numerous rivers in the Amazon's lowlands, floods and rising water levels are hydrological hazards in the broader Project Area. Specifically:

- Floods –the region cannot be economically protected against floods and the farming systems have adapted to periodic flooding. The floods generally reach their peak in June, and water levels fall to their lowest level at the end of October.
- Rising river levels - The Amazon and its tributaries begin to rise in November and by February, when most areas of Urucará are immersed from over-bank river levels.

Figure 18. Hydrographic network of the region where the Tapera project is located.

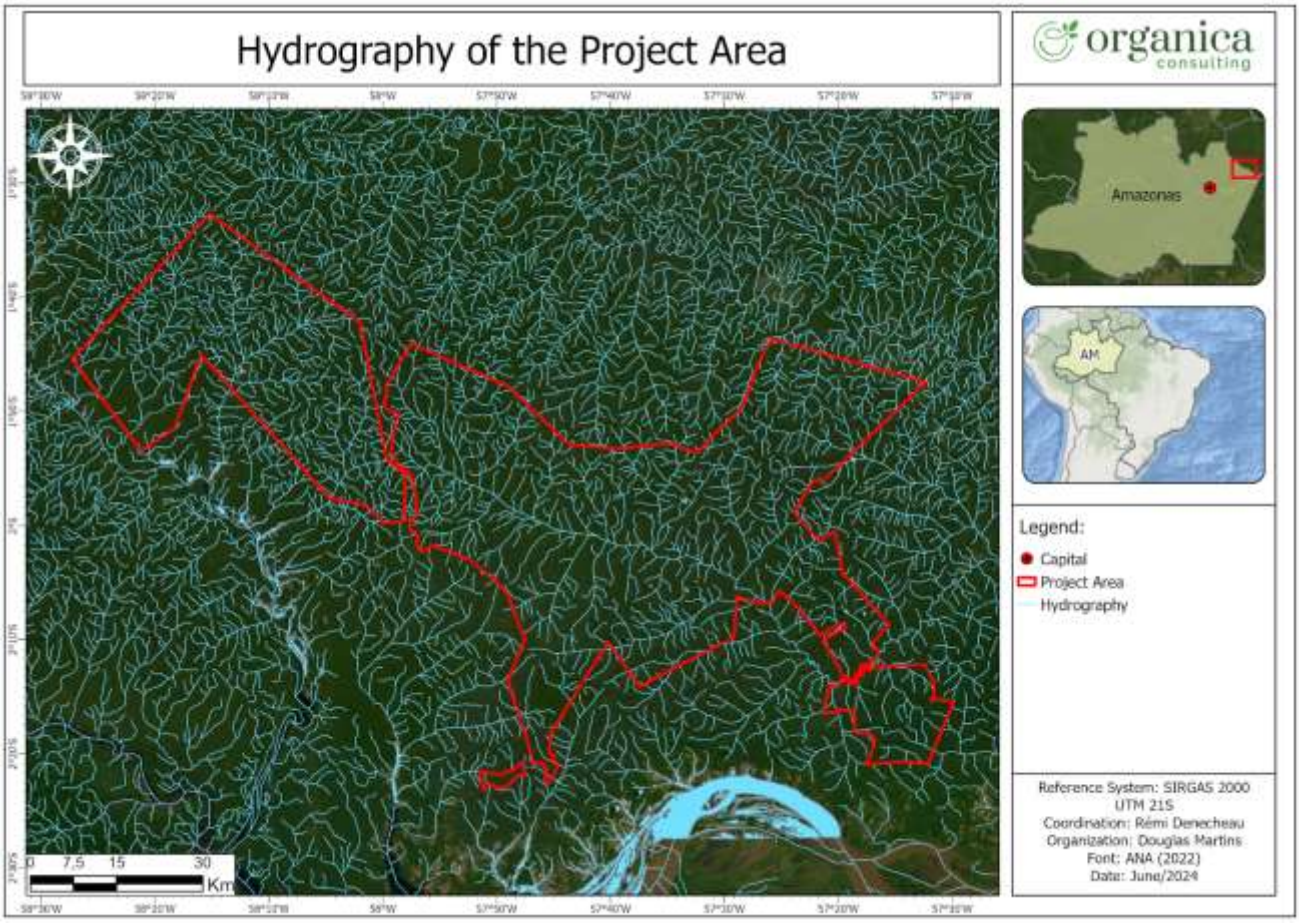


Figure 19. Location of water planning units of the region where the Tapera project is located.

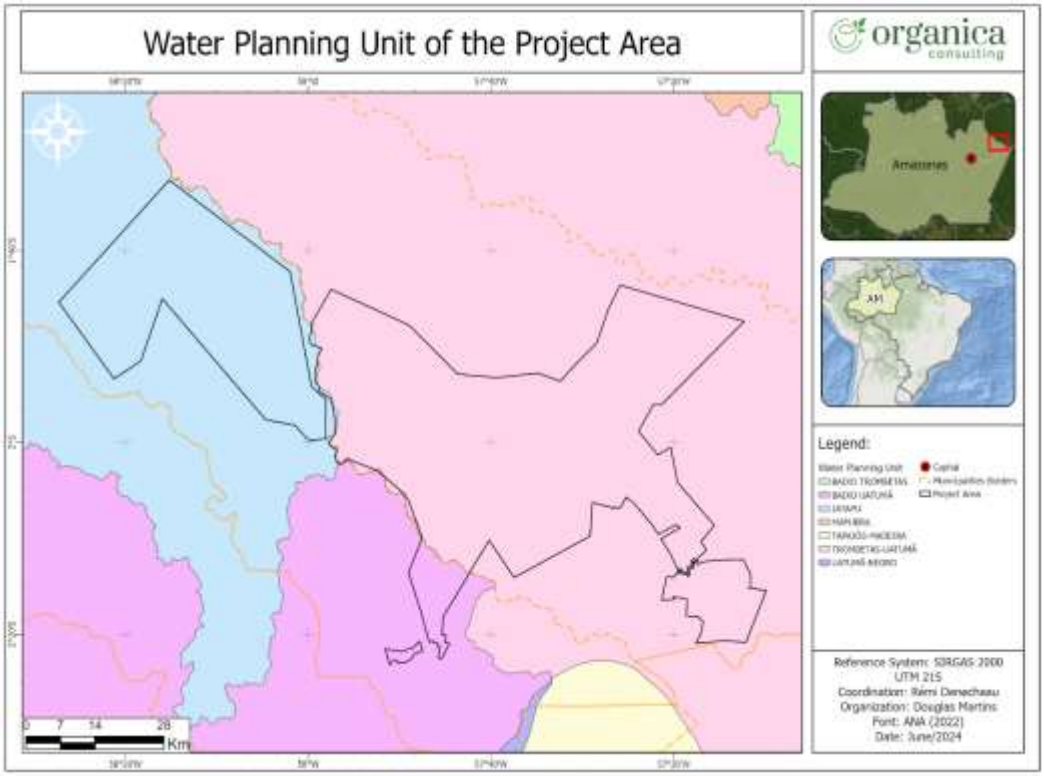
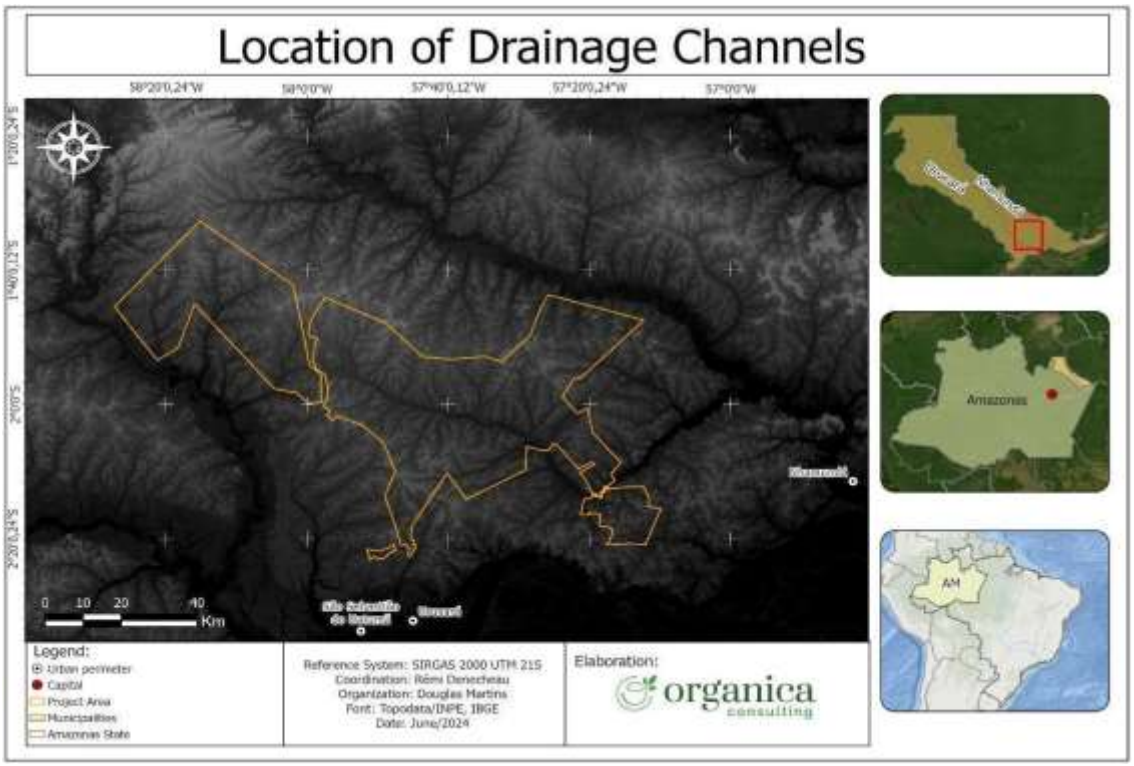


Figure 20. Terrain map of part of the Lower Amazon region immediately north of Urucará showing several NW-trending drainage channels within the Project Area (orange line)



Vegetation Types

The Tapera project area is located in the Amazon Biome, and it contains predominantly Dense and Open Ombrophylous Forests, classified, according to the Technical Manual of Brazilian Vegetation, by the following classes: (i) Lowland Dense Ombrophylous Forest (Lo) (Figure 21). The Dense Ombrophylous Forest[24] is composed of more widely spaced trees, with a low-density shrub layer and characterized sometimes by rosulate phanerophytes, sometimes by woody lianas. The Lowland Dense Ombrophylous Forest is a formation that occurs at altitudes ranging from 5 to 100m and is the most representative vegetation in the project area (100% of the total area).

Following existing littérature, we can estimate each stratum as follow:

Name of the phytofisionomy	Above Ground carbon stock	Under Ground carbon stock	Died Wood carbon stock	Litter carbon stock	Total Carbon stock
Aa	117,3	11 ,7	9,5	6,8	145,3
Da	90,5	28,1	8,5	3,6	130,7
Ds	139,3	43,2	13,1	5,6	201,1
Db	128,3	39,8	12,1	5,2	185,3

We consider Above Ground and UnderGround stocks:

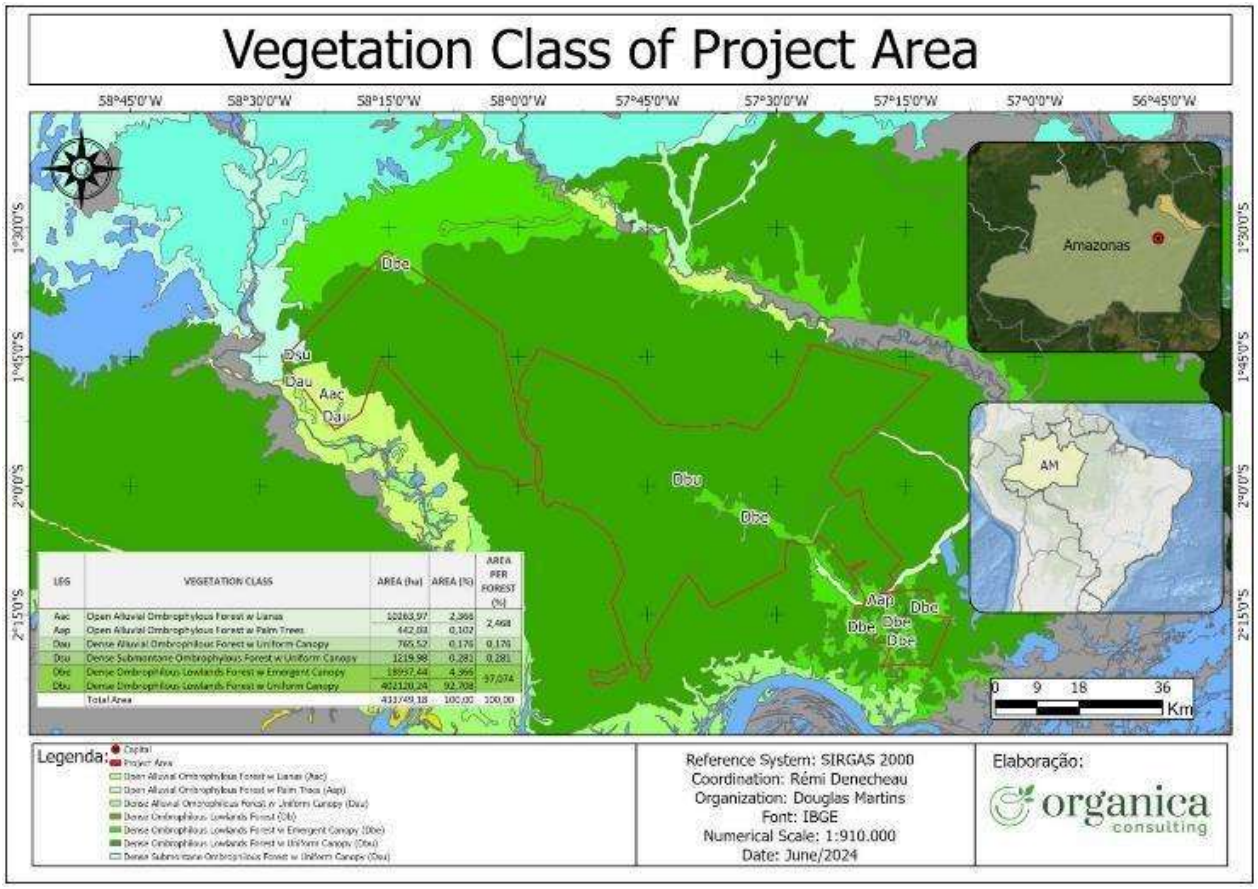
Name of the phytofisionomy	Above Ground carbon stock	Under Ground carbon stock	Total estimated Carbon stock	% per forest
Aa	117,3	11 ,7	129,0	2,47
Da	90,5	28,1	118,6	0,18
Ds	139,3	43,2	182,5	0,28
Db	128,3	39,8	168,1	97,07

The proportion of stratas Da and Ds is very small, so they are insignificant in the calculation. We consider Da (Dense Alluvial Ombrophylous Forest) as AA (Open Alluvial Ombrophylous Forest), and we consider Ds (Dense Submontane Ombrophilous Forest) as Db (Dense Ombrophylous Lowlands Forest), and consider the following strata repartitions for carbon calculation:

Name of the phytofisionomy	Above Ground carbon stock	Under Ground carbon stock	Total estimated Carbon stock	% per forest
Aa	117,3	11 ,7	129,0	2,65

Db	128,3	39,8	168,1	97,35

Figure 21. Vegetation class of the region where the Tapera project is located.



The standard size of the forest inventory of the Tapera Project is an area of 1 hectare. The inventory process serves as a foundational tool for sustainable forest management and conservation initiatives within the Tapera Project.

Figures 22.a. 22. b. Forest inventory at Piquia property.





Land use and cover

According to the Environmental Quality dimension of the IPS, In the municipalities of Urucará and Nhamundá, 38.53% and 56.62% of the total areas, respectively, are protected areas (National parks, indigenous lands and others[8]. According to MapBiomas, in 2022 the state of Amazonas had an area of 1.415.292,30 hectares burned by anthropogenic fire. Analyzing the data from other years, it can be seen that in 2022, the burned area doubled compared to the year 2021[9]. Analyzing the historical series of burned areas between the years 1985 and 2020, the state shows an upward evolution with more intense peaks in 2015, 2016 and again in 2022. Between the years 2021 and 2022, there is an increase in the growth of the burned area above the historical average.

Figure 23. Accumulated Burnt Area in the state of Amazonas[10]

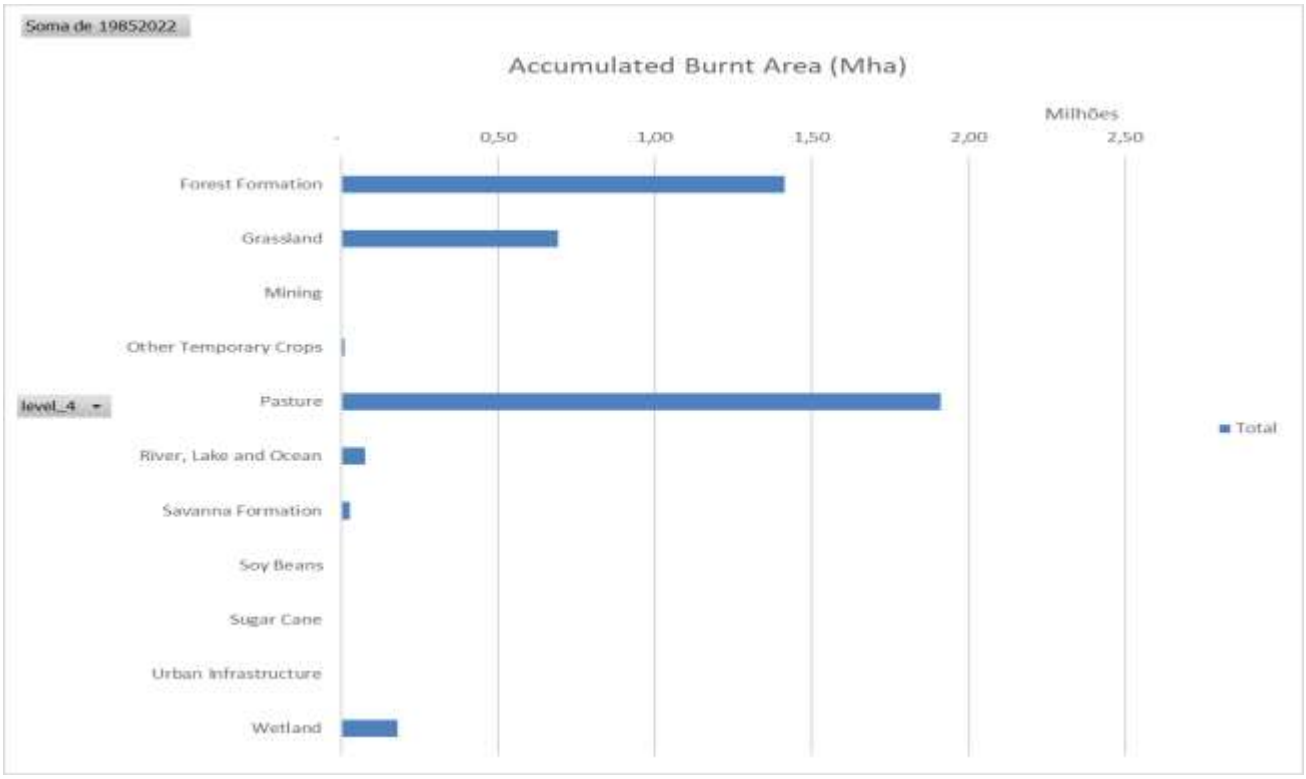
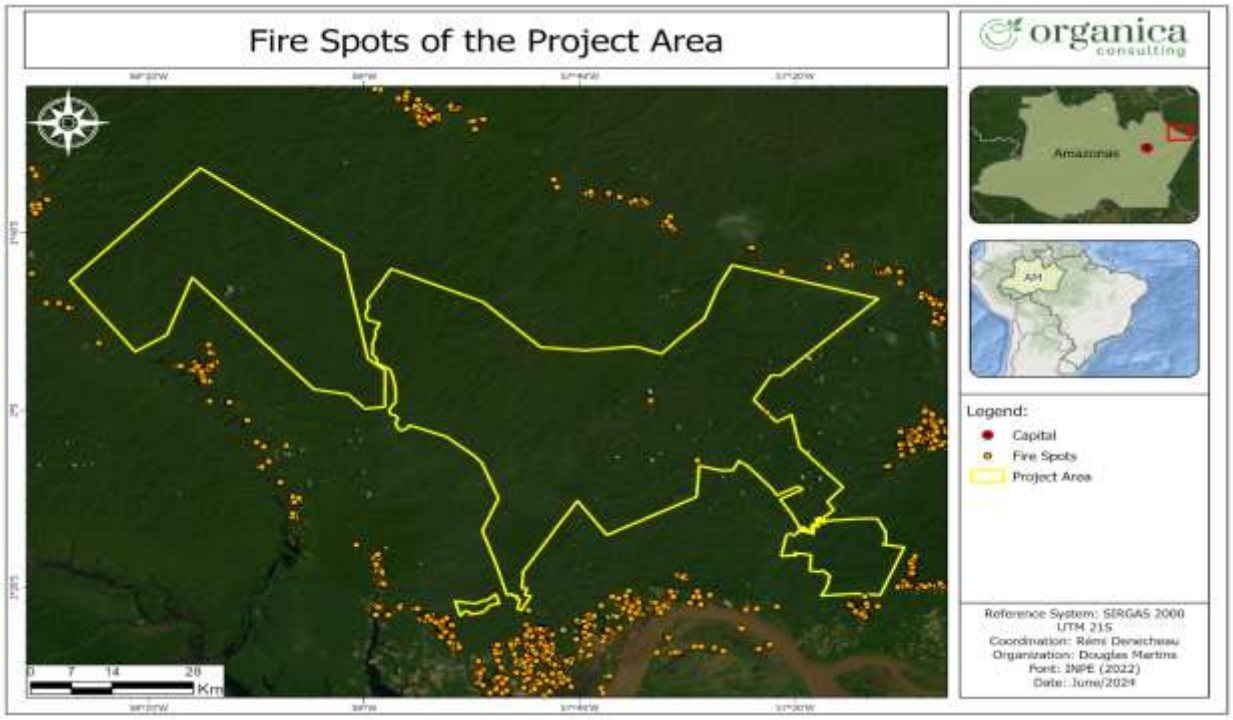


Figure 24: Fire Spots of the Project Area[11]

[8] IPS Amazonia 2023
[9] Projeto MapBiomas – Mapeamento de cicatrizes de fogo no Brasil – Coleção 1. Acessed on: 18/12/2023. Available at: https://mapbiomas.org/estatisticas
[10] Projeto MapBiomas – Mapeamento de cicatrizes de fogo no Brasil – Coleção 1. Accessed on: 18/12/2023. Available at: https://mapbiomas.org/estatisticas
[11] Available at: http://terrabrasilis.dpi.inpe.br/queimadas/portal/faq/index.html



2.1.15 Social Parameters (VCS, 3.18; CCB, G1.3)

For the analysis of secondary data regarding the municipalities of Urucará and Nhamundá, three primary indices were chosen: the 2022 Census from the Brazilian Institute of Geography and Statistics (IBGE), the Firjan Municipal Development Index (IFDM), and the Social Progress Index (IPS). These indices were selected due to their comprehensive coverage of various aspects of municipal conditions, including business, health, quality of life, and municipal management Additionally, data from official research institutions such as the Ministry of Health, the National Institute of Educational Studies and Research Anísio Teixeira (INEP), the Institute of National Artistic Heritage (IPHAN), and the National Foundation for the Indian (FUNAI) were utilized. Civil society organizations, such as the Socio-Environmental Institute, as well as two projects initiated by the Climate Observatory—MapBiomas and the System of Estimates of Emissions and Removals of Greenhouse Gases (SEG)—were also consulted to address topics not fully covered by the selected indices.

stitutions such as the Ministry of Health, the National Institute of Educational Studies and Research Anísio Teixeira (INEP), the Institute of National Artistic Heritage (IPHAN), and the National Foundation for the Indian (FUNAI) were utilized. Civil society organizations, such as the Socio-Environmental Institute, as well as two projects initiated by the Climate Observatory—MapBiomas and the System of Estimates of Emissions and Removals of Greenhouse Gases (SEG)—were also consulted to address topics not fully covered by the selected indices.

The 2022 Demographic Census, conducted by IBGE, aims to count the inhabitants of Brazil and gather detailed information on their living conditions, which is crucial for informing public policies and investment decisions. It is the primary source of data on population characteristics in municipalities, districts, neighborhoods, and localities. The Census uses face-to-face interviews and, for the first time in 2022, allowed data collection through the internet. The information collected spans various aspects of life, including work, income, education, health, poverty, housing, and more. The sample fraction for the Census was determined based on the population size of each municipality, with smaller municipalities having a larger proportion of households surveyed. The Firjan Municipal Development Index (IFDM) is another key index used, focusing on employment, income, education, and health sectors. It normalizes data on these sectors to provide a scale from 0 to 1, which ranks municipalities into categories of low, fair, moderate, or high development. The IFDM enables the tracking of municipal development over time, highlighting areas of improvement or need for attention across the various sectors. The components of each sector, taken from the IFDM 2018 publication, are shown in Table below.

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Table- Components of the IFDM Index

Employment and Income	Education	Health

Generation of formal employment	Early childhood education service	Proportion of adequate prenatal care
Labour market formalisation rate	Elementary school dropout	Deaths from ill-defined causes
Income Generation	Age/grade distortion in elementary school	Child deaths from preventable causes
Real wage bill in the formal labor market	Elementary school teachers with higher education	
	Average daily class hours in elementary school	Primary Care Sensitive Hospitalisation (ISAB)
Gini index of income inequality in formal work	Basic Education Development Index (IDEB) results in elementary education	

The Social Progress Index (IPS) was developed in response to the limitations of traditional development indicators like Gross Domestic Product (GDP) and the Human Development Index (HDI), which overly emphasize income and fail to adequately capture the social and environmental dimensions of development. The IPS measures not only economic factors but also social and environmental performance, aiming to assess a society's ability to meet the basic human needs of its citizens, improve quality of life, and create conditions for individuals to reach their full potential. The IPS is divided into three main dimensions: Basic Human Needs, Foundations for Well-Being, and Opportunities, each with key components such as nutrition, medical care, education, housing, personal security, and environmental quality. The IPS Amazônia is a subnational version of the index, specifically adapted for states and municipalities in the Amazon region, offering a comprehensive understanding of local social progress by including data from official institutions and projects like MapBiomas and SEEG, which monitor land use changes and greenhouse gas emissions.

For the community-level characterization, the Sustainable Livelihoods (MVS) methodology, supplemented by tools like Rapid Participatory Rural Diagnosis (DRP), was employed. This methodology, developed with support from the United Kingdom's Department for International Development (DFID) and CARE Brazil, is used to assess the socio-environmental impact of projects in communities reliant on environmental services, such as those offering non-wood forest products or carbon sequestration. The MVS approach emphizes participatory engagement, ensuring that communities play an active role in the process of environmental conservation and carbon credit generation. By assessing local livelihoods and their relationship to environmental conservation, the methodology provides a framework for designing projects

that align with sustainability principles and improve both ecological and community well-being. The MVS helps measure the balance between community assets and aspirations, fostering long-term, sustainable developmt through a holistic and participatory approach. The dimensions and indicators that will be used to capture and monitor the livelihoods of communities are presented in Table 10 below.

Table 10. Dimensions and indicators that comprise sustainable livelihoods.

Types of assets / dimensions	Information to be obtained for baseline description
Human Dimension	Family food security
	Use and appreciation of traditional/local ecological knowledge
	Access to new knowledge
	Satisfaction and motivation with work and life in the territory
	Occupational safety
Social Dimension	Relations with communities, partners, and institutions
	Visibility and opportunity for young people
	Participation and appreciation of women in productive activities
	Access to public policies aimed at strengthening their ways of life
Environmental Dimension (or Natural Dimension)	Access to water for human and animal consumption
	Access to land suitable for the various traditional uses and their aspirations
	Maintenance of other natural resources of the activity
	Forest conservation and use
	Wildlife conservation and use
Physical Dimension	Individual production infrastructure
	Collective production infrastructure
	Individual/family infrastructure for housing, transportation, and welfare
Financial Dimension	Income
	Product pricing and working capital, when applicable
	Commercialization

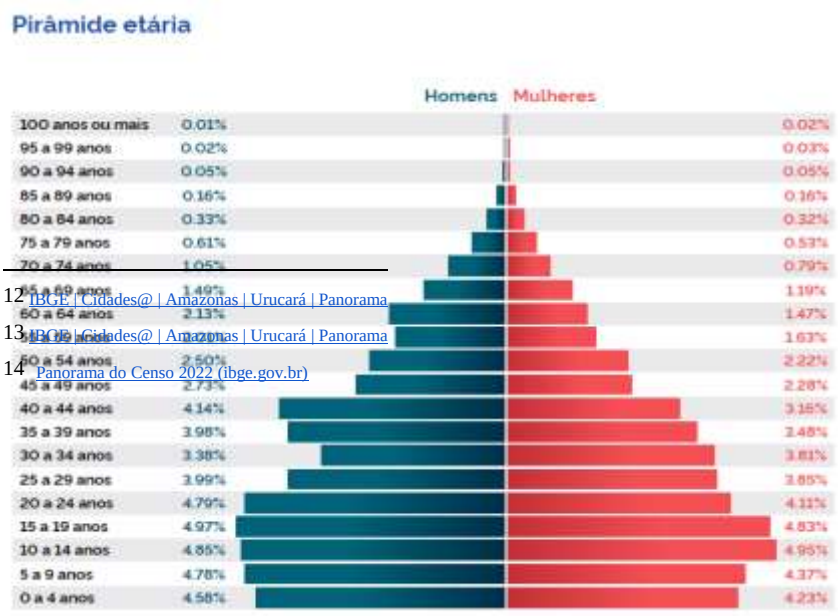
	Access to credit lines and other financial aid policies

Capturing the dimensions of community livelihoods serves as a baseline for creating indicators and subsequent monitoring throughout the project lifetime. The application of the MVS was planned in two ways in order to encompass the quali-quantitative approach in the data collection process: a) collective application in meetings with community members who were encouraged to make a justified assessment of the five dimensions (human, social, environmental/natural, physical/material and financial), obtaining records viewed by community members about their considerations on the asset base they dispose living in that territory; b) application of a formal questionnaire with the support of the Kobo Toolbox and Kobo Collect[45] applications, through which registration and general characterization and dimension-specific questions were prepared. The use of tables with selected indicators of each dimension of the MVS would help consolidate a baseline assessment in a way that will facilitate future data collection for tracking the positive and negative impacts of carbon credit projects in each territory. Some tools of Rapid Participatory Rural Diagnosis (DRP) were also used according to the need to obtain information in the contacts with the communities, aiming to complete the characterization of ways of life and consolidate the description of use of the carbon credit projects areas. The main ones used were crosswalk, seasonal calendar, maps, and sketches of areas of use and distances, and Venn diagram [8].

Population dynamics

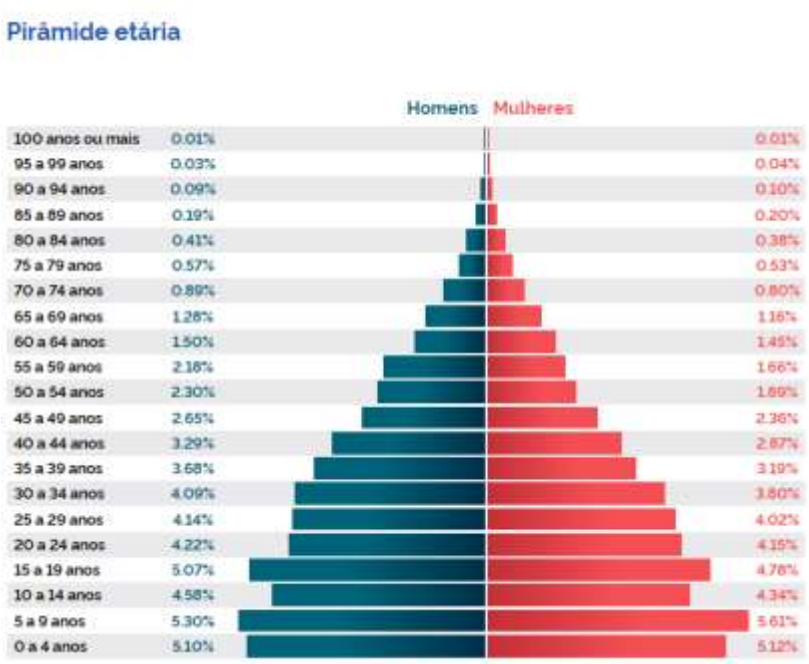
According to estimates by the Brazilian Institute of Geography and Statistics (IBGE), the population of the municipality of Urucará was 18.631 people[12] and Nhamundá was 20.136 people in the year of 2022. When considering the 2010 census, which counted 17.094 people on Urucará and 18.278, both municipalities show an upward trend in population growth[13]. The 2022 census indicated that both municipalities have a young population, with over 50% with less than 30 years of age.

Figure 25. Population Pyramid (age-sex pyramid) showing the distribution by age groups and sex of the population of Urucará [14]



12 IBGE | Cidades@ | Amazonas | Urucará | Panorama
13 IBGE | Cidades@ | Amazonas | Urucará | Panorama
14 Panorama do Censo 2022 (ibge.gov.br)

Figure 26. Population Pyramid (age-sex pyramid) showing the distribution by age groups and sex of the population of Nhamundá [15]



15 Panorama do Censo 2022 (ibge.gov.br)

Urucará has a notably young population, with the largest group ranging from 10 to 19 years old, accounting for 20% of the total population, while Nhamundá's population is even younger, with the largest group in the 0 to 9 age range. The population pyramids of both municipalities have wider bases in the younger age groups compared to the broader bases typically seen in Brazilian municipalities, indicating a high birth rate. In Urucará, the significant leap from the 20-24 to the 25-34 age group suggests limited labor market opportunities, leading to emigration among young adults. Similarly, in Nhamundá, the jump from 15-19 to 20-24 years old indicates that young adults are likely migrating to areas with more developed job markets. Regarding self-identification by color or race, both municipalities have over 80% of their populations identifying as brown ("pardo"), according to the 2010 Census. Urucará covers a total area of 27,901.962 km², with a demographic density of 0.67 inhabitants per square kilometer in 2022, ranking 47th out of 62 Amazonian municipalities. The municipality's population is 57.98% urban and 42.02% rural, which is below the Brazilian average of 84% urban population, and the population is sparsely distributed across its territory.

Figure 27. Map of the municipality of Urucará[16]



The Nhamundá municipality has a total area of 14,107.040 ha and a demographic density of 1,43 inhabitants per square kilometer for the year of 2022[17], following the same pattern of low density present in many other Amazon municipalities. Nhamundá has a higher level of rural population than Urucará, reaching 61,65%[18]. This reflects in the economic indicators that show that Nhamundá has a lower GDP per capita than Urucará.

[16] Urucará (AM) | Cidades e Estados | IBGE

[17] Nhamundá (AM) | Cidades e Estados | IBGE

[18] https://www.estadosecidades.com.br/am/nhamunda-am.html

Figure 28. Map of the municipality of Nhamundá[19]

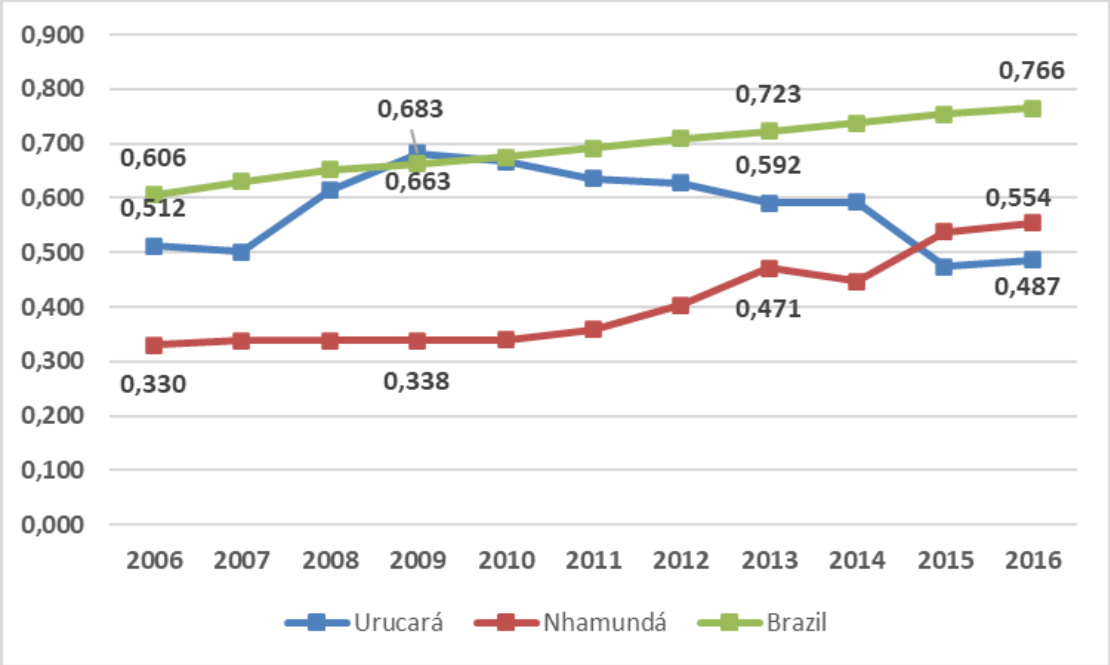


Health

In 2009, Urucará had seven health facilities under the Unified Health System, including one public hospital, with a range of services such as Basic Health Units, specialty centers, a physiotherapy clinic, and a laboratory. According to Censo 2022, Urucará's infant mortality rate is 13.84 per 1,000 live births, and hospitalizations due to diarrhea are 0.6 per 1,000 inhabitants, ranking 31st and 42nd out of 62 municipalities in the state, and 1902nd and 3103rd out of 5570 municipalities nationwide. The municipality's IFDM for Health in 2016 was 0.4865, indicating regular development and placing it 5,333rd in the national ranking. In comparison, Nhamundá has five health facilities and an infant mortality rate of 9.17 per 1,000 live births, with hospitalizations due to diarrhea at 1.6 per 1,000 inhabitants, ranking 51st and 24th in the state and 2975th and 1802nd nationally. Nhamundá's IFDM for Health in 2016 was 0.5544, also considered regular but reflecting a slightly more developed system than Urucará, with Nhamundá showing an upward trend since 2014, while Urucará's IFDM has been declining since 2009, below the national average of 0.765.

Figure 29. Historical line of the IFDM for health in the municipality of Urucará, Nhamundá and Brazil

[19] https://www.ibge.gov.br/cidades-e-estados/am/nhamunda.html



Another relevant index for analyzing the profile of Urucará and Nhamundá is the IPS 2023. In terms of nutrition and basic healthcare, Urucará had a maternal mortality rate of 75.5 deaths per 100,000 live births in 2020, while Nhamundá's rate was significantly higher at 289.02 deaths per 100,000 live births. Despite Nhamundá's higher mortality rate, both municipalities exceeded the Brazilian average of 72 deaths per 100,000 live births. In the same year, mortality due to malnutrition was 12.40 deaths per 100,000 live births in Urucará and 9.33 in Nhamundá. Urucará also had a malnutrition rate of 4.89% and 6.15 deaths per 100,000 from infections, while Nhamundá performed slightly better with a malnutrition rate of 3.89% and 4.72 deaths from infections per 100,000 inhabitants. Regarding health and well-being, Urucará had a diabetes mortality rate of 18.60 per 100,000 inhabitants, cancer mortality of 43.40, and circulatory diseases caused 99.19 deaths per 100,000 inhabitants in 2020. Nhamundá had more severe figures, with diabetes mortality at 46.64, cancer at 41.97, and circulatory diseases at 69.95 per 100,000 inhabitants. Nhamundá also faced higher rates of deaths from respiratory diseases (37.31) and suicide (32.23) compared to Urucará. These health indicators, along with the municipalities' low IFDM scores for health, reflect the inadequate infrastructure in both areas, highlighting the lack of qualified healthcare er 100,000 live births. In the same year, mortality due to malnutrition was 12.40 deaths per 100,000 live births in Urucará and 9.33 in Nhamundá. Urucará also had a malnutrition rate of 4.89% and 6.15 deaths per 100,000 from infections, while Nhamundá performed slightly better with a malnutrition rate of 3.89% and 4.72 deaths from infections per 100,000 inhabitants. Regarding health and well-being, Urucará had a diabetes mortality rate of 18.60 per 100,000 inhabitants, cancer mortality of 43.40, and circulatory diseases caused 99.19 deaths per 100,000 inhabitants in 2020. Nhamundá had more severe figures, with diabetes mortality at 46.64, cancer at 41.97, and circulatory diseases at 69.95 per 100,000

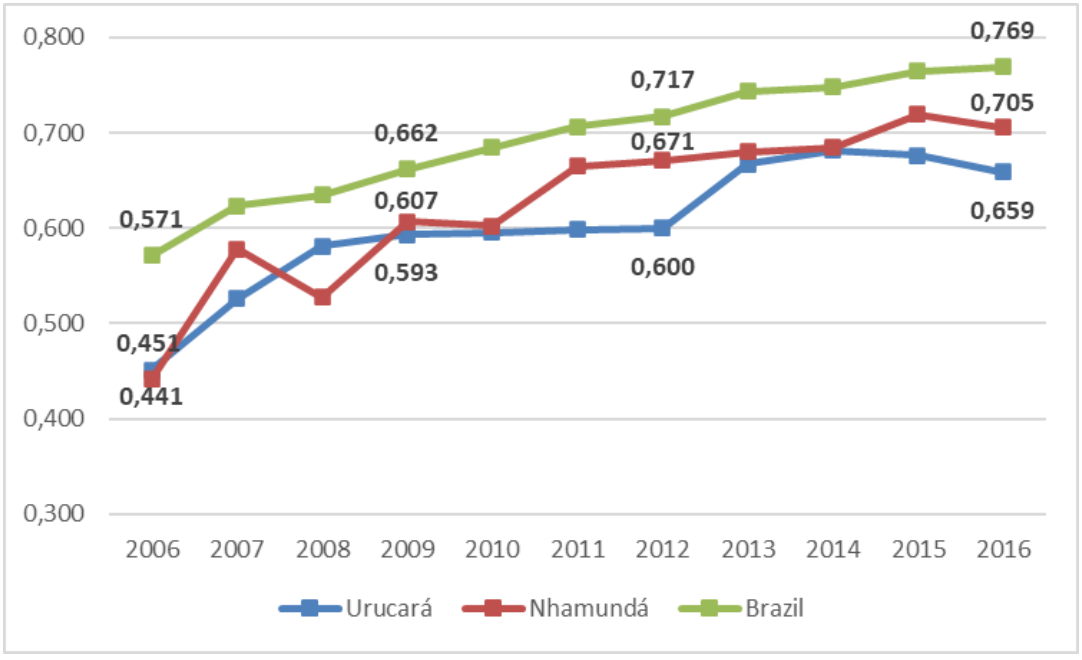
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Education

In terms of education, Urucará had a schooling rate of 94.6% for children aged 6 to 14 in 2022, ranking 8th out of 62 municipalities in the state, though it ranked 5109th out of 5570 nationwide. The municipality had 2,800 elementary school enrolments and 1,086 high school enrolments in 2021, with 35 elementary schools employing 176 teachers and 3 high schools with 62 teachers. Nhamundá, with a similar schooling rate of 94.1% in 2010, ranked 11th in the state and 5209th nationally. According to the 2022 Census, Nhamundá had 3,383 elementary school enrolments, 1,150 high school enrolments, and 56 elementary schools with 256 teachers, alongside 5 high schools employing 79 teachers. The IFDM for education in Urucará in 2016 was 0.6591, indicating moderate development, ranking 4,494th nationally, while Nhamundá's score was slightly higher at 0.705, ranking 3,953rd, though both municipalities remained below the national average in educational development. The 2023 IPS data show that Urucará performed better in terms of access to basic knowledge, with a score of 78.44, surpassing the state and regional averages. The elementary school dropout and failure rates were 0.3% and 0.5%, respectively, with 11.6% of elementary school students and 32.5% of high school students facing age-grade distortion. In comparison, Nhamundá had a lower score of 73.68 for access to basic knowledge, with higher dropout (2%) and failure rates (4.9%), and more significant age-grade distortion in both elementary (13.7%) and high school (32.1%) levels. This indicates that while both municipalities face challenges, Urucará has slightly better educational outcomes than Nhamundá.
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Figure 30. Historical series of the IFDM for education in the municipalities of Urucará, Nhamundá and Brazil

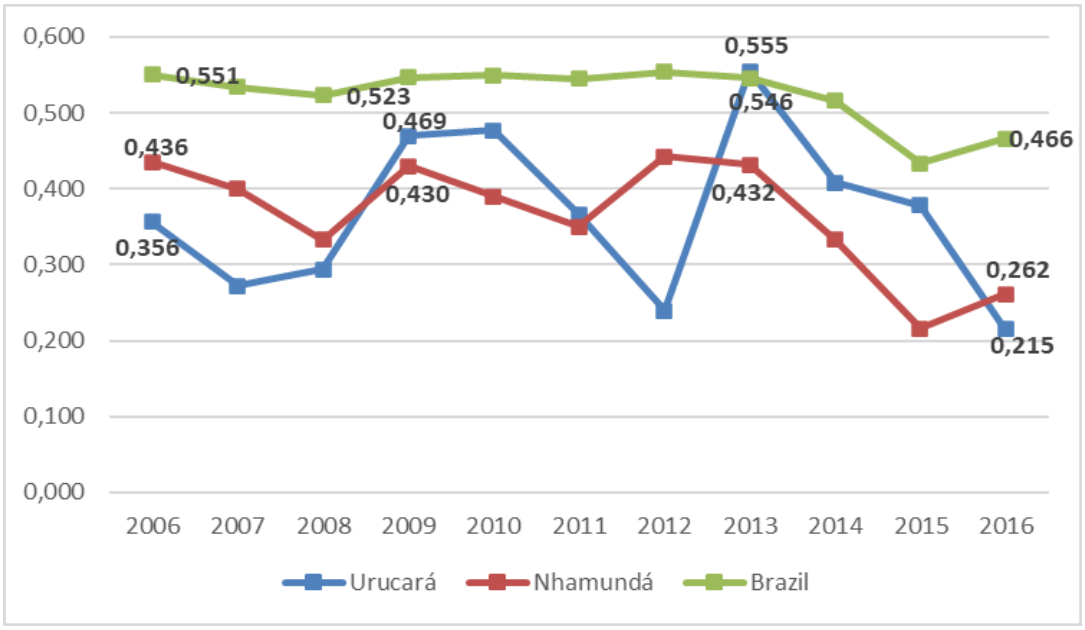


Income and public management

In 2021, Urucará had a GDP per capita of R$12,847.86, ranking 26th out of 62 municipalities in the state and 4173rd out of 5570 nationally. The municipality's external revenue percentage in 2015 was

89.3%, placing it 47th in the state and 2347th nationally. In 2017, Urucará generated R$48,232.76 (x1000) in total revenue and incurred expenses of R$39,612.24 (x1000), ranking 34th and 35th in the state and 1954th and 2140th nationally. On the other hand, Nhamundá's GDP per capita in 2021 was R$9,535.02, reflecting a lower economic strength than Urucará. It ranked 47th out of 62 municipalities in the state and 5052nd out of 5570 nationally. Nhamundá had a higher percentage of external revenue at 96.9% in 2015, ranking 10th in the state and 301st nationally. In 2017, the municipality's total revenue was R$44,772.09 (x1000), with expenses of R$38,286.61 (x1000), placing it 40th and 37th in the state and 2107th and 2213rd nationally. The average monthly salary in both Urucará and Nhamundá was 1.6 minimum wages in 2021. The employment rate in relation to the total population was 8.38% in Urucará and 5.44% in Nhamundá. From 2013 onwards, both municipalities saw a downward trend in the Employment & Income indicator, reflecting broader national economic shifts. Over 90% of the population in both municipalities works informally, with few engaged in regular, remunerated employment. According to the IPS Opportunities data for 2021, only 13.37% of jobs in Urucará and 16.9% in Nhamundá were occupied by people with higher education. Among women, these figures were 6.93% in Urucará and 8.11% in Nhamundá, showing that women fill nearly half of higher education jobs. However, despite the presence of higher education, most formal jobs in these municipalities do not require it and tend to offer lower wages, as noted by Rocha et al. (2017)

Figure 31. Historical series of the IFDM for income and public management in the municipalities of Urucará, Nhamundá and Brazil

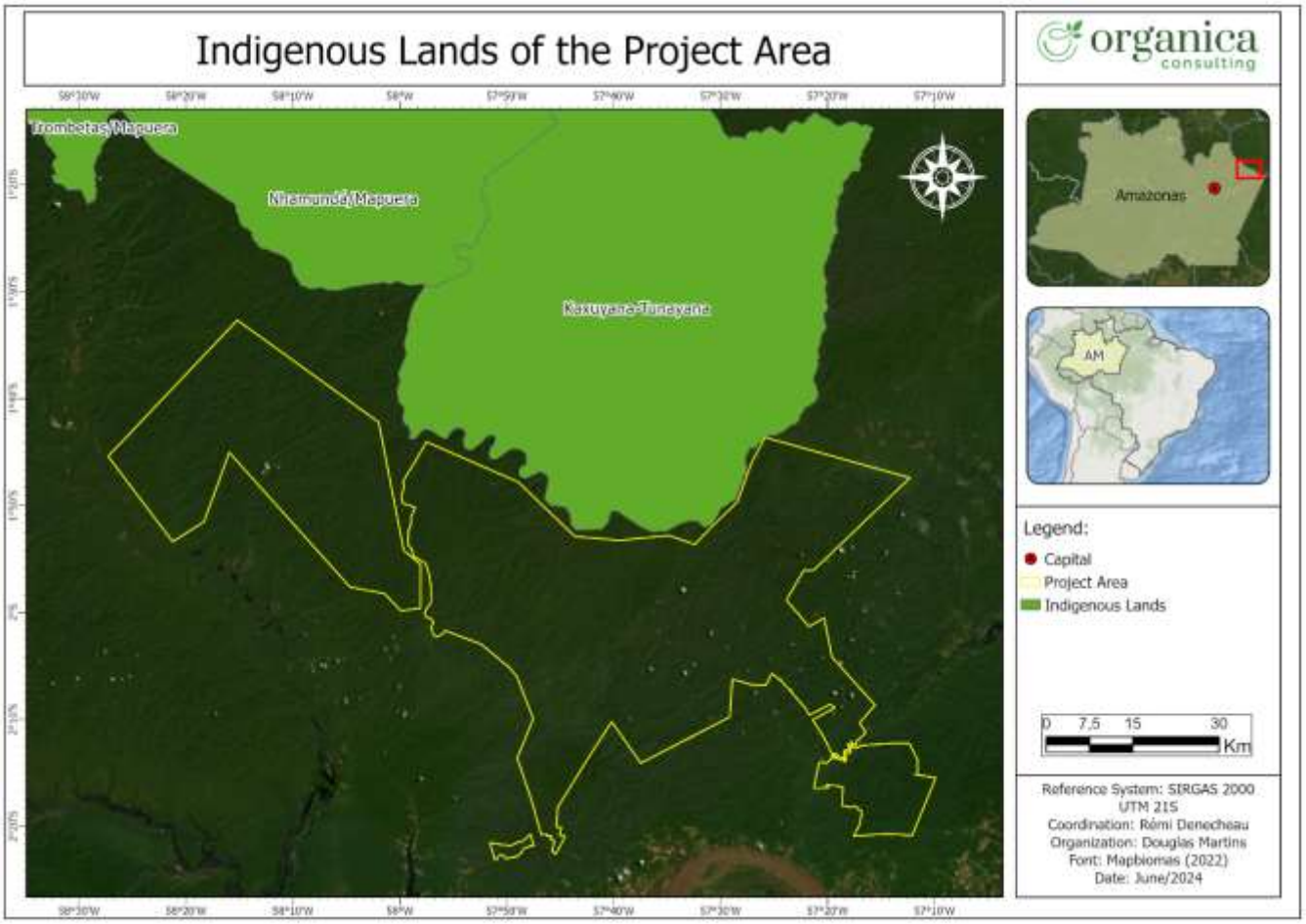


Indigenous peoples[20]

North of the project area, there are indigenous people from the Hixkaryana people. Hixkaryana is a generic name to designate several groups of similar language and culture, who currently live in the valleys of the Nhamundá (Amazonas-Pará) and middle Jatapu (Amazonas) rivers. Hixkaryana encompasses other groups that, most likely, had greater autonomy in the past, and that, even today, in local contexts, call themselves: Kamarayana, Yukwarayana, Karahawyana and Xowyana. The Hixkaryana language belongs to the Carib linguistic family and is spoken by all the group's members. This language is very similar to the other dialects spoken in the wider region bounded by the valleys of the Trombetas and Mapuera rivers, such as Waiwai, Xereu, Katuena, Karapawyana and Tunayana. Consequently, and because the Hixkaryana established very close relations with these groups in a network of matrimonial and ritual exchanges, these dialects are mutually intelligible. Today most of the Hixkaryana live by the shores of the middle Nhamundá, a river dividing the states of Amazonas and Pará. There are ten villages located on the Amazonas side and one village on the Pará side. A further two villages are situated on another river, on the Jatapu river, also in Amazonas state. There are many Hixkaryana families mixed with other groups (particularly Katuena, Waiwai and Xereu) who inhabit other localities, especially settlements along the Mapuera river in Pará state. Finally it should be noted that a few Hixkaryana families live temporarily in the cities of Nhamundá, Parintins and Manaus. The total of Hixkaryana residents on the Nhamundá and Jatapu rivers is 942 people.

Figure 32: Indigenous Lands near the Project Area

[20] Hixkaryana - Indigenous Peoples in Brazil (socioambiental.org)



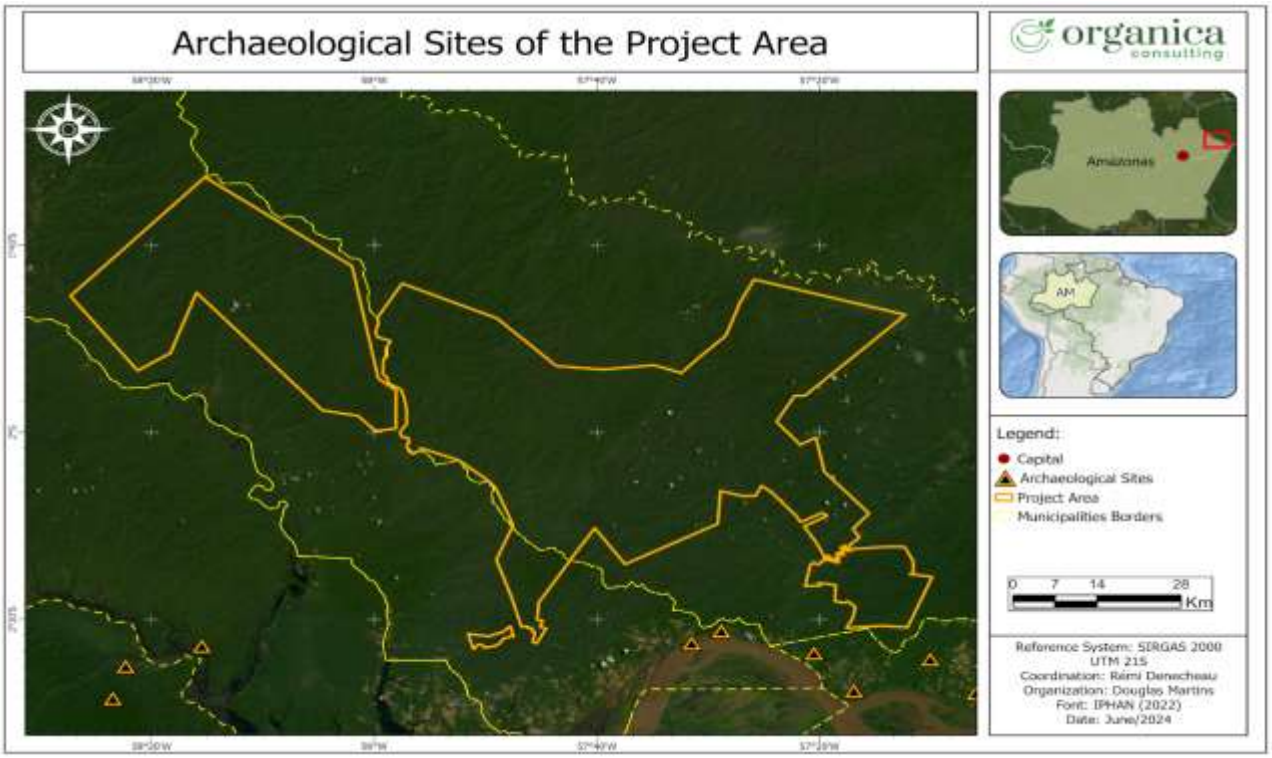
On the Nhamundá river there are residents belonging to two other indigenous groups who, despite originating from other geographic areas and speaking distinct languages, were incorporated by living alongside and/or marrying the Hixkaryana. These are the Kaxuyana and the Karara. The Kaxuyana were originally inhabitants of the Cachorro river, an affluent of the right shore of the Trombetas.

Archeological Sites

The Amazon region recently faced a historical disaster, unveiling four archaeological sites dispersed across different areas of the state of Amazonas, with three sites being previously unknown and of significant importance. In response to this revelation, the National Historical and Artistic Heritage Institute (Iphan) devised an emergency plan aimed at documenting and facilitating inspections and registrations for these cultural assets. Collaborating with various public bodies and social organizations, including the Soka Institute of Amazônia—a volunteer-driven entity dedicated to preserving local cultural and environmental heritage—Iphan orchestrated a series of inspections and educational initiatives. Notably, the third site, situated in the municipality of Urucará, approximately 260 km from the capital along the Uatumã River, features petroglyphs reminiscent of those discovered in Ponta das Lajes,

showcasing intricate engravings on stones. Categorized as pre-colonial, these sites provide valuable insights into the historical way of life of the region's past inhabitants. It is noteworthy that both the Anamã and Urucará sites remain unregistered with the CNSA (National System of Archaeological Heritage).

Figure 33. Archaeological Sites near the Project Area



2.1.16 Project Zone Map and Project Location (VCS, 3.11, 3.18; CCB, G1.4-7, G1.13, CM1.2, B1.2)

Introducing the Project Zone Map that encompasses 27 properties in the municipalities of Urucará and Nhamundá, in the state of Amazonas.

Figure 34. APD delimitations of the Tapera project.

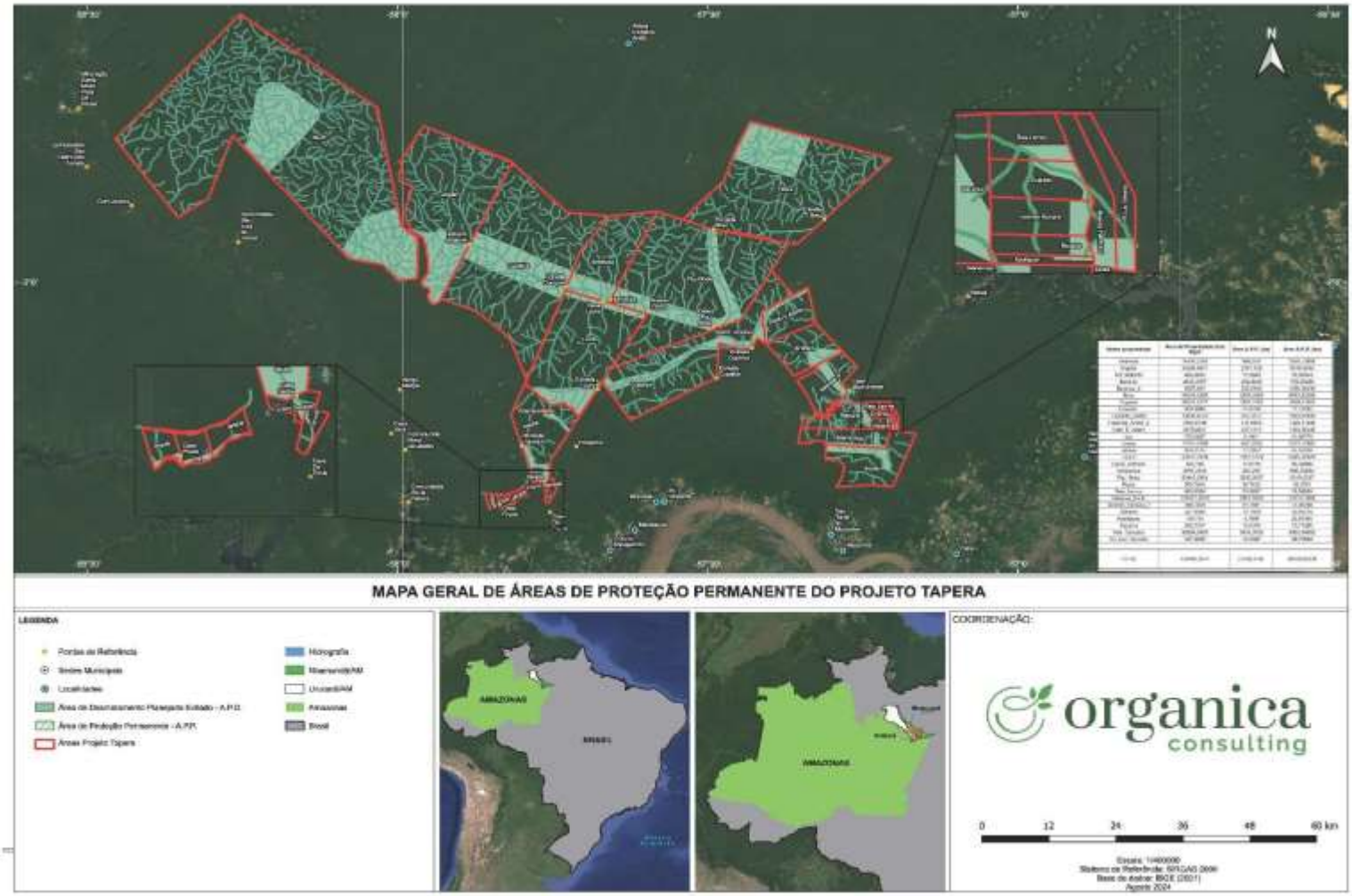


Figure 35. Tapera project zone in the Urucará and Nhamundá municipalities, Amazonas, Brazil.

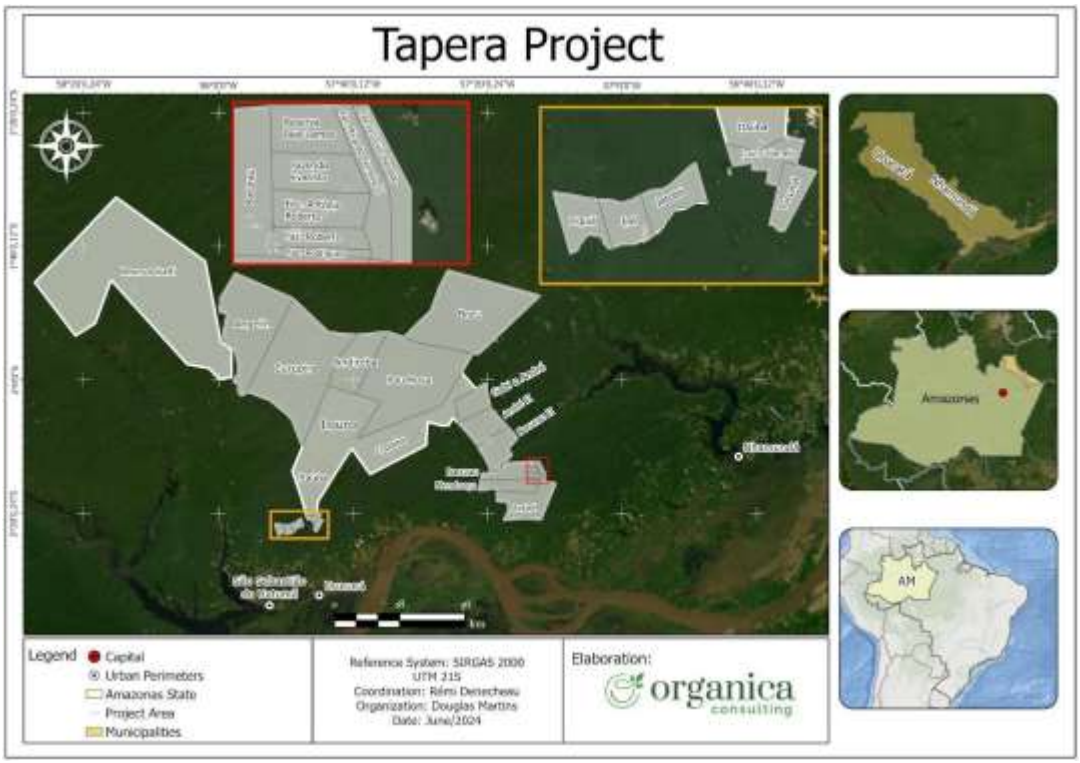
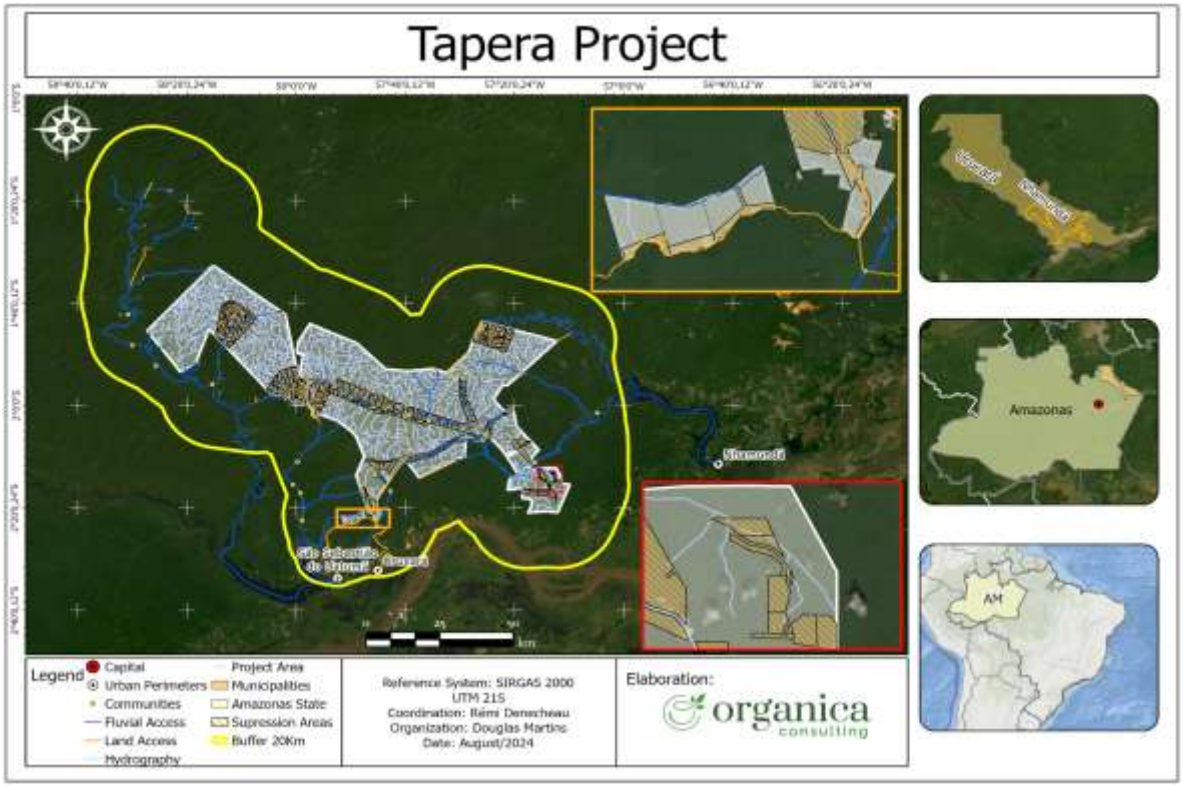


Figure 36: Location of communities south of the Tapera Project where families are distributed close to the project.



2.1.17 Project Activities and Theory of Change (VCS, 3.6; CCB, G1.8)

The main objective of the Tapera project is to promote actions aimed at reducing greenhouse gases (GHG) emissions from planned deforestation. In this way, some activities will be proposed, such as the improvement of heritage surveillance, remote monitoring of forest cover, monitoring and deepening of biodiversity studies, in addition to activities to intensify the engagement of communities with the preservation of the forest and forest resources.

Thus, to ensure positive benefits for the three main scopes: climate, community and biodiversity, the project activities were defined based on the reality and local context, always aiming at continuous improvement. The successful implementation of the project's activities guarantees the commercialization of carbon credits, which return as financial resources for the continuation of social development activities and natural resources conservation.

Maintenance of forest cover

The total area of the project is of 434.010 ha and the project will maintain 80,619 ha of forest coverage and reduction of 49.251.426 GHG emissions (tCO2e) by stopping deforestation - as shown in Table 02. The project proposes, through remote sensing, the periodic monitoring of forest cover, allowing the monitoring of changes in land use/cover, and a better understanding of the agents and vectors of deforestation in the region, as well as serving as support for the heritage surveillance team, making operations more effective and assertive. In this sense, remote monitoring of forest cover is directly related to the containmet of deforestation, conservation of natural resources and biodiversity and, consequently, the reduction of GHG emissions. In addition, the project proposes to promote the training of agents, and thus contributing to climate change adaptation and increasing communities' income.

Biodiversity conservation

By providing for the maintenance of forest cover in the project area, Tapera project also ensures the conservation and protection of the local habitats and species, thus generating expected positive net benefits to biodiversity, in a scenario with the Project.

The activities related to biodiversity for this project include the monitoring of sensitive species, that is, species that are under some degree of threat, and the performance and encouragement of scientific research in the project area, generating information and knowledge about the ecosystem dynamics. In addition, constant monitoring is planned in areas with recognized high conservation value.

Strategies for improving quality of life and technology transfer:

Based on the socioeconomic diagnosis, the result of interviews and meetings held with the participating communities, with the objective of learning about the local reality and the expectations of the target audience, the project identified the main social demands and mitigating actions capable of

promoting improvement in the local infrastructure and quality of community life. With regard to community infrastructure, the project will facilitate the transfer of social technologies, through a) acquisition and implementation of a community photovoltaic system; b) implementation of a water collection and distribution system; c) logistical alternatives to ensure the flow of non-timber forest products; d) acquisition of equipment for processing non-timber forest products; e) implementation of an internet access system.

The communities involved will also benefit from training and courses aimed at: a) strengthening the forest sub-products chain, adding value to the products and community´s management capacity; b) increase in the income of extractive families, strengthening associations; c) encouraging the training and engagement of young people and women in economic activities; d) training for sustainable forest management of nuts, tonka beans, barks, leaves, and resins. As a result, the project activity will have a positive impact by strengthening the families' autonomy, providing decent conditions for community infrastructure, and ensuring better conditions for permanence in the territory.

2.1.18 Sustainable Development Contributions (VCS, 3.17)

The Tapera Amazonas REDD+ Project aims to prevent planned deforestation (APD) in the Amazon rainforest, a critical effort to combat deforestation and preserve biodiversity in the region. The project seeks to establish a barrier against the advance of deforestation, playing a pivotal role in the conservation of Amazonian ecosystems and the regulation of the climate, particularly for Brazil and South America. By preventing deforestation and promoting sustainable forest management, the project contributes directly to national sustainable development priorities, including the Brazilian Government's commitments under the United Nations Sustainable Development Goals (SDGs) and the Nationally Determined Contribution (NDC) to the Paris Agreement.

In Brazil, the National Commission for Sustainable Development Objectives (CNODS) is tasked with overseeing the implementation of the 2030 Agenda for Sustainable Development, working alongside government representatives and civil society to ensure transparency and effective monitoring. However, there is no specific monitoring mechanism for individual projects; progress is generally tracked at the national level by the Institute of Applied Economic Research (IPEA) and the Brazilian Institute of Geography and Statistics (IBGE), which provide reports on Brazil's progress toward meeting SDG targets. The Tapera Amazonas REDD+ Project's contributions to these national priorities are defined and monitored through the specific parameters of the REDD+ framework. The project not only focuses on carbon credit generation through forest conservation but also facilitates better management of non-timber forest products, contributing to local community development through training and capacity-building programs.

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The project includes various activities that directly contribute to sustainable development, such as avoided forest conversion, sustainable forest management, and socio-economic development through the establishment of an agro-industry that processes non-timber products like fruits and oils. These activities align with several SDGs:

- **Mitigating climate change (SDG 13):** The Tapera Amazonas Project helps mitigate climate change by reducing greenhouse gas (GHG) emissions and enhancing carbon sequestration. By preserving forests that would otherwise be cleared, the project contributes to regulating the microclimate of the region, reducing local temperatures, minimizing soil reflectivity, and decreasing water evaporation from cleared lands, all of which help to combat climate change.
- **Protecting ecosystems and biodiversity (SDG 15):** Through its APD activities, the project protects and sustainably manages forest ecosystems, preventing land degradation caused by agricultural expansion. By preserving forest cover, the project halts biodiversity loss, which is critical for maintaining healthy ecosystems. This contributes to halting land degradation and preserving the biodiversity of the Amazon, in line with SDG 15.
- **Promoting sustainable economic development (SDG 8):** The project supports sustainable economic development by fostering the creation of an agro-industry focused on non-timber forest products. This will generate income for local communities and co-operatives like Agrofrut, whose members will benefit from the processing and sale of non-timber products. Additionally, the construction and operation of the agro-industry will create secondary economic benefits, such as jobs in transport, processing, and distribution. The project's focus on non-timber products offers an alternative to illegal timber harvesting, providing economic incentives for sustainable practices.

The Tapera Amazonas REDD+ Project aligns with Brazil's environmental and regulatory frameworks, particularly its commitment to reducing deforestation and preserving the Amazon as part of the country's contributions to the United Nations Framework Convention on Climate Change (UNFCCC). Through these activities, the project supports both the global effort to combat climate change and Brazil's national

policies for environmental conservation, marking it as a critical initiative for achieving both local and international sustainable development goals.

2.1.19 Implementation Schedule (CCB, G1.9)

The summary schedule of activities related to the development and implementation of the Tapera project is presented in Table below.

Table- Milestones in the project's development and implementation

Date	Milestone(s) in the project's development and implementation
2020	
23/01	Visit to IDAM and Agrofrut in Urucará to initially discuss the project idea. Given climate change impacts on the local's small producers' cultivations, an alternative for the situation felt needed. The idea of a REDD+ project in the region was welcomed and celebrated by the local farmers.
05/02	Field visits to communities that will benefit from the REDD+ project activities. Meeting with stakeholders, mapping priority demands to communities and prior presentation of the scope and activities of the project.
07/02	Visit to check the condition of access of the road and the bridge over Tapera's River. A river monitoring of the project's areas was carried out by Organica Consulting and Agrofrut.
20/02	An ATER (Technical Assistance and Rural Extension) visit and georeferencing activities of part of the road UR-04 and of Tapera group's subdivision farmers' properties were made.
18/06 to 21/06	Visits to Agrofrut as well as reforestation tests with cumaru were carried out, with the planting of 6,000 cumaru trees (Dipteryx odorata) in the project's communities.
23/10	Visit to the Agrofrut cooperative to plan the project's activities.

29/10	Signing contract between Organica Consulting, Agrofrut and landowner Dr. André Evaristo Marcondes César, to develop the REDD+ project Tapera Jungle, to start on 01/03/2021, with support from partner enterprises Nat'Organico, Ingrenium and local support from IDAM.
05/11	Hiring of collaborator Rodrigo Batalha, for topography, georeferencing and monitoring services of the areas to be included in the project.
16/12 to 21/12	Visit to communities to align their engagement in the project.
2021	
01/03	Start date of the project.
17/03 to 18/03	Field visit to communities engaged in the project and public stakeholder consultation.
17/03 to 20/03	Visit to Agrofrut, to monitor the installation of equipment for the sub- products project.
22/03	Visit to Agrofrut by Organica Consulting, for training on multipliers for implementing the REDD+ project, and meeting with the mayor and municipal secretaries.
25/03	Visit from Organica to monitor the construction of the warehouse for the project's future partner company, Urupolpas.
17/07 to 19/07	Georeferencing of the Tapera group subdivision, restoration of an access bridge and start of road cleanings.
22/07 to 24/07	Continuation of activities of demarcation of lots in the Tapera group in order to protect them from possible invaders who extract timber illegally.

12/08	A new visit by Organica to monitor the project of sub-products and to discuss the activities of the Tapera project. A visit to monitor the cumaru plantation project was also made.
31/08	A cooperation agreement between Agrofrut, Nat'Organico and Ingrenium was signed, for the acquisition of invaded and exposed areas. Land regularization work was initiated, together with the municipality of Urucara and the government of the state of Amazonas, so that definitive titles for new lands could be issued and registrations made with SIGEF.
19/10 to 22/10	A visit to Agrofrut took place. Support for developing new products from forest by-products was discussed and various pieces of equipment were purchased and built.
14/10 to 15/10	Meeting with political authorities to discuss the objectives and social impacts of the project to the region.
20/11	Organica Consulting visited Agrofrut to monitor the construction of a warehouse to support the by-products project, part of the REDD+ Tapera project.
23/11 to 25/11	Visit and inspection of cooperative members of Agrofrut included in the certification project of organic guarana production. Visit made to the unit of guaraná processing, to verify the application of good production practices.
07/12	Visit to follow up and monitor project's activities.
2022	
05/01	Opening of the company Urupolpas, to collaborate in the management of the Tapera project's activities.
13/01	Field visit to the project's communities and monitoring of the project's activities, in partnership with IDAM, which provides a 4x4 car for inspections of the Tapera areas, allowing regular visits to properties in the region where the project is located
07/05	Communities visit and monitor activities in the project's areas.

30/05 to 03/06	Inventory activities.
13/09	Support to the Urupolpas team to resolve a conflict situation, as part of their area was being invaded.
06/12 to 14/12	Construction of a support house in the Piquiá area, access bridges and more inventory activities.
2023	
09/01 to 13/01	Visit to the communities, inventory and topography activities.
07/02	Hiring of collaborator Odielio Santos de Nascimento by Urupolpas, to carry out monitoring activities on plots, visits to communities, to manage construction and improvement of access roads, and identify and find solutions to existing conflicts.
08/02 to 14/02	Support with transport logistics for the Agrofrut cooperative team and 2 IBD Inspectors, with inspection visits in the areas of guarana from cooperative members, to verify on-site compliance with organic production specifications.
14/04 to 20/04	Visit to the communities, more inventory and topography activities, construction of one more support house in the Jatobá instance.
30/05 to 04/06	Visits to communities, carrying out road cleaning activities, building of access bridges and monitoring of the region.
08/08 to 26/08	Visit to the communities. An inventory in the Jatobá instance took place, as well as topography and surveillance activities.
27/11 to 04/12	Field visit to the communities, meeting with stakeholders and planning of the project's activities.

06/12 to 12/12	Monitoring and inventory activities.

2.1.20 Risks to the Project (CCB, G1.10)

Table- Potential risks to the benefits of climate, community and biodiversity and their mitigation measures.

Risk	**Potential impact of risk on climate, community and/or biodiversity benefits**	**Actions needed and designed to mitigate the risk**
Lack of engagement of the communities involved in the project activities.	Loss of forest cover and degradation of biodiversity in the project area.	Use of participatory methods, ensuring that people are included in decision-making processes.
Illegal deforestation in the project area caused by an external agent.	Deforestation within the project area.	Ground patrols and remote sensing monitoring of the project area to identify illegal deforestation as quickly as possible and act.

2.1.21 Benefit Permanence (CCB, G1.11)

In order to maintain and enhance the climatic, social and biodiversity benefits in the scenario with the project, a set of actions organized in basic social and environmental programs will be carried out. Orgânica Consulting and its investors have the necessary financial resources to maintain the project activities until the first verification. After that, the project's resources will come from the revenues obtained from the sale of carbon credits.

Climate- The project activities focused on climate benefits aim to decrease deforestation and, consequently, GHG emissions. To this end, systematic monitoring will be implemented in the project area, including river and land patrols as well as satellite surveillance with up-to-date images of the project area. As an exceptional benefit, the maintenance of forest cover protects the watershed network of the project area and contributes to water regulation in the watershed of the project area.

Communities-The residents of the communities included in the project will be protagonists in the process of defining the actions developed. Socio-environmental programs will be developed to reduce the impacts caused by climate change, enabling the improvement of the quality of life of the community. Structured actions will be implemented to provide water security, basic sanitation, electricity, internet access, and

professional training. Continuous communication and consultation will be maintained throughout the life of the project to ensure that the activities are causing the expected positive impacts.

Biodiversity- To support biodiversity conservation, a fauna diagnosis and forest inventory will be conducted. Threatened species will be monitored through specific programs. Permanent plots and fauna surveys will track vegetation and biodiversity changes over time, providing long-term scientific data. Community activities such as environmental education, economic development, and training in sustainable resource management will raise awareness and build local capacity. These efforts will support deforestation prevention and ensure lasting benefits for biodiversity, climate, and local communities beyond the project's lifetime.

2.1.22 Financial Sustainability (CCB, G1.12)

Financing of the project activities is guaranteed by funds from the project proponents from the start date until the first verification. Thereafter, revenues from GHG emissions reductions will be used to implement programs that will leverage the project's climate, community, and biodiversity benefits. Evidence of the proponents' funds will be made available to the validation and verification body. The Paratucu River, one of the main rivers in the area of the project, is known for its suitability for commercial navigation. This presents a significant environmental challenge for the surrounding regions. In a scenario without the intervention of the Tapera REDD+ Avoided Planned Deforestation project, the areas adjacent to the river would likely face considerable ecological threats. The ease of navigation on the Paratucu River could lead to increased accessibility, making these areas more vulnerable to logging activities and subsequent conversion to pasture lands. Such developments would not only result in substantial deforestation but also disrupt the delicate ecological balance, impacting biodiversity and the local climate. The Tapera REDD+ project, therefore, plays a critical role in this context. By preventing planned deforestation and promoting sustainable land use, the project is essential for maintaining the integrity of the forests along the Paratucu River. Its efforts are crucial in safeguarding these natural areas from the adverse effects of commercial exploitation, ensuring the preservation of the region's ecological health and its valuable natural resources.

2.2 Without-project Land Use Scenario and Additionality

2.2.1 Conditions Prior to Project Initiation and Land Use Scenarios without the Project (VCS, 3.13; CCB, G2.1)

SCENARIO 1: Maintenance of the forest cover of 20% of the property, where land use conversion is allowed by law: it is the maintenance of the area as it is, without any activities and conservation measures, but still being responsible for the costs of the necessary taxes to maintain ownership of the land. Although no economic activity is carried out in the pre-project scenario, the area is exposed to invasions and illegal deforestation, antecedents to livestock, a common practice in the region.

SCENARIO 2: Legal deforestation of 20% of the property (deforestation with allowances), where land use conversion is allowed by law i.e.: forest suppression for pasture (livestock).

SCENARIO 3: Illegal deforestation of over 20% of the property (deforestation without a grant), where the conversion of land use is permitted by law, that is: forest suppression for pasture (livestock) and agricultural purposes or simply for real estate speculation.

The analysis regarding deforestation agents and the probable land use scenarios in the absence of the project were carried out using the baseline scenario as a basis. Considering that the baseline scenario is similar to the conditions existing before the start of the project, this analysis is presented and detailed in section 3.1.4 - Baseline Scenario.

2.2.2 Most-Likely Scenario Justification (CCB, G2.1)

The most likely scenario observed in the Tapera project is the conversion of land use and land cover from forest to livestock areas, legally (APD). Legal deforestation of 20% of the property (deforestation allowed by the Brazilian legislation) is considered the most plausible baseline scenario because the land is expected to be converted to non-forest land and the conversion is legally authorized and documented, following VM0007 v1.7. Furthermore, the identified deforestation agent has a history of agricultural activity on other lands owned by him for economic purposes, which makes “SCENARIO 2” realistic and credible.
tural activity on other lands owned by him for economic purposes, which makes “SCENARIO 2” realistic and credible.

2.2.3 Community and Biodiversity Additionality (CCB, G2.2)

The Tapera project aims to conserve the native Amazon Forest in an area under pressure from deforestation due to land conversion for extractive activities, timber production, and cattle ranching. In the absence of the project, deforestation and environmental degradation would likely occur, but with the project in place, essential resources will be allocated for the conservation and protection of the area, ensuring numerous benefits for both the community and biodiversity. The project will improve the quality of life for local communities by implementing strategies such as photovoltaic systems, water capture and distribution, dry pit toilets, internet access, and improvements to education, health, and infrastructure. It will also provide training and capacity-building initiatives aimed at diversifying the local economy, adding value to products, creating job opportunities, and increasing family incomes, with a focus on vulnerable groups. For biodiversity, the project will protect vegetation, ensure the gene flow of species, and maintain ecosystem services, promoting the conservation of local fauna and flora. Additionally, it will facilitate scientific research and environmental monitoring, enhancing knowledge of the area's biodiversity.

Ultimately, by preserving the forest, the project supports the livelihoods and economic activities of traditional communities, strengthening their sustainable practices and reducing the risk of deforestation.

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

The Tapera project does not intend to use any benefits to communities or biodiversity as offsets.

2.3 Safeguards and Stakeholder Engagement

2.3.1 Stakeholder Identification (VCS, 3.18, 3.19; CCB G1.5)

The stakeholder identification process for the Tapera Project involved a two-phase approach.

Phase 1: Remote Activities This phase focused on gathering preliminary information. The team conducted bibliographic reviews, internet searches, and consulted with the landowner and local intermediaries. These efforts helped compile a list of 45 potential stakeholders from various sectors, including conservation, agriculture, and non-timber forest product management, in the municipalities of Urucará-A, Nhamundá-AM, Parintins-AM, and São Sebastião do Uatuma-AM. Satellite images were also utilized to assess structures and identify nearby residents.

Phase 2: On-site Field Visit The second phase included direct engagement with the communities. It started with an opening meeting on December 16, 2020, at the Agrofrut Cooperative in Urucará, followed by six days of visits to several communities such as Santa Helena, Nova Jerusalém, and Jabote. The field team met with community leaders, conducted socioeconomic assessments, and identified additional key stakeholders. During the visits, the team addressed local challeges like water access, electricity, and infrastructure, while gathering input from the community.

nfrastructure, while gathering input from the community.

The process concluded with a synthesis meeting to discuss the social, economic, and environmental context of the communities and the potential impacts of the project. The team also engaged with 30 riverine families, conducting individual interviews to ensure stakeholders could express their views independently. Ultimately, 98 individuals expressed support for the project.

This thorough identification process helped establish strong relationships, gain a deep understanding of local needs, and secure community buy-in for the Tapera Project.

2.3.2 Stakeholder Descriptions (VCS, 3.18, 3.19; CCB, G1.6, G1.13)

Based on current data, stakeholders were grouped into the following classes: project proponent, landowners, public authorities, communities and third sector. The description of the stakeholders

according to their right, interest and relevance in participating in the project is summarized in Appendix 1: Stakeholder Identification Table.

2.3.3 Stakeholder Access to Project Documents (VCS, 3.18, 3.19; CCB, G3.1)

The Tapera Project aims to establish a private carbon credit initiative with significant socio-environmental benefits, focusing on forest conservation and improving the living conditions of local populations. The project is committed to an accreditation process that includes careful monitoring and reporting of its impacts, ensuring transparency and accountability. Central to its success is a robust communication strategy that involves educating and training local stakeholders throughout the project's phases. This approach will foster community ownership, shifting the focus from deforestation to sustainable alternatives linked to carbon credits.

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Effective communication will be key to ensuring that all stakeholders, including local communities, government, and the market, are well-informed and engaged. The project will utilize clear and accessible language, providing information through meetings, printed reports, and online platforms like VERRA and Orgânica Consulting. To maximize impact, communication channels will be tailored to local needs and infrastructure, recognizing cultural nuances and education levels. The project will prioritize direct, frequent communication with specific community segments, facilitating understanding of forest conservation, biodiversity, and carbon credit generation while respecting local perspectives and fostering a collaborative approach to sustainability.

2.3.4 Dissemination of Summary Project Documents (VCS, 3.18, 3.19; CCB, G3.1)

The project description information will be presented to the communities involved in the form of meetings after the audits performed in the project area in order to disseminate the monitoring results and actively disseminate the information in the communities in a participatory manner. Summary information of the monitoring results will be available on the Verra and Orgânica Consulting.

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2.3.5 Informational Meetings with Stakeholders (VCS, 3.18, 3.19; CCB, G3.1)

As mentioned in section 2.3.1 (Identification of Stakeholders) spanning three communities in Urucará — Marajazinho, Boa Esperança, and São João—comprising a total of 168 residents, the field team embarked on several journeys between 2019 and 2023 to engage with the local population. This included discussions with groups living along the Tapera River, consisting of 20 extractivists, as well as a distinct group of 10 property owners residing along the Urucará to São Sebastião road. Additionally, the project encompasses Nova Jerusalém, a community along the Maripá River, with 17 families (84 inhabitants), and one community in Nhamundá — Apeua— along the Paratucu River, totaling 310 people.

Applying an approach tailored for traditional extractivists, the team conveyed the project's goals, objectives, and the anticipated benefits to the region in easily understandable language. The engagement activities involved individual interviews with riverside families and a dedicated meeting with a community group. Given the geographical challenges and transportation difficulties faced by the families, individual public consultations were conducted instead of collective ones. This decision also took into account the safety of the interviewees, ensuring that ideas could be expressed without the influence of leaders with financial sway over the community. Following each conversation, families were asked for their support, and all 30 interviewed people expressed their approval, which was duly documented through signed statements. Meetings with Agrofrut guaraná producers were held at the cooperative, known for guaraná influences within the communities of Marajazinho, Boa Esperança and São João. All producers approved the project. Following thorough clarification of demands, unanimous acceptance of the project was achieved, marking the completion of the Free, Prior, and Informed Consultation, with due respect to the rights of all participants.

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2.3.6 Risk from the Project and No Net Harm (VCS, 3.18, 3.19)

There are no likely natural and human-induced risks resulting from project activities during the project lifetime and outline measures needed and designed to mitigate these risks, including risks to stakeholder participation, working conditions, safety of women and girls, and safety of minority and marginalized groups including children.

2.3.7 Community Costs, Risks, and Benefits (CCB, G3.2)

During meetings held with riverside communities and extractivists in the project region, information on costs, risks and benefits was collected, making use of the methodologies of the Rapid Participatory Diagnosis. The diagnosis aimed to analyze the level of understanding and the current situation in which they find themselves in order to better understand the implementation process of this project. During the meetings, the concepts of costs, risks and benefits were transmitted to the community, which was encouraged to raise the possible impacts generated by the implementation of the carbon credit project. The consultation was carried out by specialist professionals, who communicated in a way that everyone present could understand. Thus, from the participatory dialogue, the technical staff and the community listed the following issues:

Costs:

- Negotiate and recognize the land borders of possessions and properties.
- Have free time to participate in formal and informal meetings, giving up the application in productive, spiritual or leisure time.

Risks:

- Be threatened by invaders (external agents), when they take a position to protect the project's forest fragments.
- Suffer internal reprisals by leaders opposed to the project due to the interest in developing their livestock activity.

Benefits:

- Improvement of home infrastructure with the implementation of a family photovoltaic system, systems for capturing and distributing treated water, bathrooms with dry pits and internet access.
- Improvement of educational, productive and health infrastructure.
- Financial resource from the Forest Guardians Program.
- New learning that adds value to the products sold and generates new income alternatives, providing more job opportunities and improving families' incomes.
- Strengthening of associations and community management capacity.
- Strengthening the inclusion of socially vulnerable groups in productive activities.

During the community consultations, information about the benefits of the project was provided to community members. No financial costs will be passed on to the communities, as all project activities will be borne by the project proponents. Activities are planned to improve quality of life and have a positive impact. Furthermore, the project will not bring direct or indirect risks to the communities.

An annual monitoring plan will be implemented to quantify and document changes in social and economic well-being resulting from project activities.

2.3.8 Information to Stakeholders on Validation and Verification Process (VCS, 3.18.6, 3.19; CCB, G3.3)

To inform stakeholders about the validation and verification process, meetings were held with communities to present the project, with the application of questionnaires with directed questions that result in indicators to assess the impact of the project on people's quality of life. The participants were informed about the entire process of origination of carbon credits, validation and registration, while it was pointed out that an external auditor (validation and verification body) will visit the project area, interact with stakeholders, evaluate project information and activities, and issue evaluation reports.

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Annual communication campaigns are the most explicit way to share content comprehensively and are able to mobilize both internal and external audiences on a large scale and will be carried out before the new verifications. Other institutional stakeholders were communicated about the project by email, where informative material about it was made available.

2.3.9 Site Visit Information and Opportunities to Communicate with Auditor (VCS, 3.18.6; CCB, G3.3)

The date of the auditor's site visit will be communicated in advance to allow stakeholders to plan ahead and be available during the project site visit. Open access by communities and institutional stakeholders to the validation and verification body auditor will be provided.

The proponent will be responsible for all necessary expenses with transportation, food and accommodation to ensure compliance with the audit plan.

2.3.10 Stakeholder Consultations (VCS, 3.18; CCB, G3.4)

The Tapera Amazonas REDD+ Project engaged with multiple communities between 2020 and 2023, focusing on three communities in Urucará (Marajazinho, Boa Esperança, and São João), totaling 168 residents. The field team also reached out to 20 extractivists along the Tapera River, 10 property owners along the Urucará to São Sebastião road, and 84 residents of Nova Jerusalém. Additional outreach occurred in the Apeua community in Nhamundá (310 people) and Jabote in Urucará (400 people). The team prioritized individual interviews and public consultations, particularly with traditional extractivists, to ensure unbiased support. All 98 interviewed individuals expressed unanimous approval, documented through signed statements. Meetings with influential Agrofrut guaraná producers also resulted in full endorsement. The Free, Prior, and Informed Consultation process concluded with unanimous acceptance, and the project proponent maintains a website for ongoing communication and updates. More details are provided in the table below.

Date of stakeholder consultation	*Stakeholder consultation meetings were conducted in phases at various locations between 2020 and 2023.*

S.No.	*Location (District)*	*Date*	*GPS coordinates*
1.	*Sede do IDAM e Agrofrut Urucará Amazonas*	*23-01-2020*	*"2°53'70""S 57°75'01""W"*
2.	*Cooperativa Agrofrutíferas dos Produtores de Urucará*	*24-01-2020*	*2°32'10"S 57°45'35"W*
3.	*Câmara Municipal de Urucará*	*25-01-2020*	*"2°32'10""S 57°45'35""W"*
4.	*Nova Jerusalem*	*27-01-2020*	*21M 3901559747365*
5.	*Marajazinho*	*28-01-2020*	*2°27''19"S 57°39''23"W*
6.	*Boa esperança*	*29-01-2020*	*2°28''12'S 57°45''22"W*
7.	*Sao Joao*	*29-01-2020*	*2°28''55'S 57°43''38"W*
8.	*Grupo tapera*	*30-01-2020*	*2°19'03"S 57°43'23"W*
9.	*Jabote*	*01-02-2020*	*2°31''48"S 57°45''21"W*
10.	*Apeua*	*03-02-2020*	*2°01'21"S 57°04'56"W*
11.	*Unidade de Beneficiamento de Guaraná Urucará - AGROFRUT, e Colônia Agrícola São João*	*05-02-2020*	*2°32'23"S 57°44'27"W*

12	Unidade de Beneficiamento de Guaraná Urucará - AGROFRUT, e Colônia Agrícola São João	05-02-2020	2°32'23"S 57°44'27"W
13	Comunidade Rio Tapera Urucará	07-02-2020	2°19'03"S 57°43'23"W
14	Comunidade São Joao	18-06-2020	2°28"55'S 57°43"38"W
15	Comunidade Marajazinho	19-06-2020	2°27"19"S 57°39"23"W
16	Comunidade Boa Esperança	20-06-2020	2°28"12'S 57°45"22"W
17	Urucara	29-10-2020	2°32'23"S 57°44'27"W
18	Nhanundá	30-10-2020	2°01'21"S 57°04'56"W
19	Urucara	05-11-2020	2°32'23"S 57°44'27"W
20	Urucara	16-12-2020	2°32'23"S 57°44'27"W
21	Santa Helena e Nova Jerusalém	17-12-2020	2°22'27"S 57°58'52"W
22	Jabote	18-12-2020	2°31"48"S 57°45"21"W
23	Marajazinho	19-12-2020	2°27"19"S 57°39"23"W
24	Ribeirinhos do Rio Tapera e Grupo Tapera	20-12-2020	2°19'03"S 57°43'23"W
25	Apeua	21-12-2020	2°01'21"S 57°04'56"W

Stakeholder engagement process	*More than 900 people including multiple communities and stakeholders around the project area like near Marajazinho, Boa Esperança, and São João— in Urucará, near Tapera river, Urucara, Sao Sao Sebastiao, Nova Jerusalem, Maripa river, Nhamunda- Apwus, along Paratucu river and Jabote were consulted and interviewed about the impacts of climate change, also the difficulties faced by these communities, families and individuals.*
Consultation outcome	*After the consultation all the communities, families, individuals endorsed the Tapera project, respecting the rights of all the participants and stakeholders.*
Stakeholder input	*Stakeholder feels that there are geographical challenges and transportation difficulties faced by the family and the individuals. The project already taken the note of the stakeholder's input.*

Demonstrate in the table below how due account of all and any comments received during the consultation and public comment period has been taken. Include details on any updates to the project design or demonstrate the insignificance or irrelevance of comments.

Summary of comment received	When comment was received	Actions taken

2.3.11 Continued Consultation and Adaptive Management (VCS, 3.18; CCB, G3.4)

The project has a permanent channel of communication and consultation between project proponents and communities and other stakeholders. Communication happens instantly via email. Prior to each verification, communities and other stakeholders will be contacted and consulted for updates on project activities and results.

The following are considered success factors in the communication of this project:

- **Strategic Factor:** it must provide the exchange of knowledge and essential information for achieving and maintaining carbon accreditation, strategically, in accordance with the guidelines and standards of the control bodies;
- **Integration Factor:** encouraging constant dialogue creates an environment of trust favourable to stable and lasting relationships, through the exchange of experiences and knowledge with the main stakeholders in order to support all lessons learned and corrections in the course of the project, when necessary;

- **Motivation and Satisfaction Factor:** when the proponent's direct and indirect employees have access to information and opportunities to present their opinions with freedom of internal and external participation, raising the levels of co-responsibility among the stakeholders for the best performance of the project.

Establishing the guidelines so that communication and inter-institutional and informal relationships take place in a profitable way, both for the project and for society, is important since communication will be the access route for sharing the knowledge produced. Knowledge is shared based on this experience of contact, promoting structured dialogue between Orgânica Consultoria and extractive riverside communities that, despite not residing in the project area, use the project area for their subsistence.

The activities proposed by the project can be redirected as the results are being evaluated, according to the dynamics of the perception of the stakeholders on the impact of the actions developed.

2.3.12 Stakeholder Consultation Channels (CCB, G3.5)

Consultations are held directly with communities, institutions or their legitimate representatives in face-to-face meetings. The project summary was presented by the email address tapera@organica-consulting.com establishing a communication channel open to dialogue. The project activities were built in a collective and participatory way during workshops and meetings between the technical team and communities. Through the methodological approaches of DRP and MVS, the local needs and specificities of each community were raised in order to shape community aspects of the project.

2.3.13 Stakeholder Participation in Decision-Making and Implementation (VCS, 3.18, 3.19; CCB, G3.6)

The project values activities that favour meaningful learning for all parties involved, especially those that help employees, project representatives, to make assertive decisions and the communities involved to participate effectively. It is expected that society will be positively impacted, get to know the project well and have the opportunity to express their opinions. The public meeting and its ritual is the legal and normative tool of this collective participation for communities to decide on their willingness to get involved, at what level this will take place and what are the expectations in terms of benefits. From the mapping of stakeholders, contacts made, people records and questionnaires applied, a specific mobilisation was carried out through telephone contact with the community, in order to participate in the public hearing, in which the current status of the project was presented. For the hearings, there was also mobilisation via a personal invitation through the visit of technicians from Organiza Consultoria in the homes of communities' participating in the project. The articulation of the public hearing provided the presence of harvesters from the streams. In addition, the technical team of Organica Consulting carried out individual consultations in the project areas, due to the difficulty of mobilisation on- site and possible harassment to be suffered by livestock leaders in the region. In the meetings, the communities were informed about the project and its current stage of development. The possible impacts of the project were

also addressed in a participatory manner. Such results were used for the elaboration and consolidation of the socio-environmental programs that will be developed by the project.

2.3.14 Anti-Discrimination Assurance (VCS 3.19; CCB, G3.7)

The code of ethics and ESG policy of Organica Consulting and its project partners are based on shared principles of human rights, environmental respect, ethical conduct, and diversity. These include adherence to international human rights standards, repudiation of discrimination and harassment, and promoting gender equality in employment. All contracts with service providers, suppliers, employees, and partner producers require compliance with ESG policies, and all staff must follow these guidelines under penalty of dismissal for non-compliance.

Rural family farmers involved in the project also commit to non-discriminatory practices and the prevention of harassment. Communities are encouraged to report unethical behavior via the Tapera Jungle communication channel. Organica Consulting enforces these principles of integrity, transparency, and respect for people, with sanctions or dismissal for violations.

2.3.15 Feedback and Grievance Redress Procedure (VCS, 3.18.4; CCB, G3.8)

Development process	The TAPERA AMAZONAS REDD+ Project developed its grievance redress procedure through the following process: 1. Initial Assessment: The project team reviewed existing grievance mechanisms used in other REDD+ projects in the Amazon region and consulted with local experts on conflict resolution practices. 2. Stakeholder Consultation: Key stakeholders, including local community leaders and indigenous representatives, were consulted to understand their preferred methods for raising and resolving concerns. 3. Draft Development: Based on the initial assessment and stakeholder input, the project team drafted a grievance procedure that incorporated culturally appropriate methods and clear timelines. 4. Legal Review: The draft was reviewed by legal experts to ensure compliance with Brazilian law and VCS requirements. 5. Stakeholder Feedback: The draft procedure was presented to community members during project meetings. Feedback was collected

	and incorporated into the final version. 6. Implementation and Training: Project staff were trained on the procedure, and it was communicated to all stakeholders through community meetings and printed materials in Portuguese. This process resulted in a grievance redress procedure that is tailored to the specific context of the Tapera Amazonas region, respects local customs, and provides clear, accessible channels for stakeholders to raise and resolve concerns.
Grievance redress procedure	The TAPERA AMAZONAS REDD+ Project has developed a comprehensive grievance redress procedure in collaboration with local stakeholders. This procedure respects traditional conflict resolution methods while adhering to VCS standards. The process includes: Receiving Grievances ● Multiple channels for submitting grievances: ● Written submissions at project offices ● Verbal reports to community liaisons ● During regular community meetings ● All grievances are logged and acknowledged within 5 working days <u>Three-Stage Resolution Process</u> Stage 1: Attempt at Amicable Resolution (30 days) ● Project team investigates the grievance ● Incorporates traditional conflict resolution methods, such as community dialogues facilitated by respected elders ● Aims to resolve the issue through direct communication and negotiation ● Written response provided to the complainant Stage 2: Mediation (45 days) ● If unresolved, the grievance is referred to a neutral third-party mediator

- Mediator selected from a pre-approved list agreed upon with stakeholders
- Mediation conducted in local language, respecting cultural norms
- Outcome documented and shared with all parties

Stage 3: Arbitration or Court Proceedings (As per legal timelines)

If mediation fails, the grievance is referred to either:

a) Arbitration, where allowed by Brazilian law, or
b) Competent courts in the relevant Brazilian jurisdiction

Complainant retains the right to seek resolution through a supranational body if applicable

Key Features

- Reasonable time limits set for each stage, considering local conditions and accessibility
- Traditional conflict resolution methods integrated throughout the process
- All project staff trained on the procedure
- Regular community outreach to ensure awareness of the grievance mechanism
- Annual review and adaptation of the procedure with stakeholder input

This grievance redress procedure ensures that all stakeholders have access to a fair, transparent, and culturally appropriate process for addressing concerns related to the TAPERA AMAZONAS REDD+ Project.

2.3.16 Accessibility of the Feedback and Grievance Redress Procedure (VCS, 3.19; CCB, G3.8)

The manifestations presented by the communities will be carried out by email or through the complaint channel (reporting channel) with the completion of a digital form. Manifestations will be forwarded for discussion and feedback, under the responsibility of the Organica Consulting. The history of the manifestations will be stored in a database suitable for internal consultation whenever necessary, which will allow the production of knowledge about the main issues raised by the stakeholders, as well as the traceability of the internal conduct of these processes.

2.3.17 Worker Training (VCS, 3.19; CCB, G3.9)

The sustainability of extractivism, particularly concerning non-timber products, relies heavily on preserving the surrounding forests. Sustainable management involves extractivists exploring the flora in a manner that sustains the forest, enabling the continuation of traditional activities related to forest products. To ensure the project's longevity and enhance the quality of life in local communities, it is essential to invest in training and reinforcing technical skills while simultaneously valuing traditional knowledge. The Tapera project aims to integrate social technologies into communities and disseminate knowledge generated within these communities. With the application of technical training, the project seeks to fortify the productive chain of extractive activities and provide institutional support to local associations.
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For a detailed overview of the proposed technical training and its alignment with the project's goals, please refer to the Activities and Theory of Change table in Appendix 2. The following provides a brief summary of the activities elaborated in the communities engaged in the project.

- Training about Drying Mechanization in Agricultural Production
- Training about Fair Trade Practices
- Training about Agroindustry - Hygiene and Quality
- Training about Practices for Organic Certification
- Training about Irrigation and Solar Energy
- Training for the Use of Agro Industry Machinery
- Training for the Implementation of New Crops
- Training for Machinery Operation - Fruit Processing
- Training for Machinery Operation - Oil Extraction

Figures 38.a.37.b. Training at Agrofrut



2.3.18 Community Employment Opportunities (VCS, 3.19.13; CCB, G3.10)

The project implementation brings new job opportunities for residents of the communities of the regions where the project takes place. The job opportunities will take gender equality as a guideline for the hirings, managing to find an equal balance of opportunities for women and men. It explicitly rejects the consideration of criteria such as race, gender, sexual orientation, colour, religion, age, ethnicity, physical or mental disability, or social class for hiring processes. Concerning the job positions, it will encompass a diverse range of professional areas, such as management, forest engineering and topography. To encourage professional qualification and promote an improvement in family income and dissemination of knowledge in the region, the Tapera project intends to carry out training for community members. The hiring contracts will be made by Organica Consulting, but other job opportunities can be effectuated by other partner entities as well, such as Urupolpas and Agrofrut. So far, the elaboration of the Tapera project has resulted in the hiring of three professionals, for the areas of GIS Expertise, Monitoring and Topography. Three more vacancies are in the recruitment process, for the positions of Environmental Engineer, Forestry Engineer and Forestry Technician, to assist in tasks such as technical analysis, field visits, monitoring and inventory activities.

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2.3.19 Occupational Safety Assessment (VCS, 3.19; CCB, G3.12)

To promote occupational safety among employees, the Tapera project will follow all official norms instituted by the federal and state governments. In addition to respecting the labour legislation and the conventions of the International Labor Organisation, the project intends to be guided by the following measures to maintain the occupational safety of its employees:

- Map the risks of the work environment and make all employees aware of it;
- Conduct regular training to ensure that project employees have a safe working environment;
- Training must address the dangers of the work environment such as venomous animals and insects;
- Standardize processes to more quickly and accurately identify errors and what should be done to resolve them;
- The use of Personal Protective Equipment (PPEs) is essential to protect employees from any danger to their health. Mandatory use of PPE (helmets, boots, leggings, ear plugs, gloves, among others) when necessary;

- Record the accidents that have occurred so that it is known which failures cannot happen again;
- Promote a culture of safety among employees of the Tapera project.

2.4 Management Capacity

2.4.1 Project Governance Structures (CCB, G4.1)

The project is managed by the proponent Organica Consulting, under the direction of Rémi Denecheau, who conducts the overall coordination of the project. Among his responsibilities and with the support of his technical team, his main activities are coordinating and carrying out data management, marketing carbon credits and drafting the project's design, implementation and monitoring document (DPA).

The main players involved in the project are: Organica Consulting, Urupolpas, Nat'Organico, Agrofrut and rura family farmers. The structure presented below sufficiently demonstrates the applicant's management capacity in terms of human resources for the implementation, development, and monitoring of the project (Figure 39).

Figure 39. Management structure

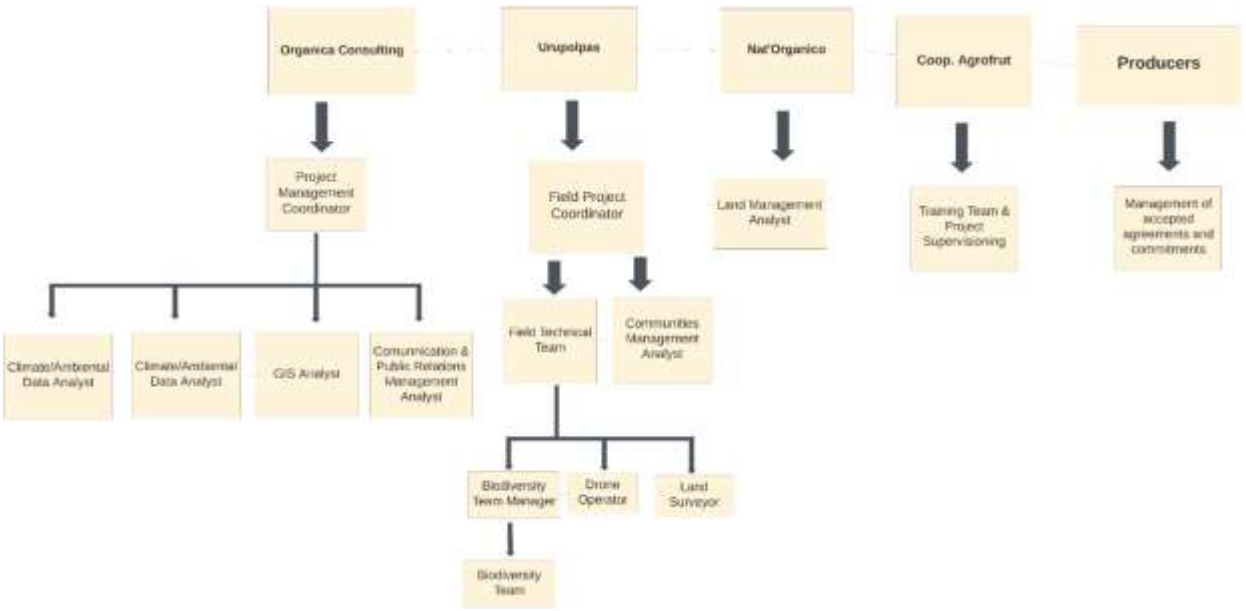


Table- Activities and responsibilities of the companies involved in the project.

Proponent & Project Manager	Technical Field Team	Land Planning Team	Communication Team	Producers

Orgânica Consulting	Urupolpas	Nat'Orgânico	Agrofrut	Farmers
- Proposing company; - Responsible for selling carbon credits; - Responsible for the overall management of the project, in terms of: Planning, Risk Identification and Management, Resource Allocation, Cost Management, Stakeholder Involvement. - Responsible for the methodology and analysis of biomass data through inventories to quantify GHG emission reductions and removals.	- Company responsible for collecting technical data on forest inventories and biodiversity. - Responsible for providing financial resources for the project	- Company responsible for monitoring and planning land and legal regularisation of forest areas. - Responsible for providing financial resources for the project.	- Responsible for monitoring beneficiary communities in the region and following up on training and contact points, as well as providing information to all the communities benefiting from the project.	- The group is responsible for conserving the native forest on their properties, managing the agroforestry systems implemented in the project and complying with the rules agreed in the project contract.

2.4.2 Required Technical Skills (VCS, 3.19; CCB, G4.2)

To implement the Tapera project, knowledge on development and management of projects related to the conservation of the Amazon biome is required. In addition, carbon measurement and monitoring expertise, development of activities in conjunction with the community and monitoring and evaluation of biodiversity are needed. The project proponents have the necessary technical skills for its implementation. Section 2.4.3 demonstrates the competencies of the specialized team of Orgânica Consulting allocated in the project.

2.4.3 Management Team Experience (VCS, 3.19; CCB, G4.2)

The management team is composed of qualified professionals (Table 17) who have the necessary technical skills for the implementation and execution of the project.

Table- Members of Organica Consulting who part of the Tapera project management team is, their respective positions and qualifications.

Name	Position and Role in the Project	Technical Qualification and Professional Experience

Davidson do Canto Marques	Forest Engineer	Forest Engineer with extensive experience in sustainable land management, forestry projects, and environmental compliance. Proficient in utilizing advanced technologies for data analysis and GIS. Skilled in community engagement, project management, and environmental impact assessments.
Hector Monteiro	Topographer Drone Operator	Experienced Topographer and Drone Operator proficient in geospatial surveying, terrain analysis, and precise measurements. Skilled in utilizing advanced drone technology and Geographic Information Systems (GIS) for accurate mapping. Strong project management capabilities and a commitment to maintaining high surveying standards.
Katherine Oliveira	Training for quality in rural properties for community members	Experienced professional in rural property quality training for communities, specializing in sustainable agriculture and rural development. Skilled in designing and implementing effective training programs tailored to community needs. Proven track record in fostering collaborative relationships, delivering workshops, and promoting environmentally conscious agricultural practices
Hendrew Nunes de Souza	Biologist	Biology professional with expertise in ecological principles, biodiversity conservation, and field research. Skilled in laboratory work, data analysis, and statistical methods. Proven experience in environmental monitoring, habitat restoration, and wildlife conservation.
Selma Xavier de Oliveira	Biodiversity manager	Graduating in Geography has a solid foundation in Geography. In addition, specializing in environmental projects linked to biodiversity inventories.
Douglas Martins	GIS Analyst	Bachelor's degree in Geography (2019) and Master's degree in Geography from the Federal University of Rio de Janeiro (UFRJ), in the area of Environmental Planning and Management. Experience in projects to identify and monitor areas of illegal deforestation in the Atlantic Forest and the recovery of APPs and water recharge areas in the Doce River Basin. Mastery and experience in Remote Sensing and Geoprocessing techniques using ArcGIS Pro, QGIS, Metashape and Pix4DMapper software. Experience in building thematic maps of large areas and characterizing the physical landscape: hydrography, paedology, geomorphology, Land Use/Land Cover. 6 years' experience as a researcher in remote sensing applied to environmental studies.
Odiélio Nascimento	Climate/Ambiental Data Analyst	Experienced farmer with technical proficiency in Information Technology from CETAM AM, coupled with a solid foundation in Cooperative Management from UNIHORIZONTES-MG
Roberto Kwengwe	Marketing Specialist	Marketing Specialist with content creation and digital marketing expert
Rémi Denecheau	Project General Coordinator	Experienced Project Coordinator with a Business Management degree, skilled in overseeing end-to-end project lifecycles. Proven expertise in strategic planning, resource allocation, and efficient execution. Adept at financial management and stakeholder engagement, with a commitment to achieving project excellence.
Sandro Martins	Funding regularization	Experienced Funding Project Coordinator

Daniel Vale	Finance and Administrative Analyst	Business Management bachelor, with large experience with finances, commercial and administration management.
Regiane Dias	Land Management Analyst	Land Administration professional with a Business Management background and experience in land governance, compliance, and administration. Skilled in managing land records, resolving disputes, and optimizing land resource utilization. Proven expertise in coordinating with stakeholders, implementing efficient land tenure systems, and ensuring transparent and ethical practices
Marcio Freitas	Agronomic and Certification Technician	Senior Agronomic and Certification professional with extensive experience in organic, fair trade, FSC certifications, local field manager based in Amazonia (Rondônia) responsible for certification training and obtaining registered labels.
Shiv Narayan Singh	Carbon Project Development	Senior professional in Climate Change and Development with more than 8 years of professional experience. Advanced degree in Environment and Ecology and over 5 plus year of experience in the Nature Based Solutions, Climate change, Forest management, Project Management and Development, Smart, regenerative agriculture, biomass estimation, remote sensing & GIS, Project Validation and Verification functions and Management.

2.4.4 Project Management Partnerships and Team Development (VCS, 3.19; CCB, G4.2)

Urupolpas, CR Agropecuária and Terra Certa da Amazônia collaborate on the project with the preparation and execution of the forest inventory and fauna diagnosis.

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

Orgânica Consulting is a private company, an Individual Limited Liability company (EIRELI), which has been operating since 2017 offering services to worldwide companies, especially in Europe (mainly France, Belgium, Germany, Portugal). Conceived as support for a group of companies focused on the export and transformation of organic products, Organica Consulting has developed and expanded its activities, working today with operations such as forest management projects, marketing, quality management, administration and more. The contribution of incentive values by client companies - Botanik Source, in exchange for a percentage share in the carbon credits generated, is foreseen as a fundraising measure through a contract. Other clients have already expressed interest in making additional contributions, given the credibility and positive viability of both Organica and the proposed project. Its capital is composed by the sale of finances, marketing and quality control services for a group of 14 companies, in 7 countries.

2.4.6 Avoidance of Corruption and Other Unethical Behavior (VCS, 3.19; CCB, G4.3)

Organica Consulting, guided by robust principles of integrity and corporate ethics, reaffirms its unwavering commitment to preventing corruption and other unethical behaviors in all its operations. We acknowledge the critical importance of maintaining high standards of ethical conduct, not only as a corporate responsibility but also as a moral imperative. The company adopts and promotes rigorous ethical and legal guidelines across all spheres of its operations. Our employees, partners, and suppliers are instructed to act in compliance with all applicable laws and ethical standards established in the locations where the company operates. We emphasize that non-compliance with these guidelines will not be tolerated and will subject those responsible to disciplinary and legal measures, depending on the severity of the violation. The company conducts continuous monitoring of its ethical practices and policies, seeking opportunities for improvement and adjustment. Organica Consulting reiterates its unwavering commitment to promoting an ethical, transparent, and corruption-free business environment. By adopting and implementing these practices, we reinforce our mission to provide innovative and reliable solutions while building lasting relationships based on trust and honesty.

2.4.7 Commercially Sensitive Information (VCS, 3.5.2 – 3.5.4; CCB Rules, 3.5.13 – 3.5.14)

Some documents are considered commercially sensitive, for this reason, they are confidential and cannot be published by the project proponents. These documents can be accessed by the third-party audit team during the validation process; however, they were not included in the public version. Below is a list of commercially sensitive documents:

w is a list of commercially sensitive documents:

- Contract between the bidders.
- Documents referring to property rights.
- Registers of community residents.
- Documents proving financial health:
- Financial statement.
- Bank statements.
- Management financial statements.

2.5 Legal Status and Property Rights

2.5.1 National and Local Laws (VCS, 3.1, 3.6. 3.7, 3.14, 3.18, 3.19; CCB, G5.6)

Currently no laws and regulations prevent or enforce the Project activity or baseline land use scenarios. No law in Brazil prohibits or restricts the execution of REDD+ Projects or prohibits or restricts any

commercial transaction of assets generated from the same Projects. Project-relevant laws, statutes and policies are outlined below.

Regulatory framework

Brazil is a member of the United Nations Framework Convention on Climate Change (UNFCCC) and an active member of the International Tropical Timber Organisation (ITTO). The country has ratified the UNFCCC (1995), the Kyoto Protocol (2005), and has established a Designated National Authority under the Clean Development Mechanism (CDM) and has implemented registered CDM Afforestation/Reforestation Projects. Brazil is also a signatory to the Paris Agreement (Paris 2015, COP 2167). The Project complies with this regulatory framework due to its AFOLU scope, which is a recognized method of GHG reductions and removals under the regulatory framework.

National legislation

The Tapera Amazon Project observes the principles established in the Brazilian Federal Constitution, as per Article 225, by contribution towards the achievement of an ecologically balanced environment. An overview of the main national laws regulating the forest sector is provided below. These laws regulate the use and protection of native natural forests and also regulate the management and exploitation of commercial forests derived from reforestation projects.

- **Law n° 12.727 - October 17, 2012**. – this law establishes general norms on the protection of vegetation, areas of Permanent Preservation and the areas of Legal Reserve; Logging, supply of forest raw materials, control of the origin of forest products and control and prevention of forest fires and provides economic and financial instruments to achieve its objectives.
- **Law n° 12.651 - May 25, 2012.** - establishes the New Brazilian Forest Code, including provisions for managing forests and the Legal Reserve.
- **Law n° 7.804 - July 18, 1989**. - amends Law 6.938, dated August 31, 1981, which provides for the National Policy on the Environment, its purposes and mechanisms for formulation and application, Law 7,735 of February 22, 1989, Law 6803, of July 2, 1980, and makes other provisions.

The Project complies with the law requirements of land use and sustainable forest management. According to Law n° 12.651/2012, all rural property in forested areas must maintain 80% of the property area with native vegetation coverage, as a Legal Reserve. This is an area located inside a rural property, with the function of ensuring the sustainable use of the natural resources of the rural property, assisting the conservation and rehabilitation of ecological processes and promoting the conservation of biodiversity, as well as the shelter and protection of wildlife and native flora.

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The Project complies with this law by preventing illegal deforestation of the Legal Reserve in rural properties within the Project Area. Forest surveillance implemented as part of APD Project activities also enables better monitoring of the forest conditions and improves compliance with the currently enforced laws and regulations.

Law n° 12.651/2012 also allows for sustainable management of forests and provides the following opportunities:

- The collection of non-timber forest products, such as fruits, flowers, vines, leaves, roots and seeds, which do not endanger the survival of individuals and of the species collected, is allowed (Article 21).
- Sustainable forestry is forbidden for commercial purposes but it's allowed for use in the property, with a maximum limit of 20 cubic meters/year (Article 23).
- It is not allowed cattle farming or any other agricultural activity.

The Project complies with opportunities for activities within sustainable forest management.

National policy

The Project activity is carried out in compliance with the environmental policies and guidelines from the Brazilian Federal Administration under the standards set at the COP 14 Conference held in Poznan, Poland, in December 2008. These guidelines set a goal of reducing deforestation by 70 percent by the year 2018 and moving to a zero-deforestation goal by 2030. These goals aim to offset the GHG emissions resulting from illegal deforestation. GHG offsets from illegal deforestation is part of the Brazilian Nationally Determined Contribution which Brazil plans to adopt under the framework of the Paris Climate Agreement (COP-21).

The Action Plan for the Prevention and Control of Deforestation in the Legal Amazon (PPCDAm; Plano de Ação para a Prevenção e Controle do Desmatamento na Amazônia Legal) was established to mitigate the escalation in deforestation in the Legal Amazon. This Project activity follows the main PPCDAm premises. The Project will comply with this plan by implementing actions to prevent deforestation, as is the intent of the plan.

Amazon State Laws

- State Law No. 3,785, July 24, 2012, provides for environmental licensing in the state of Amazonas.
- Law No. 3,789, July 27, 2012, provides for forest replacement in the state of Amazonas.
- State Decree No. 32,986, November 30, 2012. Regulates Law No. 3,789/2012, which provides for forest replacement in the state of Amazonas.

At a state level, Amazonas state has public policy measures in place facilitating forest conservation. However, these policies do not offer a definitive regulation or limit to the execution of REDD+ Projects by either public or private enterprises within the state territory.

2.5.2 Relevant Laws and Regulations Related to Worker's Rights (VCS, 3.18.2; CCB, G3.11)

Employees of the Tapera project will be guaranteed employment in accordance with Brazilian labour legislation. In addition, the international agreements ratified by Brazil and issues related to the well-being and safety of workers will be respected. Hired employees will receive training and qualifications on procedures and technical qualification, promotion of qualification, and safety at work. In addition, hired employees are advised to join the respective unions in the work area responsible for their rights.

The laws and regulations governing the protection of labor law in Brazil are listed below:

- Decree Law No. 5.452, of May 1, 1943;
- Law No. 6,514, of December 22, 1977;
- Convention OIT 012 – Compensation for accidents at work (agriculture);
- Convention OIT 026 – Methods for setting minimum wages;
- Convention OIT 029 – Forced or compulsory labor;
- Convention OIT 042 – On Compensation for Occupational Illnesses;
- Convention OIT 095 – Wage Protection;
- Convention OIT 098 - Application of the principles of organization and collective bargaining right;
- Convention OIT 099 – Methods for setting the minimum wage in agriculture;
- Convention OIT 100 – Equal remuneration for male and female workers for work of equal value;
- Convention OIT 103 – Maternity Support;
- Convention OIT 105 – Abolition of Forced Labor;
- Convention OIT 106 – Weekly rest in commerce and offices;
- Convention OIT 111 – Discrimination in respect of employment and occupation;
- Convention OIT 113 – Medical examination of fishermen;
- Convention OIT 119 – Protection of machinery;
- Convention OIT 125 – Fishermen's Capability Certificates;
- Convention OIT 127 – Regarding the maximum weight of loads that can be carried by a single
- worker;
- Convention OIT 131 – Fixing of minimum wages;

- Convention OIT 132 – Paid annual leave;
- Convention OIT 135 – Protection of Workers' Representatives;
- Convention OIT 138 – Minimum Age for Admission to Employment;
- Convention OIT 140 – Paid study leave;
- Convention OIT 141 – Organization of rural workers;
- Convention OIT 144 – Tripartite consultations to promote the application of international labor standards;
- Convention OIT 154 – Incentive to Collective Bargaining;
- Convention OIT 155 – On the safety and health of workers and the working environment;
- Convention OIT 159 – Vocational Rehabilitation and Employment of Disabled Persons;
- Convention OIT 160 – Labor Statistics;
- Convention OIT 161 – On Occupational Health Services;
- Convention OIT 167 – Safety and health in construction;
- Convention OIT 168 – Promotion of employment and protection against unemployment;
- Convention OIT 169 – Indigenous and tribal peoples;
- Convention OIT 182 – Worst forms of child labour;
- Convention OIT 011 - Agricultural Workers' Rights of Association and Union;
- Convention OIT 019 – Equal Treatment of Foreign and National Workers with regard to Compensation for Accidents at Work;
- Convention OIT 080 – Revision of the Final Articles and Constitution of the International Labor Organisation;
- Convention OIT 088 – Organisation of the Employment Service;
- Convention OIT 097 – Migrant Workers;
- Convention OIT 116 – Revision of the final articles and constitution of the OIT;
- Convention OIT 117 – Objectives and Basic Rules of Social Policy;
- Convention OIT 118 – Equal treatment of nationals and nationals in matters of social security;
- Convention OIT 122 – Employment Policy.

2.5.3 Human Rights (VCS, 3.19)

The Tapera Amazonas REDD+ Project prioritizes the recognition, respect, and promotion of the rights of Indigenous Peoples (IPs), Local Communities (LCs), and customary rights holders. In line with applicable international human rights law, including the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and the International Labour Organization (ILO) Convention 169 on Indigenous and Tribal Peoples, the project demonstrates a comprehensive approach to upholding human rights principles. Throughout all stages of the project, stakeholders are actively engaged, with their

perspectives, traditional knowledge, and cultural practices valued and integrated into decision-making processes. Efforts are made to obtain Free, Prior, and Informed Consent (FPIC) from IPs, LCs, and customary rights holders before implementing any activities that may affect their lands, territories, or resources.

The project recognizes and respects the land rights of IPs, LCs, and customary rights holders, striving to prevent and address any infringements on these rights. Capacity building initiatives are undertaken to empower these communities, strengthening their ability to advocate for their rights and interests.

Robust conflict resolution mechanisms are established to address disputes or grievances in a fair and equitable manner. By adhering to international human rights standards and meaningful engagement with affected communities, the project upholds principles of social equity, justice, and dignity for all stakeholders involved.

2.5.4 Indigenous Peoples and Cultural Heritage (VCS, 3.18, 3.19)

Tapera Project is committed to preserving and protecting cultural heritage as part of its activities. As described in Section 2.1.14, there is the presence of indigenous peoples in the north of the project area. Consultations have already been held with all mapped indigenous communities to understand how the project can assist in preserving and protecting the cultural heritage of the tribes in nearby areas.

These initial consultations ensur e that project activities are conducted in a way that respects and values local cultural traditions. As the project progresses, we plan to conduct further consultations to continually ensure that the project's activities promote and revitalize the indigenous cultural heritage in a sustainable and inclusive manner. This collaborative and iterative approach aims to develop effective strategies that protect not only the environment but also enrich the involved indigenous communities.

2.5.5 Statutory and Customary Property Rights (VCS, 3.18, 3.19; CCB, G5.1)

The Tapera Project encompasses several rural properties in Urucará and Nhamundá, Amazonas, focused on sustainable land management and environmental conservation. Key properties include Piquiá, Ipê, Jatobá, Louro Gamela, Itaúba, and others, varying in size and location, from small areas like Fazenda Roberto (227.46 hectares) to larger properties such as Itaúba (11,740.22 hectares). Many properties are designated for Avoided Planned Deforestation (APD) to conserve large sections of land and protect biodiversity, with some properties like Louro and Pau Rosa covering over 27,000 and 50,000 hectares, respectively.

The project also includes smaller properties that play crucial roles in conservation, with a diverse range of ecosystems. All properties are registered with the National Institute of Colonization and Agrarian Reform

(INCRA) and certified under the Rural Environmental Registry (CAR), ensuring compliance with Brazilian regulations. The Tapera Project incorporates strategic property placement along key access routes like the São Sebastião-Urucará Road and the Paracatu River, which provide both challenges and opportunities for land management.

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The project's goal is to balance environmental preservation with sustainable agriculture, partnering with local cooperatives like Agrofrut to ensure ecological sustainability and promote economic opportunities for nearby communities. The extensive landholdings and APD initiatives, including properties like Fazenda Mendonça and Fazenda Gabi & André Marcondes, are integral to its long-term conservation efforts and commitment to responsible land management.

2.5.6 Recognition of Property Rights (VCS, 3.7, 3.18, 3.19; CCB, G5.1)

The project area is in the municipalities of Urucará and Nhamundá, located in the state of Amazonas, and is composed of the 27 properties shown at table below with Sigef number. These properties are owned as per informed in Section 1.6. The legal documents proving the land title and ownership of the properties (Environmental Registry for Rural Properties, Land Registry Certificate, Certificate from the Institute for Agrarian Reform) will be made available to the auditors during the validation process. Orgânica Consulting a Brazilian company wholly owned by the Project proponent, is one of the landowners of the area in which APD Project activities will be implemented and is the Project owner. The respective legal documents will be produced for the review of auditors during the validation process.
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As per the rules stated at Section 2.3, an enforceable and irrevocable agreement was set between instances owners – the holder of the statutory, properties and contractual right in the land, vegetation or conservation or management process that generates GHG emission reductions or removals –and Orgânica Consulting which vests project ownership in the project proponent. Evidence of such agreement will also be made available at the audit. The evidence mentioned in the present section will also be applicable to new instances

Table -Properties integrated in the Project Tapera

Instance	Property name	Owner	Sigef Number

Instance 1	Ipê	Urupolpas	8a7c67fa-3b20-4621-bd0b- a3763fd93f01
Instance 2	Jatobá	Urupolpas	4ae2aedd-a55c-4cab-a12d- 82ac9972e641
Instance 3	Piquiá	Urupolpas	446c8814-bd86-475a-9acd-116976ca344f
Instance 4	Itaúba	Urupolpas	9c8a1d0a-ce66-4583-b77c- 7284931f1afa
Instance 5	Louro	Urupolpas	4009d9a7-c49a-431d-89f4-ea20922f31aa
Instance 6	Louro Gamela	Odiélio Nascimento	faed4977-5b8b-49b4-96b4- d141b9583d12
Instance 7	Pau Rosa	Urupolpas	970e2cce-c060-4b54-a074-b869f54465ed
Instance 8	Curupira	Agrofrut	d97670b2-5a87-473b-8b54-6eb9fc0cbd4e
Instance 9	Andiroba	Nat'Organico	13f347a5-01b8-4774-b4c9-af5703826cfd
Instance 10	Angelin	Nat'Organico	d503fda6-1a10-435b-9021-8d1ed627a6e3
Instance 11	Breu	Gerliane da Paz	0a806212-2346-451e-b09e-85540e807dff
Instance 12	Fazenda Roberto	Roberto Camargo Quevedo	fa6f2726-1312-4a79-8820-1f0a7316f81d
Instance 13	Fazenda Andre	André Evaristo Marcondes Cesar	d3f86dd4-249e-444a-865b-d747681ae3b0
Instance 14	Fazenda Antônio Roberto	Antônio Roberto Quevedo	aa5146ad-3414-47a4-a829-813bfeb48d05
Instance 15	Fazenda Vô Luiz Geraldo	Evaristo Marcondes Cesar	ecdc51b6-331c-4cd3-a860- 3cdcb1ce90ce
Instance 16	Fazenda Evaristo	Evaristo Marcondes Cesar	e4bd54c1-9e55-4ff6-bb8f- 338af74d05dc
Instance 17	Fazenda	Ricardo Jose	0e634037-3962-47f6-ac4c-

	Rodriguez	Rodriguez Ferreira	fe8c3d63b9ac
Instance 18	Fazenda Ricardo Ferreira 2	Ricardo Jose Rodriguez Ferreira	9b311857-22b3-462b-b985- b3411076f882
Instance 19	Reserva Bacurau	Ismar Luis Reis Lemos	70a8ed96-b89f-437f-987c-0f755c5b2034
Instance 20	Imóvel Bacurau 2	Ismar Luis Reis Lemos	4573914c-ab2b-4d61-adcd- 7dbca5bd5378
Instance 21	Fazenda Mendonça	Aline de Abreu Mendonça Martins	9c44bc28-ba1a-41bf-b35a- 79e049eb1f1c
Instance 22	Andre Marcondes II	Marco Q Participacoes Ltda	92157e0d-07be-4c19-8bb5-0868498499c9
Instance 23	Reserva Reis Lemos	Alcino Luis Da Costa Lemos Junior	903779cd-2984-49bd-a72b-fbae33f15d3c
Instance 24	Fazenda Gabi E Andre Marcondes	Marco Q Participacoes Ltda	b42f8390-6f99- 4502-b53d-c46448ebf018
Instance 25	Tucumã	Urupolpas	AM-1304302-5B35BD55829D47F89980205265534FD5
Instance 26	Reserva Buriti	Urupolpas	AM-1304302-25DA.0225.CE60.24A3.E82C.58CA.5696.341E
Instance 27	Copaíba	Nat'Organico	AM-1303007-1D54D82D5CE04313A66016CDE183F3E9

2.5.7 Free, Prior and Informed Consent (VCS, 3.18; CCB, G5.2)

Description of process for obtaining consent	The Tapera Project obtained consent from landowners and partners in the project area through freely negotiated contracts, signed by those with legal authority. Riverside communities involved in non-timber forest product extractivism also gave their consent through public consultations, which

	were conducted after informing and addressing community questions. The consultations followed a four-stage process to ensure active participation, with meetings held in Urucará and Nhamundá. These consultations gathered input from various stakeholders, including riverine families, community leaders, and local authorities, using simple language for clear communication. Detailed minutes, attendance lists, and photographs were documented and signed by both community members and Organica Consultoria representatives. This documentation, which will be available for review by validation bodies, ensures transparency and highlights the project's commitment to inclusive, participatory decision-making. The consultations focused on understanding the community's needs, aspirations, and the project's impact, with an emphasis on environmental conservation and sustainable development in the Amazon region.
Outcome of FPIC process	The outcomes of the Tapera project consultations were clearly communicated and documented, ensuring that all stakeholders understood the project's impact. The agreement with local communities guarantees their continued access to the project area for the extraction of non-timber forest products and for sustainable practices like subsistence fishing and hunting, while respecting ecological balance and seasonal cycles. This approach reflects the project's commitment to balancing environmental conservation with the traditional livelihoods of local communities, aligning with their needs and cultural practices.

2.5.8 Benefit Sharing Mechanisms (VCS, 3.18, 3.19;)

Process used to design the benefit sharing plan	The process of socio-economic diagnosis, public consultation, and communication with the extractives in the territory occurred in an open and participatory manner with no distinction of sex or gender. In this sense, there was a concern on the part of the technical team to enable women's participation throughout the project development process. During the meetings, activities, and interviews, there was participation and influence of the women of the community on decision-making and on the development of the actions to be adopted in the territory.
Summary of the	As a way of ensuring gender equality and improving the quality of life of the riverine and extractives women in the project, a support network for women who

benefit sharing plan	are victims of domestic violence and attempted femicide will be implemented in the communication channel. This channel will be a space where only women will work so that there will be a comfortable welcome for the victims, where they can express themselves and report abuses and aggressions. These reports will be received by a professional who will forward the necessary actions to the psychosocial support. The search for this action aims at the possibility of a space where these women can talk about issues that they cannot or have no interest in sharing with the closest person they trust, usually the husband or the father and mother, being a safe, accessible, and cost-free place for these women.
Approval and dissemination of benefit sharing plan	The project will seek, through training, to expand the possibility of creating a riverine women's association in the project areas, in order to enable a union among the women of the communities so that a space can be created to help each other with psychophysiological issues that occur in the communities, enabling a greater range of representation and community support among women, thus ensuring the exposure of problems hidden by the limitation of communication that these women currently have as their place of speech. Considering the project Tapera, 5% of the total VCS/CCB sales will be invested in Communities, for social impact.

2.5.9 Property Rights Protection (VCS, 3.18, 3.19; CCB, G5.3)

Under Brazilian law, it is possible to state that the owner has the full right to use, enjoy and dispose of the assets that make up his property, having the legitimacy to allow the development of the project. Regarding public entities, whether state, federal or municipal, directly or indirectly administered, the certificates analyzed indicate the legitimacy of the title and ownership of the properties. The project does not lead to the involuntary removal or relocation of property rights holders from their lands or territories, nor will it displace traditional livelihood activities. In addition, the proponents maintain constant communication with the stakeholders through the communication channel established to protect the property rights of the owner and the maintenance of the traditional ways of life of riverside communities in the project area.

2.5.10 Illegal Activity Identification (VCS, 3.19; CCB, G5.4)

The Tapera Project encompasses 434,010 hectares, an area susceptible to a range of illegal activities, both directly related to land use, such as land grabbing, illegal deforestation, mining, logging, and construction, as well as activities like money laundering and the use of slave labor. Notably, the project has faced issues with invasions, including illegal agricultural cultivation for marijuana in the Piquiá region, which were addressed through negotiations to mitigate the activities. Additionally, a historical land title from 1976 led to a conflict with a São Paulo resident, Cristiano, who claimed 2,000 hectares of land

overlapping areas owned by eight long-standing Tapera group members. The dispute escalated to illegal land clearing, but the situation was resolved through mapping and discussions with the Agrofrut cooperative. The project also dealt with other incursions, such as unauthorized land clearing by individuals like Baleado, who attempted to cultivate cassava on the Jatobá property, and trespassing hunters in various regions. In response, the project management has implemented a series of strategies to combat these illegal activities, including socio-educational programs, land inspection, and property surveillance. Regular field visits by the project's technical team ensure the monitoring and documentation of any illegal activities. Any violations are recorded and managed by Organica Consulting, which ensures proper tracking and resolution of these issues.

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Figures 40.a. and 40.b. Superposition of properties and illegal ecosystem transition

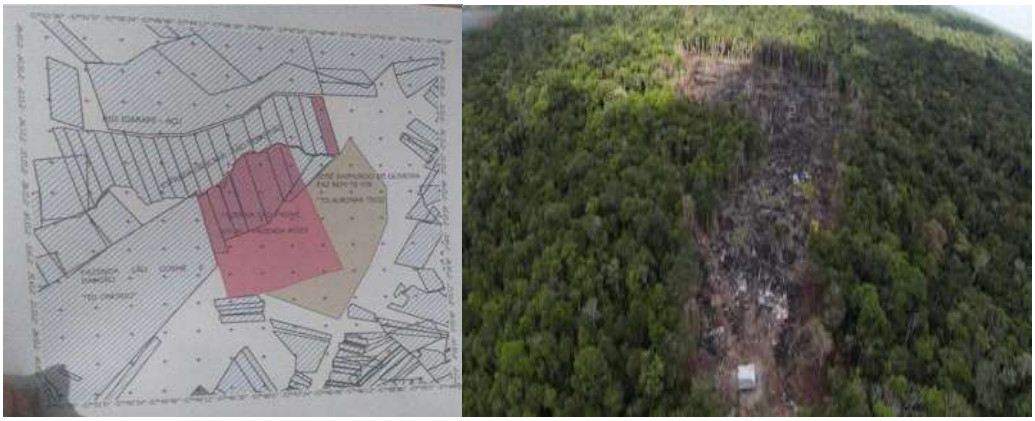


Table- Actions to combat and monitor illegal activities in the Tapera project area.

Preventive Measures General	Preventive actions

Promoting Community Participation	● Involve local communities in land planning and management, promoting active participation. ● Encourage the formation of community committees or associations to monitor and protect vulnerable areas from illegal occupation; ● Carry out educational campaigns to inform communities about the risks and consequences of illegal land occupation. ● Promote awareness of the legal processes and the appropriate ways to obtain land legally.
Education and Awareness	● Carry out educational campaigns to inform communities about the risks and consequences of illegal land occupation. ● Promote awareness of the legal processes and the appropriate ways to obtain land legally.
Social and economic assistance	● Develop social assistance programs to meet the needs of vulnerable communities. ● Create alternative economic opportunities to reduce pressure on public lands and risk areas.
Cooperation between sectors and governments	● Promote collaboration between different government sectors, such as urban planning, environment, agriculture, and justice, to fully address the issue of illegal land occupation. ● Establish partnerships between local, state and federal governments for a coordinated approach.
Technology Monitoring	● Use remote sensing technologies, geographic information systems (GIS) and other tools to monitor changes in land use. ● Establish early warning systems to identify possible illegal occupations.
Surveillance	● Strengthen surveillance operations to detect and stop illegal activities.
Strengthening the Institution	● Strengthen the institutions responsible for land management, ensuring that they have adequate resources and trained personnel. ● Improve coordination between different government bodies involved in land management.
Immediate procedures and actions when illegal activities are detected	● Sending a specialized team to the scene; ● Record the incident and notify all those concerned; ● Contact legal representatives; ● Notifying the relevant authorities;

	● Alert IPAAM or the environmental police if environmental crimes are found.
Regularization of Informal Settlements	● Implement regularization programs for informal settlements, providing safer conditions and basic infrastructure for communities. ● Seek solutions that reconcile land regularization with respect for human rights and the promotion of decent housing conditions.

2.5.11 Ongoing Disputes (VCS, 3.18, 3.19; CCB, G5.5)

The right to rural land in Brazil is regulated by the Constitution, the Rural Statute, and the Civil Code of 2002 (Law No. 10,406). These legal frameworks address matters related to family, inheritance, possession, and property rights. In the Brazilian context, individuals can secure land ownership through various means, such as purchase, property transfer (e.g., through inheritance), and government allocations. A noteworthy mechanism for acquiring land in Brazil is prolonged occupation, known as "usucapião," a right recognized since 1916. This legal concept allows individuals to obtain property rights over land through prolonged and uncontested possession. It underscores the importance of consistent and uncontested occupation as the basis for legitimizing a property claim.

The ability to resolve the impasses unfolding within the project's boundaries emerges as a notable achievement. In particular, the land dispute with the "Vai Quem Quer" community deserves attention, where we identified that one of the properties associated with the project was territorially overlapping with their areas. To address this delicate issue, we employed effective strategies, with purchase and sale contracts being the chosen tool to achieve a suitable resolution. This approach allowed us not only to mitigate the conflict but also to establish robust legal foundations to ensure ownership of the lands in question. The problem was considered resolved, consolidating the relationships with the relevant stakeholders and reinforcing the integrity and sustainability of the project.

to mitigate the conflict but also to establish robust legal foundations to ensure ownership of the lands in question. The problem was considered resolved, consolidating the relationships with the relevant stakeholders and reinforcing the integrity and sustainability of the project.

2.5.12 Approvals (CCB, G5.7)

Currently, Brazil does not have a specific authority for the management and approval of projects that generate voluntary carbon credits, so there was no need for such approval. The project proponents gained recognition and approval of project implementation through meetings, community consultations, as well as consultations with other project stakeholders. Although there is no specific need for approval by any administrative body , the project was designed and will be conducted in accordance with the rules

and principles of administrative bodies in Brazil, such as IBAMA, FUNAI, INCRA and ICMBIO. Proponents declare to follow all laws applicable to the country and the state of Amazonas.

2.5.13 Double Counting and Participation under Other GHG Programs (VCS, 3.23; CCB G5.9)

2.5.13.1 No Double Issuance

Is the project receiving or seeking credit for reductions and removals from a project activity under another GHG program, or any other form of community, social, or biodiversity unit or credit?

☐ Yes ☒ No

If yes, provide required evidence of no double issuance as outlined by the VCS Standard *and the* CCB Standards*. Include all relevant information about the community, social, or biodiversity credit.*

2.5.13.2 Registration in Other GHG Programs

Has the project registered under any other GHG programs?

☐ Yes ☒ No

If yes, provide the registration number and the date of project inactivity under the other GHG program.

Is the project active under the other program?

☐ Yes ☒ No

Project proponents, or their authorized representative, must attest that the project is no longer active in the other GHG program in the Registration Representation.

2.5.13.3 Projects Rejected by Other GHG Programs

Has the project been rejected by any other GHG programs?

☐ Yes ☒ No

If yes, provide the program name(s), reason(s) and date for the rejection, justification of eligibility under the VCS Program, and any other relevant information.

2.5.14 Double Claiming, Other Forms of Credit, and Scope 3 Emissions (VCS, 3.24)

2.5.14.1 No Double Claiming with Emissions Trading Programs or Binding Emission Limits

Are project reductions and removals or project activities also included in an emissions trading program or binding emission limit? See the *VCS Program Definitions* for definitions of emissions trading program and binding emission limit.

☐ Yes ☒ No

If yes, provide all required evidence of no double claiming as outlined by the VCS Standard.

2.5.14.2 No Double Claiming with Other Forms of Environmental Credit

Has the project activity sought, received, or is planning to receive credit from another GHG-related environmental credit system? See the *VCS Program Definitions* for definition of GHG-related environmental credit system.

☐ Yes ☒ No

If yes, provide all required evidence of no double claiming as outlined by the VCS Standard.

2.5.14.3 Supply Chain (Scope 3) Emissions

Do the project activities affect the emissions footprint of any product(s) (goods or services) that are part of a supply chain?

☐ Yes ☒ No

Is the project proponent(s) or authorized representative a buyer or seller of the product(s) (goods or services) that are part of a supply chain?

☐ Yes ☒ No

Has the project proponent(s) or authorized representative posted a public statement on their website saying, "Carbon credits may be issued through Verified Carbon Standard project [project ID] for the greenhouse gas emission reductions or removals associated with [project proponent or authorized representative organization name(s)] [name of product(s) whose emissions footprint is changed by the project activities]."?

☐ Yes ☒ No

2.6 Additional Information Relevant to the Project

2.6.1 Leakage Management (VCS, 3.11, 3.15)

Not applicable. The Tapera Amazonas REDD+ Project does not have a leakage management plan.

2.6.2 Further Information

Not applicable. The Tapera Amazonas REDD+ Project does not have additional relevant information.

3 CLIMATE

3.1 Application of Methodology

3.1.1 Title and Reference of Methodology (VCS, 3.1)

The Tapera Amazonas REDD+ Project is applying the Climate, Communities and Biodiversity (CCB) and Verified Carbon Standard (VCS) with the intention of reducing CO2 emissions from planned (APD) deforestation compared to baseline levels. As required by VM000749, project area consists of contiguous, discrete areas covered by forest that meet the definition of eligible forest, which would be an area that has been forested for at least 10 years prior to the project start date. Methodology VM0007 applies to Project activities that prevent conversion of forest to non-forest and of native grassland to a non-native state. The list below refers to the methodologies, modules, and tools used within the project:

Type (methodology, tool, module)	Reference ID (if applicable)	Title	Version
Methodology	VM0007	VM0007 - Methodological Structure of REDD+ (REDD+ MF)	v 1.7
Methodology	VM0007	VM0007 - REDD+ Methodology Framework (REDD+ MF)	v 1.7
Carbon pool Module	VMD0001	VMD0001 - Estimation of carbon stocks in the above and belowground biomass in live tree and non tree pools" (CP AB), v1.1	V 1.2
Carbon pool Module	VMD0005	VMD0005 - Estimation of carbon stocks in the long-term wood products pool" (CP W)	v 1.2
Baseline Module	VMD0006	VMD0006 - Estimation of baseline carbon stock changes and greenhouse gas emissions from planned deforestation/forest degradation and planned wetland degradation (BL PL)	v 1.4
Baseline Module	VMD0007	VMD0007 - Estimation of baseline carbon stock changes and greenhouse gas emissions from unplanned deforestation and unplanned wetland degradation" (BL UP)	v 3.3
Leakage Module	VMD0009	Estimation of emissions from activity shifting for avoided planned deforestation/forest degradation and avoided planned wetland degradation (LK ASP)	v 1.3
Leakage Module	VMD0010	Estimation of emissions from activity shifting for avoiding unplanned deforestation and avoiding unplanned wetland degradation (LK ASU)	v 1.2
Leakage Module	VMD0011	Estimation of emissions from market effects (LK ME)	v 1.1
Miscellaneous Module	VMD0013	Estimation of greenhouse gas emissions from biomass and peat burning (E BPB)	v 1.2

Miscellaneous Module	VMD0016	Methods for stratification of the project area (X STR)	v 1.2
Miscellaneous Module	VMD017	Estimation of uncertainty for REDD project activities (X UNC)	v 2.2
Tool		Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities (T ADD)	Version 01
Tool	CDM	Executive Board Tool for testing significance of GHG emissions in A/R CDM project activities	(Version 01) EB 31
Tool	AFOLU	Non-Permanence Risk Tool, Procedural Document, VCS	v 4.2

3.1.2 Applicability of Methodology (VCS, 3.1)

The applicability conditions of the VM0007 methodology and its associated modules are detailed in Table below.

Reference ID/Title	Applicability condition	Justification of conformance
VM0007	For all project activities: All areas of land registered under the CDM or any other GHG program (either voluntary or compliance oriented) should be transparently reported and excluded from the project area. The exclusion of land in the project area from any other GHG program should be monitored over time and reported in monitoring reports.	The Tapera project is not registered in any carbon trading system or program.
VM0007	For all types of REDD activity: This REDD+ activity is applicable due to the following conditions: ● Land in the project area has been qualified as forest for at least 10 years prior to the project start date; ● Baseline deforestation in the project area falls under the category of planned deforestation/ degradation (VCS APD category); ● Leakage prevention activities do not include: i) Agricultural land that is flooded to increase production (e.g. rice paddies); ii) Intensification of livestock production through the use of feedlots and/or manure lagoons.	Land in the Tapera project area has qualified as forest (following the definition used by the VCS and the Brazilian National Agency definition of forest - SNIF, 2018) for at least the 10 years prior to the project start date. Baseline deforestation in the project area falls into the activity category: planned deforestation/degradation (VCS APD category). Activities to prevent leakage do not include: (i) agricultural land that is flooded to increase production (e.g. paddy rice); ii) Intensifying livestock production through the use of feedlots and/or manure ponds.
VM0007	For Avoided Planned Deforestation: Avoidance of planned	The activity to prevent deforestation and planned

	deforestation/degradation activities are applicable under the following conditions: ● Where conversion of forest land to deforested conditions must be legally permitted. ● Where, prior to the project, unsustainable firewood collection is occurring within project boundaries, the BL-DFW and LK-DFW modules should be used to determine possible leakage.	degradation is applicable, considering that the conversion of forest lands to a deforested condition is legally permitted up to the limit of 20% in relation to the total area of the property, as described in section 2.5.7 National laws and locations (G5.6). No logging is carried out within the Tapera project area.
VMD0001 "Estimation of carbon stocks in above- and below-ground biomass in live tree and non-tree pools" (CP-AB), v1.2	The module allows for the ex-ante estimation of carbon stocks in tree and non- tree above and below ground biomass in the baseline scenario (for both pre- and post-deforestation stocks) and in the project case and for the ex-post estimation of the change in carbon stocks in tree above and below ground biomass in the project case.	This module is applicable to all forest phyto physiognomies and age classes. The inclusion of the above ground tree biomass pool as part of the project boundary is mandatory according to the REDD-MF module.
VMD0005 "Estimation of Carbon Stocks in the Long-Term Wood Products Pool" (CP-W), v1.2	This module allows for the ex-ante estimation of carbon stocks in the long-term wood products pool in the baseline scenario. The carbon stocks addressed here are those remaining in wood products after 100 years; most of the emissions associated with harvesting, processing and waste of wood and eventual removal of products occur within this timeframe, and this module employs the simplifying assumption that the proportion remaining after 100 years is effectively 'permanent'.	This module is applicable to all cases where timber is harvested for conversion into timber products for commercial markets, for all forest phytophysiognomies and age classes. This module is applicable in the baseline, as the wood products pool is included as part of the project boundary, as per applicability criteria in the REDDMF framework module, specifically: ● Timber harvesting occurs before or during the deforestation process, and the timber is destined for commercial markets; ● The wood product pool is determined to be significant (using T GIS).
VMD0006 "Estimating Baseline Carbon Stock Changes and Greenhouse Gas Emissions from Planned Deforestation/Forest Degradation and Planned Wetland Degradation" (BL-PL), v1.4	The module allows you to estimate changes in carbon stock and GHG emissions related to planned deforestation, planned forest degradation, and planned wetland degradation in the baseline scenario.	The module is applicable for estimating baseline emissions on forest lands (usually privately or government owned) that are legally permitted and documented to be converted to non forested lands. Where, pre- project, unsustainable fuelwood collection is occurring within project boundaries, the BL-DFW and LK-DFW modules should be used to determine potential leakage.

VMD0009 "Estimated Emissions from Activity Change to Avoid Planned Deforestation/ Forest Degradation and Avoid Planned Wetland Degradation" (LK-ASP), v1.3	The module allows estimation of GHG emissions caused by activity change leakage from planned deforestation carbon projects. The module is applicable for estimating leakage emissions due to activity change from legally permitted and documented forest lands to be converted to non-forest lands, including activity change to forested wetlands drained or degraded due to project implementation. The module is also applicable for estimating leakage emissions due to activity displacement from legally authorized and documented non-forested wetlands to be converted and degraded. In these situations, the displacement of baseline activities can be controlled and measured directly by monitoring baseline deforestation or wetland degradation agents or class of agents. This tool should be used for projects in areas where planned deforestation occurs in forested wetlands, regardless of the absence of wetland within the project boundary.	The module is mandatory if the BL-PL Module is used to define the baseline, and the applicability conditions in the BL-PL Module must be met in full.
VMD0011 "Estimation of Market Effects Emissions" (LK-ME), v1.2	The module allows estimating GHG emissions caused by leakage from market effects related to timber extraction for wood, fuelwood or charcoal in the baseline for carbon projects. It is applicable for calculating market effects leakage from REDD projects that are expected to reduce timber harvest levels substantially and permanently. Where REDD project activities result in reductions in timber harvest, it is likely that production can be shifted to other areas of the country to compensate for the reduction. As referenced in the Framework (REDD-MF), the module is mandatory where: The deforestation process involves harvesting timber for commercial markets. Baseline is calculated using BL-DFW AND firewood or charcoal is harvested for commercial markets. In all other circumstances, the module should not be used.	The module is mandatory when the deforestation process involves the extraction of timber for commercial markets.
VMD0013 "Estimation of Greenhouse Gas	This module provides a step-by-step approach to estimating greenhouse emissions from biomass and peat burning.	In the baseline scenario, fire is used to clear land, resulting in emissions of CO2, N2O and CH4.

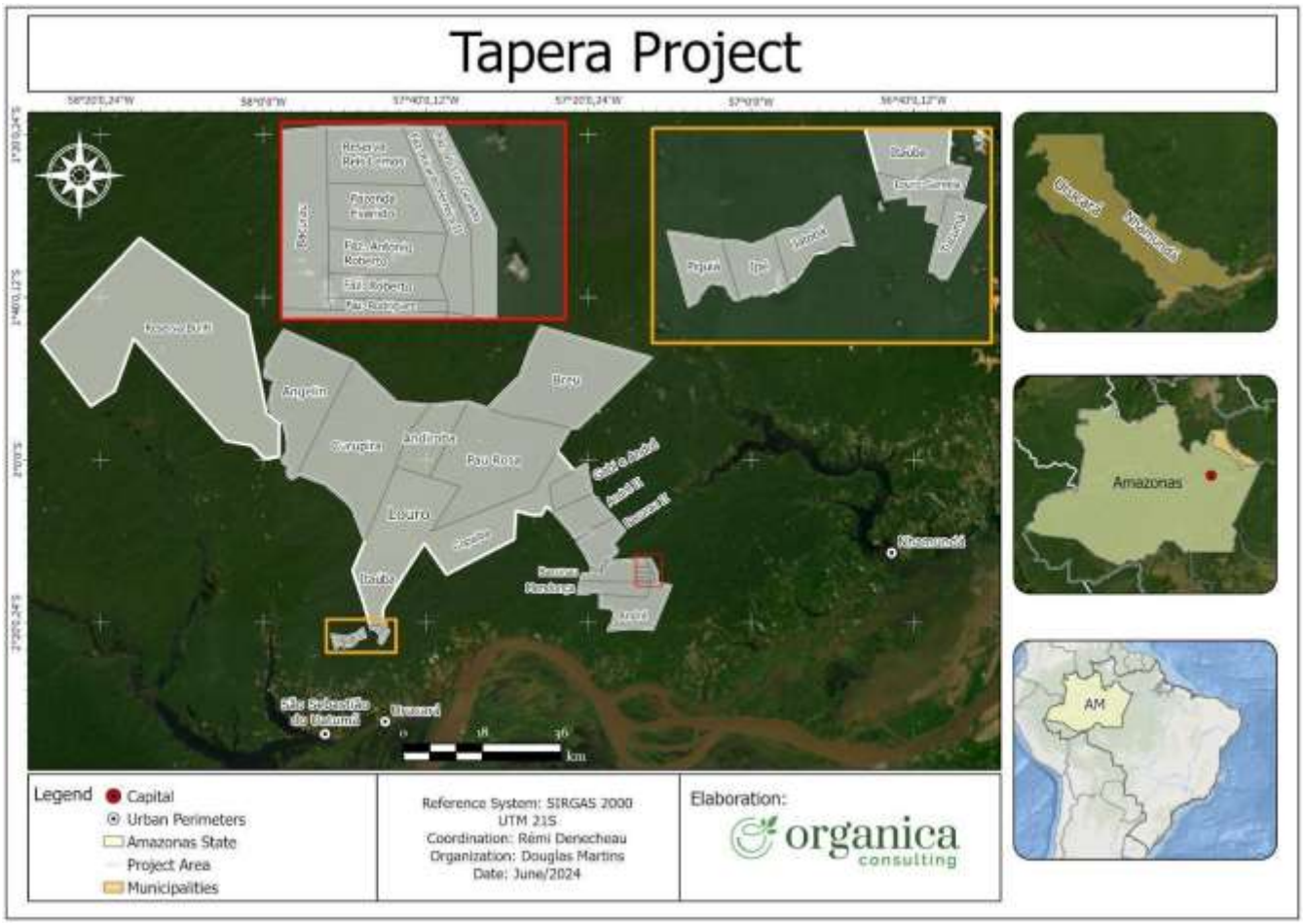
Emissions from Biomass Burning" (E-BB), v1.3	This module is applicable to REDD project activities with emissions from biomass burning and REDD-WRC project activities with emissions from biomass and/or peat burning. This module is also applicable to RWE and ARR-RWE project activities with emissions from peat burning.	When used in the baseline, accounting must occur both under the baseline and in the project scenario and both in the project area and in the leakage belt. Where fires occur ex- post in areas that coincide with deforested or degraded areas in the baseline, the module should be used to account for greenhouse gas emissions.
VMD0016 "Methods for Stratification of project area" (X-STR), v1.3	This module provides guidance on how to stratify the project area into discrete, relatively homogeneous units to improve the accuracy and precision of carbon stock and carbon stock change estimates.	Strata are only used for forest classes under deforestation pressure and are the same in the case of the baseline and project scenario. The post-deforestation (conversion) scenario is not stratified, instead the average of the carbon stock values for post-deforestation land uses is applied observing the guidelines of Modules BLUP and BL-PL.
VMD0017 "Estimation of Uncertainty for REDD Project Activities" (X-UNC), v2.2	The module allows you to estimate uncertainty in baseline estimates and in project estimates of sequestration, emissions, and leakage. The module focuses on the following sources of uncertainty: ● Determination of deforestation and degradation rates; ● Uncertainty associated with estimating carbon stocks and changes in carbon pools; ● Uncertainty associated with estimating peat emissions; ● Uncertainty in assessing project emissions. When an uncertainty value is not known or cannot be simply calculated, the project must justify that it is using an arguably conservative number and an uncertainty of 0% can be used for this component.	This module is mandatory when using the REDD+ MF methodology.
VT0001 "Tool for Demonstrating and Assessing Additionality in Agriculture, Forestry and Other Land Use (AFOLU) Project Activities" (T-ADD), v3.0	● AFOLU activities the same or similar to the proposed project activity on the land within the proposed project boundary, performed with or without registration as a VCS AFOLU project, will not lead to a violation of any applicable law, even if the law is not enforced. ● The use of this tool to determine	● As stated in Section 2.5, the project is in compliance with all relevant laws, statutes and regulatory frameworks. ● The approach to define the baseline scenario using this tool was described in section 3.1.4

		additionality requires that the baseline methodology provide a stepwise approach that justifies the determination of the most plausible baseline scenario. Project proponents proposing new baseline methodologies should ensure consistency between the determination of a baseline scenario and the determination of the additionality of a project activity.	

3.1.3 Project Boundary (VCS, 3.12)

The project area is located in the municipalities of Urucará and Nhamundá (Figure 51). The total area of the properties amounts to **434,010** Hectares and extends along its northern border to the Kaxuyana-Tunayana indigenous land and the Faro state forest. It is bordered to the south by the São Sebastião-Urucará road. To the west is the Maripá River, and to the east is the Nhamundá River.

Figure 41: Map delimiting the area of the Tapera REDD+ Project



Source		Gas	Included	Justification/explanation
Baseline	Biomass burning	CO2	Excluded	Excluded as recommended by the applied methodology. Counted as carbon stock change.
		CH4	Included	Included as non-CO2 emissions from biomass burning in the baseline scenario, according to the methodology.
		N2O	Included	Included as non-CO2 emissions from biomass burning in the baseline scenario, according to the methodology.
		Other	Excluded	No other GHG gases were considered in this project activity.
	Livestock emissions	CO2	Excluded	Not a significant source
		CH4	Excluded	Excluded for simplification. This is conservative
		N2O	Excluded	Excluded for simplification. This is conservative.
		Other	Excluded	No other GHG gases were considered in this project activity.
Project	Biomass burning	CO2	Excluded	No biomass burning increase is predicted to occur in the project scenario compared to the baseline case. Therefore considered insignificant.
		CH4	Included	Included as non-CO2 emissions from biomass burning in the project scenario, according to the methodology.
		N2O	Included	Included as non-CO2 emissions from biomass burning in the project scenario, according to the methodology.
		Other	Excluded	No other GHG gases were considered in this project activity.
	Livestock emission	CO2	Excluded	Not a significant source
		CH4	Excluded	No livestock agriculture increase is predicted to occur in the project scenario compared to the baseline case. Therefore, considered insignificant.
		N2O	Excluded	As above.
		Other	Excluded	No other GHG gases were considered in this project activity.

3.1.4 Baseline Scenario (VCS, 3.13)

Legal Permissibility for Deforestation

Governing Framework

Deforestation within the Tapera project area is governed by the Brazilian Forest Code - Law 12.651/2012. Under this legislation, rural properties located within the Legal Amazon are obligated to maintain 80% of native forest cover as a Legal Reserve (RL).

Permissible Limits

The law permits deforestation of up to 20% of the total property area for alternative land uses. This conversion is considered legal as long as it does not encroach upon designated Permanent Preservation Areas (APP).

Application to the Tapera Project

The Tapera project proposes to convert forest land equivalent to 20% of the property area, strictly adhering to the legal allowance. The request for vegetation suppression has been officially submitted and filed with the authorities and is currently awaiting approval.

The planned deforestation is legally permissible under national law, and the necessary legal procedures to obtain authorization have been initiated.

Suitability of Project Area for Conversion to Alternative Non-Forest Land Use

Evaluation Criteria

The suitability of the Tapera project area for conversion to pasture was assessed based on:

Soil types

Slope and elevation

Vegetation cover

Climatic conditions

Proximity to markets and transportation (e.g., Paratucu River)

Dominant economic activities (livestock and family agriculture)

Proxy Area Comparison

Seven proxy areas were selected using criteria from the VMD0006 tool. These areas matched the Tapera site in:

Vegetation types

Soil and topography

Legal status (private ownership with registered Legal Reserve)

Historical deforestation and land use (primarily for pasture)

The Tapera project area is technically and economically suitable for conversion to alternative land use, with pasture identified as the most probable post-deforestation activity.

Evidence of Intent to Deforest

Agent of Deforestation

The landowners have been identified as the deforestation agents, in compliance with VMD0006 Section 1.1






Formal Documentation

- A request for vegetation suppression has been submitted and officially recorded.
- The request is currently under review by relevant environmental authorities.

There is demonstrable intent to deforest within the Tapera project area, supported by the formal initiation of legal deforestation procedures.

The Tapera project meets all necessary legal and technical conditions to justify planned deforestation under the Avoided Planned Deforestation (APD) methodology. It adheres to national environmental laws, demonstrates intent through official documentation, and confirms the suitability of land conversion through comprehensive analysis of proxy areas.

3.1.5 Additionality (VCS, 3.14)

3.1.5.1 Regulatory Surplus (VCS, 3.14)

Is the project located in an UNFCCC Annex 1 or Non-Annex 1 country?

☐ Annex 1 country ☒ Non-Annex 1 country

Are the project activities mandated by any law, statute, or other regulatory framework?

☐ Yes ☒ No

If the project is located inside a Non-Annex 1 country and the project activities are mandated by a law, statute, or other regulatory framework, are such laws, statutes, or regulatory frameworks systematically enforced?

☐ Yes ☒ No

The Tapera Amazon REDD+ Project operates within a Non-Annex 1 country, under the United Nations Framework Convention on Climate Change (UNFCCC), highlighting its role in a developing country context without the stringent GHG emission reduction commitments faced by Annex 1 countries. Crucially, the project confirms that its activities are not mandated by any local law, statute, or regulatory framework, establishing its actions as voluntary and additional to any existing environmental conservation or climate action mandates.

Furthermore, the project clarifies that even if it were subject to any legal or regulatory requirements, those are not systematically enforced, underscoring the project's efforts as surpassing what is legally required in its operational domain. This ensures the project's contributions towards reducing deforestation and GHG emissions are genuinely additional and voluntary, strengthening its impact on environmental conservation and sustainable development beyond any regulatory obligations.

3.1.5.2 Additionality Methods (VCS, 3.14)

According to the procedure defined in methodology VT0001 v3.0, the most recent version of the tool referenced in the T-ADD was used to identify credible alternative land use scenarios and evaluate the proposed project alternatives and scenarios, and to demonstrate project additionality: "Combined tool to identify baseline scenario and demonstrate additionality in F/R CDM project activities (T-ADD) (v.01)" [61]. The additionality analysis, applying the T-ADD tool (v.1) is presented below for the APD activity.

Step 1. Identification of Alternative Land Use Scenarios for the Proposed AFOLU Project Activity

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

All realistic and credible land use scenarios were identified considering relevant national and/or sectoral policies and circumstances, such as historical land use practices and economic trends. The list

of credible alternative land use scenarios that would have occurred on the land within the project boundary of the VCS AFOLU project is described below:

I. Continuation of the pre-project land use (business as usual)

In the Amazon region, the Brazilian Forest Code (Law No. 12.651/2012) permits landowners to deforest up to 20% of their property for commercial activities, such as timber production and other non-forest economic uses. To carry out deforestation, landowners must submit a vegetation suppression request to the relevant environmental authority, accompanied by a deforestation plan, and obtain authorization through the Single Environmental License LAU. Livestock farming and intensive logging are the primary drivers of deforestation in the region, with the first step often involving clear-cutting and logging. However, only a small portion of the timber (around 35%) is used for long-term products, while the rest is typically burned, contributing significantly to carbon emissions. Since 2018, 645 LAUs have been issued in Amazonas State, with the largest approved deforestation area in 2021 totaling 36,052 hectares[21].

Livestock farming, particularly cattle ranching, has expanded rapidly in the Legal Amazon from 1990 to 2015, outpacing growth in other regions of Brazil[22]. Key factors drisving this expansion include the construction of roads, tax incentives, subsidized rural credit, and favorable climatic conditions. The profitability of cattle ranching in the region is enhanced by low land prices and higher pasture productivity compared to other areas of the country. This rapid growth in livestock production has significantly contributed to deforestation, making the avoidance of planned deforestation a crucial focus of REDD+ projects in the region[23]

II. Project activity on the land within the project boundary performed without being registered as the VCS AFOLU project

In this scenario, landowners maintain the preserved forest area on their property through sustainable practices and proactive monitoring and surveillance measures, prioritizing the legal reserve (80% of the property) and protecting against external land invasions. These measures include patrolling by dedicated employees, satellite monitoring for fire detection via MapBiomas Alert data, and geospatial analysis to identify high-risk areas for potential deforestation. Additionally, leakage control is implemented to prevent carbon loss in adjacent properties, involving cooperation with local stakeholders to promote sustainable land use. However, this approach is entirely financed by the landowners without any additional revenue to support these activities.

[21] https://infoamazonia.org/en/2021/11/19/deforestation-amazon-grows-22-in-2021
[22] https://news.mongabay.com/2009/01/beef-drives-80-of-amazon-deforestation
[23] https://imazon.org.br

III. Logging being conducted through Sustainable Forest management

In the State of Amazonas, logging occurs both legally and illegally, with enforcement of environmental laws often lacking. A study by Sistema de Monitoramento da Exploração de Madeira (Simex) found that 14% of logging in the state was legally approved, while a significant portion of illegal logging occurred on registered rural properties[24] In the Tapera project, landowners are allowed to explore their legal reserve (80% of the property) under sustainable forest management plans, which must be approved by the relevant environmental authorities. These logging activities are subject to regulations but can still be exploited legally within the boundaries of the law.

While forest management to extract timber resources is costly, it could provide revenue for the landowners and increase the value of their land, helping maintain the integrity of the remaining forest area. This activity is a potential but less viable economic scenario for the project area, as the cost of implementing sustainable forest management may outweigh the benefits. However, given the existing infrastructure for timber processing and the growing demand for sustainable products, this option remains plausible. Forest management activities could be conducted within the legal reserve, with the development of a sustainable management plan approved by the competent environmental agency.

remaining forest area. This activity is a potential but less viable economic scenario for the project area, as the cost of implementing sustainable forest management may outweigh the benefits. However, given the existing infrastructure for timber processing and the growing demand for sustainable products, this option remains plausible. Forest management activities could be conducted within the legal reserve, with the development of a sustainable management plan approved by the competent environmental agency.

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Actions to prevent illegal deforestation would be easier to take than such as patrolling and satellite monitoring, maybe not as strong and effective as in scenario (2), but much better than doing nothing as in scenario (1).

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

Considering the three credible alternative land use scenarios from sub-step 1a, a demonstration of compliance with all mandatory applicable legal and regulatory requirements was made in the next paragraphs.

I. Continuation of the pre-project land use (Business as Usual Scenario)

[24] https://www.brasildefato.com.br/2024/08/16/illegal-logging-in-the-state-of-para-rose-by-22-in-a-year

Maintaining the planned activities for the project area before the Tapera project, the landowners would continue to be in accordance with the pertinent legislation, already detailed in Section 2.1.9. All landowners have the rights to explore 20% of their lands in the most appropriate way they decide to, according to the Brazilian Forest Code, that is the plan to do and would continue to execute in this scenario. The planned activities for the project area involves the suppression of the vegetation followed by non-forest economic uses (e.g., cattle ranching and soybeans production).

II. Project activity on the land within project boundary performed without being registered as the VCS AFOLU project.

In terms of compliance, in the same way as scenario (I) both landowners from the Tapera project comply with the legality already described in Section 2.1.9. Besides the economic activities done in 80% of their lands, the additional activities executed to avoid invaders do not imply compliance with any legislation that has not already been complied with.

III. Logging being conducted through Sustainable Forest management

The Brazilian Forest Code (Law Nº 12,651, 2012, Brasil (2012b)) allows forest management practices inside the LR area of rural property, and there is no legal boundary to implement sustainable forest management practices in 20% of the property, after a Sustainable Forest Management Plan has been approved, meaning that additional revenues could be generated by the landowner. Some important articles state that:

Art. 17. The Legal Reserve must be conserved with native vegetation cover by the rural property owner, owner or occupant in any capacity, individual or legal entity, public or private law.

§ 1 The economic exploitation of the Legal Reserve is admitted through management sustainability, previously approved by the competent body of SISNAMA, in accordance with the modalities provided for in art. 20.

Art. 20. In the sustainable management of the forest vegetation of the Legal Reserve, practices of selective exploitation adopted in the modalities of sustainable management without purpose commercial for consumption on the property and sustainable management for forest exploitation with commercial purpose.

Art. 22. Sustainable forest management of the Legal Reserve vegetation with purpose commercial activity depends on authorization from the competent body and must comply with the following guidelines:

- do not de-characterize the vegetation cover and do not harm the conservation of the native vegetation of the area;
- ensure the maintenance of species diversity;

- conduct the management of exotic species with the adoption of measures that favor the regeneration of native species.

Step 2. Investment analysis

The Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities — VT0001 requires Step 2 (investment analysis) or Step 3 (barrier analysis) to be carried out for the development of the additionality analysis. In this case, the barrier analysis was selected and is developed below

.Step 3. Barrier Analysis

(As per VT0001 v3.0 – Additionality Tool)

To determine whether the proposed REDD project activity would not have occurred in the absence of the revenue from the sale of VCUs, we apply the barrier analysis. The following three alternative land-use scenarios were identified in Sub-step 1a:

Scenario I – Continuation of the pre-project land use (i.e., natural forest cover remains untouched, without any formal conservation commitment)

Scenario II – Legal deforestation of up to 20% of the property, as permitted by Brazilian Forest Code

Scenario III – Sustainable logging conducted under a Sustainable Forest Management (SFM) plan

Each scenario is assessed below in relation to the key financial, institutional, and social barriers present in the project area.

Barrier Assessment for Scenario I: Continuation of Pre-Project Land Use

Scenario I assumes that the land remains in its pre-project state — intact forest cover — without implementation of either the project activity or any alternative land use. This scenario faces **multiple binding barriers**:

Investment Barrier: There are no financial incentives or revenue streams for maintaining the forest without a project. Conservation is not commercially viable in the region.

Institutional Barrier: Weak enforcement of forest protection means the forest is vulnerable to informal or illegal clearing, even if landowners opt not to use the land.

Opportunity Cost Barrier: Landowners face significant opportunity costs in not converting legally allowed portions of their land (up to 20%) to cattle or other uses.

Conclusion: Scenario I is **not a viable baseline** due to a lack of economic motivation and institutional support to maintain intact forest cover.

Barrier Assessment for Scenario II: Legal Deforestation (Planned Land Conversion)

Scenario II represents legal deforestation of 20% of the land, in line with Brazil's Forest Code. This scenario:

Has a strong legal foundation.

Is consistent with historical land-use practices in the region.

Faces **no significant financial, social, or institutional barriers** to implementation.

Conclusion: Scenario II is **viable and realistic**, and is the **most plausible baseline scenario**. It aligns with landowner intentions in the absence of carbon finance.

Barrier Assessment for Scenario III: Sustainable Forest Management (SFM)

Scenario III assumes that landowners would pursue sustainable timber harvesting under a regulated SFM framework. While this scenario may be **technically feasible**, it faces substantial **economic and practical barriers** in this region:

Financial Barrier: SFM requires upfront investment and specialized technical capacity that is absent locally. Market access for certified or legal timber is also limited.

Cultural and Institutional Barriers: There is limited precedent or incentive for landowners to pursue regulated SFM, which is more complex and less profitable than ranching or legal clearing.

Absence of Support Programs: There are no public or private programs currently supporting widespread implementation of SFM in the project region.

Conclusion: Scenario III is **not a viable baseline** due to economic infeasibility, lack of support infrastructure, and low local uptake.

Overall Conclusion

Among the three land-use scenarios considered, only **Scenario II (legal deforestation of 20%)** is both financially and institutionally feasible. Scenarios I and III face substantial barriers that would prevent their implementation in the absence of revenue from carbon credits.

Therefore, in accordance with VT0001 v3.0, **Scenario II is selected as the most plausible baseline scenario**.

Step 4. Common practices analysis

In Brazil, there are limited legal and regulated mechanisms that effectively prevent legal deforestation on private properties, with the Environmental Reserve Quota (CRA) being one such mechanism. Established under the 2012 Brazilian Forest Code and regulated in 2018, CRAs allow property owners with "excess" Legal Reserve to sell quotas to those with a "deficit" in the same biome. However, this mechanism is limited in the Amazon, as forest cover exceeds the required 80%, leading to low demand and a limited supply of bonds. Furthermore, CRAs do not address forest carbon stocks, making them distinct from carbon offset projects like REDD+, which focus on reducing GHG emissions. The CRA mechanism's impact in the Amazon is minimal, with only 55 CRAs offered in the entire state of Amazonas and 110 for the Amazon biome.

Conservation on private lands is rare in Amazonas, with most conservation efforts occurring in public conservation units or through state-imposed measures. Legal mechanisms such as the RPPN (Private

Reserve of Natural Heritage) and environmental servitudes can promote conservation but are less effective than REDD+ projects. RPPNs offer benefits like tax exemptions and priority for funding but are ineffective in curbing local deforestation due to the high opportunity costs of agriculture and livestock farming. Similarly, environmental servitude provides limited financial incentives for conservation. Although Payment for Environmental Services (PES) mechanisms, including those linked to the Amazon Fund, exist in Amazonas State, they remain at a very early stage of implementation and have not led to widespread forest conservation on private lands. These mechanisms face significant limitations in terms of funding, institutional support, and legal enforceability. As such, PES initiatives are not representative of common land-use practices in the region and do not undermine the additionality of the proposed project activity. Instead, they demonstrate the systemic challenges in implementing conservation at scale, further validating the need for market-based REDD+ approaches supported by VCU revenue. A recent systematic review of Payment for Environmental Services (PES) schemes in Brazil highlights significant conceptual and operational limitations that further distinguish such schemes from the proposed REDD project activity. The review found that many PES initiatives are developed through complex frameworks lacking clarity in the definition of key terms, payment conditions, and the specific ecosystem services targeted. Approximately one-third of all reviewed PES schemes failed to clearly define the services being paid for, and most lacked conditionality—i.e., actual payments were not directly tied to measurable provision of environmental services. This ambiguity, particularly in schemes focused on the Amazon biome, has undermined their environmental effectiveness and consistency. Moreover, the absence of standardized terminology and methodologies has hampered the development of coherent public policies and impeded the broader adoption of PES mechanisms[25]. In contrast, the proposed REDD project is implemented under a rigorous and internationally recognized standard (VM0007, VCS), with clearly defined carbon benefits, enforceable conditionality, and independent verification. These structural differences confirm that PES, as it currently exists in Brazil, does not represent a widespread or effective conservation strategy and cannot be considered common practice in the project region.

Therefore, the proposed VCS REDD+ AFOLU project is considered additional, as it presents a more effective and structured approach to forest conservation compared to existing mechanisms, addressing both deforestation prevention and carbon emissions reduction with a comprehensive monitoring and verification system.

3.1.6 Methodology Deviations (VCS, 3.20)

The Tapera project has no methodology deviations.

[25] Paula Karen Mota, Adriana Monteiro da Costa, Rachel Bardy Prado, Luís Filipe Sanches Fernandes, Teresa Cristina Tarlé Pissarra, Fernando António Leal Pacheco, Payment for Environmental Services: A critical review of schemes, concepts, and practice in Brazil, Science of The Total Environment, Volume 899, 2023,165639, ISSN 0048-9697,https://doi.org/10.1016/j.scitotenv.2023.165639.

3.2 Quantification of Estimated GHG Emission Reductions and Removals

3.2.1 Baseline Emissions (VCS, 3.15)

Baseline emissions are estimated according to VM0007 v1.7 - REDD+ Methodology Framework (REDD+ MF) and VMD0006 v1.3 - Estimation of baseline carbon stock changes and greenhouse gas emissions from planned deforestation/forest degradation and planned wetland degradation (BL-PL). This module allows estimating GHG emissions related to planned deforestation on forest lands that are legally authorized and documented to be converted to non-forest land. As presented in Section 2.2, these areas would be deforested in the absence of the REDD project activity and converted to pasture for cattle raising, as presented in Table below.

Table- Stratum of the Tapera project.

LEG	VEGETATION CLASS	AREA (ha)	AREA (%)	AREA PER FOREST (%)
Aac	Open Alluvial Ombrophylous Forest w Lianas	10263,97	2,366	2,468
Aap	Open Alluvial Ombrophylous Forest w Palm Trees	442,03	0,102	
Dau	Dense Alluvial Ombrophilous Forest w Uniform Canopy	765,52	0,176	0,176
Dsu	Dense Submontane Ombrophylous Forest w Uniform Canopy	1219,98	0,281	0,281
Dbe	Dense Ombrophilous Lowlands Forest w Emergent Canopy	18937,44	4,366	97,074
Dbu	Dense Ombrophilous Lowlands Forest w Uniform Canopy	402120,24	92,708	
	Total Area	433749,18	100,00	100,00

We can define 4 main different strata, with the following repartition and classification:

Following existing literature, we can estimate each stratum as follow:

Name of the phytofisionomy	Above Ground carbon stock	Under Ground carbon stock	Died Wood carbon stock	Litter carbon stock	Total Carbon stock
Aa	117,3	11 ,7	9,5	6,8	145,3
Da	90,5	28,1	8,5	3,6	130,7
Ds	139,3	43,2	13,1	5,6	201,1
Db	128,3	39,8	12,1	5,2	185,3

We consider only Above Ground and Underground stocks :

Name of the phytofisionomy	Above Ground carbon stock	Under Ground carbon stock	Total estimated Carbon stock	% per forest
Aa	117,3	11 ,7	129,0	2,47
Da	90,5	28,1	118,6	0,18
Ds	139,3	43,2	182,5	0,28
Db	128,3	39,8	168,1	97,07

The proportion of stratas Da and Ds is very small, so they are insignificants in the calculation. We consider Da (Dense Alluvial Ombrophylous Forest) as AA (Open Alluvial Ombrophylous Forest), and we consider Ds (Dense Submontane Ombrophilous Forest) as Db (Dense Ombrophylous Lowlands Forest), and consider the following strata repartitions for carbon calculation :

Name of the phytofisionomy	Above Ground carbon stock	Under Ground carbon stock	Total estimated Carbon stock	% per forest
Aa	117,3	11 ,7	129,0	2,65
Db	128,3	39,8	168,1	97,35

Net carbon stock changes and GHG emissions from the project were calculated using two modules of the VM0007 methodology. To estimate baseline emissions related to APD areas, module VMD0006 "Estimating baseline changes in carbon stock and GHG emissions from planned forest clearing/degradation and planned wetland degradation (BL-PL)" was used. APD areas comprise forest land on which proponents can apply for permission to clear forest areas (20% of the property according to the legal limit prescribed in the Brazilian Forest Code).

The annual area of baseline planned deforestation (AAplanned,i,t) is calculated according to VMD0006 BL- PL v1.3 (Equation 1):

$AAplanned,i,t = (Aplanned,i * D\%planned,i,t) * L - Di$ Equation 1

Where:

AAplanned,i,t

Annual area of baseline planned deforestation for stratum i at time t; ha.

Aplanned,i Projected annual proportion of land that will be deforested in stratum i during year t; ha

D%planned,i,t Total area of planned deforestation over the baseline period for stratum i; ha.

L − Di Likelihood of deforestation for stratum i; %.

The total area of planned deforestation over the baseline period (Aplanned) is determined according to what is recognized as an immediate site-specific threat of deforestation, which, in its turn, is a function of the legal permissibility for deforestation. In our recent study involving the analysis of various proxies, we calculated a deforestation rate of 6.29%. However, for the purposes of our draft suppression plan, we have decided to apply a more conservative rate of 5% per year. This rate is consistent with the findings from the study of proxies, allowing for a balanced approach between environmental conservation and legal feasibility. For a complete discussion of the $AAAAAAAA$ determination, see Section 3.1.4. The Aplanned,I was considered to be 80,619 ha. The projected annual proportion of land that will be deforested in stratum i during year t (D%planned,t) is determined according to vegetation suppression

authorizations issued by the competent environmental agencies in each state. These authorizations should be viewed as verified plans with known and recorded actual annual deforestation proportions. According to the specifications of VMD0006 v1.3, L − Di is set to 100% because only private areas are included by the project. The total area of planned deforestation over the baseline period (Aplanned,i,t) in the project area is determined according to what is recognized as a site-specific immediate deforestation threat, which in turn is a function of the legal permissibility for deforestation, the suitability of the project area for conversion to alternative non-forest land use, government approval for deforestation and a management plan for the deforestation of the project area. For details on the determination Aplanned,i,t, see section **3.1.4.**

Change in Carbon Stock in the Baseline Scenario

This section presents a reservoir's expected changes in carbon stocks in the baseline scenario. Initial stocks and stocks in post- deforestation are obtained by peer-reviewed literature. This parameter will be updated when the Tapera project biomass inventory is made in the project area.

The project is located in the Amazon Biome, Amazonas, Brazil. Based on the correlation between geospatial data (BDiA, 2022c)[26] and biomass data from the Amazon biome published in the literature (Nogueira et al., 2015)[27], biomass was estimated in the project region. In the project area, only one stratum was identified, namely the Dense Lowland Ombryphilous forest (Db). According to Nogueira et al. (2015)[28], the average biomass values of this stratum of the Amazon Forest are shown in Table 37. As already seen, after deforestation, the area would possibly become pasture, so post-deforestation values were considered pasture biomass according to Silva Neto et al. (2012)[29]

Aboveground Tree Biomass

The baseline carbon stock change in aboveground tree biomass (ΔCABtree,i) is calculated according to the difference between the forest carbon stock in aboveground tree biomass ($C_{ABtree,bsl,I}$) and the post-deforestation carbon stock in aboveground tree biomass (CABtreepost,i), according to VMD0006 v1.3 (Equation 2)

ΔCABtree,I = CABtree bsl ,I − CABtreepost,i Equation 2

[26] *Considering the conversion factor for a 95% confidence interval of 1.96. Note: SD – standard deviation; $\sigma\bar{x}$ – standard error -*

[27]

[28] Idem

[29]

Where:

ΔCABtree,i Baseline carbon stock change in aboveground tree biomass in stratum i; t CO2- e ha-1

CABtreebsl,i Forest carbon stock in aboveground tree biomass in stratum i; t CO2-e ha-1

CABtreepost,i Post-deforestation carbon stock in aboveground tree biomass in stratum i; t CO2-e ha-1

i 1, 2, 3, … M strata

Forest carbon stock in aboveground tree biomass (CABtree,bsl) was estimated based on peer-reviewed literature (Nogueira et al., 2015). The carbon component of dry matter of 0.47 t C t d.m-1 is used when converting biomass measured in Mg ha-1 to t C ha-1 (IPCC, 2006b). The value of t CO2-e ha-1 was obtained considering the molar weight of CO2 (44 g mol-1) divided by C (12 g mol-1) Equation 3.

$$C_{AB_{tree\ bsl}}{}_{,i} = \text{ab} * \text{CF} * \frac{44}{12}$$

Equation 3

Where:	
CAB_tree, bsl, i	Forest carbon stock in aboveground tree biomass in stratum i; t CO2-e ha-1
ab	Average biomass stock per hectare in the aboveground biomass pool of initial forest class i; Mg ha-1
CF	Default value of carbon fraction in biomass CF = 0.47 t C d.m-1 (IPCC, 2006b)
44/12	Ratio converting C to CO2-e

Post-deforestation carbon stock in aboveground tree biomass (CABtreepost,) is taken from peer reviewed literature (Silva Neto et al., 2012) considering an average degradation and the total dry mass.

Belowground Tree Biomass

Quantifying belowground tree biomass is also recommended, as it generally represents between 15% and 30% of aboveground biomass. The baseline carbon stock change in belowground tree biomass

(ΔCBB_tree,i) is calculated according to the difference between the forest carbon stock in the belowground tree (CBBtreebsl,i) and the post-deforestation carbon stock in belowground tree biomass (CBBtree post,i), according to VMD0006 v1.3, Equation 4:

$$\Delta C_{BB\_tree,i} = C_{BB_{tree_{bsl},i}} - C_{BB_{tree_{post},i}}$$

Equation 4

Where:

ΔCBB_tree,i	Baseline carbon stock change in belowground tree biomass in stratum i; t CO2- e ha^{-1}
CBBtreebsl,i	Forest carbon stock in belowground tree biomass in stratum i; t CO2-e ha^{-1}
CBBtreepost,i	Post-deforestation carbon stock in belowground tree biomass in stratum i; t CO2- e ha^{-1}
i	1, 2, 3, … M strata

The aboveground is converted into belowground biomass through a root-shoot ratio. The value used for the ratio of belowground biomass to aboveground biomass was 0.221 for the tropical forest of natural origin, according to the updated IPCC report (IPCC, 2019). The average carbon stock per hectare in belowground tree biomass in stratum i is determined by Equation 5.

$$C_{BB\_tree,bsl,i} = bb * CF * \frac{44}{12}$$

Equation 5

Where:	
CBB_tree,bsl,i	Forest carbon stock in belowground tree biomass in stratum i; t CO2-e ha^{-1}
Bb	Average biomass stock per hectare in the belowground biomass pool of initial forest class i; Mg ha-1

CF	Default value of carbon fraction in biomass CF = 0.47 t C d.m-1 (IPCC, 2006b)
44/12	Ratio converting C to CO2-e

Post-deforestation carbon stock in belowground tree biomass (CBBtree,post) is taken from peer-reviewed literature (Silva Neto et al., 2012).

Wood Products

The harvested trees would have been made into sawnwood, typical for the tropical hardwood species in Amazonas State. Baseline carbon stock change in wood products (AAA, Equation 6) is calculated through commercial inventory estimation, according to VMD0005 v1

$$C_{WP,i} = \sum_{ty=s,w,oir,p,o} C_{XB,ty,i} * (1 - WW_{ty})$$

Equation 6

- **Where:**

CWP,i Carbon stock entering the wood products pool from stratum i; t CO2-e ha-1
Mean stock of extracted biomass carbon by class of wood product ty from stratum i; t CO2-e ha-1
Wood waste. The fraction immediately emitted through mill inefficiency by class of wood product ty; dimensionless

WWty = 0.24 (Pearson et al. (2012), page 8)[30]

ty Wood product class – defined here as sawnwood (s), wood-based panels (w), other industrial roundwood (oir), paper and paper board (p), and other (o)
i 1, 2, 3, … M strata

The wood waste (WWty) is taken from peer-reviewed literature (Pearson et al., 2012)[31]. The mean stock of extracted biomass carbon by class of wood product (CXB,y,i, Equation 7) is calculated according to VMD0005 v1.1:

30

$$C_{XB,i,ty,i} = \frac{1}{A_i} * \sum_{j=1}^{S} (V_{ex,ty,j,i} * D_j * CF_j * \frac{44}{12})$$

Equation 7

- **WHERE:**

CXB,i,ty,i	Mean stock of extracted biomass carbon by class of wood product ty from stratum i; t CO2-e ha^{-1}
Ai	Total area of stratum i; ha
Vex,ty,j,i	Volume of timber extracted from within stratum i (does not include slash left onsite) by species j and wood product class ty; m3 Vex,ty,j,i =38.3 m3 ha-1 ((da SILVA et al., 2001; Veríssimo et al., 1992), Table 1
Dj	Mean wood density of species j; t d.m.m-3
CFj	Carbon fraction of biomass for tree species j; t C t-1 d.m.
j	1, 2, 3, … S tree species
ty	Wood product class – defined here as sawnwood (s), wood-based panels (w), other industrial roundwood (oir), paper and paper board (p), and other (o)
44/12	Ratio of molecular weight of CO2 to carbon; t CO2-e t C^{-1}

The carbon entering the wood products pool at the time of deforestation that is expected to be emitted over 100 years (CWP100,, Equation 8) is calculated according to VMD0005 v1.1. The fraction of wood products that will be emitted into the atmosphere within 5 years (SLFty) and between 5 and 100 years (Ofty) of timber harvest is taken from peer-reviewed literature (Pearson et al., 2012; Winjum et al., 1998). culated according to VMD0005 v1.1. The fraction of wood products that will be emitted into the atmosphere within 5 years (SLFty) and between 5 and 100 years (Ofty) of timber harvest is taken from peer-reviewed literature (Pearson et al., 2012; Winjum et al., 1998).

$$C_{WP100,i} = C_{WP,i} - C_{WP,i} * (1 - SLF_p) * (1 - Of_p)$$

[31] Idem

Equation 8

Where:	
CWP100,i	Carbon stock entering the wood products pool at the time of deforestation that is expected to be emitted over 100 years from stratum i; t CO2-e ha-1
CWP,i	Carbon stock entering wood products pool at time of deforestation from stratum i; t CO2-e ha-1
SLFty	Fraction of wood products that will be emitted to the atmosphere within 5 years of timber harvest by class of wood product ty; dimensionless SLFty = 0.2 (page 276, Winjum et al. (1998) and Pearson et al. (2012))
Ofty	Fraction of wood products that will be emitted to the atmosphere between 5 and 100 years of timber harvest by class of wood product ty; dimensionless OFty= 0.8 (page 276, Winjum et al. (1998) and Pearson et al. (2012))
ty	Wood product class – defined here as sawnwood (s), wood-based panels (w), other industrial roundwood (oir), paper and paper board (p), and other (o)
i	1, 2, 3, … M strata

Carbon Stock Change in All Pools in the Baseline Scenario

The net carbon stock changes in all pools in the baseline (ΔCBSL,,t) is calculated according to the following Equation 9 from VMD0006 v1.3. Conservatively, the parameters ΔCABnon−tree,, ΔCLI,i, ΔCBBnon−tree,i,ΔCDW,, ΔCSOC,i have been left out of calculations as they are not included in the project boundary.

$$\Delta C_{BSL,i,t} = AA_{planned,i,t} * (\Delta C_{ABtree,i} - \Delta C_{WP,i} + \Delta C_{ABnon-tree,i} + \Delta C_{LI,i}) + \left(\sum_{t-10}^{t} AA_{planned,i,t}\right) * (\Delta C_{BBtree,i} + \Delta C_{BBnon-tree,i} + \Delta C_{DW,i}) * \left(\frac{1}{10}\right) + \left(\sum_{t-20}^{t} AA_{planned,i,t}\right) * (C_{WP100,i} + \Delta C_{SOC,i}) * \left(\frac{1}{20}\right)$$

Equation 9

Where:	

ΔCBSL,i,t	Sum of the baseline carbon stock change in all terrestrial pools in stratum i in year t, t CO2-e
AAplanned,i,	Annual area of baseline planned deforestation for stratum i in year t; ha
CWP100,i	Carbon stock entering the wood products pool at the time of deforestation that is expected to be emitted over 100 years from stratum i; t CO2-e ha^{-1}
ΔCABtree,i	Baseline carbon stock change in aboveground tree biomass in stratum i; t CO2- e ha^{-1}
ΔCBBtree,i	Baseline carbon stock change in belowground tree biomass in stratum i; t CO2-e ha^{-1}
ΔCABnon−tree ,i	Baseline carbon stock change in aboveground non-tree biomass in stratum i; t CO2-e ha-1
ΔCBBnon−tree ,i	Baseline carbon stock change in belowground non-tree biomass in stratum i; t CO2-e ha-1
ΔCWP,i	Baseline carbon stock change in wood products in stratum i; t CO2-e ha-1
ΔCDW,i	Baseline carbon stock change in dead wood in stratum i; t CO2-e ha-1
ΔCLI,i	Baseline carbon stock change in litter in stratum i; t CO2-e ha-1
ΔCSOC,i	Baseline carbon stock change in soil organic carbon in stratum i; t CO2-e ha-1
i	1, 2, 3, … M strata
t	1, 2, 3, … t* years elapsed since the projected start of the project activity

Stock changes in aboveground biomass and litter are emitted at the time of deforestation. Following deforestation, emissions from belowground biomass, dead wood, soil and wood products take place gradually over time. Stock changes in belowground biomass and dead wood are emitted at an annual rate of 1/10 of the stock change for 10 years, and at an annual rate of 1/20 of the stock change for 20 years for soil organic carbon (for non-wetland soils). Carbon stocks entering the wood products pool at the time

of deforestation and that are expected to be emitted over 100-years are emitted at an annual rate of 1/20 of the stock for 20 years. Thus, for a given year t, emissions are summed across areas deforested from time t-10 up to time t (for belowground biomass and dead wood) and from time t-20 up to time t (for soil organic carbon and wood products), in the Equation 9.

Non-CO2 Emissions in the Baseline Scenario

Greenhouse gas emissions in the baseline resulting from deforestation activities within the project area ($AAAAAA,,A$) are calculated using Equation 10, according to VMD0006 v1.3.

Greenhouse gas emissions in the baseline resulting from deforestation activities within the project area ($GHG_{BSL,i,t}$) are calculated using Equation 10, according to VMD0006 v1.3.

$$GHG_{BSL,i,t} = E_{FC,i,t} + E_{BiomassaBurn,i,t} + N_2O_{direct-N,i,t} \quad \text{Equation 10}$$

Where:

$GHG_{BSL,i,t}$	Greenhouse gas emissions as a result deforestation activities within the project boundary in the stratum *i* in year *t*; t CO_{2-e}
$E_{FC,i,t}$	Net CO_{2-e} emission from fossil fuel combustion in stratum *i* in year *t*; t CO_{2-e}
$E_{BiomassaBurn,i,t}$	Non-CO_2 emissions due to biomass burning in stratum *i* in year *t*; t CO_{2-e}
$N_2O_{direct-N,i,t}$	Direct N_2O emission as a result of nitrogen application on the alternative land use within the project boundary in stratum *i* in year *t*; t CO_{2-e}
i	1, 2, 3, ... M strata
t	1, 2, 3, ...t* years elapsed since the start of the REDD VCS project activity

The baseline scenario conservatively excludes nitrogen application ($N_2O_{direct-N,i,t}$) and net CO_{2e} emissions from burning fossil fuels ($E_{FC,i,t}$) i . Hence, non-CO_2 emissions due to biomass burning ($E_{BiomassBurn,i,t}$) are calculated according to VMDU013 v1.2 (Equation 11). For that, The area burnt ($A_{burn,i,t}$) equal to annual area of baseline planned deforestation in the baseline case ($AA_{planned,i,t}$). Combustion and emission factors and global warming potential are default values adopted and taken from IPCC reports (IPCC, 2006a, 2014).

$$E_{biomassbur\,n,i,t} = \sum_{g=1}^{G} \left(\left(A_{burn,i,t} * B_{i,t} * COMF_i * G_{g,i} \right) * 10^{-3} \right) * GWP_g \qquad \text{Equation 11}$$

Where:

$E_{biomassbur\,n,i,t}$	Greenhouse gas emissions due to biomass burning in stratum i in year t of each GHG (CO_2, CH_4, N_2O); t CO_{2e}
$A_{burn,i,t}$	Area burnt for stratum i in year t; ha
$B_{i,t}$	Average aboveground biomass stock before burning stratum i in year t; t d.m. ha^{-1}
$COMF_i$	Combustion factor for stratum i; unitless $COMF_i$ = 0.59 (Table 2.6, page 2.55, IPCC (2006a))
$G_{g,i}$	Emission factor for stratum i for gas g; kg t^{-1} d.m. burnt G_{g,CH_4} = 6.8 kg t^{-1}, G_{g,NO_2} = 0.2 kg t^{-1} (Table 2.5, page 2.54, IPCC (2006a))
GWP_g	Global warming potential for gas g; t CO_2/t gas g GWP_{CH_4} = 28 t CO_2 t_{gas}^{-1}, GWP_{NO_2} = 265 t CO_2 t_{gas}^{-1} (Box 3.2, Table 1, page 87, IPCC (2014) and Grennhouse (2014))
g	1, 2, 3 ... g greenhouse gases including carbon dioxide, methane and nitrous oxide; unitless
i	1, 2, 3, ... M strata
t	1, 2, 3, ... t* time elapsed since the start of the project activity; years

The average aboveground biomass stock before burning ($B_{i,t}$) is calculated according to VMD0013 v1.2 adjusted to reflect methodological deviation (Equation 12).

$$B_{i,t} = \left(C_{AB_{tree},i,t} + C_{DW_{i,t}} + C_{LI_{i,t}}\right) * \frac{12}{44} * \frac{1}{CF} \qquad \text{Equation 12}$$

Where:

$B_{i,t}$	Average aboveground biomass stock before burning for stratum *i*, year *t*; tonnes d.m. ha^{-1}
$C_{AB_{tree},i,t}$	Carbon stock in aboveground biomass in trees in stratum *i* in year *t*; t CO_{2-e} ha^{-1})
$C_{DW_{i,t}}$	Carbon stock in dead wood for stratum *i* in year *t*; t CO_{2-e} ha^{-1}
$C_{LI_{i,t}}$	Carbon stock in litter for stratum *i* in year *t*; t CO_{2-e} ha^{-1}
$\frac{12}{44}$	Inverse ratio of molecular weight of CO_2 to carbon; t CO_{2-e} t C^{-1}
$\frac{1}{CF}$	Carbon fraction of biomass; t C t^{-1} d.m. CF = 0.47 t C t^{-1} d.m. (pg. 4.48, Table 4.3, IPCC (2006b))
i	1, 2, 3, ... M strata
t	1, 2, 3, ... t* time elapsed since the start of the project activity; years

Table 44 shows the parameters used in calculating biomass burning for the baseline scenario, as well as results accounted for CH_4 and N_2O emissions generated and the average aboveground biomass stock before burning for stratum Ds.

Net GHG emissions in the Baseline Scenario

The baseline net GHG emissions for planned deforestation (Equation 13) is determined according to VMD0006 BL-PL v1.3.

$$\Delta C_{BSL,planned} = \sum_{t=1}^{t^*}\sum_{i=1}^{M}\left(\Delta C_{BSL,i,t} + GHG_{BSL-E,i,t}\right) \qquad \text{Equation 13}$$

Where:

$\Delta C_{BSL,planned}$	Net greenhouse gas emissions in the baseline from planned deforestation up to year t^*; t CO_{2-e}
$\Delta C_{BSL,i,t}$	Net carbon stock changes in all pools in the baseline stratum *i* in year *t*; t CO_{2-e}
$GHG_{BSL-E,i,t}$	Greenhouse gas emissions as a result of deforestation activities within the project boundary in the baseline stratum *i* in year *t*; t CO_{2-e} yr^{-1}.
i	1, 2, 3, ... M strata
t	1, 2, 3, ... t* time elapsed since the start of the project activity; years

Table 4510 presents all values for net carbon stock changes in all pools in the baseline stratum Ds in year t, greenhouse gas emissions as a result of deforestation activities within the project boundary in the baseline stratum Ds in year t and, finally, the net greenhouse gas emissions in the baseline from planned deforestation up to year t.

3.2.2 Project Emissions (VCS, 3.15)

Expected project emissions are estimated ex-ante and apply Equation 14 of module M-MON (VMD0015 v2.3) of Methodology VM0007. Ex-ante projections of deforestation in the project case assume no deforestation have taken place as one of the project proponents is the baseline agent of deforestation and has committed to not undertake land clearing on the property.

$$\Delta C_{WPS-REDD} = \sum_{t=1}^{t*} \sum_{i=1}^{M} (\Delta C_{P,DefPA,i,t} + \Delta C_{P,Deg,i,t} + \Delta C_{P,DistPA,i,t} + GHG_{P-E,i,t} - \Delta C_{P,Enh,i,t}) \quad \text{Equation 14}$$

Where:

ΔCWPS−REDD	Net GHG emissions in the REDD project scenario up to year t*; t CO2-e
ΔCP,DefPA,i,t	Net carbon stock change as a result of deforestation in the project area in the project case in stratum i in year t; t CO2-e
ΔCP,Deg,i,t	Net carbon stock change as a result of degradation in the project area in the project case in stratum i in year t; t CO2-e
ΔCP,DistPA,i,t	Net carbon stock change as a result of natural disturbance in the project area in the project case in stratum i in year t; t CO2-e
$GHGP-E,i,t$	Greenhouse gas emissions as a result of deforestation and degradation activities within the project area in the project case in stratum i in year t; t CO2-e
ΔCP,Enh,i,t	Net carbon stock change as a result of forest growth and sequestration during the project in areas projected to be deforested in the baseline* in stratum i in year t; t CO2-e . For areas with a degradation baseline (i.e. using Module BL-DFW) this parameter shall be set to zero, for areas with baseline set by Module BL-UP and Module BL-PL this parameter may be conservatively set to zero.
i	1, 2, 3, … M strata
t	1, 2, 3, … t* years elapsed since the start of the project activity

In the case of an identified deforestation agent, the agent has committed not to deforest, collect firewood, or remove wood from the forests in the project area. Thus, these actions are expected to prevent degradation by illegal actors, and ex-ante degradation is estimated as zero (ΔCP,eg,i,t = 0).

Amazon forests have a low incidence of natural disturbance (Espírito-Santo et al., 2014), which does not generally result in tree death and C emissions (ΔCP,istPA,i,t = 0). Furthermore, according to module

VMD00015 for areas with baseline set by Module BL-PL the ΔCP,Enh,i,t parameter may be conservatively set to zero (ΔCP,Enh,i,t = 0).. Therefore, Equation 14 can be rewritten as (Equation 15):

$$\Delta C_{WPS-REDD} = \sum_{t=1}^{t*} \sum_{i=1}^{M} (\Delta C_{P,DefPA,i,t} + GHG_{P-E,i,t}) \qquad \text{Equation 15}$$

Where:	
ΔCWPS−REDD	Net GHG emissions in the REDD project scenario up to year t*; t CO2-e
ΔCP,DefPA,i,t	Net carbon stock change as a result of deforestation in the project area in the project case in stratum i in year t; t CO2-e
GHGP−E,i,t	Greenhouse gas emissions as a result of deforestation and degradation activities within the project area in the project case in stratum i in year t; t CO2-e
i	1, 2, 3, … M strata
t	1, 2, 3, … t* years elapsed since the start of the project activity

The net carbon stock change as a result of deforestation (ΔCP,efPA,i,t) is equal to the area deforested multiplied by the emission per unit area, according to VMD0015 v2.3 (Equation 16).
On the parameter GHGP-E,i,t, there will be no deforestation planned in the project, therefore it is zero.

$$\Delta C_{P,DefPA,i,t} = \sum_{u=1}^{U} (A_{DefPA,u,i,t} * \Delta C_{pools,P,Def,u,i,t}) \qquad \text{Equation 16}$$

Where:	
ΔCP,DefPA,i,t	Net carbon stock change as a result of deforestation in the project case in the project area in stratum i at time t; t CO2-e
ADefPA,u,i,t	Area of recorded deforestation in the project area stratum i converted to land use u at time t; ha
ΔCpools,P,Def,u,i,t	Net carbon stock changes in all pools in the project case in land use u in stratum i at time t; t CO2-e ha^{-1}
u	1, 2, 3, … U post-deforestation land uses.
i	1, 2, 3, … M strata
t	1, 2, 3, … t* years elapsed since the start of the project activity

3.2.3 Leakage Emissions (VCS 2.5, 3.2, 3.6, 3.15, 4.3)

Leakage is the net change of anthropogenic GHG emissions that occurs outside the Project boundary and is attributable to Project activities. Leakage due to Project activities is expected to be very low. Small levels of leakage could occur as land-use changes (agricultural expansion, illegal timber harvesting etc.) in the Project surroundings outside of the Project Area. These land-uses are economically attractive owing

to market pressures, global demand for timber products, increasing domestic demand for meat and soy products, population expansion in frontier deforestation areas.

The Project proponents will adopt proactive initiatives to fight these leakage sources, based on a cooperative effort with Agrofrut co-operative, its members, local stakeholders and landowners and in accordance with leakage management strategies outlined in VM0007.

Additionally, it is important to note that the proponent does not possess other areas outside the Project boundary, ensuring a focused and dedicated effort to manage and mitigate any potential leakage effectively.

The estimates of GHG emissions due to leakage from market effects through reduced logging is equal to the sum of emissions from logging in the case of the potentially shifted baseline plus a leakage factor, as per the equation:

$$\Delta C_{LK-REED} = \Delta C_{LK-AS,planned} + \Delta C_{LK-ME}$$ **Equation 17**

Where:	
ΔCLK−REED	Net GHG emissions due to leakage from the REDD project activity up to year t*; t CO2-e
ΔCLK−AS,planned	Net GHG emissions due to activity shifting leakage for projects preventing planned deforestation up to year t* – from Module LK-ASP; t CO2-e
ΔCLK−ME	Net GHG emissions due to market-effects leakage up to year t* – from Module LK-ME; t CO2-e

Add module reference of equation 17

Estimation of emissions from activity shifting

Activity shifting leakage due to displacement of planned deforestation was assessed using a series of equations outlined in VMD0009 LK-ASP. Thus, Equation 18 is used when the specific deforestation agent is identified as is the case of the Tapera project.

$$\Delta C_{LK-AS,planned} = \sum_{t=1}^{t*} \sum_{i=1}^{M} (LKA_{planned,i,t} * \Delta C_{BSL,i}) + GHG_{LK,E,i,t} \quad \text{Equation 18}$$

Where:	
ΔCLK−AS,planned	Net greenhouse gas emissions due to activity shifting leakage for projects preventing planned deforestation up to year t*; t CO2-e
LKAplanned,i,t	The area of activity shifting leakage in stratum i in year t; ha
ΔCBSL,i	Net carbon stock changes in all pre-deforestation pools in baseline stratum i; t CO2-e ha^{-1}
GHGLK,E,i,t	Greenhouse gas emissions as a result of leakage of avoiding deforestation activities in stratum i in year t; t CO2-e
i	1, 2, 3, … M strata; unitless
t	1, 2, 3, … t* time elapsed since the start of the project activity; years

The procedure for calculating leakage when the deforestation agent is identified must follow three steps: (i) determination of the baseline rate of forest clearance by the deforestation agent; (ii) estimate new projection of forest clearance by the baseline agent of deforestation with project implementation if no leakage is occurring; and (iii) monitor all areas deforested by baseline agent of deforestation through the years in which planned deforestation was forecast to occur. In step (iii), all areas deforested by the baseline agent of deforestation must be monitored. Areas of deforestation may be anywhere in the host country. There is no requirement to track international leakage. For this, the following equation must be followed (Equation 19).

rested by the baseline agent of deforestation must be monitored. Areas of deforestation may be anywhere in the host country. There is no requirement to track international leakage. For this, the following equation must be followed (Equation 19).

$$LKA_{planned,i,t} = A_{defLK,i,t} - NewR_{i,t} \quad \text{Equation 19}$$

Where:	
	The area of activity shifting leakage in stratum i in year t; ha

LKAplanned,i,t	
AdefLK,i,t	The total area of monitored deforestation by the baseline agent of the planned deforestation in stratum i in year t; ha
NewRi,t	New calculated forest clearance by the baseline agent of the planned deforestation in stratum i in year t where no leakage is occurring; ha
i	1, 2, 3, … M strata; unitless
t	1, 2, 3, … t* time elapsed since the start of the project activity; years

Non-CO2 emissions due to biomass burning in the area of activity shifting leakage is calculated according to the same procedures used to estimate baseline GHG emissions due to biomass burning. Non-CO2 emissions due to nitrogen application are not part of the project scope.

According to VMD0009 LK-ASP v1.3, the parameter AdefLK,,t is monitored. Ex-ante, it is assumed this value is zero and the deforestation agent is the same as the project proponent, as the land owners are also the project proponents as demonstrated in **section 2.1.8**. Still according to the methodology, if NewRi, exceeds AdefLK,i,t then LKAplanned,i,t must be set as zero as negative leakage is not considered under the VCS. Therefore, for the time being, in the Tapera project the ΔCLK−AS,lanned will be assumed to be zero. In this sense, GHG emissions due to activity shifting for avoiding planned deforestation are set to zero in ex-ante.

Estimation of emissions from market-effects

According to VMD0011 LK-ME v1.1, the total leakage due to market effects is equal to the sum of market- effects leakage through decreased timber harvest and decreased harvest for fuelwood / charcoal production (Equation 20).

$$\Delta C_{LK-ME} = LK_{MarketEffects,timber} + LK_{MarketEffects,FW/C} + LK_{MarketEffects,peat}$$ **Equation 20**

Where:	
ΔCLK−ME	Net greenhouse gas emissions due to market-effects leakage; t CO2-e
LKMarketEffects,timber	Total GHG emissions due to market-effects leakage through decreased timber harvest; t CO2-e

LKMarketEffects,FW/C	Total GHG emissions due to market-effects leakage through decreased harvest of fuelwood and charcoal sold into regional and/or national markets; t CO2-e
LKMarketEffects,peat	Total GHG emissions due to market-effects leakage through decreased timber, fuelwood and charcoal harvest resulting in increased peatland drainage; t CO2-e

As there is no fuelwood or charcoal collection by the baseline agent of deforestation market leakage is limited to leakage through decreased timber harvest as calculated in Equation 21. Leakage due to market effects is equal to the baseline emissions from logging multiplied by a leakage factor and, where applicable, by a leakage management factor:

$$LK_{MarketEffects,timber} = \sum_{i=1}^{M} (LF_{ME} * LK_{MAF} * AL_{T,i}) \qquad \text{Equation 21}$$

Where:	
LKMarketEffects,timber	Total GHG emissions due to market-effects leakage through decreased timber harvest; t CO2-e

LFME	Leakage factor for market-effects calculations; dimensionless
LKMAF	Leakage management adjustment factor; dimensionless
ALT,i	Summed emissions from timber harvest in stratum i in the baseline case potentially displaced through implementation of the project; t CO2-e
i	1,2,3,...M strata; dimensionless

The deduction of the leakage factor for market-effects calculations (LFME) was adopted based on the relation between mean merchantable biomass as a proportion of total aboveground tree biomass for each forest type (PMLFT) and merchantable biomass as a proportion of total aboveground tree biomass for stratum i within the project boundary (PMPi). The PMLFT is estimated considering the literature data. According to Homma (2011), from 45 billion m3 of Amazon wood stocks, almost 14 billion m3 was marketable. Thus, the PMLFT adopted is 31% for legal Amazon. The LFME used for timber is 0.4, where mean merchantable biomass as a proportion of total aboveground tree biomass for each forest type is equal to merchantable biomass as a proportion of total aboveground tree biomass within the project

boundary (PMLFT = ±15% to PMPi). The species that would be harvested in the project area is an Amazonian species and could only originate from other native forest sites in the Brazilian Amazon.

Additionally, they would need to come from woods that are in a state of relative maturity and where it is simple to locate trees of millable size (> 40 cm DBH). According to Higuchi et al. (1998)[32], the proportion of stem (merchantable portion) biomass to total aboveground biomass is largely constant in mature Amazonian forests. It is also not anticipated to vary between the mature native forests in the project area and those in other regions of the Brazilian Amazon.

Deduction factors for LFME:

PMLFT = ±15% toPMPi		LFME = 0.4
PMLFT > 15% less than PMPi		LFME = 0.7
PMLFT > 15% greater than PMPi		LFME = 0.2
Where:		
PMLFT	Mean merchantable biomass as a proportion of total aboveground tree biomass for each forest type (%)	
PMPi	Merchantable biomass as a proportion of total aboveground tree biomass for stratum i within the project boundary (%)	
LFME	Leakage factor for market-effects calculations; dimensionless	

Moreover, if leakage management activities are established within areas under the control of the project proponent in order to minimise the displacement of land use activities to areas outside the project area by maintaining the production of total biomass in commercial species that is merchantable, a leakage management adjustment factor (LK_{MAF}) may be applied (Equation 22). As leakage management activities have not been established within areas under the control of the proponent and according to Higuchi et al. (1998)[33], that the proportion of stem biomass (marketable portion) to total aboveground biomass is constant in mature Amazonian forests, the LK_{MAF} was kept at 1.

$$LK_{MAF} = 1 - \left(\frac{PRODMB_{LMA,t}}{PRODMB_{BL,t}}\right) \qquad \text{Equation 22}$$

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Where:	
LKMAF	Leakage management adjustment factor; dimensionless
PRODMBLMA, t	Production biomass in commercial species that is merchantable in year t in leakage management areas; t per year
PRODMBBL,t	Production of biomass in commercial species that is merchantable in year t in the baseline case; t per year
t	1, 2, 3, … t* time elapsed since the projected start of the REDD project activity;years

The next step is to estimate the emissions associated with the displaced logging activity. This is based on the total volume that would have been logged in the baseline in the project area across strata and time periods (Equation 23):

on the total volume that would have been logged in the baseline in the project area across strata and time periods (Equation 23):

$$AL_{T,i} = \sum_{t=1}^{t} (C_{BSL,XBT,i,t}) \qquad \textbf{Equation 23}$$

Where:

ALT,i	Summed emissions from timber harvest in stratum i in the baseline case laced through implementation of carbon project; t CO2-e
CBSL,XBT,i, t	Carbon emission due to displaced timber harvests in the baseline scenario in stratum i in year t; t CO2-e
i	1, 2, 3, …M strata
t	1, 2, 3, … t* time elapsed since the projected start of the REDD project activity; years

The carbon emission due to the displaced logging has two components: the biomass carbon of the extracted timber and the biomass carbon in the forest damaged in the process of timber extraction (Equation 24):

$$C_{BSLXBT,i,t} = ((V_{BSLEX,i,t} * D_{mn} * CF) + (V_{BSLEX,i,t} * LDF) + (V_{BSLEX,i,t} * LIF)) * \frac{44}{12} \quad \textbf{Equation 24}$$

Where:

$C_{BSLXBT,i,t}$	Carbon emission due to timber harvests in the baseline scenario in stratum *i* in year *t*; t CO_{2e}
$V_{BSLEX,i,t}$	Volume of timber projected to be extracted from within the project boundary during the baseline in stratum *i* in year *t*; m^3 $V_{BSLEX,i,t}$ = 38.3 m^3 ha^{-1} (da SILVA et al., 2001; Veríssimo et al., 1992)
D_{mn}	Mean wood density of commercially harvested species; t d.m.m^{-3} D_{mn} = 0.60 t d.m. m^{-3} (VMD0011-LK-ME-v1.1).
CF	Carbon fraction of biomass for commercially harvested species *j*; t C t d.m.$^{-1}$ CF = 0.47 t C t d.m.$^{-1}$ ((IPCC, 2006b) page 4.48, Table 4.3).
LDF	Logging damage factor; t C m^{-3} LDF = 0.53 t C m^{-3} (VMD0011-LK-ME-v1.1).
LIF	Logging infrastructure factor; t C m^{-3} LIF = 0.29 t C m^{-3} (VMD0011-LK-ME-v1.1)
i	1, 2, 3, ... M strata
t	1, 2, 3, ... t* time elapsed since the projected start of the project activity; years

The logging damage factor (LDF) is a representation of the quantity of emissions that will ultimately arise per unit of extracted timber (m3). These emissions arise from the non-commercial portion of the felled tree (the branches and stump) and trees incidentally killed during tree felling. The default values given here come from the slope of the regression equation between carbon damage and volume extracted based on 774 logging gaps measured by Winrock International in Bolivia, Belize, the Republic of Congo, Brazil and Indonesia, and 134 logging gaps in Mexico.

The logging infrastructure factor (LIF) is a representation of the quantity of emissions that will ultimately arise per unit of timber (m3) from roads, skid trails and logging decks. The conservative default value is the upper confidence interval of the average emission from analyses conducted across 1 473 hectares in the Republic of Congo and 366 hectares in Brazil.

Leakage Management Area Diagnosis

The leakage management area (LMA) comprises non-forest areas located outside the project boundary in which the project proponent intends to implement the activities which reduce the risk of leakage in the

project scenario. These activities must include the agents of deforestation and involve seeking new sources of income which contribute to forest conservation. Leakage management could involve agriculture, agroforestry, reforestation, education, or other activities. To define the Leakage Management Area was defined in the nearest communities of the project area.

Leakage Management Plan

The main objective of the Tapera Amazonas REDD+ Project is to prevent planned deforestation by expanding monitoring efforts and involving the local community in project activities. This will include environmental education and providing alternative sources of income to reduce the risks of invasion and deforestation in the project area and surrounding regions. A key component of the project is the potential implementation of a Non-Timber Forest Products (NTFP) extraction program, which could include breu resin, tonka beans, jatoba fruits, copaiba oil, and nuts—though further studies are needed. In line with Brazilian legislation, such as Decree nº 6040, the collection of these products is allowed if it does not harm the environment, and the project aims to support sustainable livelihoods rather than restrict local communities. Additionally, the project will create job opportunities for monitoring the area, prioritizing the hiring of residents with professional training. Revenue from carbon credit sales will be reinvested into the community, supporting the educational and professional development of both children and adults, ensuring that the project delivers ecological, economic, and social benefits.

3.2.4 Uncertainty Analysis

The uncertainty in baseline rate of deforestation is set as zero (UncertaintyBSL,RATE= 0), as the deforestation rates are based on actual deforestation plans, following VMD0017 v2.2, sections 5.1.1 and 5.1.2 criteria. Uncertainty in the combined carbon stocks and greenhouse gas sources in the REDD baseline scenario is estimated according to VMD0017 v2.2 equation 5. The total error in the REDD+ project activity is therefore calculated by VMD0017 v2.2 equation 2114. The UREDD-BSl,SS parameter through equation 4 from VMD0017 v2.2 section 5.1.2 as described below:

$$U_{REDD-BSL,SS,i} = \frac{\sqrt{\sum_1^n \left(U_{REDD-BSL,SS,i,pool\#} \times E_{REDD-BSL,SS,i,pool\#}\right)^2}}{\sum_1^n E_{REDD-BSL,SS,i,pool\#}}$$

Where:

$U_{REDD-BSL,SS,i}$	Percentage uncertainty in the combined carbon stocks and greenhouse gas sources in the REDD baseline scenario in stratum i (%).
$U_{REDD-BSL,SS,i,pool\#}$	Percentage uncertainty for carbon stocks and greenhouse gas sources in the REDD baseline scenario in stratum i (%)
$E_{REDD-BSL,SS,i,pool\#}$	Carbon stock or GHG sources in the REDD baseline scenario (t CO_2e)

Where:

$U_{REDD-BSL,SS,i.}$ - Percentage uncertainty in the combined carbon stocks and greenhouse gas sources in the REDD baseline scenario in stratum i (%).

$U_{REDD-BSL,SS,i,pool}$ - Percentage uncertainty for carbon stocks and greenhouse gas sources in the REDD baseline scenario in stratum i (%)

$E_{REDD-BSL,SS,i,pool}$- Carbon stock or GHG sources in the REDD baseline scenario (t CO2e).

i 1, 2, 3 …M strata (unitless)

In this sense, carbon stocks and uncertainties from all relevant pools (CAB_tree,bsl,i; CBB_tree,bsl,i; CAB_non-tree, bsl,i; CBB_non-tree,bsl,i; CDW,bsl,i; CLI,bsl,i; CSOC,bsl,i) were taken into account (EREDD_BSL,SS,i,pool# and UREDD_BSL,SS,i,pool#, respectively). Thus, uncertainty across combined strata is assessed as follows (equation 5):

$$Uncertainty_{REDD-BSL,SS} = \frac{\sqrt{\sum_{i=1}^{M}\left(U_{REDD-BSL,SS,i} \times E_{REDD-BSL,SS,i}\right)^2}}{\sum_{i=1}^{M} E_{REDD-BSL,SS,i}}$$

Where:

$Uncertainty_{REDD-BSL,SS}$	Total uncertainty in the combined carbon stocks and greenhouse gas sources in the REDD baseline scenario (%).
$U_{REDD-BSL,SS,i}$	Percentage uncertainty in the combined carbon stocks and greenhouse gas sources in the REDD baseline scenario (%)
$E_{REDD-BSL,SS,t,i}$	Carbon stock or GHG sources in the REDD baseline scenario (t CO_2e)
i	1, 2, 3 …M strata (unitless)

Total Uncertainty in REDD baseline scenario is estimated according to VMD0017 v2.2 equation 6 as follows.

$$Uncertainty_{REDD-BSL,t^*} = \sqrt{Uncertainty_{BSL,RATE,t^*}{}^2 + Uncertainty_{REDD-BSL,SS}{}^2}$$

Where:

$Uncertainty_{REDD-BSL,t^*}$	Cumulative uncertainty in REDD baseline scenario up to year t* (%)
$Uncertainty_{REDD-BSL,RATE,t^*}$	Cumulative uncertainty in the baseline rate of deforestation up to year t (%)
$Uncertainty_{REDD-BSL,SS}$	Total uncertainty in the combined carbon stocks and greenhouse gas sources in the REDD baseline scenario (%)
t	1, 2, 3, …t* time elapsed since the start of the project activity (years)

Deductions are made in the case total error in the REDD+ project activity exceeds 15% of NER_{REDD} at the 95% confidence level according to VMD0017 v2.2 equation 21. No WRC activities have been included, therefore intrinsic expressions within the squared root of equation 21 were suppressed from its original structure (see equation below). As a result, data calculated for the second monitoring period are presented in further table.

$$NER_{REDD+ERROR} = \sqrt{\left(Uncertainty_{REDD_{BSL,t^*}} \times \Delta C_{BSL-REDD,t^*}\right)^2 + \left(Uncertainty_{REDD_{WPS}} \times \Delta C_{WPS-REDD,t^*}\right)^2 \times \left(\frac{1}{\Delta C_{BSL-REDD,t^*} + \Delta C_{WPS-REDD,t^*}}\right)}$$

Where:

$NER_{REDD+ERROR}$	Cumulative uncertainty for the REDD+ (REDD and WRC) project activities up to year t* (%)
$Uncertainty_{REDD_{BSL,t^*}}$	Cumulative uncertainty in REDD baseline scenario up to year t (%)
$Uncertainty_{REDD_{WPS}}$	Total uncertainty in the REDD project scenario (%)
$\Delta C_{BSL-REDD,t^*}$	Net GHG emissions in the REDD baseline scenario up to year t* (t CO_2e)
$\Delta C_{WPS-REDD,t^*}$	Net GHG emissions in the REDD project scenario up to year t* (t CO_2e)
t	1, 2, 3, …t* time elapsed since the project start (year)

3.2.4 aEstimated GHG Emission Reductions and Carbon Dioxide Removals (VCS, 3.15, 4.1)

State the non-permanence risk rating (%)	*12 %*
Has the non-permanence risk report been attached as either an appendix or a separate document?	☒ Yes ☐ No
For ARR and IFM projects with harvesting, state, in tCO2e, the Long-term Average (LTA).	*Not Applicable*

Has the LTA been updated based on monitored data, if applicable?	☐ Yes ☒ No *If no, provide justification.*
State, in tCO2e, the expected total GHG benefit to date.	
Is the number of GHG credits issued below the LTA?	☒ Yes ☐ No *If no, provide justification.*

Net GHG emission reduction estimates are based in VM0007 v1.7. The total net greenhouse gas emissions reductions of the REDD project activity are calculated as follows (Equation 25, Equation 26 and Equation 27):

Where:	
ΔCLK−REDD	Net GHG emissions due to leakage from the REDD project activity up to year t*; t CO2-e
ΔCLK−AS,planned	Net GHG emissions due to activity shifting leakage for projects preventing planned deforestation up to year t*; t CO2-e
ΔCLK−AS,unplanned	Net GHG emissions due to activity shifting leakage for projects preventing unplanned deforestation up to year t*; t CO2-e
ΔCLK−AS,deg rad−FW/C	Net GHG emissions due to activity shifting leakage for degradation caused by extraction of wood for fuel up to year t*; t CO2-e
ΔCLK−ME	Net GHG emissions due to market-effects leakage up to year t*; t CO2-e

Specific procedures for the quantification of the net GHG emissions in the REDD baseline scenario, the net GHG emissions in the REDD project scenario and GHG emissions due to leakage can be found in Sections 3.2.1, 3.2.2 and 3.2.3, respectively.

3.3 Monitoring

3.3.1 Data and Parameters Available at Validation (VCS, 3.16)

Table below provides the data and parameters that are determined or available at validation and remain fixed throughout the project crediting period at the Tapera Project.

Data / Parameter	AAplanned,i,t
Data unit	ha
Description	Annual area of baseline planned deforestation for stratum i at time t
Source of data	Calculated based on VMD0006 v1.3 equation 4
Value applied	See the values applied in the Table 4.1
Justification of choice of data or description of measurement methods and procedures applied	Estimated based on projected annual proportion of land that will be deforested in stratum i during year t, the total area of planned deforestation over the baseline period for stratum I and the likelihood of deforestation for stratum i according to VMD0006 v1.3.
Purpose of Data	Calculation of baseline emissions.
Comments	-

Data / Parameter	Aplanned,i,t
Data unit	ha
Description	Total area of planned deforestation over the baseline period for stratum i
Source of data	Vegetation Management Plan
Value applied	55,192.77
Justification of choice of data or description of measurement methods and procedures applied	Determined according to what is recognized as an immediate site-specific threat of deforestation, which, in its turn, is a function of the legal permissibility for deforestation, the suitability of the project area for conversion to alternative non-forest land use, the government approval for deforestation and a management plan for deforesting the project area. See Section 3.1.4 for a complete description of

	measurement methods and procedures applied.
Purpose of Data	Calculation of baseline emissions.
Comments	-

Data / Parameter	D%planned,i,t
Data unit	%
Description	Projected annual proportion of land that will be deforested in stratum i at year t
Source of data	Vegetation Management Plan
Value applied	5%
Justification of choice of data or description of measurement methods and procedures applied	Where a valid verifiable plan exists for the rate at which deforestation is projected to occur, this rate must be used, according to VMD0006 v1.3, Section 1.3 criteria.
Purpose of Data	Determination of baseline scenario.
Comments	-

Data / Parameter	L − Di
Data unit	%
Description	Likelihood of deforestation for stratum i
Source of data	VMD0006 v1.3
Value applied	100

Justification of choice of data or description of measurement methods and procedures applied	For all areas not both under Government control and zoned for deforestation, L-Di must be equal to 1. Must be revisited at the time of baseline revision
Purpose of Data	Determination of baseline scenario
Comments	

Data / Parameter	CF
Data unit	t C t d.m-1
Description	Default value of carbon fraction in biomass
Source of data	(IPCC, 2006b) page 4.48, Table 4.3
Value applied	0.47
Justification of choice of data or description of measurement methods and procedures applied	The default value was used to be more conservative
Purpose of Data	Calculation of baseline emissions Calculation of leakage
Comments	-

Data / Parameter	ab
Data unit	Mg ha-1
Description	Average biomass stock per hectare in the aboveground biomass pool of initial forest class i
Source of data	Nogueira et al., 2015
Value applied	See the values applied in the Table 4.2
Justification of choice of data or description of measurement methods and procedures applied	Average biomass stock per hectare in the aboveground biomass pool was estimated based on peer-reviewed literature

Purpose of Data	Calculation of baseline emissions
Comments	-
Data / Parameter	CABtreebsl,i
Data unit	t CO2-e ha-1
Description	Forest carbon stock in aboveground tree biomass in stratum i
Source of data	Estimated based on peer-reviewed literature (Nogueira et al., 2015).
Value applied	470.43
Justification of choice of data or description of measurement methods and procedures applied	Forest carbon stock in aboveground tree biomass was estimated based on peer-reviewed literature $CABtreebsl,i = ab * CF * 44 .$ 12
Purpose of data	Calculation of baseline emissions
Comments	

Data / Parameter	CABtreepost,i
Data unit	t CO2-e ha-1
Description	Post-deforestation carbon stock in aboveground tree biomass in stratum i
Source of data	Secondary data from peer-reviewed literature (Silva Neto et al., 2012)
Value applied	13.56
Justification of choice of data or description of measurement methods and procedures applied	Post-deforestation carbon stock in aboveground tree biomass is taken from peer reviewed literature (Silva Neto et al., 2012) considering an average degradation and the total dry mass

Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	ΔCABtree,i
Data unit	t CO2-e ha-1
Description	Baseline carbon stock change in aboveground tree biomass in stratum i
Source of data	Calculated based on VMD0006 v1.3 Equation 6
Value applied	456.87
Justification of choice of data or description of measurement methods and procedures applied	Estimated based on the forest carbon stock in aboveground tree biomass in stratum i and the post-deforestation carbon stock in aboveground tree biomass in stratum i
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	44/12
Data unit	Dimensionless
Description	Ratio converting C to CO2-e
Source of data	-
Value applied	44/12 = 3.67
Justification of choice of data or description of measurement methods and procedures applied	Conversion of carbon to carbon dioxide
Purpose of Data	Calculation of baseline emissions Calculation of leakage
Comments	-

Data / Parameter	bb
Data unit	Mg ha-1
Description	Average biomass stock per hectare in the belowground biomass pool of initial forest class i
Source of data	The aboveground is converted into belowground biomass through a root-shoot ratio
Value applied	See the values applied in the Table 4.2
Justification of choice of data or description of measurement methods and procedures applied	Average biomass stock per hectare in the belowground biomass pool was estimated based on peer-reviewed literature and through a root-shoot ratio
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	Root-shoot ratio
Data unit	t root d.m.t-1 shoot d.m.
Description	Root to shoot ratio appropriate to species or forest type / biome; note that as defined here, root to shoot ratio is applied as belowground biomass per unit area: aboveground biomass per unit area (not on a per stem basis)
Source of data	IPCC, 2019 – Table 4.4
Value applied	0.221
Justification of choice of data or description of measurement methods and procedures applied	The ecological zone was selected as a Tropical Rain Forest on the South American continent
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	CBBtreebsl,i
Data unit	t CO2-e ha-1
Description	Forest carbon stock in belowground tree biomass in stratum i
Source of data	Estimated based on peer-reviewed literature (Silva Neto et al., 2012)
Value applied	145.93
Justification of choice of data or description of measurement methods and procedures applied	Calculated from carbon stock in aboveground biomass in trees in the baseline in stratum i and root to shoot ratios
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	CBBtreepost,i
Data unit	t CO2-e ha-1
Description	Post-deforestation carbon stock in belowground tree biomass in stratum i
Source of data	Estimated based on peer-reviewed literature (Silva Neto et al., 2012)
Value applied	3.00
Justification of choice of data or description of measurement methods and procedures applied	Post-deforestation carbon stock in belowground tree is taken from peer reviewed literature (Silva Neto et al., 2012) considering an average degradation and the total dry mass
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	ΔCBB_tree,i
Data unit	t CO2-e ha-1
Description	Baseline carbon stock change in belowground tree biomass in stratum i
Source of data	Calculated based on VMD0006 v1.3 Equation 8
Value applied	142.93
Justification of choice of data or description of measurement methods and procedures applied	Estimated based on the forest carbon stock in aboveground tree biomass in stratum i and the post-deforestation carbon stock in aboveground tree biomass in stratum i ΔCBB_tree,I = CBBtree ,i − CBBtree ,i bsl post
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	CWP,i
Data unit	t CO2-e ha^{-1}
Description	Carbon stock entering the wood products pool from stratum i
Source of data	Calculated based on VMD0005 v1.1 equation 2
Value applied	27.57
Justification of choice of data or description of measurement methods and procedures applied	Estimated based on mean stock of extracted biomass carbon by class of wood product ty from stratum i and the wood waste (the fraction immediately emitted through mill inefficiency by class of wood product)
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	CXB,ty,i
Data unit	t CO2-e ha-1
Description	Mean stock of extracted biomass carbon by class of wood product ty from stratum i
Source of data	Calculated based on VMD0005 v1.1 equation 1
Value applied	36.27
Justification of choice of data or description of measurement methods and procedures applied	Estimated based on volume of timber extracted from stratum i (does not include slash left onsite) by species j and wood product class ty measurement methods and procedures applied, mean wood density of species j, carbon fraction and the total area of stratum
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	WWty
Data unit	Dimensionless
Description	Wood waste. The fraction immediately emitted through mill inefficiency by class of wood product ty
Source of data	Pearson et al. (2012), page 8
Value applied	0.24
Justification of choice of data or description of measurement methods and procedures applied	Waste wood gives the proportion emitted immediately due to factory inefficiency which is 0.19 in developed countries, 0.24 in developing countries.
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	Vex,ty,j,i
Data unit	m3 ha-1
Description	Volume of timber extracted from within stratum i (does not include slash left onsite) by species j and wood product

	class ty
Source of data	da SILVA et al., 2001; Veríssimo et al., 1992, Table 1
Value applied	38.3
Justification of choice of data or description of measurement methods and procedures applied	Estimated value based on the average of the values presented in Table 1 by Veríssimo et al., 1992 for a forest stratum similar to the Tapera project
Purpose of Data	alculation of baseline emissions alculation of leakage
Comments	-

Data / Parameter	Di
Data unit	t d.m.m-3
Description	Mean wood density of species j
Source of data	Default value of VMD0011 LK-ME v1.1
Value applied	0.60
Justification of choice of data or description of measurement methods and procedures applied	Regional average (0.58 t d.m.m-3 - tropical Africa; 0.60 t d.m.m-3 - tropical America; 0.57 t d.m.m-3 - tropical Asia) from Brown, S. 1997. Estimating Biomass and Biomass Change of Tropical Forests: a Primer. For the Food and Agriculture Organization of the United Nations. Rome, 1997. FAO Forestry Paper - 134. ISBN 92- 5-103955-0.
Purpose of Data	alculation of baseline emissions alculation of leakage
Comments	-

Data / Parameter	CWP100,i
Data unit	t CO2-e ha-1
Description	Carbon stock entering the wood products pool at the time

	of deforestation that is expected to be emitted over 100 years from stratum i
Source of data	Calculated based on VMD0005 v1.1 equation 3
Value applied	23.15
Justification of choice of data or description of measurement methods and procedures applied	Estimated base on carbon stock entering wood products pool at time of deforestation from stratum i, fraction of wood products that will be emitted to the atmosphere within 5 years of timber harvest by class of wood product ty, and Fraction of wood products that will be emitted to the atmosphere between 5 and 100 years of timber harvest by class of wood product ty
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	SLFty
Data unit	Dimensionless
Description	Fraction of wood products that will be emitted to the atmosphere within 5 years of timber harvest by class of wood product ty
Source of data	page 276, (Winjum et al., 1998) and page 8, (Pearson et al., 2012)
Value applied	0.2
Justification of choice of data or description of measurement methods and procedures applied	Winjum et al. 1998 give the following proportions for wood products with short- term (<5 yr) uses after which they are retired and oxidized (applicable internationally): Sawnwood: 0.2 The methodology makes the assumption that all other classes of wood products, and where wood product class ty is unknown, are 100% oxidized within 5 years
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	Ofty
Data unit	Dimensionless
Description	Fraction of wood products that will be emitted to the atmosphere between 5 and 100 years of timber harvest by class of wood product ty
Source of data	page 276, (Winjum et al., 1998) and page 8, (Pearson et al., 2012)
Value applied	0.8
Justification of choice of data or description of measurement methods and procedures applied	Default value suggested by Winjun et al., 1998
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	GHGBSL,i,t
Data unit	t CO2-e
Description	Greenhouse gas emissions as a result deforestation activities within the project boundary in the stratum i in year t
Source of data	Calculated based on VMD0006 v1.3 equation 15
Value applied	See the values applied in the Table 4.10
Justification of choice of data or description of measurement methods and procedures applied	Calculated based on the non-CO2 emissions due to biomass burning in stratum i in year t
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	EBiomassaBurn,i,t
Data unit	t CO2-e
Description	Non-CO2 emissions due to biomass burning in stratum i in year t
Source of data	Calculated based on VMD0013 v1.2 equation 1
Value applied	See the values applied in the Table 4.9
Justification of choice of data or description of measurement methods and procedures applied	Calculated based on area burnt for stratum i in year t, average aboveground biomass stock before burning stratum i, in year t, combustion factor for stratum i, emission factor for stratum i for gas g and the Global warming potential for gas g
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	Aburn,i,t
Data unit	ha
Description	Area burnt for stratum i in year t
Source of data	Equal to AAplanned,i,t in the baseline case
Value applied	See the values applied in the Table 4.9
Justification of choice of data or description of measurement methods and procedures applied	For the calculation of baseline emissions, the burned area is considered equivalent to the annual deforested area, assuming that all deforestation is preceded by a fire to clear the land in the baseline case
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	Bi,t
Data unit	t d.m. ha-1
Description	Average aboveground biomass stock before burning stratum i in

	year t
Source of data	Calculated based on VMD0013 v1.3 Equation 2
Value applied	272.98
Justification of choice of data or description of measurement methods and procedures applied	Calculated based on carbon stock in aboveground biomass in trees in stratum i in year t, Carbon stock in dead wood for stratum i in year t, Carbon stock in litter for stratum i in year t and Carbon fraction of biomass
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	COMFi
Data unit	Dimensionless
Description	Combustion factor for stratum i
Source of data	Table 2.6, page 2.55, IPCC (2006a)
Value applied	0.59
Justification of choice of data or description of measurement methods and procedures applied	Default values in Table 2.6 of IPCC, 2006a
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	Gg,i
Data unit	kg t-1 d.m. burnt
Description	Emission factor for stratum i for gas g

Source of data	Table 2.5, page 2.54, IPCC (2006a)
Value applied	Gg,CH = 6.8 kg t-1, Gg,NO = 0.2 kg t-1 4 2
Justification of choice of data or description of measurement methods and procedures applied	Default values in Table 2.6 of IPCC, 2006a
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	GWPg
Data unit	t CO2/t gas g
Description	Global warming potential for gas g
Source of data	Box 3.2, Table 1, page 87, IPCC (2014)
Value applied	
Justification of choice of data or description of measurement methods and procedures applied	Default factor from the latest IPCC Assessment Report
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	CABtree,i,t
Data unit	t CO2-e ha-1
Description	Carbon stock in aboveground biomass in trees in stratum i in year t
Source of data	Estimated based on peer-reviewed literature (Nogueira et al., 2015)
Value applied	470.43

Justification of choice of data or description of measurement methods and procedures applied	Forest carbon stock in aboveground tree biomass was estimated based on peer-reviewed literature $CABtreebls,i = ab * CF * 44$ 12
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	12/44
Data unit	Dimensionless
Description	Ratio converting CO2-e to C
Source of data	-
Value applied	12/44 = 0.27
Justification of choice of data or description of measurement methods and procedures applied	Conversion of carbon dioxide to carbon
Purpose of data	Calculation of baseline emissions
Comments	-

Data / Parameter	$\Delta CBSL,i,t$
Data unit	t CO2-e
Description	Net carbon stock changes in all pools in the baseline stratum i in year t
Source of data	Calculated based on VMD0006 v1.3 Equation 13
Value applied	See the values applied in the Table 4.10
Justification of choice of data or description of measurement methods and procedures applied	Estimated based on the annual area of baseline planned deforestation for stratum i in year t, the baseline carbon stock change in aboveground tree biomass in stratum i, the baseline carbon stock change in belowground tree biomass in stratum i, the baseline carbon stock change in wood products in stratum i, and the carbon stock entering the wood products pool at the time of

	deforestation that is expected to be emitted over 100-years from stratum i.
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	ΔCBSL,planned
Data unit	t CO2-e
Description	Net greenhouse gas emissions in the baseline from planned deforestation up to year t*
Source of data	Calculated based on VMD0006 v1.3 Equation 1
Value applied	See the values applied in the Table 4.10
Justification of choice of data or description of measurement methods and procedures applied	Estimated based on the net carbon stock changes in all pools in the baseline and GHG emissions as a result of deforestation activities within the project boundary in the baseline stratum i in year t
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	ΔCLK−ME
Data unit	t CO2-e
Description	Net greenhouse gas emissions due to market-effects leakage
Source of data	Calculated based on VMD0011 v1.1 Equation 1
Value applied	See the values applied in the Table 4.11

Justification of choice of data or description of measurement methods and procedures applied	Total leakage due to market effects is equal to the sum of market- effects leakage through decreased timber harvest and decreased harvest for fuelwood / charcoal production
Purpose of Data	Calculation of leakage
Comments	-

Data / Parameter	LKMarketEffects,timber
Data unit	t CO2-e
Description	Total GHG emissions due to market-effects leakage through decreased timber harvest
Source of data	Calculated based on VMD0011 v1.1 Equation 2
Value applied	See the values applied in the Table 4.11
Justification of choice of data or description of measurement methods and procedures applied	Leakage due to market effects is equal to the baseline emissions from logging multiplied by a leakage factor and, where applicable, by a leakage management factor
Purpose of Data	Calculation of leakage
Comments	-

Data / Parameter	LFme
Data unit	Dimensionless
Description	Leakage factor for market-effects calculations
Source of data	VMD0011 LK-ME v1.1
Value applied	0.4
Justification of choice of data or description of measurement methods and procedures applied	When the mean biomass is equal 15% to the biomass within the project boundaries, the *AAAA* shall be considered 0.4. In the Tapera project, the biomass of the total trees aboveground is considered equal in the Amazon Biome and in the Project Area

Purpose of Data	Calculation of leakage
Comments	-

Data / Parameter	LKmaf
Data unit	Dimensionless
Description	Leakage management adjustment factor
Source of data	Calculated based on VMD0011 v1.1 Equation 3
Value applied	1
Justification of choice of data or description of measurement methods and procedures applied	As leakage management activities have not been established within areas under the control of the proponent and according to Higuchi et al. (1998), that the proportion of stem biomass (marketable portion) to total aboveground biomass is constant in mature Amazonian forests, the LKMAF was kept at 1.
Purpose of Data	Calculation of leakage
Comments	-

Data / Parameter	CBSL,XBT,i,t
Data unit	t CO2-e
Description	Carbon emission due to displaced timber harvests in the baseline scenario in stratum i in year t
Source of data	Calculated based on VMD0011 v1.1 Equation 5
Value applied	See the values applied in the Table 4.11
Justification of choice of data or description of measurement methods and procedures applied	The carbon emission due to the displaced logging has two components: the biomass carbon of the extracted timber and the biomass carbon in the forest damaged in the process of timber extraction
Purpose of Data	Calculation of leakage
Comments	-

Data / Parameter	LDF

Data unit	t C m-3
Description	Logging damage factor
Source of data	VMD0011 LK-ME v1.1
Value applied	0.53
Justification of choice of data or description of measurement methods and procedures applied	Default value for broadleaf and mixed forests of 0.53 t C m-3. Default value for broadleaf and mixed forests of 0.53 t C m-3 from 774 logging gaps measured by Winrock International in Bolivia, Belize, the Republic of Congo, Brazil and Indonesia may be used for tropical broadleaf forests
Purpose of Data	Calculation of leakage
Comments	-

Data / Parameter	LIF
Data unit	t C m-3
Description	Logging infrastructure factor
Source of data	VMD0011 LK-ME v1.1
Value applied	0.29
Justification of choice of data or description of measurement methods and procedures applied	Conservative default value of 0.29 t C m-3 calculated from 1,839 hectares of logging concessions analysed by Winrock International in the Republic of Congo and Brazil, may be used for tropical broadleaf forests
Purpose of Data	Calculation of leakage
Comments	-

3.3.2 Data and Parameters Monitored (VCS, 3.16)

Table below provides the data and parameters to be monitored during the crediting period of the Tapera project.

Data / Parameter	Project Forest Cover Monitoring Map
Data unit	N/A
Description	Map showing the location of forest land within the project area at the beginning of each monitoring period. If within the Project Area some forest land is cleared, the benchmark map must show the deforested areas at each monitoring event.
Source of data	Remote sensing in combination with GPS data collected during ground truthing
Description of measurement methods and procedures to be applied	The measurement methods and procedures applied are described in Approved VCS Module VMD0015-M-REDD-v2.2 - methods for monitoring of GHG emissions and removals in REDD and CIW projects.
Frequency of monitoring/recording	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied	N/A
Monitoring equipment	Remote sensing and GPS.
QA/QC procedures to be applied	The minimum map accuracy must be 90% for the classification of forest/non-forest in the remote sensing imagery. If the classification accuracy is less than 90% then the map is not acceptable for further analysis. More remote sensing data and ground truthing data will be needed to produce a product that reaches the 90% minimum mapping accuracy.
Purpose of data	Calculation of baseline emissions Calculation of project emissions
Calculation method	N/A
Comments	N/A

Data / Parameter	Aburn,i,t
Data unit	ha
Description	Burned area in stratum *i* at time *t*
Source of data	Remote sensing data
Description of measurement methods and procedures to be applied	It is considered that burning is a common practice in the region, and that all deforested area undergoes burning in a given moment
Frequency of monitoring/recording	Areas burnt will be monitored every 5 years or if verification occurs on a frequency of less than every 5 years, examination will occur prior to any verification event
Value applied	This value varies annually, depending on the area deforested.
Monitoring equipment	Remote sensing and GPS
QA/QC procedures to be applied	Best practices in remote sensing and GIS: 1) Land use and land cover mapping is assessed using Landsat satellites images with resolution 30 meters (MapBiomas, 2022a) validating through a pixel-by-pixel based machine learning algorithms classification using Google Earth Engine. 2) The Mapbiomas methodology uses an image with minimal cloud cover product of Landsat scenes mosaicked from various months of the year (MapBiomas, 2022a). 3) An independent verifiable accuracy assessment was performed using high-resolution images with 5 m resolution from Planet Image to confirm the minimum map accuracy of 90% for each land use class used. 4) Conservatively the secondary forest is eliminated from the forest class according to Silva Junior et al. (2020). Also, with the objective of reducing the classification error between forest cover maps, a PRODES hydrography mask was downloaded by TerraBrasilis plataform is added in each forest cover maps map, in this way, this land use class remained unchanged in all years (Assis et al., 2019)

Purpose of data	alculation of baseline emissions alculation of project emissions
Calculation method	N/A

Data / Parameter	AAplanned,i,t
Data unit	ha
Description	Annual area of baseline planned deforestation for stratum i at time t
Source of data	Calculated according to VMD0006 v1.3, Equation 5
Description of measurement methods and procedures to be applied	Calculated based on the Projected annual proportion of land that will be deforested in stratum i during year t, Total area of planned deforestation over the baseline period for stratum i and Likelihood of deforestation for stratum i
Frequency of monitoring/recording	Must be monitored every 5 years or if verification occurs on a frequency of less than every 5 years, examination will occur prior to any verification event
Value applied	See the values applied in the Table 4.1
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Calculation of baseline emissions
Calculation method	VMD0006 v1.3, Equation 5
Comments	-

Data / Parameter	Aplanned,i
Data unit	hectare
Description	Projected annual proportion of land that will be deforested in stratum *i* during year *t*
Source of data	Forest suppression plan

Description of measurement methods and procedures to be Applied	According to the Forest Suppression Plan
Frequency of monitoring/recording	Must be examined at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied	See the values applied in the Table 4.1
Monitoring equipment	N/A
QA/QC procedures to be Applied	N/A
Purpose of data	Calculation of baseline emissions
Calculation method	N/A
Comments	-

Data / Parameter	ADefPA,u,i,t
Data unit	ha
Description	Area of recorded deforestation in the project area stratum *i* converted to land use *u* in year *t*
Source of data	Remote sensing data
Description of measurement methods and procedures to be applied	Remote sensing tools
Frequency of monitoring/recording	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied	N/A

Monitoring equipment	Remote sensing and GPS
QA/QC procedures to be applied	Best practices in remote sensing and GIS: Land use and land cover mapping is assessed using Landsat ellites images with resolution 30 metres (MapBiomas, 2022a) idating through a pixel-by-pixel based machine learning orithms classification using Google Earth Engine. The Mapbiomas methodology uses images with minimal cloud ver product of Landsat scenes mosaicked from various months of year (MapBiomas, 2022a). n independent verifiable accuracy assessment was performed using gh-resolution images with 5 m resolution from Planet Image to nfirm the minimum map accuracy of 90% for each land use class ed. Conservatively the secondary forest is eliminated from the forest ss according to Silva Junior et al. (2020). Also, with the objective of reducing the classification error between forest cover maps, a PRODES hydrography mask was downloaded by TerraBrasilis platform is added in each forest cover maps map, in this way, this land use class remained unchanged in all years (Assis et al., 2019)
Purpose of data	Calculation of project emissions
Calculation method	N/A
Comments	-

Data / Parameter	$\Delta CP,DefPA,i,t$
Data unit	t CO2-e
Description	Net carbon stock change as a result of deforestation in the project area in the project case in stratum *i* in year *t*
Source of data	Calculated according to VMD0015 v2.2, Equation 3

Description of measurement methods and procedures to be applied	Calculated based on the area of recorded deforestation in the project area stratum *i* converted to land use *u* at time *t* and the net carbon stock changes in all pools in the project case in land use *u* in stratum *i* at time *t*
Frequency of monitoring/recording	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Calculation of project emissions
Calculation method	VMD0015 v2.2, Equation 3
Comments	-

Data / Parameter	ΔCpools,Def,u,i,t
Data unit	t CO2-e ha-1
Description	Net carbon stock changes in all pools as a result of deforestation in the project case in land use u in stratum i in year t
Source of data	Calculated according to VMD0015 v2.2, Equation 5
Description of measurement methods and procedures to be applied	Calculated based on carbon stock in all pools in the baseline case in stratum i, carbon stock in all pools in post-deforestation land use u in stratum i and carbon stock sequestered in wood products from harvests in stratum i
Frequency of monitoring/recording	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied	N/A

Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Calculation of project emissions
Calculation method	VMD0015 v2.2, Equation 5
Comments	-

Data / Parameter	GHGP,E,i,t
Data unit	t CO2-e
Description	Greenhouse gas emissions as a result of deforestation activities within the project area in the project case in stratum i in year t
Source of data	Calculated based on VMD0015 v2.2 Equation 30
Description of measurement methods and procedures to be applied	Calculated based on the non-CO2 emissions due to biomass burning in stratum i in year t
Frequency of monitoring/recording	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Calculation of project emissions
Calculation method	VMD0015 v2.2 Equation 30
Comments	-

Data / Parameter	EBiomassBurn,i,t
Data unit	t CO2-e
Description	Greenhouse gas emissions due to biomass burning in stratum i in year t of each GHG (CO2, CH4, N2O)
Source of data	Calculated based on VMD0013 v1.2 Equation 1
Description of measurement methods and procedures to be applied	Calculated based on area burnt for stratum *i* in year *t*, average aboveground biomass stock before burning stratum *i*, in year *t* combustion factor for stratum *i*, emission factor for stratum *i* for gas *g* and the Global warming potential for gas *g*
Frequency of monitoring/recording	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied	See the values applied in the Table 4.9
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Calculation of project emissions
Calculation method	VMD0013 v1.2 Equation 1
Comments	-

Data / Parameter	Asp
Data unit	ha

Description	Area of sample plots in biomass inventory
Source of data	Recording and archiving of number and size of sample plots
Description of measurement methods and procedures to be applied	Cluster plot in Maltese cross setup with four rectangular sub-plots with 0.1 ha (10 m x 100 m) each
Frequency of monitoring/recording	Must be re-evaluated whenever the baseline is revised
Value applied	N/A
Monitoring equipment	GPS and measuring tape
QA/QC procedures to be applied	GPS coordinates are double checked in the field
Purpose of data	Calculation of baseline emissions
Calculation method	N/A
Comments	The biomass inventory will be estimated according to the Standard Operating Procedure (SOP)34

Data / Parameter	n
Data unit	Dimensionless
Description	Number of sample plots
Source of data	Recording and archiving of number of sample points
Description of measurement methods and procedures to be applied	Calculated with statistic equation
Frequency of monitoring/recording	Must be re-evaluated whenever the baseline is revised
Value applied	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	

Purpose of data	Calculation of baseline emissions
Calculation method	
Comments	The biomass inventory will be estimated according to the Standard Operating Procedure (SOP)

Data / Parameter	DBH
Data unit	cm
Description	Diameter at breast height of a tree in cm
Source of data	Field measurements in sample plots
Description of measurement methods and procedures to be applied	Measured 1.3m above ground. Measure all trees above some minimum DBH (≥ 10 cm) in the sample plots
Frequency of monitoring/recording	Must be re-evaluated whenever the baseline is revised. Where carbon stock enhancement is included, monitoring shall occur at least every five years
Value applied	N/A
Monitoring equipment	Measuring tape
QA/QC procedures to be applied	Standard quality control procedures for forest inventory including field data collection and data management were applied. The procedure of DBH measurement is already applied in national forest monitoring and is available from published handbooks, and from Penman et al. (2003) (an example of a handbook is MacDicken (1997)).
Purpose of data	Calculation of baseline emissions
Calculation method	Diameter (DBH) is calculated based on circumference at breast height (CBH) measurement, by means of the basic perimeter equation: CBH DBH = π

Comments	The biomass inventory will be estimated according to the Standard Operating Procedure (SOP)

Data / Parameter	Bi,t
Data unit	t d.m. ha-1
Description	Average aboveground biomass stock before burning stratum *i* in year *t*
Source of data	Calculated based on VMD0013 v1.2 Equation 2
Description of measurement methods and procedures to be applied	Calculated based on the Carbon stock in aboveground biomass in trees in stratum *i* in year *t* and Carbon fraction of biomass
Frequency of monitoring / recording	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event.
Value applied	See the valued applied in Table 4.9
Monitoring equipment	N/A
QA / QC procedures to be applied	N/A
Purpose of data	alculation of baseline emissions alculation of leakage
Calculation method	VMD0013 v1.2 Equation 2
Comments	-

Data / Parameter	ΔCWPS−REDD
Data unit	t CO2-e
Description	Net GHG emissions in the REDD project scenario up to year *t**
Source of data	Calculated according to VMD0015 v2.2, Equation 1

Description of measurement methods and procedures to be applied	Calculated based on net carbon stock change as a result of deforestation in the project area in the project case in stratum *i* in year *t*, Net carbon stock change as a result of degradation in the project area in the project case in stratum *i* in year *t*, Net carbon stock change as a result of natural disturbance in the project area in the project case in stratum *i* in year *t* and Greenhouse gas emissions as a result of deforestation and degradation activities within the project area in the project case in stratum *i* in year *t*
Frequency of monitoring/recording	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Calculation of project emissions
Calculation method	VMD0015 v2.2, Equation 1
Comments	-

Data / Parameter	ΔCLK−REDD
Data unit	t CO2-e
Description	Net GHG emissions due to leakage from the REDD project activity up to year *t**
Source of data	Calculated according to VM0007 v1.7 Equation 4
Description of measurement methods and procedures to be applied	Calculated based on net GHG emissions due to activity shifting leakage for projects preventing planned deforestation up to year *t**, and the Net GHG emissions due to market-effects leakage up to year *t**
Frequency of monitoring / recording	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event

Value applied	See the values applied in the Table 4.11
Monitoring equipment	
QA/QC procedures to be applied	
Purpose of data	Calculation of leakage
Calculation method	VM0007 v1.7 Equation 4
Comments	-

Data / Parameter	$\Delta CLK-AS,planned$
Data unit	t CO2-e
Description	Net greenhouse gas emissions due to activity shifting leakage for projects preventing planned deforestation up to year *t**
Source of data	Calculated according to VMD0009 v1.3, Equation 1
Description of measurement methods and procedures to be applied	Calculated based on the area of activity shifting leakage in stratum *i* in year *t*, the net carbon stock changes in all pre- deforestation pools in baseline stratum *i*, and the Greenhouse gas emissions as a result of leakage of avoiding deforestation activities in stratum *i* in year *t*
Frequency of monitoring/recording	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Calculation of leakage
Calculation method	VMD0009 v1.3, Equation 1
Comments	-

Data / Parameter	$LKAplanned,i,t$
Data unit	Ha
Description	The area of activity shifting leakage in stratum *i* in year *t*
Source of data	Calculated according to VMD0009 v1.3, Equation 6
Description of measurement methods and procedures to be applied	Calculated according to the total area of monitored deforestation by the baseline agent of the planned deforestation in stratum *i* in year *t*, and the New calculated forest clearance by the baseline agent of the planned deforestation in stratum *i* in year *t* where no leakage is occurring
Frequency of monitoring / recording	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Calculation of leakage
Calculation method	VMD0009 v1.3, Equation 6
Comments	-

Data / Parameter	ADefLK,i,t
Data unit	ha
Description	The total area of monitored deforestation by the baseline agent of the planned deforestation in stratum *i* in year *t*
Source of data	Remote sensing data

Description of measurement methods and procedures to be applied	Analysis of remote sensing data and/or legal records and/or survey information for lands owned or controlled or previously owned or controlled by the baseline agent of deforestation. Legal records will include government permits to deforest including concession licenses. Ex ante, project proponents must determine and justify the likelihood of leakage based on characteristics of the baseline agent or class of agent.
Frequency of monitoring/ recording	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied	N/A
Monitoring equipment	Remote sensing and GIS tools
QA/QC procedures to be applied	Best practices in remote sensing and GIS: and use and land cover mapping is assessed using Landsat satellites images h resolution 30 meters (MapBiomas, 2022a) validating through a pixel-by- el based machine learning algorithms classification using Google Earth gine. he Mapbiomas methodology uses image with minimal cloud cover product of ndsat scenes mosaicked from various months of the year (MapBiomas, 22a). An independent verifiable accuracy assessment was performed using high- olution image with 5 m resolution from Planet Image to confirm the nimum map accuracy of 90% for each land use class used. onservatively the secondary forest is eliminated of the forest class according Silva Junior et al. (2020). Also, with the objective of reducing the classification error between forest cover maps, a PRODES hydrography mask was downloaded by TerraBrasilis plataform is added in each forest cover maps map, in this way, this land use class remained unchanged in all years (Assis et al., 2019)

Purpose of data	Calculation of leakage emissions
Calculation method	N/A
Comments	-

Data / Parameter	$NewRi,t$
Data unit	ha
Description	New calculated forest clearance in stratum *i* in year *t* by the baseline agent of the planned deforestation where no leakage is occurring
Source of data	Calculated according to VMD0009 v1.3, Equation 4 or 5
Description of measurement methods and procedures to be applied	Calculated based on projected annual proportion of land that will be deforested outside the project boundary in stratum *i* in year *t*, and Total area of planned deforestation outside the project boundary over the baseline period for stratum *i*, according to equation 04 or based on Deforestation by the baseline agent of the planned deforestation in stratum *i* in year *t* in the absence of the project, projected annual proportion of land that will be deforested in project stratum *i* in year *t*, and Total area of planned deforestation over the baseline period for project stratum *i*
Frequency of monitoring/recording	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Calculation of leakage
Calculation method	VMD0009 v1.3, Equation 4 or 5

Comments	Equation 4 is used when the identified deforestation agent has made public a business plan or similar documentation containing data suited for estimating a conversion rate over the baseline period. Equation 5 is used when the conversion rate must be estimated. In this case, the projected annual proportion of land that will be deforested is the same used to set the baseline, while the deforestation provoked by the identified deforestation agent is calculated by VMD0009 v1.3, Equation 1 or 2
Monitoring equipment	N/A

Data / Parameter	D%planned,i,t
Data unit	%
Description	Projected annual proportion of land that will be deforested in project stratum *i* in year *t*
Source of data	Deforestation permits for areas outside the project boundary
Description of measurement methods and procedures to be applied	Defined in deforestation permits. Use a verifiable plan or proxy areas
Frequency of monitoring/ recording	Must be revisited at the time of baseline revision
Value applied	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Calculation of leakage
Calculation method	N/A
Comments	-

Data / Parameter	Aplanned,i,OP
Data unit	ha
Description	Total area of planned deforestation outside the project boundaries over the entire project lifetime for stratum *i*
Source of data	Deforestation permits for areas outside the project boundary
Description of measurement methods and procedures to be applied	Defined in deforestation permits
Frequency of monitoring/recording	Must be re-evaluated whenever the baseline is revised
Value applied	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Calculation of leakage
Calculation method	N/A
Comments	This parameter is used when an identified deforestation agent has made public a business plan or similar documentation containing data suited for estimating a conversion rate over the baseline period in areas outside the project boundary

Data / Parameter	WoPRi,t
Data unit	ha
Description	Deforestation by the baseline agent of the planned deforestation in stratum *i* in year *t* in the absence of the project
Source of data	Calculated according to VMD0009 v1.3, equation 2 or 3

Description of measurement methods and procedures to be applied	Projected based on linear regression according to VMD0009 v1.3 Equation 2 or based on the average number of hectares of forest cleared by the baseline agent of the planned deforestation in the five years prior to project implementation in stratum *i* by agent *ag* within the country (VMD0009 v1.3 Equation 3)
Frequency of monitoring/recording	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Calculation of leakage
Calculation method	VMD0009 v1.3 Equation 2 is used when the results of the analysis must produce a statistically significant regression with a p≤0.05 and an adjusted r2 of ≥0.75. The regression is calculated based on the deforested by the deforestation agent each year over the previous five years within the country. Where no statistically significant regression can be found, VMD0009 v1.3 Equation 3 is used
Comments	-

Data / Parameter	HistHai,ag
Data unit	Ha
Description	Number of hectares of forest cleared by the baseline agent of the planned deforestation in the five years prior to project implementation in stratum *i* by agent *ag* within the country
Source of data	Remote sensing data
Description of measurement methods and procedures to be applied	Analysis of remote sensing data and/or legal records and/or survey information for lands owned or controlled or previously owned or controlled by the baseline agent of deforestation

Frequency of monitoring / recording	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied	N/A
Monitoring equipment	Remote sensing tools
QA/QC procedures to be applied	Best practices in remote sensing and GIS: nd use and land cover mapping is assessed using Landsat satellites images h resolution 30 meters (MapBiomas, 2022a) validating through a pixel-by- el based machine learning algorithms classification using Google Earth gine. he Mapbiomas methodology uses image with minimal cloud cover product Landsat scenes mosaicked from various months of the year (MapBiomas, 22a). n independent verifiable accuracy assessment was performed using high- olution image with 5 m resolution from Planet Image to confirm the nimum map accuracy of 90% for each land use class used. Conservatively the secondary forest is eliminated of the forest class ording to Silva Junior et al. (2020). Also, with the objective of reducing the classification error between forest cover maps, a PRODES hydrography mask was downloaded by TerraBrasilis platform is added in each forest cover maps map, in this way, this land use class remained unchanged in all years (Assis et al., 2019)
Purpose of data	Calculation of leakage
Calculation method	N/A
Comments	-

Data / Parameter	GHGLK,E,i,t
Data unit	t CO2-e
Description	Greenhouse gas emissions as a result of leakage of avoiding deforestation activities in stratum *i* in year *t*
Source of data	Calculated according to VMD0009 v1.3, Equation 7

Description of measurement methods and procedures to be applied	Calculated based on Non-CO2 emissions due to biomass burning in stratum *i* in year *t*
Frequency of monitoring / recording	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Calculation of leakage
Calculation method	VMD0009 v1.3, Equation 7
Comments	

Data / Parameter	$\Delta CLK-ME$
Data unit	t CO2-e
Description	Net greenhouse gas emissions due to market-effects leakage
Source of data	Calculated according to VMD0011 v1.1 Equation 1
Description of measurement methods and procedures to be applied	Calculated based on total GHG emissions due to market- effects leakage through decreased timber harvest
Frequency of monitoring/recording	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied	See the values applied in the Table 4.11
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A

Purpose of data	Calculation of leakage
Calculation method	VMD0011 v1.1 Equation 1
Comments	-

Data / Parameter	LKMarketEffects,timber
Data unit	t CO2-e
Description	Total GHG emissions due to market-effects leakage through decreased timber harvest
Source of data	Calculated according to VMD0011 v1.1, Equation 2
Description of measurement methods and procedures to be applied	Calculated according to leakage factor for market-effects calculations, summed emissions from timber harvest in stratum *i* in the baseline case potentially displaced through implementation of carbon project and leakage management adjustment factor
Frequency of monitoring/recording	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied	See the values applied in the Table 4.11
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Calculation of leakage
Calculation method	VMD0011 v1.1, Equation 2
Comments	-

Data / Parameter	LFME
Data unit	Dimensionless
Description	Leakage factor for market-effects calculations
Source of data	Default data from VMD0011 v1.1

Description of measurement methods and procedures to be applied	Each project thus must calculate within each stratum the proportion of total biomass in commercial species that is merchantable (PMPi). This must then be compared to the mean proportion of total biomass that is merchantable for each forest type (PMLFT).
Frequency of monitoring/recording	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied	0.4
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Calculation of leakage
Calculation method	N/A
Comments	-

Data / Parameter	ALT,i
Data unit	t CO2-e
Description	Summed emissions from timber harvest in stratum *i* in the baseline case laced through implementation of carbon project
Source of data	Calculated based on VMD0011 v1.1, Equation 4
Description of measurement methods and procedures to be applied	Calculated based on Carbon emission due to displaced timber harvests in the baseline scenario in stratum *i* in time *t*
Frequency of monitoring/ recording	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied	See the values applied in the Table 4.11
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Calculation of leakage

Calculation method	VMD0011 v1.1, Equation 4
Comments	-

Data / Parameter	CBSL,XBT,i,t
Data unit	t CO2-e
Description	Carbon emission due to timber harvests in the baseline scenario in stratum *i* in year *t*
Source of data	Calculated according to VMD0011 v1.1, Equation 5
Description of measurement methods and procedures to be applied	Calculated based on the volume of timber projected to be extracted from within the project boundary during the baseline in stratum *i* at time *t*, the mean wood density of commercially harvested species, the carbon fraction of biomass for commercially harvested species *j*, the logging damage factor (LDF), and the logging infrastructure factor (LIF)
Frequency of monitoring/ recording	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied	See the values applied in the Table 4.11
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Calculation of leakage
Calculation method	VMD0011 v1.1, Equation 5
Comments	-

Data / Parameter	VBSL,EX,i,t
Data unit	m3
Description	Volume of timber projected to be extracted from within the project boundary during the baseline in stratum *i* in year *t*
Source of data	da SILVA et al., 2001; Veríssimo et al., 1992

Description of measurement methods and procedures to be applied	The volume of commercial wood found in previous inventories carried out to request the deforestation of the project area and the deforestation in the baseline scenario are considered to estimate market leakage effects.
Frequency of monitoring/recording	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied	38.3 m3 ha-1
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Calculation of leakage emissions
Calculation method	N/A
Comments	-

Data / Parameter	LDF
Data unit	t C m-3
Description	Logging damage factor
Source of data	Default value provided by VMD0011 v1.1
Description of measurement methods and procedures to be applied	Default value for broadleaf and mixed forests of 0.53 t C m-3 from 774 logging gaps measured by Winrock International in Bolivia, Belize, the Republic of Congo, Brazil and Indonesia may be used for tropical broadleaf forests
Frequency of monitoring/recording	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied	Default value for broadleaf and mixed forests of 0.53 t C m-3
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Calculation of leakage emissions
Calculation method	N/A

Comments	-

Data / Parameter	*LIF*
Data unit	t C m-3
Description	Logging infrastructure factor
Source of data	Default value provided by VMD0011 v1.1
Description of measurement methods and procedures to be applied	Factor for calculating the emissions arising from the creation of logging infrastructure (roads, skid trails and decks) during logging operations per cubic meter extracted
Frequency of monitoring/recording	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied	Conservative default value of 0.29 t C m-3
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Calculation of leakage
Calculation method	N/A
Comments	-

3.3.3 Monitoring Plan (VCS, 3.16, 3.20)

The Monitoring Plan was developed based on the guidelines of the "VM0007 REDD+ Methodology Framework (REDD+ MF), v1.6". According to the methodology, the Monitoring Plan demands the inclusion of the following tasks:

- Monitoring of project implementation;
- Monitoring the change in the current carbon stock and greenhouse gas emissions;
- Monitoring leakage in the carbon stock change and greenhouse gas emission
- Estimation of net ex-post carbon stock change and greenhouse gas emission.

Monitoring Project Implementation

The project implementation will be monitored considering the project activity defined earlier. Table 52 presents information relevant to this task, following the criteria in section 9.3.1 of VM0007. Orgânica Consultoria will be responsible for the implementation of the project activity and its monitoring. The

implementation of specific project activities can be performed by external consultants operating under the supervision of Organica Consultoria. Digital files will be stored in the Organica Consultoria database and hard copies will be archived at their headquarters.

Table- Standardized Benefit Category, Project Activities, and Technical Description of the Monitoring Task.

Standardized Benefit Category	Project Activities	Technical Description of the Monitoring Task
Forest cover / GHG emissions reduction	Improving asset surveillance	Deforestation, forest degradation and fire scars will be monitored annually by means of satellite images and field verifications. Land use change maps will be collected from PRODES and DETER/INPE[34], MapBiomas[35] and orbital images from the European Space Agency[36].
Reduction of GHG emissions	Remote Biomass Monitoring	Land use change maps from scientifically recognized data sources such as MapBiomas will be used. There will also be annual remote monitoring of the area through satellite imagery and drone and radar overflights in order to assess the conservation status of the area and project zone, more specifically, to assess whether there have been changes in forest cover during the monitoring period.
Reduction of GHG emissions	Prevention and Fighting of Forest Fires	Training on good management and firefighting practices will be offered to the communities living in the project area to prevent the spread of forest fires. The training in good management practices will focus on risk control and mitigation measures. There will be firefighting training for the formation of volunteer brigades. The execution of the training will be registered through activity reports. The number of training sessions will be reported in each monitoring report. Forest fires should also be prevented by establishing firebreaks. The

[34] Available at: http://terrabrasilis.dpi.inpe.br/ . Accessed on: 12/12/2022.
[35] Available at: https://mapbiomas.org/ . Accessed on: 12/12/2022.
[36] Available at: <https://sentinels.copernicus.eu/web/sentinel/home>. Accessed on: 12/12/2022

		number and extension of the firebreaks will be monitored and reported in each monitoring report.

The implementation of the Tapera project will be closely monitored using a combination of schedules, activity reports, meeting minutes, attendance lists, and forest cover maps, ensuring continuous improvement and quality assurance throughout the project's 30-year duration. Organica Consultoria will manage digital data storage via Google Drive, ensuring that all documents are accessible to Validation and Verification Bodies (VVBs) during each verification process. The monitoring of changes in carbon stock, GHG emissions, and leakage will follow the guidelines outlined in module VMD00015 v2, using various data sources and methods to assess deforestation, forest degradation, and carbon stock changes in both the project area and leakage belt. This will involve a series of steps, including the selection and analysis of land use and land cover data, processing of satellite imagery, and post-processing accuracy evaluation.

The project will utilize classified orbital images from the PRODES and DETER services to monitor deforestation and degradation. Images from the Landsat-8, SENTINEL-2, and CBERS-4 satellites will be used to assess land use changes, with further refinement through geometric correction and cloud-cover reduction methods. The PRODES system, with its higher spatial resolution, will be used annually to monitor land use changes, while the DETER system, which offers higher temporal resolution, will provide monthly alerts for deforestation and forest degradation. These alerts will be field-verified every four months, with field observations used to update forest cover maps and to estimate GHG emissions resulting from deforestation in the project area or leakage belt. Deforestation alerts will be processed according to the prescribed methodologies, and the net change in carbon stock will be calculated, considering all carbon pools in the design scenario. Participatory rural appraisals, conducted every two years, will also assess the potential for illegal logging and other forest activities. Non-CO2 emissions from biomass burning will be accounted for, and all monitoring reports, including data classification and accuracy assessment, will be stored digitally and in printed form for future verification by VVBs.

Table - Data and parameters to be monitored during the Tapera project crediting period

Data / Parameter	Aburn,i,t

Data unit	hectare
Description	Burned area in stratum i at time t
Source of data	Remote sensing data
Description of measurement method and procedures to be applied	Burning is considered a common practice in the region, and that every deforested area suffers burning at some point.
Frequency of monitoring/recording	Burned areas will be monitored annually, the examination will take place before any verification event.
Value applied	This value varies annually, depending on the area deforested.
Monitoring equipment	Remote sensing
QA/QC procedures to be applied	Good practices in remote sensing; Land use change map for the monitoring period; Land use change map superimposed with location data from fire alerts from INPE-BDQUEIMADAS (http://www.inpe.br/queimadas/abasFogo.php) in the period; Quantify pixels of deforested areas on fire alerts. Monitor areas of burned forest
Purpose of data	N/A
Calculation method	As burning biomass is a common practice in the region, it was considered that all deforested areas were burned – the deforestation cycle includes burning.
Comments	Remote sensing

Data / Parameter	External Leakage
Data unit	tCO2/year
Description	Net CO2 emissions due to unplanned deforestation moved outside the leakage belt by year t*
Source of data	Remote sensing and GIS data. Secondary data.
Description of measurement method and procedures to be applied	Leakage management areas that result in a decrease in the carbon stock will be subject to monitoring.

Frequency of monitoring/recording	Annually
Value applied	Values are described in Table 55.
Monitoring equipment	Remote sensing and GIS. Secondary data.
QA/QC procedures to be applied	N/A
Purpose of data	Calculation of leakage
Calculation method	As per LK-ASU, Step 4.
Comments	N/A

Data / Parameter	ΔCP, LB
Data unit	tCO2e
Description	Liquid greenhouse gas emissions within the leakage belt in the case of the project
Source of data	According to the M-REDD Module.
Description of measurement method and procedures to be applied	According to the M-REDD Module.
Frequency of monitoring/recording	Annually
Value applied	Ex post
Monitoring equipment	N/A
QA/QC procedures to be applied	As per REDD+ MoF section 9.3 or other VCS methodology using this module.
Purpose of data	Calculation of leakage

Calculation method	N/A
Comments	N/A

Data / Parameter	UMADefLB,i,t
Data unit	hectare
Description	Area of deforestation recorded in the leakage belt in the case of the project in stratum i in the year t
Source of data	As per the M-REDD Module. Satellite image.
Description of measurement method and procedures to be applied	According to the M-REDD Module. Analysis of satellite images.
Frequency of monitoring/recording	Annually
Value applied	Ex post
Monitoring equipment	N/A
QA/QC procedures to be applied	As per REDD+ MoF section 9.3 or other VCS methodology using this module.
Purpose of data	Calculation of leakage
Calculation method	N/A
Comments	N/A

Data / Parameter	UMADefPA,I,u,t
Data unit	hectare
Description	Area of deforestation recorded in the project area in case of project in

	stratum i converted to land use u in year t
Source of data	As per M-REDD Module. Satellite image.
Description of measurement method and procedures to be applied	According to the M-REDD Module. Analysis of satellite images.
Frequency of monitoring/recording	Annually
Value applied	To measure ex-post.
Monitoring equipment	N/A
QA/QC procedures to be applied	As per REDD+ MoF section 9.3 or other VCS methodology that uses this module.
Purpose of data	Calculation of leakage
Calculation method	N/A
Comments	N/A

Data / Parameter	RFt
Data unit	%
Description	Risk factor used to calculate VCS buffer credits
Source of data	Non-Permanence Risk Report (v3.1), Remote sensing and GIS data, Literature data

Description of measurement method and procedures to be applied	All VCS Non-Permanence Risk Report data sources will be used to measure the various risk factors.
Frequency of monitoring/recording	Annually
Value applied	10
Monitoring equipment	VCS Approved AFOLU Non-Permanence Risk Tool
QA/QC procedures to be applied	Literature data from renowned sources will be used and critically checked. When possible, the average of two or more sources will be used.
Purpose of data	Calculation of project emissions
Calculation method	All risk factors described in the VCS Risk Report have been assessed.
Comments	N/A

Data / Parameter	ADefLB,eu,u,t
Data unit	hectare
Description	Deforested area recorded in the leakage belt in stratum i converted to land use i in year t
Source of data	According to Module M-REDD v2 .two. Remote sensing images.
Description of measurement method and procedures to be applied	According to the M-REDD Module. Analysis of satellite images.
Frequency of monitoring/recording	Annually
Value applied	Ex-post
Monitoring equipment	N/A
QA/QC procedures to be applied	As per REDD+ MoF section 9.3 or other VCS methodology using this module.

Purpose of data	Calculation of leakage
Calculation method	N/A
Comments	

Data / Parameter	Leakage Belt Forest Cover Monitoring Map
Data unit	hectare
Description	Map showing the location of the forest area within the leakage belt area at the beginning of each monitoring period. Applicable only when leakage must be monitored on a leakage belt.
Source of data	Remote sensing in combination with GPS data collected during soil verification
Description of measurement methods and procedures to be applied	Minimum map accuracy should be 90% for forest/non-forest classification on remote sensing images. If classification accuracy is less than 90%, the map is not acceptable for further analysis. More remote sensing data and ground verification data will be needed to produce a product that achieves the minimum 90% mapping accuracy.
Frequency of monitoring/ recording	Must be monitored at least every 5 years or if verification occurs at a frequency less than every 5 years, examination must occur prior to any verification event.
Value applied	Ex-post
Monitoring equipment	Remote sensing and GIS

QA/QC procedures to be applied	Mapbiomas data are applicable for use in this project, according to the criteria listed below (Methodology VM0007): i) Mapbiomas data cover the entire project area, leakage belt and reference region. ii) Mapbiomas data cover the entire reference period (beginning, middle and end) of the fixed baseline period. iii) Mapbiomas monitors the conversion of forest areas into non-forest areas. iv) Monitoring took place throughout the fixed baseline period. In case of unavailability of Mapbiomas data for the monitoring period, other sources will be consulted such as PRODES or an image classification (Landsat 8) will be carried out to measure the deforested area. Land use and land cover mapping is evaluated using images with a spatial resolution greater than 30 meters. The assessment of the classification accuracy is performed by analysing the overall accuracy and the kappa index obtained from a confusion matrix. The minimum classification mapping accuracy should be greater than 90%, which is considered very good.
Purpose of data	Calculation of leakage
Calculation method	Remote sensing and GIS
Comments	N/A

Data / Parameter	Forest Coverage Monitoring Map
Data unit	hectare
Description	Map showing the location of the forest area within the leakage belt area at the beginning of each monitoring period. Applicable only when leakage must be monitored on a leakage belt.
Source of data	Remote sensing in combination with GPS data collected during the soil verification

Description of measurement method and procedures to be applied	Minimum map accuracy should be 90% for forest/non-forest classification on remote sensing images. If classification accuracy is less than 90%, the map is not acceptable for further analysis. More remote sensing data and ground verification data will be needed to produce a product that achieves the minimum 90% mapping accuracy.
Frequency of monitoring/recording	Must be monitored at least every 5 years or if verification occurs at a frequency less than every 5 years, examination must occur prior to any verification event.
Value applied	Ex-post
Monitoring equipment	Remote sensing and GIS
QA/QC procedures to be applied	Mapbiomas data are applicable for use in this project, according to the criteria listed below (Methodology VM0007): Mapbiomas data covers the entire project area, leakage belt and reference gion. Mapbiomas data cover the entire reference period (beginning, middle and d) of the fixed baseline period. Mapbiomas monitors the conversion of forest areas into non- forest areas. Monitoring took place throughout the fixed baseline period. In case of unavailability of Mapbiomas data for the monitoring period, other sources will be consulted such as PRODES or an image classification (Landsat 8) will be carried out to measure the deforested area. Land use and land cover mapping is evaluated using images with a spatial resolution greater than 30 meters. The assessment of the classification accuracy is performed by analyzing the overall accuracy and the kappa index obtained from a confusion matrix. The minimum classification mapping accuracy should be greater than 90%, which is considered very good.
Purpose of data	Calculation of project emissions
Calculation method	Remote sensing and GIS
Comments	N/A

3.3.4 Dissemination of Monitoring Plan and Results (VCS, 3.18; CCB, CL4.2)

The results of climate monitoring will be made available on the project website and will also be publicly available on Verra's website. The results will be presented to local communities through communication campaigns, and scientific articles will be published in technical journals.

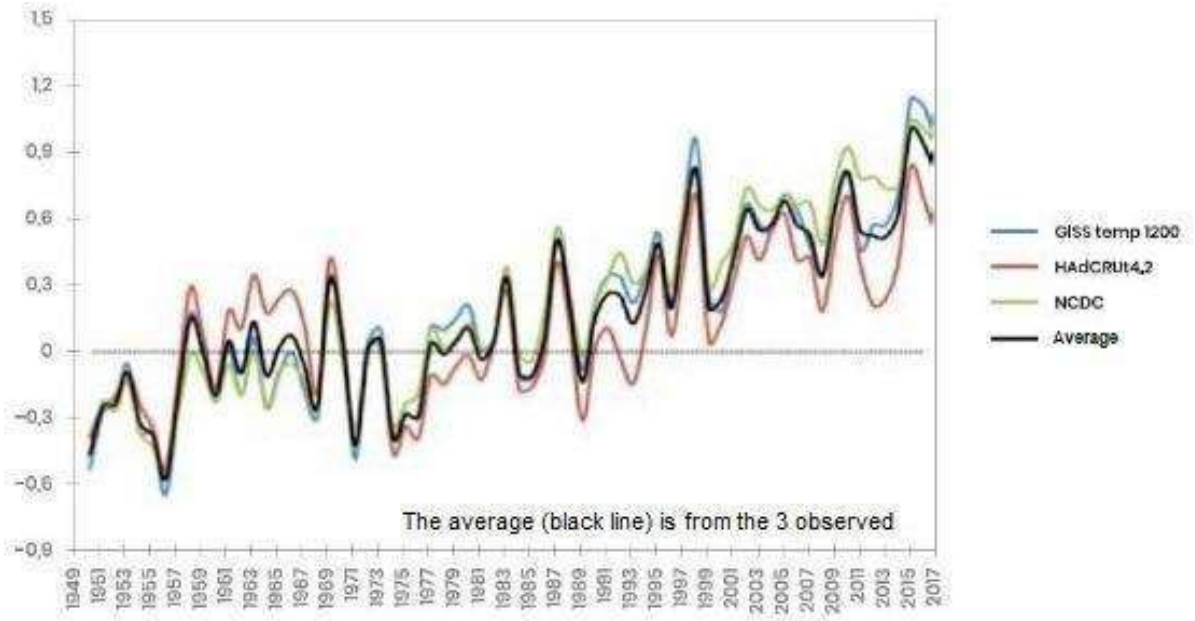
3.4 Optional Criterion: Climate Change Adaptation Benefits

Not Applicable

3.4.1 Regional Climate Change Scenarios (CCB, GL1.1)

Ongoing climate change poses a serious threat to the Amazon Rainforest, with rising temperatures and increased aridity predicted due to the El Niño phenomenon and global warming. Climate models suggest that the Amazon could experience large-scale forest loss, leading to soil heating, increased carbon emissions, and further deforestation. The 2005 drought highlighted the risks of such climate-driven changes. While different climate models offer varying predictions, some, like the UK Meteorological Center's model, foresee severe outcomes, including extreme heat and droughts that could cause high tree mortality. Observations from 1949 to 2017 show consistent warming, underscoring the urgency for effective climate adaptation and mitigation strategies to protect the Amazon's ecosystems and regional stability.

Figure 44. Observed temperature anomaly for 1961-1990 obtained from three data sources for Amazonia. Sources: GISS-NASA Goddard Institute for Space Studies, USA, NCDC-National Climatic Data Center, USA, HAdCRU-Hadley Centre-Climate Research United, United Kingdom.



Climate change projections for the Amazon, based on IPCC-endorsed models, predict a significant increase in air temperatures, potentially exceeding 4°C by the end of the 21st century. Additionally, Amazonian rainfall is expected to decrease by up to 40%. These changes could lead to severe ecological imbalances, with South America facing the highest risk of species extinction (23%). Human activity is identified as the primary driver of these changes, supported by previous IPCC findings and recent reports on global warming surpassing 1.5°C. Projections for the period 2046-2100 under low and high emission scenarios highlight these risks.

Figure- 45 Projections of temperature and precipitation changes in the tropical region of South America produced by the IPCC AR5 model defined for 2046-2065 and 2081-2100 with low emission (RCP2.6) and high emission (RCP8.5) scenarios, for the period from 1981 -2010 73.

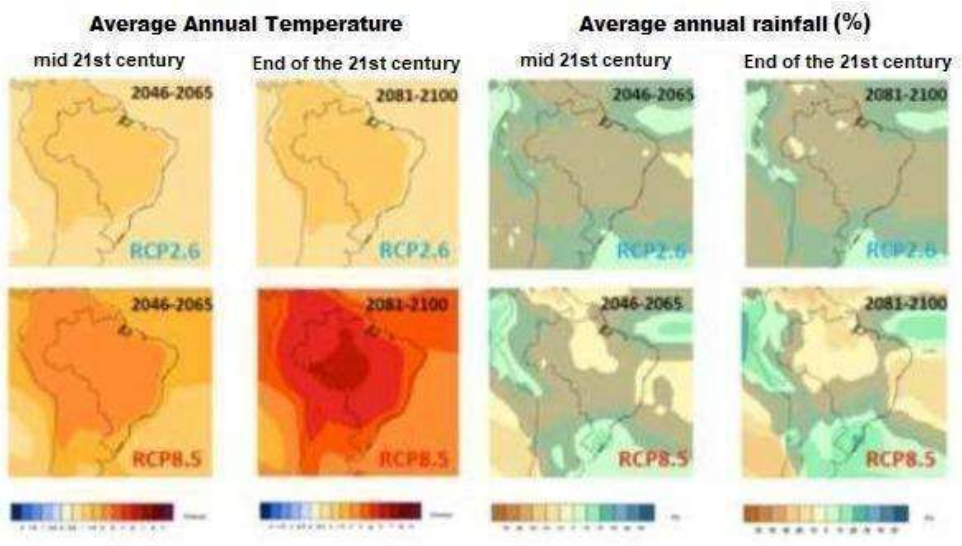
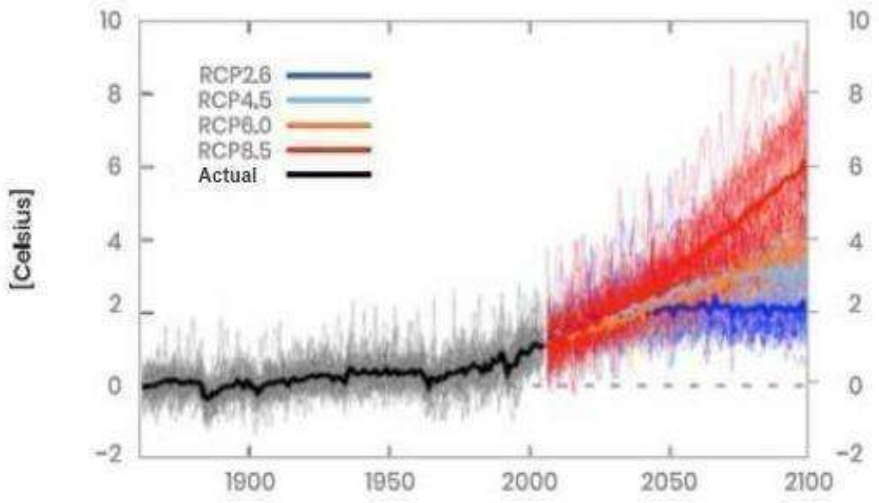


Figure 46 Projections of temperature changes up to 2100 for the various IPCC A5 emission scenarios for the Amazon74.



68 Marengo, J.A., Souza Jr, C. 2018. Climate Change: Impacts and Scenarios for the Amazon. São Paulo. 2018. Available at: https://www.oamanhaehoje.com.br/assets/pdf/Report_Climate_Change_impacts_and_scenarios_for_the_Amazon.pdf . Accessed on 14/12/2022.
69 Marengo, J.A., Souza Jr, C. 2018. Climate Change: Impacts and Scenarios for the Amazon. São Paulo. 2018. Available at: https://www.oamanhaehoje.com.br/assets/pdf/Report_Climate_Change_impacts_and_scenarios_for_the_Amazon.pdf . Accessed on 14/12/2022.

3.4.2 Climate Change Impacts (CCB, GL1.2)

Global warming poses significant threats to biodiversity and human well-being, driving shifts in species distribution, migration, and interactions, particularly in sensitive ecosystems like the Amazon. The IPCC AR6 report underscores the vulnerability of ecosystems to extreme weather events, such as droughts and fires, which are exacerbated by climate change. In the Brazilian Amazon, species with restricted habitats or small populations are most at risk, while fragmentation of ecosystems further amplifies these threats by reducing genetic diversity and limiting species' adaptive capacity. The existing Protected Areas may not be sufficient to safeguard critically exposed species, emphasizing the need for more effective conservation strategies. As climate change disrupts ecosystems, it also affects human health, directly through extreme weather events like heatwaves and indirectly via shifts in ecosystems that alter disease patterns and food security. Seasonal fluctuations influence vector-borne diseases, such as malaria and dengue, while extreme events can lead to outbreaks of waterborne diseases and malnutrition, especially as agricultural productivity declines due to droughts and floods.

In the Tapera project region, climate change is expected to have far-reaching consequences on both biodiversity and human communities. As the Amazon undergoes gradual changes like savannization in its southern portion, the region will experience biodiversity loss, forest fragmentation, and habitat degradation. Increased temperatures, droughts, and fires will strain agriculture, threaten food security, and may lead to the displacement of communities. Furthermore, the impacts on aquatic ecosystems and fishing industries, coupled with rising incidences of tropical diseases and animal health concerns, will further exacerbate the challenges faced by local populations. The anticipated reduction in nutrient cycling and soil biota could also undermine agricultural productivity, further diminishing the capacity of the region to support both human and ecological health. The cumulative effects of these changes necessitate urgent attention and adaptive measures to ensure the resilience of both the environment and local communities.

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

Based on the causal model described, the measures initially proposed to help communities and biodiversity adapt to the likely impacts of climate change are described in Table 54.

Table- Measures to assist communities and biodiversity adapt to the likely impacts of climate change

Item	Adaptation Measure	Directed to		Outputs	Results	Impacts
		Community	Biodiversity			
1	Permanent maintenance of contact with institutions that issue climate alerts for the region to issue climate alerts	X	X	Weather alerts communicated to local population	The local population is warned about extreme weather events and risks of storms, fires, etc.	Less climate risk for the local population

	for the region					
2	Ongoing training on topics related to climate change, vulnerabilities, mitigation and adaptation measures	X	X	Training courses for extractive communities	Local population well-informed and motivated to adopt mitigation and adaptation measures to combat climate change	Less climate risk for the local population
3	Acquisition and donation of river emergency transport for health care and emergencies	X		River ambulance and better assisted population	Ease of emergency transport	Increased quality of life and improved health of the local population
4	River transport measures to adapt the local population to the effects of extreme weather events	X		Improved moorings along river banks	Ease of transport for the local population	Better infrastructure for the local population

5	River transport measures to adapt the local population to the effects of extreme weather events	X		Training courses for extractive communities	Use of a wider range of plants for food production by local people	Food, energy and water security for the local population

Item	Adaptation Measure	Directed to		Outputs	Results	Impacts
		Community	Biodiversity			
6	Training in practices of broader use of local biodiversity and adaptation of forest plants in crops	X	X	Training courses for extractive communities	Use of a wider range of plants for food production by local people	Food security for the local population
7	Monitor rates of deforestation and forest degradation in the region to analyze the effects of climate change on biodiversity		X	Biweekly analysis maps of forest cover in the project area	Improved knowledge about forest (and biodiversity) response to climate change	Biodiversity benefited

8	Continuous forest inventory to analyze the effects of climate change on the adaptation of species to the environment throughout their lives		X	Annual carbon reports executed	Improved knowledge about forest (and biodiversity) response to climate change	Biodiversity benefited

4 COMMUNITY

4.1 Without-Project Community Scenario

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

The history of the Uatumã River basin, located within the province of Amazonas, is a narrative marked by a long period of under-exploration until the late 19th century. Despite numerous scientific expeditions from Europe in the 18th and 19th centuries, the region remained largely untouched, and historical documentation about its occupation remains scarce. This lack of documentation extends to the complex interactions between indigenous peoples, settlers, religious orders, and trade networks in the area. The first human settlements in the Uatumã and Jatapu river basins predate the arrival of European settlers in the 17th century. Over 3,000 years ago, the Arawak-speaking peoples settled in the region, developing advanced agricultural, fishing, and hunting skills. The Arawak migration across the Amazon basin, notably to the Negro, Urubu, and Uatumã river basins, represents one of the oldest and most significant dispersals in the region. However, due to conflict, enslavement, diseases brought by European colonizers, and the aggressive expansion of white settlers, the Arawak population gradually dwindled, and their presence in the current territories of Urucará, São Sebastião, Itapiranga, and Silves was erased over time. The colonization process in the Amazon, and particularly in the Uatumã and Jatapu river basins, was met with fierce resistance from indigenous populations, including the Arawaks. Despite limited evidence from historical, anthropological, and archaeological studies, it is clear that the indigenous peoples did not accept the presence of European missionaries or the construction of missions without resistance. The destruction of the Jatapu mission and the subsequent violent retaliation by the Grão-Pará government stand as stark examples of the violent confrontations that characterized the indigenous resistance during the colonization period. In the early stages of settlement, villages such as Urucará, São Sebastião do Uatumã, and Distrito de Santana (which belonged to the municipality of Silves until 1887) emerged, composed primarily of settlers and peasants. According to statistical data from 1839, the population of

the missions and villages along the Jatapu and Uatumã rivers was relatively small, totaling 817 inhabitants, not including the indigenous populations living in more remote areas. The settlement of Urucará began in the early 19th century with the arrival of Crispim Lobo de Macedo, a merchant who traveled from Cametá in Pará to the Uatumã and Jatapu river basins. He, along with his family and slaves, developed agriculture in the region and sought to protect Portuguese colonial interests in the area. Through this settlement, Macedo contributed to the expansion of Portuguese influence in the region, which was essential for controlling the land during disputes with the Spanish.

The economic foundations of Urucará were built on agriculture, with a particular focus on products such as chestnuts and later latex, which were valuable on the European market. The indigenous populations, who were not integrated into the exploitative systems of agriculture and trade, migrated further north, beyond the borders of Brazil. The strategic importance of settling the Uatumã and Jatapu river basins was underscored by the need to control territory during the period of dispute between the Portuguese and Spanish empires. As settlement expanded, indigenous peoples, although knowledgeable in agriculture, fishing, and trade, were exploited by the settlers who controlled the trade of forest products. This created a system where local indigenous knowledge was commodified, with products funneled into larger commercial networks that connected the region to more developed urban centers such as Manaus and Belém. The late 19th century was marked by the "rubber boom," which reinvigorated the region's economy and urban network. During this period, Urucará became an important outpost in the regional economy, functioning primarily as a rubber-export hub. However, despite the booming rubber trade, Urucará did not develop into a fully functioning urban center with a social elite. The lack of significant capital accumulation, in large part due to the dominance of the aviation system and the concentration of profits in cities like Manaus, prevented Urucará from forming distinct social and territorial divisions of labor.

From 1912 onward, the Brazilian rubber industry faced increased competition from Asian plantations, and the industry began to decline. This had significant repercussions for the economies of towns like Urucará, which had depended on the rubber trade. The decrease in the international demand for latex caused many of the Amazonian urban centers to stagnate. Urucará, like many towns, did not suffer major direct impacts from the crisis but still experienced a general decline in economic activity. This period of stagnation lasted for decades, as the region struggled to adapt to the changing global market. In the mid-20th century, Urucará began to experience changes with the expansion of agriculture, particularly the cultivation of jute, which became an important crop in the region during the 1960s and 1970s. The jute boom contributed significantly to the municipality's economy, but the decline of the jute market also left its mark on the urban landscape. Despite these economic fluctuations, agriculture remained the backbone of Urucará's economy, with over 40 different species being cultivated.

The transformation of Urucará and the surrounding region continued through the latter half of the 20th century, especially during the military government's push to integrate the Amazon more fully into the

national economy. Starting in the 1950s, with infrastructure projects like road construction, the Brazilian government sought to ensure sovereignty over the Amazon region. Programs such as the Superintendence for the Development of the Amazon (SUDAM) facilitated the entry of large capital investments into the region, although small farmers and indigenous peoples did not benefit from these programs. This period marked a shift from traditional forms of regional development based on extractivism to a model of industrialization and economic integration into the national economy. As large national and international capital began to dominate the development of the region, local elites, especially those linked to extractivism, were marginalized. The construction of roads such as BR-364 and BR-163, along with the creation of major infrastructure projects like the Transamazônica, brought new economic dynamics to Urucará, but it also led to significant changes in the local population and economy. Today, Urucará's economy is driven by agriculture, with crops such as cassava, tobacco, beans, cocoa, coffee, corn, and bananas, and by fishing and the extraction of over 100 forest products, including copaíba and various timber species. The municipality's economy continues to rely heavily on external markets, and its development trajectory reflects the challenges faced by many rural Amazonian towns. The historical trajectory of Urucará and its neighboring municipality, Nhamundá, underscores the importance of understanding the region's complex history in shaping its contemporary development. The challenges of addressing both immediate economic needs and the long-term legacies of colonization and external market dependency require a holistic approach to development. As these municipalities move forward, it is critical to adopt strategies that are sensitive to the region's unique social, cultural, and environmental context, fostering sustainable development that includes and benefits local communities.

Table - Number of families that inhabit the streams in the Tapera project area.

Water bodies (creek or river)	N°. of persons
Tapera River	26
Paratucu River	310
Jabote	400
Apeuá	200

The primary data mobilized here are the result of the application of the MVS methodology in field activities during the month of March 2023. Four activities were carried out based on the MVS questionnaire, with open and closed questions, covering a total of 14 families that make up the territorial

sample. The profile of the interviewees was 50% male and 50% female (Figure 30). Regarding the age of the interviewees, the age bracket between 41 and 50 years old corresponded to the majority, corresponding to 50% of the interviewees. The age range between 26 and 30 years corresponded to 25% of the interviewees, and above 51 years also corresponded to 25%, as presented in Figure 31. All interviewees stated that they were born, grew up and live in the region during the nut fruiting and gathering season.

Sustainable Livelihoods- As outlined in section 2.1.11, the methodology utilized to delineate the baseline and its subsequent monitoring followed the Sustainable Livelihoods framework. 25 indicators were defined, categorized into five dimensions: Human, Social, Environmental, Physical, and Financial. Table 56 displays these indicators along with their respective averages, derived from the completion of the questionnaires.

Table- Indicators and averages resulting from the application of the questionnaires with the communities.

Types of assets/dimensions	Information to be gathered for baseline description (Indicators)	Average
Human Dimension	H1 - Community Skills	1,00
	H2 - Food security	0,27
	H3 - Labor safety	0,86
	H4 - Access to education	0,45
	H5 - Preservation of cultural traditions	0,98
Social Dimension	S1 - Participation in decision making	0,91
	S2 - Resolution of internal conflicts	0,78
	S3 - Participation of women in decision-making	0,88
	S4 - Access to public policies	0,45
	S5 - Access to health services	0,61

Environment Dimension	E1 - Biodiversity in the region	0,84
	E2 - Climate change impacts	0,96
	E3 - Situation of rivers and watercourses in the region	0,81
	E4 - Access to drinking water	0,66
	E5 - Waste management	0,62
Physical Dimension	P1 - Access to the community	0,60
	P2 - Community's infrastructure	0,33
	P3 - Challenges of maintenance of physical structures	0,82
	P4 - Management of physical spaces	0,17
	P5 - Physical spaces for collective decision-making	0,45
Financial Dimension	F1 - Sources of income	1,00
	F2 - Financial stability	0,43
	F3 - Access to credit services and financial support policies	0,25
	F4 - Opportunities for local economic development	0,56
	F5 - Financial challenges	0,98

The Tapera project involved interviews with 104 members from five communities in the project region, providing valuable insights into local livelihoods, skills, and environmental interactions. The communities primarily engage in traditional activities like agriculture and fishing, which form the foundation of their subsistence. These practices underscore the communities' strong reliance on natural resources, which

they recognize as vital for their survival and are open to projects focused on environmental conservation. Despite their connection to the land, food security and access to education are concerns, with moderate barriers to achieving consistent access to nutritious food and educational opportunities.

The communities demonstrate a high level of social cohesion, with active participation in decision-making, including notable involvement from women in governance. While internal conflict resolution is strong, challenges exist in accessing public services, such as healthcare and governmental policies. Climate change awareness is evident, as the communities report impacts like droughts and rising temperatures, highlighting the need for resilience-building strategies. Additionally, infrastructure issues, including waste management and transportation, as well as financial stability, are areas of concern. Access to drinking water is a moderate issue, while financial services and credit support are also seen as barriers to economic stability.

Overall, the communities exhibit strengths in cultural preservation, active participation, and biodiversity conservation, yet face significant challenges in food security, education, infrastructure, and financial well-being. These findings provide a comprehensive foundation for developing targeted interventions aimed at improving livelihoods, addressing environmental concerns, and enhancing access to essential services and resources for sustainable community development.

Commercial Level- All the families involved in the study collect forest byproducts, such as breu resin, jatobá fruits, tonka seeds, nuts, and ipe roxo bark, during the harvest season, primarily for subsistence. None of the families sell these products directly to the market in Urucará. Instead, the Agrofrut cooperative serves as the main buyer, facilitating access to both national and international markets. The collection is a family-oriented activity, carried out in forest parcels passed down within kinship groups, where family members, including grandparents, parents, siblings, and children, gather to harvest. As children grow up and form their own families, the land is divided among them, but it is common for relatives to collaborate, sharing the costs and profits from the harvest.

Religious Level - The municipalities of Urucará and Nhamundá are both rich in religious and cultural traditions, with Catholicism as the predominant religion in each community. In Urucará, Catholicism is deeply rooted, with the main church serving as the focal point for religious events, alongside a significant Protestant presence. The "Festa do Divino Espírito Santo," a major cultural and religious festival held in June, blends religious devotion with traditional music, folk dances, and processions, reflecting the town's cultural heritage shaped by Indigenous, Portuguese, and Afro-Brazilian influences. This festival is a vibrant expression of Urucará's faith and cultural diversity.

Similarly, Nhamundá celebrates its Catholic faith, with the local church being a central hub for mass and community gatherings. Protestant churches also contribute to the town's spiritual life. The "Festa de São Pedro," held annually in late June, honors Saint Peter, the patron saint of fishermen, with boat processions, music, and local cuisine, emphasizing the town's strong connection to the river and fishing

culture. Both municipalities showcase a dynamic blend of religious and cultural practices, with festivals acting as key expressions of their collective identity.

Cultural Level- No social leisure activities were identified in the territory, such as sports practices, other than religious celebrations. Nhamundá's cultural calendar is very diverse, starting in January with the city's anniversary, in May the Nhamundá Agricultural Exhibition (ExpoaNh), in June the festival of the city's patron saint, Santo Antônio, in August the festival of the patron saint, Nossa Senhora Assunção, in September the traditional Tucunaré Fishing Festival and in December New Year's Eve.77

Family Level- The family groups that inhabit the igarapés are related to each other.

4.1.2 Interactions between Communities and Community Groups (VCS, 3.19; CCB, CM1.1)

At the start of the Tapera Amazonas REDD+ Project, significant efforts were made to engage with local communities and community groups through a series of initiatives. These included community workshops to introduce the project and its objectives, consultation meetings to understand the specific needs and priorities of each community, and needs assessment surveys to identify socio-economic and environmental challenges. Capacity-building initiatives were also implemented, focusing on forest management, sustainable agriculture, and alternative livelihoods, with the aim of empowering local members to actively participate in project activities and decision-making.

Additionally, community committees were established to ensure ongoing communication and collaboration between the project team and local communities, fostering transparency and inclusivity. The project team emphasized cultural sensitivity, actively involving traditional leaders and elders in decision-making to ensure that the project aligned with local customs and values. These efforts helped lay the foundation for strong, mutually beneficial relationships, guiding the project's implementation and ensuring that local perspectives remain central to its planning and execution.

4.1.3 High Conservation Values (CCB, CM1.2)

Not Applicable

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

Without the Tapera Amazonas REDD+ Project, the forest area targeted for preservation would face increasing threats of deforestation, driven by the expansion of cattle pastures. This would escalate municipal deforestation rates, harm the local ecosystem, and destabilize the community's livelihoods, potentially leading to rural exodus. Illegal hunting would also continue to rise, severely depleting local wildlife and exacerbating food insecurity, which could increase reliance on processed foods, further impacting health. Additionally, endangered species endemic to the area would be at risk, and the loss of biodiversity would undermine the community's subsistence practices.

The project aims to address these challenges by implementing key infrastructure improvements, such as photovoltaic energy systems, water distribution, residential bathrooms, and enhanced communication and educational services. Without the project, these critical services would not be established, leaving

communities vulnerable to poor health outcomes, including high infant mortality rates due to waterborne diseases, as well as a lack of medical support for work-related injuries, especially among extractive workers. The absence of stable electricity would also exacerbate the communities' difficulties in preserving food, accessing clean water, and improving educational opportunities, limiting their potential for economic and social development.

Moreover, the Tapera project provides essential financial support for forest monitoring and protection, which would otherwise be unfeasible for landowners to sustain on their own. This support ensures the conservation of the region's biodiversity and provides ongoing benefits for local communities. By addressing energy, healthcare, and infrastructure challenges, the project helps reduce the risk of rural depopulation, improves the quality of life, and strengthens the resilience of both communities and ecosystems in the face of increasing environmental threats.

4.2 Net Positive Community Impacts

4.2.1 Expected Community Impacts (CCB, CM2.1)

The International Association for Impact Assessment (IAIA) defines social impacts as changes to various aspects of people's lives, including their livelihoods, culture, community cohesion, political participation, environment, health, personal rights, and aspirations. Social impact assessment involves analyzing, monitoring, and managing the intended and unintended consequences—both positive and negative—of planned interventions, with the goal of creating more sustainable and equitable environments. These impacts encompass a broad range of social, cultural, environmental, and psychological factors, and the assessment process aims to understand how policies, programs, or projects will influence communities and their well-being.

In the case of the Tapera Amazonas REDD+ Project, community consultations were held to gather local perceptions about potential positive and negative changes. The community highlighted several positive impacts, emphasizing the crucial role of forest preservation in sustaining their way of life and well-being. The maintenance of biodiversity, in particular, supports extractivism, enhances hunting and fishing yields, and helps preserve a stable climate. These benefits contribute to an improved quality of life for riverside communities by ensuring food security, protecting natural resources, and promoting environmental stability.

Community group	Extractivist families from the Maripá, Tapera, Paratucu and Jatapu rivers.
Impact(s)	• Improved household infrastructure with the deployment of household photovoltaic systems and internet access points
Type of benefit/cost/risk	**Benefits:** • Reduction in energy costs for households through solar power.

	• Increased access to information and digital services with internet connectivity. • Improved quality of life due to better infrastructure. • Enhanced sustainability with renewable energy solutions. • Empowerment of local communities through technological advancements. • Potential for economic growth with improved access to online markets or education. **Costs:** • Initial capital investment for photovoltaic systems and internet infrastructure. • Maintenance costs for the technology and systems. • Potential for higher electricity costs during the installation phase. • Training and support for users to manage new technology. • Risk of dependency on technology that may require continuous updates. **Risks:** • Technical issues or system failures that could disrupt service. • Potential difficulty in maintaining the systems in remote or rural areas. • Unequal access or affordability in some communities, leading to disparities. • Vulnerability to natural disasters (e.g., storms or floods) affecting infrastructure. • Risk of increased electronic waste as technology becomes outdated.
Change in well-being	Positive impact, indirect and of great magnitude.

Community group	Extractivist families from the Maripá, Tapera, Paratucu and Jatapu rivers.
Impact(s)	• Increased instantaneous communication between communities in emergencies, events, negotiations and integration of populations in cyber environments and distance education.
Type of benefit/cost/risk	**Benefits:** Instant communication improves emergency response, resource mobilization, and coordination during crises. It also facilitates better community collaboration, negotiations, and integration into distance education, providing access to knowledge and improving educational outcomes. **Costs:**

	Setting up and maintaining communication infrastructure, including internet and digital tools, can be expensive. Ongoing costs for digital literacy programs and system maintenance could place financial strain on communities or organizations. **Risks:** Increased communication may lead to misinformation, cyber threats, or data breaches. Unequal access to technology could exclude some individuals, and over-reliance on digital communication might reduce face-to-face interactions, affecting social cohesion.
Change in well-being	Positive impact, indirect and of great magnitude.

Community group	Extractivist families from the Maripá, Tapera, Paratucu and Jatapu rivers.
Impact(s)	• Improved health with access to safe drinking water promoted by the implementation of treated water collection and distribution systems and dry pit toilets.
Type of benefit/cost/risk	**Benefits:** Access to safe drinking water reduces waterborne diseases, improving public health. Dry pit toilets enhance sanitation, preventing contamination of water sources and reducing the spread of diseases. **Costs:** The installation and maintenance of water treatment and distribution systems, along with dry pit toilets, require significant investment. Ongoing operational costs for cleaning, repairs, and system upgrades may also arise. **Risks:** Improper maintenance of systems could lead to contamination or failure, potentially causing health hazards. Lack of community training and engagement may result in misuse or neglect of the infrastructure.
Change in well-being	Positive impact, indirect and of great magnitude.

Community group	Extractivist families from the Maripá, Tapera, Paratucu and Jatapu rivers.
Impact(s)	• New learning that adds value to the commercialized products and generates new income alternatives, providing more work opportunities and

	improvement in the families' income.
Type of benefit/cost/risk	**Benefits:** New learning opportunities can enhance skills, increasing the value of commercialized products and creating alternative income sources. This leads to more job opportunities and improved family incomes. **Costs:** Training and capacity-building programs require investment in resources, facilitators, and materials. The initial costs can be high, and ongoing support may be necessary for continued success. **Risks:** If new skills are not properly aligned with market demands, the investment in training may not yield expected returns. There is also a risk that the community may face challenges in accessing new markets or sustaining new income streams.
Change in well-being	Positive impact, indirect and of great magnitude.

Community group	Extractivist families from the Maripá, Tapera, Paratucu and Jatapu rivers.
Impact(s)	• Strengthening of associationism and community management capacity.
Type of benefit/cost/risk	**Benefits:** Strengthening community associations enhances collaboration, improves decision-making, and increases the capacity to manage resources effectively. This can lead to more cohesive communities and better access to collective resources and opportunities. **Costs:** Building the capacity of associations requires investments in training, organizational development, and ongoing support. These efforts may take time and resources to ensure sustainable leadership and management. **Risks:** If leadership structures are not well-established, there is a risk of mismanagement or conflict within the community. Additionally, external factors such as political or economic instability can undermine the effectiveness of the associations.
Change in well-being	Positive impact, indirect and of great magnitude.

Community group	Extractivist families from the Maripá, Tapera, Paratucu and Jatapu rivers.
Impact(s)	• Strengthening the inclusion of socially vulnerable groups in productive activities.
Type of benefit/cost/risk	**Benefits:** Inclusion of socially vulnerable groups in productive activities promotes social equity, improves livelihoods, and fosters economic empowerment. It can enhance community resilience and reduce poverty by providing access to income-generating opportunities. **Costs:** Efforts to integrate vulnerable groups may require initial investment in training, infrastructure, and support services. These activities may also need tailored approaches to ensure effective participation and sustainability. **Risks:** If not carefully managed, there could be challenges in overcoming social or cultural barriers, leading to unequal participation. Additionally, vulnerable groups may face exploitation or marginalization if adequate safeguards are not in place.
Change in well-being	Positive impact, indirect and of great magnitude.

4.2.2 Negative Community Impact Mitigation (VCS, 3.19; CCB, CM2.2)

The Tapera project does not cause negative impacts on local communities and communication channels have been established to clarify doubts, receive suggestions, and receive complaints.

4.2.3 Net Positive Community Well-Being (VCS, 3.19; CCB, CM2.3, GL1.4)

Access to safe drinking water and improved sanitation, including the installation of dry toilets, will significantly enhance public health in the communities, reducing infant mortality and cases of dysentery and parasitic infections. These improvements in basic infrastructure are crucial for raising the overall quality of life and achieving more complex community goals. Additionally, the introduction of solar panels for energy will have a transformative impact, providing the communities with free, sustainable electricity to power household appliances such as refrigerators, freezers, and fans. This will improve food storage, reduce reliance on immediate hunting or fishing, and decrease the risk of foodborne illnesses, ultimately leading to a healthier and more stable lifestyle.

Moreover, the availability of continuous energy from solar panels will support internet access, enabling better communication, digital inclusion, and connection to essential services. It will also enhance educational opportunities by allowing for online learning, reducing school dropout rates, and improving literacy. The savings from reduced fuel consumption for generators can be redirected towards increased mobility and transportation, further improving access to markets and services. The project will also support local economic development through training programs in production processing and marketing, increasing the income of local families by diversifying their commercial opportunities and reducing dependence on a single buyer. Together, these interventions will strengthen community ties, reduce rural exodus, and promote long-term social and economic sustainability.

4.2.4 High Conservation Values Protected (CCB, CM2.4)

The project's activities consist in the conversation of the forest used as an area for extraction of products by the communities of Urucará, Nhamundá and São Sebastião and will serve to maintain the reproduction of their way of life and improve the supply of ecosystem services, such as extraction of forest products, hunting, and fishing.

4.3 Other Stakeholder Impacts

4.3.1 Impacts on Other Stakeholders (VCS, 3.18, 3.19; CCB, CM3.1)

The development of the Tapera project is not expected to cause negative impacts on other stakeholders. It may cause positive impacts for other stakeholders apart from the communities. In this sense, the positive impact on the well-being of these other stakeholders will be related to the project's benefits activities. To share the positive impacts with all stakeholders, the project intends to:

- Benefit all stakeholders through forest conservation in the project are.
- Increase the commercialization of local extractivism products.
- Promote technical training not only for traditional communities, but also serve interested communities that live in the municipality headquarters and practice extractivism.

Although not anticipated to occur, negative impacts can be listed as:

- Conflict between the time dedicated to day-to-day activities and that available for conducting training and participating in the project.
- Failure in communication between the technical team and the community and, consequently, misunderstandings between the parties.

4.3.2 Mitigation of Negative Impacts on Other Stakeholders (VCS, 3.18, 3.19; CCB, CM3.2)

As mentioned, the Tapera project is not expected to cause negative impacts on other stakeholders. The negative impacts listed above are unlikely to occur. As a mitigating measure, the project proposes that the development of the project happens in a participative way, allowing the free exercise of the manifestations of the other stakeholders, as well as an efficient and permanent communication between the project developer and all the stakeholders.

4.3.3 Net Impacts on Other Stakeholders (VCS, 3.18, 3.19; CCB, CM3.3)

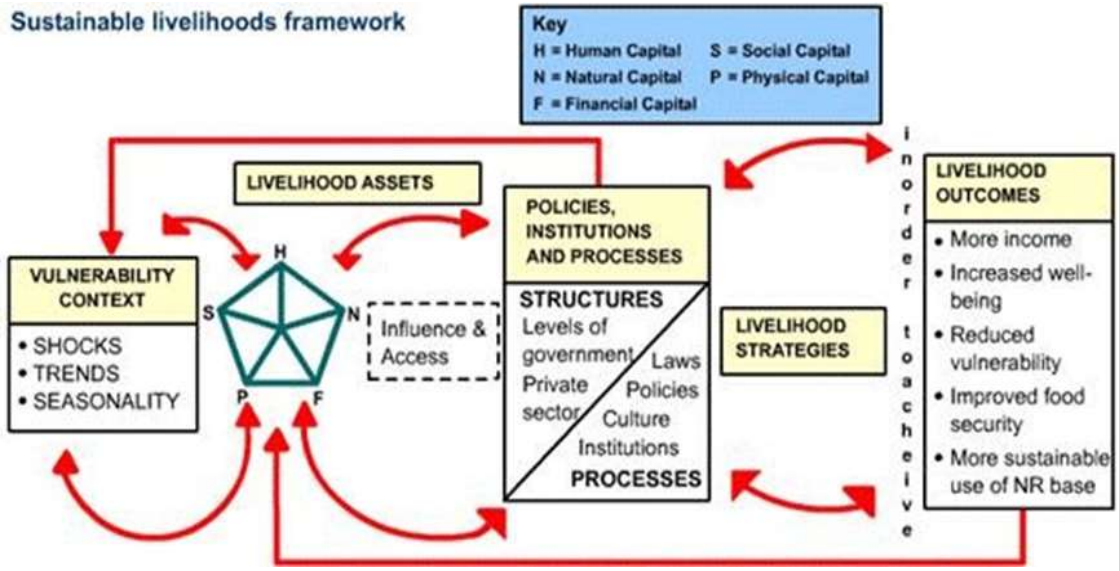
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4.4 Community Impact Monitoring

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

The Sustainable Livelihoods (SLM) methodology adopted makes it possible to recognize the future aspirations for change of the community members in line with the forest conservation and protection measures. Because of its multidimensional aspect (human, social, environmental, physical, and financial), the baseline assessment allows the project to consider precisely that the fragile foundations are strengthened and the expected changes come with a structured tying together of these changing dimensions. This will occur from a governance that transversely considers the participation of communities in the process of deliberation of local projects and their monitoring following the light of changes that are sustainable. Figure 63 presents the conditional processes between improvement in the dimensions of the MVS with access to and influence of policies, management, structure, and laws.

Figure 47 Processes for improvement in the MVS dimensions



Carbon credit projects, to be truly effective and sustainable, must align with the livelihoods, values, and goals of local communities, particularly those in vulnerable socio-economic situations, such as extractivists and riverbank dwellers. These projects should enhance access to the five key dimensions of community life—natural resources, human capital, financial capital, social capital, and physical capital—without disrupting or damaging the existing asset base. It's crucial that the intervention process fosters positive impacts by supporting community aspirations and strategies for the future, while respecting their way of life. This balance ensures that the livelihoods of the people involved are strengthened rather than undermined.

The design and implementation of carbon credit projects must take into account the complex interactions between internal community dynamics and external factors. To measure the effectiveness of these projects, a methodology is needed that considers both material and immaterial assets, including the community's rights, aspirations, and dreams. By focusing on these aspects, communities will be empowered to better understand and promote their rights, leading to greater autonomy and independence in maintaining their livelihoods. Therefore, the process requires continuous monitoring of how the projects impact community development, both during and after implementation.

Orgânica Consultoria conducted an initial diagnosis in January 2020 to develop indicators for measuring the impact of community carbon credit projects. This comprehensive baseline analysis was designed to evaluate the effects of these projects on the defense of rights, aspirations, and livelihoods, comparing conditions before and after the project's execution. The methodology encourages dialogue between all stakeholders, ensuring that the projects not only meet environmental objectives but also contribute to informed social participation and the achievement of community development goals. This participatory approach is vital to ensuring that the outcomes of the projects genuinely benefit the communities they aim to support.

Types of assets/dimensions	Information to be obtained for baseline description (Indicators)
Human Dimension	H1 - Family food security
	H2 - Use and appreciation of traditional/local ecological knowledge
	H3 - Access to new knowledge
	H4 - Satisfaction and motivation with work and life in the territory
	H5 - Work safety
Social Dimension	S1 and S2 - Relationships with community members, partners and institutions
	S3 - Visibility and opportunity for young people
	S4 - Participation and appreciation of women in productive activities
	S5 - Access to public policies aimed at strengthening their ways of life
Environmental Dimension	A1 - Access to water for human and animal drinking
	A2 - Access to land suitable for the various traditional uses and their aspirations
	A3 - Conservation and use of the forest and wild fauna
Physical Dimension	P1 - Individual production
	P2 - Collective production infrastructure
	P3 and P4 - Individual/family infrastructure for housing, transport and well- being
Financial dimension	F1 - Income
	F2 - Price of products and working capital, when applicable
	F3 - Commercialization
	F4 - Access to lines of credit and other financial aid policies

Indicator of Impacts on Women

Category	Indicators

Participation & Leadership	% of women attending community meetings Number of women in decision-making or governance roles
Economic Empowerment	Number of women trained in financial literacy, leadership, or entrepreneurship
Health & Well-being	Number of households with women reporting improved access to health services or clean water
Education & Awareness	Number of gender-focused awareness or education sessions conducted

Sustainable livelihoods are central to understanding the lifestyles, aspirations, and well-being of people in carbon credit project areas. To develop these projects in partnership with local communities, a participatory approach is essential, ensuring that communities' autonomy and way of life are respected. The projects will be guided by clear, measurable indicators to track progress annually. These indicators will be based on the MVS (Multidimensional Vulnerability Score) questionnaire, with a sample of up to 25% of the beneficiaries. The goal is to achieve positive growth, with a 20% annual improvement in the human, social, and physical dimensions, and 15% in the financial dimension for those initially below average. For indicators that start above 0.5, the improvement target is 5% per year.

The baseline survey results show that many of the resource bases for livelihoods, except for natural resources like forest, hunting, and fishing, are insufficient for long-term sustainability. As a result, rapid improvement is needed, particularly in human, social, and financial dimensions, to reduce the risk of rural exodus, especially among young people and women. The aim is to raise the scores of key indicators to the median level, establishing a more stable foundation for livelihoods. Once these indicators reach the median, changes will progress more slowly due to external factors, but the project will have successfully reduced the likelihood of communities abandoning their roles as extractivists and forest stewards, ensuring their continued connection to the land.

4.4.2 Monitoring Plan Dissemination (CCB, CM4.3)

The indicator monitoring plan will be disclosed by email and in meetings with the communities. All results will be available for public consultation on the internet and summaries will be communicated to communities and other stakeholders through informative materials. The monitoring and verification results of this project will be published on the Verra platform. The process will be agreed with the communities in participatory workshops with the bulletin informing the progress of the project.

4.5 Optional Criterion: Exceptional Community Benefits

4.5.1 Exceptional Community Criteria (CCB, GL2.1)

As described in sections 2.3.1 Stakeholder Identification (G1.5) and 2.1.21 Permanence of Benefits (G1.11), 108 people living along the rivers Tapera, Maripa, and Paratucu Rivers around the municipalities of Urucará and Nhamundá were identified as beneficiaries of the project. The project will have the communities as protagonists in the definition of socio-environmental programs and activities in the territories, enabling the extraction of non-timber products and access to projects for improving the production chain, associativism, and improving the quality of life.

As described in section 2.1.15 Social Parameters (G1.3), the riverine dwellers live in a region of social vulnerability, in which there are people below the poverty line, defined as individuals who live on less than R$ 499,00[82] per month.

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

As described in section 4.2.1 Expected Impacts for Communities (CM2.1), the project has activities that generate short- and long-term benefits for the communities. As short-term benefits, the communities will be benefited with direct jobs in the surveillance of the project area, in addition to training and courses aimed at strengthening the production chain, new income alternatives, associativism and female empowerment. In addition, structuring actions will be implemented to provide water security, basic sanitation, electricity, internet access, transportation, and education and health infrastructure. These actions together generate benefits that last from the medium to the long term.

The actions taken in the short term will generate the following benefits in the medium term: (i) Water Security; (ii) Basic Sanitation; (iii) Energy autonomy; (iv) Access to means of communication; (v) Reduced effort in household and income generation jobs; (vi) Educational development through access to remote classes and technology-mediated classroom instruction; (vii) Decreased school dropout and age-grade distortion; (viii) Learning in the use of new technologies and management techniques for agroforestry products; (ix) Increased capacity and speed in transporting production; (x) Added value to the marketed product; (xi) Decreased dependence on a single buyer, ensuring the sale of fairer prices; (xii) Adding value to associated products; (xiii) Increased income due to the construction of new business relationships, development of own brand and activities to promote products; (xiv) Resilience to crisis through diversification of production.

In the long term, the project tends to provide the following impacts: (i) decrease in the rate of water-borne diseases, such as diarrhoea, cholera and diseases caused by worms; (ii) decrease in women's workload

in water collection and domestic activities; (iii) disseminate social technologies; (iv) increase permanence in the territory; (v) improve access to rights and citizenship; (vi) strengthen family autonomy; (vii) improve educational indices; (viii) strengthen associationism; (ix) add value to the productive chain; (x) increase the value of carbon credits by increasing the socio-environmental value and bio-economy of the projects; (xi) strengthen the ways of life of traditional local communities and their economic and cultural reproduction; (xii) reduce rural exodus and urban marginalization; (xiii) mitigate the risks of extreme climate events; (xiv) improve quality of life.

Figures 48.a, 48.b, 64.c, 48.d, 48.e, 48.f, 64.g. Implementation of the Project´s benefits












4.5.3 Community Participation Risks (CCB, GL2.3)

Regarding the risks associated with the participation of communities in the Tapera REDD+ project, as described in section 4.2.1 Expected Impacts for Communities (CM2.1), it was pointed out possible threats suffered by invaders of lands that are close to the project area. As pointed out in section 4.2.2 Mitigation of Negative Impacts on Communities (CM2.2), to mitigate the possible risk of threats, it is proposed the creation of a channel for reporting possible threats, directly directed to a specialized team that will take the appropriate legal actions to safeguard the integrity of the community. In relation to the risks associated with not carrying out the project, as described in section 4.1.4 Scenario Without the Project: Community (CM1.3), the project will ensure the allocation of resources necessary for the conservation and protection of the project area, ensuring various benefits for the community and biodiversity in the region. For the community, we highlight the implementation of strategies aimed at improving the quality of life of local communities, as described in the previous section. It is noteworthy that by preserving the forest area used for extractivism and subsistence and that is at imminent risk of deforestation, the project tends to provide the strengthening of the ways of life of local traditional communities and their economic production.

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

The project will guarantee the allocation of resources necessary for the conservation and protection of the project area, ensuring several benefits for the community and biodiversity in the region. For the community, we highlight the implementation of strategies aimed at improving the quality of life of local communities, as described in the previous section. It is noteworthy that by preserving the traditionally occupied area that is in imminent risk of deforestation, the project tends to provide the strengthening of the traditional local communities' ways of life and their socioeconomic production.

In the annual investment forecast meetings and in the semi-annual evaluation, the riverine community will have their participation not only encouraged, but also facilitated on the issue of transportation, so there is a growing trend of empowerment of this specific group regarding governance in the municipal region and in the Tapera REDD+ project. The initial way to manage the risks of these groups not receiving

the benefits of the project in an equitable way was to design a participatory management of the project by including a representative of this sector in the Steering Committee, monitoring the actions and investments to ensure that the benefits are being distributed equitably.

4.5.5 Net Impacts on Women (CCB, GL2.5)

With a commitment that 50% of the people involved in the project are and will be women, the Association of Warrior Women of Urucará will seek to promote economic empowerment, develop training and capacity-building programs focused on women's entrepreneurship.

Furthermore, it will implement initiatives for education and awareness on health, nutrition, and well-being, aiming to improve the quality of life for women and their families.

The Association of Warrior Women of Urucará will act as a safe and inclusive space to promote gender equality, combat violence against women, and challenge harmful gender stereotypes. It will serve as a channel of communication among women involved in the project, enabling the exchange of knowledge, experiences, and mutual support. Additionally, it will seek to establish partnerships with other local organizations and initiatives focused on promoting women's rights and sustainable development. By establishing the Association of Warrior Women of Urucará, we aim not only to strengthen the role of women as agents of change but also to contribute to the construction of more inclusive, equitable, and resilient communities where all women could thrive and achieve their full potential.

4.5.6 Benefit Sharing Mechanisms (CCB, GL2.6)

The benefit sharing mechanisms of Tapera project was already presented on section 2.5.8 above.

4.5.7 Benefits, Costs, and Risks Communication (VCS, 3.18; CCB, GL2.7)

The Tapera REDD+ project is designed with a strong focus on community engagement and participatory decision-making throughout its lifecycle, ensuring that local stakeholders are actively involved in all stages of the project—from design to implementation, monitoring, and evaluation. The project emphasizes transparent communication, building trust between the stakeholders and the project team. This is achieved through ongoing public meetings and consultations, including public hearings, where communities are informed about the project's benefits, costs, and risks. As a result, community members have the opportunity to express their expectations, make decisions on their involvement, and give their consent to the project's actions. These participatory processes ensure that the project is not only community-driven but also adapts to the needs and aspirations of the local populations, as detailed in the sections on Free, Prior, and Informed Consent and Ongoing Consultation.

A key aspect of the Tapera REDD+ project is the transfer of social technologies to improve local infrastructure and quality of life. This includes the implementation of family photovoltaic systems, water collection and distribution systems with filters, dry septic tank toilets, and internet access. Additionally,

the project will provide an equipped ambulance boat to ensure better healthcare access. The communities will also receive training and capacity-building support in areas such as strengthening the productive chains of native products (e.g., breu resin, jatoba fruits, Amazon nut) and promoting income generation, particularly for women and youth. By increasing community involvement in sustainable economic activities and improving local infrastructure, the project aims to enhance the autonomy of families, improve living conditions, and reduce rural exodus by offering better prospects for staying in the territory.

Transparency and effective communication are also critical to the project's success. Information about the carbon credit generation process and the revenue from their sale will be openly shared with communities through the project's website and in meetings. This ensures that stakeholders are informed about the financial aspects of the project and how the generated funds are used. The project's benefit-sharing mechanism was designed collaboratively with the communities, ensuring that all participating groups receive their fair share of the benefits. This approach helps to create a strong foundation for community development, empowerment, and the long-term sustainability of the project, while also promoting social equity and inclusion.

4.5.8 Governance and Implementation Structures (CCB, GL2.8)

As detailed in section Project Governance Structures (g4.1), the communities will participate in the project management through the communication channels developed and periodic meetings in the communities, respecting the right to Free, Prior and Informed Consultation.

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

The Tapera Amazonas REDD+ project is designed to enhance the technical skills of community members significantly, incorporating social technologies tailored for the traditional families living along the Maripá, Tapera, and Paratucu rivers. This initiative focuses on improving the production chain, bolstering community associations, and facilitating the economic integration of vulnerable groups. The training and educational programs offered will concentrate on several key areas: a) augmenting the value and management efficiency of Amazonian forest subproducts, thereby enhancing the production chain; b) boosting the earnings of families engaged in extractive activities and reinforcing the role of associations; c) promoting the involvement and training of youth and women in economic ventures, thus increasing their inclusion and fortifying the position of socially vulnerable groups. Ultimately, this project aims to empower local families by fostering their independence, securing their continued presence in their native territories, and imparting new skills that will elevate their productive capabilities.

5 BIODIVERSITY

5.1 Without-Project Biodiversity Scenario

5.1.1 Existing Conditions (VCS, 3.19; CCB, B1.1)

The Amazon is renowned for its immense biodiversity, offering vital ecosystem services crucial for sustaining climate, managing water and biogeochemical cycles, storing carbon, and preserving various species. It is believed that the Amazon is home to approximately 10% of the planet's biodiversity, including both endangered and unique species.

The Amazon's significance for biodiversity is attributed to its vast expanse, encompassing a multitude of environments and housing a plethora of both land and water habitats. This diversity leads to a rich assortment of plant and animal life, with an estimated 45,000 plant and vertebrate species identified in the Amazon area.

The project's location, situated in the Uatumã and Jatapu River basins, is notable for its significant natural ecosystems and biological diversity. However, research on the fauna in this area is still in its early stages, suggesting a lack of comprehensive understanding of its biodiversity. To assess the potential fauna and flora of the region, we utilised secondary data from studies conducted by the Management Plans of nearby Conservation Units, specifically the RDS Uatumã and the APA Nhamundá and performed on ground research.

Given the scarcity of direct data for the project area, we plan to initiate primary data collection at the start of the project and continue throughout its duration through environmental monitoring. This will help us gain a deeper insight into the unique biodiversity of the project area. The initial assessments for the fauna and flora are detailed below.

Fauna

The Amazon fauna has a very large diversity of species; however, many areas of the Amazon region do not have a more specific catalogue of the species living in certain locations. The fauna report catalogued vertebrate and invertebrate species existing in the forest area of the Tapera region, located 52.56 km from the municipality of Urucará-AM.

The cataloguing of species will be specifically focused on the groups of Arthropoda, Herpetofauna, Avifauna and Mastofauna, with the following specific objectives: characterising the diversity of fauna in the Tapera region; identify the species of the groups mentioned above that exist in the region; and generate data on the existing fauna in the Tapera region.

Arthropoda, Herpetofauna, Avifauna and Mastofauna.

Fauna and flora must be discussed separately, as flora is the place where the species' natural habitat occurs and where they can exercise their ecological niche. Due to the wide variety of trees in the Tapera region and because it is considered a closed forest area, the number of different species present in the region is high.

Figures 48a., 49.b, 49.c, 49.d. Jungle Tapera Project Forest



i) Arthropoda

Arthropods (Phylum Arthropoda) are invertebrate animals that have great evolutionary success, with it being estimated that there are around one billion billion different species (10^{18}) living on the planet (SANTOS, 2023). The species of this phylum have an extremely high reproductive capacity, having great biological success in terms of reproduction. Arthropods are divided into five groups: arachnids, insects, crustaceans, chilopods and diplopods. Each group has distinct characteristics and important functions for biodiversity, being present in different types of food chains, and in the Amazon, the incidence of these different types of arthropods is very rich, especially insects.

Figure 50: Arthropods



ii) Herpetofauna

Herpetofauna is a branch of Zoology that studies the order of amphibians and reptiles. Brazil is considered the country with the greatest wealth of Herpetofauna species. At least 1026 species of amphibians are known (988 Anurans, 5 Caudatas and 33 Gymnophiona) and 773 species of reptiles

(731 Squamata – 73 Amphisbaenas, 266 lizards and 392 Snakes; 36 Testudines and 6 Crocodylia), according to data from the Brazilian Society of Herpetofauna – SBH (SEGALLA et. al., 2014; COSTA & BÉRNILS, 2015).

Figure 51 : Amphibians and Reptiles



iii) Avifauna

It comprises the group of birds from a given region. This group has a wide variety of species. In the Amazon, the local bird fauna has some of the species considered endemic to the region. Birdlife is present in greater quantities in environments where there are trees and natural environments (PEREIRA et al., 2009).

Figure 52: Variety of species of birds



iv) ***Mastofauna***

Group that comprises mammals, which can be small, medium and large. The Amazon is the biome with the greatest wealth of small, medium and large mammals in Brazil, housing approximately 60% of the species that occur in the country. Around 400 species of mammals occur in the Amazon, and approximately 57% of these are endemic (Paglia et al. 2012). The richness of the Amazon flora means that the Mastofauna group can perform its ecological functions within the food chain without difficulty.

Figure 53: Variety of species of mammals






Data collection and processing

Arthropoda

The cataloguing of the species of the Phylum Arthropoda was carried out through an active search at the research site. The active search occurred seasonally: July to August 2022 (summer) and October to December 2023 (winter). Captures occurred during the day, from 8 am to 3 pm, through photographic records, traps that were set up in the forest with the aim of capturing species present in the location. The diverse types of traps used for collection were puçá, suspended net, interception and fall traps (sampling method) and pitfall.

Figure 54: Arthropod Traps. Image A – suspended hammock; Image B – trap for Coleopetera; Image C – Puça; Image D – Pitfall trap.



In table below, the species found during the fauna survey of the arthropod species found at the research site are cataloged.

Table: Species found in the region - Arthropoda

TABLE 01 – SPECIES FOUND IN THE REGION – ARTHROPODA						
Common name	**Family**	**Genus**	**Scientific Name**	**VU[37]**	**EAM [38]**	**Amount**
Besouro Hércules	Dynastidae	Dynastes	Dynastes hercules			155
Besouro-rola-bosta	Scarabaeidae	Digitonthophagus	Digitonthophagus gazella			78
Besouro-serra-pau	Cerambycidae	Macrodontia	Macrodontia cervicornis			32
Gafanhoto	Romaleidae	Tropidacris	Tropidacris grandis			76
Louva-Deus	Mantidae	Mantis	Mantis religiosa			34
Bicho-pau	Phasmatidae	Cladomorphus	Cladomorphus phyllinum			23
Cigarra	Cicadidae	Cicada	Cicada orni			09
Grilo	Gryllidae	Acheta	Acheta domesticus			23
Borboleta azul	**Nymphalidae**	**Morpho**	**Morpho didius**	**X**		**56**
Mutucão	Tabanidae	Chrysops	Chrysops relictus			56
Tucandeira	Formicidae	Paraponera	Paraponera clavata			33

Herpetofauna

Reptiles and amphibians were recorded mainly through 2 sampling methods: Active Search and Auditory Transects (CAMPBELL; CHRISTMAN, 1982). The active search took place for both types of species during

[37] VU: Vulnerability, at risk of extinction
[38] EAM: Endemic to Amazonas

the day, from 8 am to 4 pm. For the amphibian group, auditory transects were specifically used, which consists of locating species through their vocalisation.

Figure 55 Image A – interception trap; Image B - Phyllobates lugubris



Table- Species found in the region - Herpetofauna

TABLE 02 – SPECIES FOUND IN THE REGION – HERPETOFAUNA						
Popular Name	**Family**	**Genus**	**Scientific Name**	**VU[39]**	**EAM[40]**	**Amount**
Jabuti	**Testudinidae**	**Chelonoidis**	**Chelonoidis denticulata**		**X**	**27**
Cobra coral	Elapidae	Micrurus	Micrurus corallinus			25
Surucucu-pico-de-jaca	**Viperidae**	**Lachesis**	**Lachesis muta**		**X**	**18**
Jararaca	Viperidae	Bothrops	Bothrops jararaca			08

[39] VU: Vulnerability, at risk of extinction
[40] EAM: Endemic to Amazonas

Cascavel	Viperidae	Crotalus	Crotalus durissus			03
Sapo cururu	Bufonidae	Rhinella	Rhinella diptycha			45
Sapo	Hemiphractidae	Hemiphractus	Hemiphractus scutatus			56
Perereca	Dendrobatidae	Phyllobates	Phyllobates lugubris			40
Rã	Hylidae	Osteocephalus	Osteocephalus castaneicola			14
Cobra-cega	Amphisbaenidae	Amphisbaena	Amphisbaena alba			08
Osga	Gekkonidae	Hemidactylus	Hemidactylus frenatus			09

Avifauna

For the Avifauna group, three methods were used: active search, auditory transects and the suspended interception net. Active searches and auditory transects took place through photographic records during the day, from 8 am to 3 pm. The same net was used to capture bats during the night to collect data on this mammalian species.

Figure 56. a) Image A and B – suspended mica line net, trap for bird and mammal fauna.





Table - Species found in the Project region - Avifauna

Species found in the region - Avifauna						
Popular Name	**Family**	**Genus**	**Scientific Name**	**VU**	**CAM**	**Amount**
Gavião real	**Accipitridae**	**Harpia**	**Harpia harpyja**	**X**	**X**	
Jacu Penélope	Cracidae	Penelope	Penelope jacquacu			12
Jacu-de-spix	Cracidae	Penelope	Penelope jacquacu jacquacu			21
Jacu-estalo	Cuculidae	Neomorphus	Neomorphus geoffroyi	X		
Mutum	Cracidae	Pauxi	Pauxi tuberosa			08
Tucano-toco	Ramphastidae	Ramphastos	Ramphastos toco			09
Bem-ti-vi	Tyrannidae	Pitangus	Pitangus sulphuratus			18
Arara vermelha	Psittacidae	Ara	Ara chloropterus		X	08
Arara azul	Psittacidae	Anodorhynchus	Anodorhynchus hyacinthinus			

Arara juba	Psittacidae	Guaruba	Guaruba guarouba	X		
Uirapuru	Troglodytidae	Cyphorhinus	Cyphorhinus aradus	X		02
Coruja (Caburé-da-amazônia)	Strigidae	Glaucidium	Glaucidium hardyi		X	05
Gavião Carcará	Falconidae	Caracara	Caracara plantus			07
Gavião-pedrês	Accipitridae	Buteo	Buteo nitidus			10
Pica-pau	Picidae	Campephilus	Campephilus rubricollis			08

Mastofauna

The methods used to obtain information on the Mastofauna were the use of traps, as well as the interception and fall net, active search, road sampling, which consists of travelling trails looking for species that are moving along it and by vocalisation.

Table - Species found in the Project region - Mastofauna

Species found in the region - Mastofauna						
Popular Name	**Family**	**Genus**	**Scientific Name**	**VU**	**CAM**	**Quant.**
Tatu-canastra	Dasypodidae	Priodontes	Priodontes maximus	X		03
Onça-pintada	Felidae	Panthera	Panthera onca	X	X	
Gato maracajá	Felidae	Leopardus	Leopardus wiedii	X		
Anta	Tapiridae	Tapirus	Tapirus terrestris		X	10
Tatu	Dasyp odidae	Dasypus	Dasypus novemcinctus			20
Veado	Cervidae	Mazama	Mazama americana			15

Macaco-prego	Cebidae	Cebus	Cebus apella robustus	X		20
Brown howler monkey	Atelidae	Alouatta	Alouatta guariba			25
Macaco-aranha-de-cara-branca	Atelidae	Ateles	Ateles marginatus	X	X	09
Mucura	Didelphidae	Didelphis	Didelphis marsupialis			25
Tamanduá-bandeira	Myrmecophagidae	Myrmecophaga	Myrmecophaga tridactyla	X		08
Morcego	Phyllostomidae	Desmodus	Desmodus rotundus			10
Paca	Cuniculidae	Cuniculos	Cuniculus Paca			16
Cutia	Dasyproctidae	Dacyprócta	Dasyprocta Aguti			28
Porco-queixada	Tayaçúideos	Tayassu	Tayassu Pecari			10
Macaco sauim-de-coleira	Cebidae	Seguinus	Saguinus Bicolor	X		58

Arthropods were found in abundance in the region. Its importance is mainly due to being one of the main pollinator groups, contributing significantly to the maintenance and recovery of biodiversity. As it is a broadleaf forest, the region presents a continuous flowering of different tree species, contributing significantly to the food chain of which these species are part.

For the Herpetofauna group, in general, results were obtained that pointed to the occurrence of species commonly recorded in the state of Amazonas, and some species present high abundance. Even so, it is essential to maintain vegetation where different species of amphibians and reptiles can use as a passage, feeding and reproduction area.

In the Avifauna group, it is important to highlight the presence of migratory birds, which have adapted to the conditions of the region. The Tapera forest has conditions such as food, water, and a canopy over 25

metres high that makes access difficult for birds in terms of animal trafficking. At the Itaúba Property, traces of the presence of *Harpya harpyja* - an endangered species - and Hyacinth Macaw were recorded.

In relation to Mastofauna, the Tapera forest presents full conditions for the establishment of the species. One of the factors is the distance between the Tapera region and the urban area of the municipality of Urucará. Therefore, it is essential that the remaining vegetation are preserved and that they present conditions, especially those that require large areas, as well as the jaguar that during the visitation period was not seen, however, traces of its presence were found in various points in that locality.

At this first moment, it is important to highlight that this data collection regarding the wild fauna of the Tapera REDD+ Project area is not completed as it consists of an area of difficult access and due to climatic reasons and the great diversity existing in the region, new expeditions for more detailed information.

However, since then, serious measures and actions must be taken to maintain existing ecological processes, connecting the main protected areas and the remnants of native vegetation, adding and respecting the cultural preservation of the human population that lives around the project.

Flora

The forest formation in the Tapera project area is all Ombrophylous Forest: Lowland Dense Ombrophylous Forest (100%), as presented in section **2.1.5**.

The Lowland Dense Ombrophylous Forest is a formation that occurs at altitudes ranging from 5 to 100m, and is composed of more widely spaced trees, with a low-density shrub stratum and characterised by phanerophytes and woody lianas[1]. The characterization of the flora in the region was conducted using secondary data obtained from the IBAT - Integrated Biodiversity Assessment Tool database[1]. About 98 (morphological) tree species were recorded[202], distributed among 271 genera and 15 botanical families: Burseraceae: 1 species; Sapotaceae: 1 species; Lecythidaceae: 3 species; Annonaceae: 1 species; Acanthaceae: 1 species; Ehretiaceae: 1 species; Chrysobalanaceae: 1 species; Lauraceae: 1 species; Fabaceae: 2 species; Myristicaceae: 1 species; Bignoniaceae: 1 species; Moraceae: 1 species; Araliaceae: 1 species; Rubiaceae: 1 species and Cupressaceae: 1 species. The following species are endemic to the Amazon:

- Protium heptaphyllum (Breu) is native to the Amazon.
- Pouteria caimito (Abiurana) is found in the Amazon basin.
- Eschweilera parviflora (Matamatá) is part of the Lecythidaceae family, which includes many species endemic to the Amazon.
- Bocageopsis multiflora (Envira Preta/Envira Vermelha) is often found in the Amazon.
- Inga sp. (Ingá) includes species widespread in the Amazon rainforest.
- Virola surinamensis (Virola) is known to occur in the Amazonian regions.
- Euterpe oleracea (related to Ripeira) is endemic to the Amazon and is known as Açaí.

Table- Vegetation according to inventory 1 per species

Species	Common Name	Family	VU/EN	Qty, per species
Protium heptaphyllum	Breu	Burseraceae		435
Pouteria caimito	Abiurana	Sapotaceae		370
Eschweilera parviflora	Matamatá	Lecythidaceae		290
Bocageopsis multiflora	Envira Preta/Envira Vermelha	Annonaceae		210
Trichanthera gigantea	Canela de Garça	Acanthaceae		174
Cordia trichotoma	Louro Amarelo	Ehretiaceae		153
Licania floribunda	Caraipé	Chrysobalanaceae		138
Ocotea nigrescens	Louro-PStraight	Lauraceae		130
Inga sp.	**Ingá**	**Fabaceae**	**EN**	**119**
Virola surinamensis	**Virola**	**Myristicaceae**	**VU**	**88**
Euterpe edulis	**Ripeira**	**Arecaceae**	**VU**	**82**
Eschweilera atropetiolata	Castanharana	Lecythidaceae		79
Zygia racemosum	Angelim Bordado	Fabaceae		79
Maquira sclerophylla	Muiratinga	Moraceae		69
Parinarium barbatum	Macucu	Rosaceae		66
Myrtus spp.	Murta	Myrtaciae		59
Swietenia macrophylla King	**Mara-mara**	**Meliaceae**	**VU**	**57**
Talisia esculenta	Pitomba	Pitomba		54
Minquartia guianensis	Acariquara	Olacaceae		53
Himatanthus sucuuba	Sucuúba	Apocynaceae		52

Species	Common Name	Family	VU/EN	Qty, per species
Gibasis pellucida	Noira	Apocynaceae		51
Cinchona	Quina-quina	Rubiaceae		48
Cecropia pachystachya	Embaúba	Urticaceae		42
Chrysophyllum oppositum	Caramuri	Sapotaceae		42
Socratea exorrhiza	Louro Paxiúba	Arecaceae		41
Laurus nobilis	Louro Cheiroso	Rosaceae		40
Pseudopiptadenia psilostachya	Faveira-Folha-Fina	Leguminosae		40
Xylopia frutescens Aub	Envira Branca	Annonaceae		38
Inga paraensis	Ingarana	Fabaceae		35
Aniba canelilla	Preciosa	Lauraceae		34
Parinari montana	Uxirana	Chrysobalanaceae		33
Psidium guajava	Goiabeira	Myrtacea		33
Bastardiopsis densiflora	Louro Gamela	Malvaceae		32
Protium apiculatum	Breu Vermelho	Burseraceae		29
Bactris gasipae	Tata Punha	Arecaceae		27
Buchenavia capitata	Tanibuca	Combretaceae		27
Goupia glabra	Cupiúba	Goupiaceae		27
Andira parviflora	Sucupira Vermelha	Fabaceae		26
Aspidosperma polyneuron	Pau Caboclo	Apocynaceae		26
Alibertia edulis	Puruí	Rubiaceae		25
Ceiba pentandra	Saiuda	Malvaceae		25
Dimorphandra macrostachya	Paracuúba	Leguminosae		25
Dipteryx odorata	Cumaru	Fabaceae		25
Dialium guianense	Jutaí	Caesalpiniaceae		24

Species	Common Name	Family	VU/EN	Qty, per species
Hymenolobium petraeum	Angelim Pedra	Leguminosae		24
Anadenanthera macrocarpa	Gipi	Fabaceae		23
Herrania mariae	Cacaurana	Esterculiáceas		21
Plinia cauliflora	Jaboticaba	Myrtacea		21
Simarouba amara	Marupa	Simaroubaceae		21
Cryptocarya minima	Louro Abacate	Lauraceae		20
Endopleura uchi	Uxi Liso	Humiriaceae		17
Mouriri ulei	Socoró	Melastomataceae		17
Iryanthera grandis	Arurá Vermelho	Myristicaceae		16
Vismia brasiliensis	Lacre	Hypericaceae		16
Lithraea molleoides	Bugreiro	Anacardiaceae		15
Astronium lecointei	Muiracatiara	Anacardiaceae		14
Mezilaurus itauba	**Itaúba**	**Lauraceae**	**VU**	**14**
Couma macrocarpa	Sorva	Apocynaceae		13
Caryocar glabrum	Piquiarana	Caryocaraceae		12
Anacardium excelsum	Cajuaçu	Anacardiaceae		11
Annonaceae guatteria	**Envira**	**Annonaceae**	**EN**	**11**
Aspidosperma desmanthum Benth	Araracanga	Apocynaceae		11
Lecythis lurida	Jarana	Lecythidaceae		11
Maytenus guianensis	Xixuá	Celastracea		11
Scheelea phalerata	Bacuri	Arecaceae		11
Schizolobium amazonicum	Paricá	Fabaceae		11
Bowdichia virgilioides	Sucupira Amarela	Fabaceae		10
Couratari guianensis	Tauari branco	Lecythidaceae		10
Handroanthus albus	Ipê Amarelo	Bignoniaceae		10
Tachia guianensis Aubl	Caferana	Gentianaceae		10

Species	Common Name	Family	VU/EN	Qty, per species
Brosimum potabile	Amapazeiro	Moraceae		9
Didymopanax angustissimum	Morototo	Araliaceae		9
Ocotea rubra	Louro Vermelho	Lauraceae		9
Onychopetalum periquino	Envira Vermelha	Annonaceae		9
Plathymenia foliolosa	Amarelinho	Fabaceae		9
Annona neoinsignis	Cortiça	Annonaceae		8
Clarisia racemosa	Guariúba	Moraceae		8
Couratari spp	Tauari	Lecythidaceae		8
Manilkara bidentata	Balata	Sapotaceae		8
Vitex montevidensis	Tarumã	Lauraceae		8
Osteophloeum platyspermum	Arura Branco	Myristicaceae		7
Bowdichia racemosa	Sucupira Preta	Leguminosae		6
Coussapoa asperifolia	Caimbé	Cecropiaceae		6
Crataeva benthami	Catauari	caparidaceae		6
Hymenaea courbaril	Jatobá	Fabaceae		6
Ocotea barcellensis	Louro Mamuri	Lauraceae		6
Morus	Amora	Moraceae		5
Protium icicariba	**Breu PStraight**	**Burseraceae**	**EN**	**5**
Theobroma subincanum	Cupui	Fabaceae		5
Byrsonima crassifolia	Muruci	Malpighiacea		4
Copaifera guianensis	Copaiba	Fabaceae		4
Handroanthus avellanedae	Ipe roxo	Bignoniaceae		4
Hevea brasiliensis	Seringueira	Euphorbiaceae		4
Rapanea ferruginea	Pororoca	Myrsinaceae		4
Trattinnickia burserifolia	Breu Sucuruba	Burseraceae		4
Bellucia dichotoma Cogn	Muuba	Melastomataceae		3

Species	Common Name	Family	VU/EN	Qty, per species
Brosimum rubescens	Pau Rainha	Moraceae		3
Calophyllum brasiliense	Muruci	Malpighiacea		3
Erisma uncinatum	Cedrinho	Vochysiaceae		3
Eugenia myrciantes	Laranjinha	Myrtaceae		3
Ormosia paraensis	Tento	Cyperaceae		3
Parkia paraensis	Arara-tucupi	Leguminosae		3
Platymiscium Duckei Huber.	Miraúba	Malvaceae		3
Protium heptaphyllum March	Breu	Burseraceae		3
Sclerolobium paniculatum	Tachi Branco	Fabaceae		3
Sterculia Pruriens	Tacacazeiro	Esterculiáceas		3
Carapa guianensis	Andirobinha	Meliaceae		2
Cariniana micrantha	Tauari Vermelho	Lecythidaceae		2
Copernicia prunifera	Copaiba	Fabaceae		2
Dinizia excelsa Ducke	Angelim vermelho	Leguminosae		2
Lecythis pisonis	Castanha Sapucai	Lecythidaceae		2
Ocotea glomerata	Abacatão	Lauraceae		2
Poecilanthe parviflor	Coraci	Fabaceae		2
Spondias mombin	Taperebarana	Anacardiaceae		2
Vatairea sp.	Angelim fava	Leguminosae		2
Aspidosperma nitidum Benth	Carapanaúba	Apocynaceae		1
Bertholletia excelsa	**Castanha do Am**	**Lecythidaceae**	**VU**	**1**
Calycophyllum spruceanum Benth	Mulateira	Rubiaceae		1
Calycophyllum spruceanum Benth.)	Mulateiro	Rubiaceae		1
Cinchona spp.	Quina	Rubiaceae		1

Species	Common Name	Family	VU/EN	Qty, per species
Ficus trigona L.f.	Apui Parazita	Moraceae		1
Joannesia princeps	Pelo de Cutia	Euphorbiaceae		1
Manilkara guberi	Maçaranduba	Sapotaceae		1
Mauritia flexuosa	Diguia	Arecaceae		1
Pachira aquatica Aubl	Mungubeira	Malvaceae		1
Peltogyne spp.	Roxinho	Fabaceae		1
Sacoglottis guianensis	Uxi Torrado	Humiriaceae		1
Siparuna guianensis Aubl	Capitiu	Sapotaceae		1
Solanum corymbiflorum (Sendtn.)	Maniva de viado	Solanaceae		1
Thuja Occidentalis	Davida	Cupressaceae		1

The analysis of this forest inventory reveals several key points about the species distribution and diversity in the area:

Species Richness and Diversity: The inventory lists a total of 98 different species, indicating a high level of biodiversity. This diversity is vital for the ecological health of the forest, as it supports various wildlife and contributes to the stability and resilience of the ecosystem.

Dominance of Certain Species: The most abundant species, Protium heptaphyllum (Breu), constitutes 10.46% of the total, suggesting that this species is particularly well-adapted to the local conditions. Other dominant species include Pouteria caimito (Abiurana) and Eschweilera parviflora (Matamatá), each making up 8.89% and 6.97% of the forest, respectively. These dominant species can greatly influence the forest's structure and the availability of resources for other species.

Family Representation: The inventory includes a wide range of families, with significant representation from Burseraceae, Sapotaceae, Lecythidaceae, Annonaceae, and Acanthaceae. This variety in families indicates a healthy ecosystem with a variety of functional roles played by different plants.

Potential for Sustainable Use: Some of these species may have economic value, such as fruit-bearing trees or timber-yielding species. Sustainable management practices could be developed to harness these resources without compromising the forest's ecological balance.

Indicator of Environmental Health: The presence and health of these species can be indicators of the overall health of the forest ecosystem. Changes in their population sizes or health could signal changes in the environment, which might require investigation or intervention.

In conclusion, this forest inventory reflects a rich and diverse ecosystem with a mix of dominant and rare species. It highlights the importance of continued monitoring and management to maintain biodiversity and ecological balance, and it also presents opportunities for sustainable use and conservation initiatives.

Table - Vegetation according to inventory 2 per species

Species	**Common Name**	**Family**	**VU/EN**	**Qty. per species**
Protium heptaphyllum	Breu	Burseraceae		488
Bellucia dichotoma	Tintarana	Melastomataceae		354
Pouteria caimito	Abiurana	Sapotaceae		304
Myrsine guianensis	Pororoca	Primulaceae		209
Ocotea sp.	Louro	Lauraceae	VU	193
Herrania mariae	Cacaurana	Malvaceae		180
Virola surinamensis	Virola	Myristicaceae	VU	166
Andira parviflora	Sucupira Vermelha	Fabaceae		148
Scheelea phalerata	Bacuri	Arecaceae		115
Endopleura uchi	Uxi	Humiriaceae		99
Gustavia augusta	Murrão	Lecythidaceae		88
Bocageopsis multiflora	Envira Preta/Envira Vermelha	Annonaceae		87
Euterpe edulis	Ripeira	Arecaceae	VU	86
Rapanea Ferruginea	Pororoca	Myrsinaceae		80
Ocotea canaliculata	Louro Pimenta	Lauraceae		74
Vantanea parviflora	Uxirana	Humiriaceae		72
Lecythis pisonis	Castanharana/Castanha Sapucaia	Lecythidaceae		72

Species	Common Name	Family	VU/EN	Qty. per species
Coussapoa asperifolia	Caimbé	Urticaceae		71
Simarouba amara	Marupá	Simaroubaceae		61
Dipteryx odorata	Cumarú	Fabaceae		61
Dialium guianense	Jutaí	Caesalpiniaceae		60
Minquartia guianensis	Quariquara	Coulaceae		59
Attalea maripa	Najazeiro	Arecaceae		57
Aspidosperma discolor	Carapanaúba	Apocynaceae		57
Psidium longipetiolatum	Araça Vermelho	Myrtaceae		55
Hymenolobium sp.	Angelim	Fabaceae		52
Aniba burchellii	Louro Rosa	Lauraceae		51
Licania octandra	Caripé	Chrysobalanaceae		50
Tachigali glauca	Taxizeiro	Caesalpiniaceae		45
Ocotea tabacifolia	**Louro Abacate**	**Lauraceae**	**EN**	**40**
Bertholletia excelsa	**Castanheira**	**Lecythidaceae**	**VU**	**40**
Sorbus domestica	Soveira	Rosaceae		36
Brosimum rubescens	Murapiranga	Moraceae		35
Caryocar villosum	Pequiá	Caryocaraceae		33
Mezilaurus itauba	**Itaúba**	**Lauraceae**	**VU**	**33**
Bowdichia nitida	Sucupira	Fabaceae		32
Plathymenia foliolosa	Amarelinho	Fabaceae		32
Inga paraensis	Ingarana	Fabaceae		31
Annonaceae guatteria	**Envira**	**Annonaceae**	**EN**	**29**
Psidium sp.	Araça	Myrtaceae		27
Cinchonopsis amazonica	Quina	Rubiaceae		24
Talisia esculenta	Pitombeira	Sapindaceae		23

Species	Common Name	Family	VU/EN	Qty. per species
Pouteria guianensis	Abiu	Sapotaceae		21
Ormosia paraensis	Tento	Fabaceae		19
Artocarpus heterophyllus	Jaqueira	Moraceae		19
Nectandra grandiflora	Caneleira	Lauraceae		19
Oenocarpus mapora	Bacabeira	Arecaceae		19
Brosimum potabile	Amapá	Moraceae		19
Myrtus spp.	Murta	Myrtaciae		18
Carapa guianensis	Andiroba	Meliaceae		18
Mora paraensis	Paracaúba	Fabaceae		15
Vismia brasiliensis	Lacre	Hypericaceae		15
Rinorea flavescens	Canela de Garça	Violaceae		14
Didymopanax angustissimum	Morototó	Araliaceae		13
Maytenus guianensis	Chichuá	Celastraceae		13
Osteophloeum platyspermum	Arurá	Myristicaceae		12
Parkia multijuga	Arareira	Fabaceae		12
Himatanthus sucuuba	Sucubeira	Apocynaceae		11
Byrsonima crassifolia	Murici	Malpighiaceae		11
Swietenia macrophylla	**Maramara**	**Meliaceae**	**VU**	**11**
Astronium lecointei	Maracatiara	Anacardiaceae		11
Sacoglottis verrucosa	Uxi Coroa	Humiriaceae		10
Vitex montevidensis	Tarumã	Lauraceae		10
Manilkara huberi	Maçaranduba	Sapotaceae		10
Ocotea nigrescens	Louro Preto	Lauraceae		10
Inga sp.	**Ingá**	**Fabaceae**	**EN**	**10**
Anacardium giganteum	Cajuaçu	Anacardiaceae		10

Species	Common Name	Family	VU/EN	Qty. per species
Mouriri guianensis	Socoró	Melastomataceae		9
Trema micrantha	Piriquiteira	Cannabaceae		9
Clarisia racemosa	Guariúba	Moraceae		9
Alibertia edulis	Puruí	Rubiaceae		7
Cedrela odorata	**Cedro**	**Meliaceae**	**VU**	**7**
Virola duckei	Ucuubeira	Myristicaceae		6
Couratari oblongifolia	Tauarí	Lecythidaceae		4
Ceiba pendrata	Saiúda	Malvaceae		4
Aniba canelilla	Preciosa	Lauraceae		4
Aniba parviflora	Louro Gamela	Lauraceae		4
Cecropia pachystachya	Imbaúba	Urticaceae		4
Goupia glabra	Cupiúba	Goupiaceae		4
Copaifera multijuga	Copaíba	Caesalpiniaceae		4
Zygia racemosa	Angelim Bordado	Fabaceae		4
Pera glabrata	Sapateiro	Euphorbiaceae		3
Handroanthus serratifolius	Pau d'arco	Bignoniaceae		3
Hymenaea courbaril	Jatobá	Fabaceae		3
Amburana acreana	**Amburana**	**Fabaceae**	**VU**	**3**
Caraipa densifolia	Tamaquaré	Calophyllaceae		2
Bowdichia racemosa	Sucupira Preta	Leguminosae		2
Swartzia recurva	Muirajibóia	Fabaceae		2
Citrus aurantium	Laranjinha	Rutaceae		2
Cecropia sp.	Imbaúba	Urticaceae		2
Parkia sp.	Farveira	Fabaceae		2
Xylopia frutescens Aub	Envira Branca	Annonaceae		2
Parkia decussata	Arara-Tucupi	Fabaceae		2

Species	Common Name	Family	VU/EN	Qty. per species
Persea americana	Abacateira	Lauraceae		2
Croton Urucarana	Urucurana	Euphorbiaceae		1
Tachigali paraensis	Taxirana	Fabaceae		1
Bagassa guianensis	Tatajuba	Moraceae		1
Geissospermum sericeum	Quinarana	Apocinaceae		1
Joannesia princeps	Pelo de Cútia	Euphorbiaceae		1
Cynometra bauhiniifolia	Jutairana	Fabaceae		1
Astrocaryum jauari	Jauari	Lauraceae		1
Theobroma grandiflorum	Cupuaçu	Sterculiaceae		1

The analysis of this second forest inventory highlights several notable aspects of the species composition and diversity in this forest area:

The second forest inventory conducted in the Tapera Project area reveals a rich and diverse ecosystem, with 96 species recorded, highlighting the region's high biodiversity. Dominant species, such as *Protium heptaphyllum* (Breu), remain abundant, indicating their strong adaptation to local conditions. Other key species include *Bellucia dichotoma* (Tintarana) and *Pouteria caimito* (Abiurana), which play significant ecological roles. However, there are notable shifts in species representation compared to the first inventory, with species like *Myrsine guianensis* (Pororoca) and *Ocotea sp.* (Louro) becoming more prevalent, signaling potential changes in forest dynamics. This diverse flora, with families from Burseraceae, Melastomataceae, Sapotaceae, Primulaceae, and Lauraceae, underscores a healthy and resilient ecosystem.

The presence of both common and rare species in the Tapera area highlights the need for comprehensive conservation strategies. It is crucial to protect less represented species to maintain ecological balance alongside managing the dominant species. The inventory also indicates that some species may hold economic or medicinal potential, suggesting that sustainable use could benefit local communities while preserving the forest's health. Additionally, the abundance and distribution of certain species serve as valuable indicators of the forest's environmental health, providing early signs of ecological changes that may need further attention.

The Tapera Project area is home to several Vulnerable and Endangered species of both flora and fauna. Among the fauna, species such as *Chelonoidis denticulata*, *Harpia harpyja*, *Priodontes maximus*, *Tapirus terrestris*, and *Alouatta guariba* are classified as Vulnerable, with *Ateles marginatus* and *Cebus apella robustus* being

listed as Endangered. In terms of flora, species like *Inga sp.*, *Virola surinamensis*, *Swietenia macrophylla*, and *Bertholletia excelsa* are also at risk. These species, many endemic to the region, play vital roles in maintaining ecological balance and are of significant value for both their ecological functions and potential human use. The conservation of these species is paramount to preserving the forest's biodiversity and ensuring the long-term health of the ecosystem.

Table- List of trees families endemic to the Brazilian territory and their respective endemism in the Amazon.

Family	Scientific Name	Popular Name	Endemism in the Amazon
Fabaceae	*Mora paraensis*	-	Endemic
Fabaceae	*Schizolobium parahyba var. amazonicum*	Angico	Endemic
Fabaceae	*Vatairea heteroptera*	Angelim	Non-endemic
Fabaceae	*Zollernia paraensis*	Pracauba, Pracuúba, Jenipapinho	Non-endemic
Lauraceae	*Aniba canelilla*	precious bark	Non-endemic
Lecythidaceae	*Eschweilera ovata*	-	Non-endemic
Malvaceae	*Quararibea amazonica*	-	Endemic
Moraceae	*Castilla ulei*	Caucho rubber	Endemic
Moraceae	*Naucleopsis jamariensis*		Endemic
Myrtaceae	*Myrcia aliena*		Endemic
Nyctaginaceae	*Guapira venosa*		Non-endemic
Phytolaccaceae	*Gallesia integrifolia*	Pau-alho	Non-endemic
Piperaceae	*Piper hispidinervum*	long-pepper	Non-endemic

Rubiaceae	*Duroia hirsutissima*	-	Endemic
Rubiaceae	*Psychotria carthagenensis*	Amyruca	Non-endemic
Siparunaceae	*Siparuna glycycarpa*	-	Non-endemic
Violaceae	*Rinorea longistipulata*	Canela-de-Velho	Endemic
Vochysiaceae	*Erisma bracteosum*	-	Endemic

In the secondary survey, a total of 13 tree species threatened with extinction were registered according to the official lists, three of which are exclusive to the IUCN international list[41], one to the national list of the Ministry of the Environment (MMA), and eight species present in both lists. Among the threatened species, two are endemic to the Amazon phytogeographic domain, namely: *Annonaceae guatteria* and *Virola surinamensis*.

Table- List of threatened species in the Tapera project region (VU = Vulnerable, EN = Endangered).

Family	Scientific Name	Popular Name	Threat Category
Annonaceae	*Annonaceae guatteria*		VU (IUCN, 2018)
Bignoniaceae	*Handroanthus serratifolius*	Yellow lapacho	EN (IUCN, 2020)
Fabaceae	*Amburana acreana*	cerejeira	VU (IUCN, 1998; MMA, 2022)
Lauraceae	*Mezilaurus itauba*	Itaúba	VU (IUCN, 1998; MMA, 2022)
Lecythidaceae	*Bertholletia excelsa*	Brazil nut	VU (IUCN, 1998; MMA, 2022)
Meliaceae	*Cedrela odorata*	Spanish cedar	VU (IUCN, 2017; MMA, 2022)

[41] IUCN Red List of Threatened Species

Meliaceae	*Swietenia macrophylla*	Mahogany	VU (IUCN, 1998; MMA, 2022)
Myristicaceae	*Virola surinamensis*	Baboonwood, Ucuuba, Ucuhuba	EN (IUCN, 1998); VU (MMA, 2022)

Most of the threatened species listed above are timber species of high commercial value that have been suffering from strong extractive pressure along with a continuing decline in the extent and quality of their habitat. The table below shows the main uses of each species:

Table- Main uses of threatened species in the Tapera project region.

Scientific Name	Popular Name	Uses
Amburana acreana	cerejeira	Noble wood used in the manufacture of luxury furniture.
Annona calcarata	Biribá	Rare species threatened mainly due to the loss of its natural habitat. No information on its use was found.
Bertholletia excelsa	Brazil nut	Wood used for light internal construction (floors and walls); Seeds exploited for industrial purposes (cosmetics manufacturing) and food.
Cedrela odorata	Cedro	Wood is widely used in civil construction, in the furniture industry and in the production of essential oils due to its unique and highly beneficial aroma for health. [4]
Handroanthus capitatus	Ipê	Wood widely used in civil construction and considered one of the most valuable in the market.
Handroanthus serratifolius	Yellow lapacho	Excellent quality wood for furniture production.
Mezilaurus itauba	Itaúba	Resistant and highly durable wood, being the main raw material for the construction of medium and large vessels; It is also used for external constructions (bridges, posts and piles), in civil construction (beams, slats, boards), in the manufacture of furniture and in the manufacture of, for example, train wagons, barrels and casks.

Sarcaulus vestitus		Specific information about its use was not found. Logging is considered its main threat.[5]
Swietenia macrophylla	Mahogany	One of the most commercialised mahogany species, being valuable and widely exploited in Brazil. [1]
Virola surinamensis	Baboonwood, Ucuuba	A highly exploited wood, considered the second most economically important wood in the Amazon basin region; It presents other resources exploited by pharmaceutical industries to produce cosmetics and pharmaceutical products.

The use of non-timber resources is widespread in the region. The most extracted products are oils, gums, latex, resin, roots, leaves, bark, straw, stem, and fruit, and they have as main uses: food, construction, household utensils, medicinal, crafts, religious worship (e.g. preparation of the "Ayahuasca" for Santo Daime cults) and as hunting blind for their consumption and commercialization. According to the secondary data, 10 tree species were identified as being of great use and importance for the communities in the region, and which present potential for sustainable use and income generation. According to the data collected by the socio-environmental team, it was identified that the local communities near the project area conduct the exploitation of breu resin, copaiba oil, tonka beans, nuts, but also for sustainable practices such as subsistence fishing and hunting.

Species of commercial interest

Several species listed in the inventories have commercial interest, either for their timber, fruit, medicinal properties, or other uses. Here are some notable ones:

Table- Species of commercial interest

Name	**Commercial use**
Protium heptaphyllum (Breu)	Known for its resin, which has various medicinal and industrial applications

Name	Commercial use
Pouteria caimito (Abiurana)	Valued for its wood and also its edible fruit.
Virola surinamensis (Virola)	The wood of this tree is commercially valuable. Additionally, it has ethnobotanical uses
Euterpe edulis (Ripeira)	Known as the source of the heart of palm, a popular food item. It's also a source of açaí berries.
Dipteryx odorata (Cumaru)	Known for producing tonka beans, which are used in perfumes and as a vanilla substitute. The wood is also valuable.
Swietenia macrophylla (Mara-mara)	A species of mahogany, highly valued for its wood.
Bertholletia excelsa (Castanheira)	Known for Brazil nuts, which are economically significant.
Carapa guianensis (Andiroba)	The seeds are used to produce andiroba oil, which has medicinal properties. Its wood is also commercially valuable.
Cedrela odorata (Cedro)	Known for its aromatic wood, used in furniture and cigar boxes.
Hevea brasiliensis (Seringueira)	The primary source of natural rubber.
Ocotea sp. (Louro)	Some species in this genus are valued for their timber.

Name	Commercial use
Aniba canelilla (Preciosa)	Known for its essential oil, used in perfumery.
Hymenaea courbaril (Jatobá)	The wood is highly prized for construction and furniture making.
Manilkara bidentata (Balata)	Known for its hard, durable wood and balata gum, similar to gutta-percha.
Copaifera spp. (Copaiba)	The resin (copaiba oil) is used medicinally and in cosmetics.
Aspidosperma polyneuron (Pau Caboclo)	Valued for its wood.
Theobroma subincanum (Cupui) and Theobroma grandiflorum (Cupuaçu)	Relatives of the cacao tree, known for their fruit, used in food products
Couratari spp. (Tauari)	The wood is used in construction and furniture.

These species are of commercial interest due to their diverse applications in various industries, including timber, food, medicine, and cosmetics. However, it's important to note that the exploitation of these species must be done sustainably to ensure their conservation and the ecological balance of the forests.

Protected and Priority Areas for Conservation

The Urucará municipality includes a portion of the 938,720 ha Uatuma Biological Reserve, which was established in 2002 to protect the biological diversity of the dense rainforest ecosystem in the basin of the Uatumã River and Jatapu River. Forest ecosystems in Urucará municipality currently suffer rapid levels of

planned and illegal deforestation driven by increasing demand for timber globally, expansion of agriculture and cattle ranching, and poor enforcement of forest protection laws.

In addition to the protected areas, there are also areas considered priority for the Conservation and Protection of biodiversity close to the project area, varying in level of biological importance and priority of action (high, very high and extremely high), according to the Ministry of the Environment (MMA) (Figure 42). The Priority Areas for conservation, established by Ordinance Nº 5.092/2004[1], are considered a public policy instrument that aims to help in the decision making process, in an objective and participative manner, besides supporting the planning and implementation of actions for the conservation of Brazilian biodiversity[2].

The Tapera project area, according to MMA (2018), is located close to an area of "High" relevance for the conservation and protection of biodiversity (AMZ-838) and two other areas of "Extremely High" relevance (AMZ-363 and AMZ-011) (Figure 42). As the project is located in the region with the highest rates of deforestation in the Amazon (Arc of Deforestation)[3], the implementation of the project in this region is extremely important for the conservation of biodiversity.

5.1.2 High Conservation Values (CCB, B1.2)

According to the survey of secondary data in the region, the High Conservation Values - HCV were defined, according to the HCV Resource Network guide. The table below presents information on the high conservation values related to biodiversity in the project region.

Table - High Conservation Value (HCV) related to Flora biodiversity within the Tapera project zone.

High Conservation Value	HCV 1 - Endemic and threatened Flora species
Qualification Attribute	In the project region, endemic flora species to Brazil and to Amazon were recorded, as well as species threatened with extinction at the international level according to the International Union for Conservation (IUCN) and at the national level according to the Ministry of Environment (MMA). According to the data survey, 9 species are considered threated: Vulnerable (VU): *Inga sp.; Virola surinamensis; Euterpe edulis; Swietenia macrophylla (Mahogany); Mezilaurus itauba; Protium icicariba; Bertholletia excelsa (Brazil Nut).* Endangered (EN): *Annonaceae guatteria; Virola surinamensis* Endemic Species The species Protium heptaphyllum (Breu) and Pouteria caimito (Abiurana) stand out, as they are restricted to the Amazon Domain in

	the Brazilian territory and are threatened with extinction.
Focus area	In project areas where potentially threatened species populations occur.

Table- High Conservation Value (HCV) related to Flora biodiversity within the Tapera project zone.

High Conservation Value	HCV 1- Endemic and threatened fauna species
Qualification Attribute	Several threatened and endemic fauna species were recorded in the region. Regarding the threatened status of species, 14 threatened species were identified, considering the IUCN classification: Vulnerable (VU): *Chelonoidis denticulate; Harpia harpyja (Harpy Eagle); Priodontes maximus (Giant Armadillo); Tapirus terrestris (South American Tapir); Alouatta guariba (Brown Howler Monkey); Myrmecophaga tridactyla (Giant Anteater); Tayassu pecari (White-lipped Peccary); Guaruba guarouba (Golden Parakeet); Neomorphus geoffroyi; Trichechus inunguis (Amazonian Manatee)* Endangered (EN): *Ateles marginatus (White-cheeked Spider Monkey) and And Cebus apella robustus.* Many of the listed species, such as the Harpy Eagle, the Amazonian Manatee and Golden Parakeet, are endemic to the Amazon region, playing unique roles in its ecosystem.
Focus area	In all project areas.

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

The municipalities of Urucará and Nhamundá are in the Amazon region, where there has been a significant expansion of the agricultural frontier within the state. The main access road, Urucará to São Sebastião, is flanked by deforested land, as well as the banks of the main rivers (Tapera, Maripá, Paratucu). Since the roads facilitate the opening of new frontiers, leading to disorderly occupation, increased deforestation, and subsequent socio environmental impacts.

Deforestation in the municipalities of Urucará and Nhamundá, located in the state of Amazonas, can be attributed to several factors. In the Project Area, key drivers of deforestation include legal conversion of forests, illegal logging, timber harvesting, and land clearance for agricultural expansion. As previously discussed in this document, deforestation has escalated in recent years in the municipality of Urucará, particularly along the Urucará – São Sebastião road. This surge is primarily linked to a significant

concentration of timber industries in São Sebastiao, specialising in clandestine wood sourced from the Urucará municipality via road access. According to the history of land use and occupation in the region, the scenario without the Tapera project, which comprises 24 private properties, tends to be the replacement of areas of native vegetation by areas of pasture, in compliance with the provisions of Law 12.651/12[233], where the owner has the right to deforest about 20% of his area, as shown in section **2.5.**

In the absence of the project, the region faces the imminent threats of deforestation and degradation, posing severe impacts on biodiversity. The resulting fragmentation and loss of habitat could lead to the displacement and decline of species, particularly those with limited mobility and specialised characteristics. This, in turn, may result in the population decrease or even extinction of critically important species for conservation, such as endemic Amazon species or those at risk of extinction.

Against this backdrop, the implementation of the REDD+ project becomes crucial for forest conservation. The project involves monitoring activities within a region historically prone to increased deforestation and acknowledged for its biological importance. By conserving the area, the project ensures the preservation of continuous forest environments, facilitating gene flow among species and providing essential ecosystem services to local communities.

5.2 Net Positive Biodiversity Impacts

5.2.1 Expected Biodiversity Changes (VCS, 3.19; CCB, B2.1)

Table- Expected changes in biodiversity resulting from Tapera project activities.

Biodiversity Element	Vegetation
Estimated Change	Reducing deforestation and conserving habitats
Change Justification	The Tapera project aims to prevent deforestation and forest degradation, protecting a vegetation area of great biological importance. The factors that will contribute to change refer to forest conservation, periodic remote monitoring, and improvement of heritage surveillance in the area during project activities.

Biodiversity Element	Fauna and Flora
Estimated Change	Conservation and maintenance of biodiversity

Change Justification	The conservation of the project area will ensure the maintenance of local forest benefits, avoiding the loss of species (fauna and flora) and habitats in the region, and maintaining the connectivity between the environments. The factors that will contribute to change are related to the conservation of the area, monitoring and deepening the knowledge of biodiversity in the project area, environmental education actions with local communities aimed at raising awareness and engagement in the conservation of local fauna and flora.

5.2.2 Mitigation Measures (VCS, 3.19; CCB, B2.3)

The Tapera project aims to preserve the forest cover in the project area, contributing to the maintenance or improvement of HCV attributes (Table 52) and to the conservation of biodiversity in the region. For that, it is necessary to improve the knowledge of the structure and composition of the communities, mainly of the threatened and endemic species recorded in the region, and this will be accomplished through the monitoring of the fauna and flora groups in the project area.

In addition, to ensure the conservation of biodiversity, measures such as enhanced surveillance in the area to prevent invasions, deforestation, and illegal practices that harm flora and fauna will be taken, along with regular monitoring of forest cover through satellite imagery to detect any changes in land use in the area.

As the project advances, knowledge of the structure of the faunal and floristic communities will be deepened and additional measures can be proposed to safeguard the conservation of biodiversity.

Table- Measures for the maintenance and improvement of the HCV attributes identified in the Tapera project area.

HCVs	Maintenance and Improvement Measures
HCV 1 - Protected, priority and key biodiversity areas (KBAs)	- Improvement of heritage surveillance in the area. - Remote monitoring of the area. - Periodic monitoring of fauna and flora. - Engagement and awareness of local communities. - Scientific understanding of the biodiversity in the project area.
HCV 1 - Endemic and threatened Flora species	

HCV 1 - Endemic and threatened species of fauna	

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

The implementation of the Tapera project foresees the conservation of a 80,619 ha area of Amazon rainforests of great biological importance, resulting in positive impacts on the biodiversity of the region.

Such impacts are attributed to several factors, such as the reduction of deforestation and habitat degradation, biodiversity monitoring, improvement of heritage surveillance in the area, and the engagement and awareness of local communities.

The protection of the area allows the maintenance of local forest benefits, maintaining vegetation cover and the structure and composition of biodiversity. The implementation of the project, in addition to conserving biodiversity, will allow a greater knowledge about the local fauna and flora based on surveys carried out in the scope of the planned environmental monitoring, ensuring a better scientific knowledge of the region. Furthermore, the conservation of the area favors the maintenance of continuous forest environments, ensuring the maintenance of the gene flow of the species.

As presented in section **5.1.3**, the region where the project is located has a history of land use and occupation change, with a high rate of deforestation and degradation. In the absence of the project, the area would probably be deforested, considering the owner's right to clear about 20% of the area, causing several negative impacts on biodiversity due to fragmentation and loss of habitats and, thus, species. The proposed project activities would not be developed, which demonstrates that the scenario with the project guarantees net positive impacts for biodiversity compared to not implementing the project in the region.

5.2.4 High Conservation Values Protected (CCB, B2.4)

As presented in section **5.1.2,** the project area has high conservation values related to HCV 1 - Species Diversity. The proposed project activities aim to maintain and conserve biodiversity, ensuring the protection of 80,619 ha, not negatively affecting any of the identified HCVs.

5.2.5 Species Used (VCS, 3.19; CCB, B2.5, B2.6)

Not applicable. No new species, other than those native to the area, will be used within the scope of the Tapera project.

5.2.6 Invasive Species (VCS, 3.19; CCB, B2.5)

Not applicable. The Tapera project will not introduce or increase the population of invasive species in the area affected by the project

5.2.7 GMO Exclusion (CCB, B2.7)

Not applicable. The Tapera project guarantees that no GMOs will be used for the purpose of generating reductions or removals of GHG emissions within the scope of the project.

5.2.8 Inputs Justification (VCS, 3.19; CCB, B2.8)

Not applicable. No fertilisers, chemical pesticides, biological control agents, or other inputs will be used in the Tapera project.

5.2.9 Waste Products (VCS, 3.19; CCB, B2.9)

The Tapera project activities have no intention of generating solid waste in the area. However, if any generation of waste is required in the project area, the criteria for classifying solid waste will be followed in terms of their potential risks to the environment and human .

5.3 Offsite Biodiversity Impacts

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

Negative impacts outside the Tapera project zone will not be considered. The biodiversity conservation activities within the scope of the project does not foresee any actions that cause a negative impact on the ecosystem, both within the project area and outside the project zone. Therefore, the implementation of mitigation actions will not be necessary.

5.3.2 Net Offsite Biodiversity Benefits (VCS, 3.19; CCB, B3.3)

As mentioned in the section above, the Tapera project does not foresee negative impacts of its activities on biodiversity outside the project zone. Therefore, a comparative analysis between the unmitigated negative impacts outside the project zone and the positive impacts within the project zone will not be necessary.

5.4 Biodiversity Impact Monitoring

5.4.1 Biodiversity Monitoring Plan Dissemination (CCB, B4.3)

The monitoring of biodiversity is an important tool for the evaluation and follow-up of the project's activities, providing relevant information about the structure and composition of the fauna and flora communities during its implementation.

For flora monitoring, the characterization of tree vegetation will be carried out through forest inventory using permanent plots of 1 ha. The number of plots will be defined after field recognition of the project area and the allocation of the plots will be based on the physical and environmental characteristics of the area, which will be defined through satellite analysis and validated in the field. At each plot, all tree individuals with a diameter at breast height (DBH) greater than or equal to 10 cm will be tagged, measured, and identified to species level,

when possible, by a botanical expert. At each monitoring campaign, the plots will be revisited and the tree individuals sampled again. If there are recruits (i.e. individuals that were not present at the first sampling but reached the minimum DBH in the following campaign), they will be included in the sampling (tagged, measured and identified). In addition, remote monitoring of the area will be carried out annually using satellite images to assess the conservation status of the project area, more specifically, if there have been changes in forest cover.

For fauna, the Herpetofauna, Mammalian fauna and Avifauna groups will be monitored utilizing non-interventional methods. In order to obtain species records, linear transects will be carried out in the project area, where data will be collected through direct and indirect records in two periods of the day (morning and afternoon).

The survey of herpetofauna (amphibians and reptiles) in the transects will be performed through the Visual Active Search method, which involves walking slowly through visually accessible microhabitats with a higher probability of finding the animals. Additionally, the Active Search method will be used in reproductive sites, and opportunistic encounters will be recorded.

The mammalian fauna will be surveyed and monitored using the Active Search method along the transects to record animals in motion and their traces, such as footprints, faeces, burrows, vocalisations, hair, carcasses, and nail marks. Furthermore, trap cameras (photographic traps) will be fixed at sampling points defined in the field to record medium and large animals.

The avifauna monitoring will be performed following the Mackinnon Lists methodology[1]. This method involves recording all the species seen and/or heard along pre-existing trails, which will be traversed randomly. In addition to this, occasional records of bird species during the survey campaign will also be included to supplement the information on the area's species richness.

The monitoring of the project area's flora and fauna is planned to take place continuously throughout the project's duration. An overview of the monitoring plan is detailed in table below:

Table- Summary of the biodiversity monitoring plan for the Tapera project area.

Biodiversity parameters to be monitored	Variables to be monitored	Methodology	Frequency
Flora	• Species diversity • Vegetation conservation status • Number of threatened and endemic species	• Forest Inventory	• Annual monitoring

Flora	• Vegetation conservation status • Area (ha) preserved	• Remote monitoring by satellite images	• Annual monitoring
Avifauna	• Species richness • Number of threatened and endemic species	• Mackinnon's Lists • Indirect Records	• Annual monitoring
Mammalian fauna	• Species richness • Number of threatened and endemic species	• Active Search • Trap Cameras	• Annual monitoring
Mammalian fauna	• Species richness • Number of threatened and endemic species	• Active Search • Trap Cameras	• Annual monitoring

5.5 Optional Criterion: Exceptional Biodiversity Benefits

5.5.1 High Biodiversity Conservation Priority Status (CCB, GL3.1)

In the Tapera project region, the presence of threatened species of flora and fauna that meet the Gold Level criteria was verified, such as species classified as "Endangered" (EN), according to the IUCN Red List:

Flora: Annonaceae guatteria (EN – Endangered); ·

Protium icicariba (EN – Endangered);

Inga sp. (EM – Endangered)

Fauna: Ateles marginatus (EN Endangered);

Saguinus Bicolor (CR - Critically Endangered)

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

Table- Population trends of the trigger species identified in the Tapera project region.

Trigger Species	Ateles marginatus (EN Endangered);

Population Trend at the Start of the Project	Ateles marginatus is endemic to the Brazilian Amazon, occurring between the Rio Tapajós (right bank) and its tributary, the Rio Teles Pires (right bank) and the Rio Xingu (left bank), south of the Rio Amazonas (Kellogg and Goldman 1944, Ravetta 2008, Ravetta 2009). This is the least known of the Amazonian spider monkeys. It is listed as Endangered based upon an inferred or suspected population reduction upwards of 50% (for the period 2006–2050) due to projected and corresponding habitat declines in both protected and unprotected areas, as well as associated declines and population extirpations due to continued high levels of hunting. This combination of factors has impacted one previous generation (15 years; 2006-2020) and will likely impact two succeeding generations (30 years; 2021-2050) in the tropical forests of Brazilian Amazonia.
Without-project Scenario	In the absence of the Tapera project, the population of *Ateles marginatus* would probably continue to decline due to habitat loss from deforestation and environmental degradation that has been occurring in the region.
With-project Scenario	The project, by monitoring and conserving the area, will prevent deforestation and forest degradation, and thus the loss of habitat for this species. In addition, conservation and monitoring of the area will prevent predatory hunting of the species in the project area.
References	https://www.iucnredlist.org/species/2282/191689524 https://repositorio.unesp.br/items/7c1c77f4-dc5f-43e2-a484-1df580133a12 https://repositorio.ufpa.br/jspui/handle/2011/4150

Trigger Species	Saguinus Bicolor
Population Trend at the Start of the Project	Saguinus bicolor is considered Critically Endangered due to a projected population reduction of 80% or more in the next 18 years (three generations) due to serious multiple threats suffered within a very concentrated range in and around the city of Manaus: deforestation and habitat fragmentation related to expanding rural settlements and agriculture, livestock production, urban development, an

	expanding energy matrix and road network, routine collection for the pet trade, competition with the Golden-handed Tamarin (Saguinus midas), and high mortality due to predation by dogs and cats, disease, and electrocution on transmission lines. This species is commonly seen in fragmented habitats, more than in primary forests (Gordo 2012). Saguinus bicolor groups survive in small, highly degraded forest patches around housing estates and in the suburbs of Manaus. Saguinus midas populations are gradually replacing S. bicolor in the extremes of S. bicolor's range (Ayres et al. 1980, 1982; revision in Röhe 2006). Gordo (2012) estimated the population size in 30 forest fragments of different size, observing that the individual density decreases when fragment size increases. Small fragments like Park Mindu Fragment with 46 ha have two groups and eight individuals; Park Sumaúma with 56 ha has two groups with 15 individuals; RS Pinto fragment with 3 ha has one group with five individuals; University fragment with 776 ha has 24 groups with 145 individuals; and Reserva Ducke with 10,000 ha has 620 individuals in 120 groups. It is suspected that the population will suffer a reduction of at least 80% over the next three generations (18 years) due to serious multiple threats suffered within a very concentrated range in and around the city of Manaus, including: deforestation and habitat fragmentation related to expanding rural settlements and agriculture, livestock production, urban development, and an expanding energy matrix and road network; routinely collection for the pet trade; competition with the Golden-handed Tamarin (Saguinus midas); high mortality due to predation by dogs and cats; disease; and electrocution on transmission lines.
Without-project Scenario	In the absence of the Tapera project, the Ateles chamek population would likely continue to decline due to habitat loss from deforestation and environmental degradation that has been occurring in the region.
With-project Scenario	The Tapera project, by monitoring and conserving the area, will prevent deforestation and forest degradation, and thus the loss of habitat for this species. In addition, conservation and monitoring of the area will prevent predatory hunting of the species in the project area.
References	https://www.iucnredlist.org/species/42697/192592444

APPENDIX 1: STAKEHOLDER DESCRIPTION TABLE

Categories	Group of Stakeholders Involved in the Project	Project Rights	Interests in your participation in the project	Relevance to the project
Project Proponent	*Orgânica Consulting*	Responsibility for Implementation, Orgânica Consulting plays an active role from the conception to the monitoring of the project, including its construction and development; Sale of Carbon Credits: The company is responsible for selling the carbon credits generated by	Financial returns from the sale of carbon credits; Improved quality of life for the communities involved; Implement social, environmental and economic improvement actions those involved	As a project proponent, your participation is of the utmost importance for the development of actions related to the project.

		the project, resulting from the emission reductions		
The owners	*Urupolpas*	Interest in protecting forest ecosystems. Involvement with associations and cooperatives to map and protect existing forests; Motivation to finance and actively participate, with a view to financial benefits.	Interest in protecting forest ecosystems. Involvement with associations and cooperatives to map and protect existing forests Motivation to finance and actively participate, with a view to financial benefits.	A crucial role in making the project viable, providing resources and logistical support. Participation is essential for the success of forest management and the generation of benefits for family farmers.
The owners	*Nat'Orgânico*	Rights to carbon credit revenues.	Interest in maintaining projects aimed at sustainable development in line with the company's	Crucial for ensuring that the project complies with environmental and legal regulations, contributing to the sustainability and legality of operations.

		Right to obtain the CCB & VCS label.	proposal It aims for financial returns from the project, as it is providing financial resources for the project	It is essential for the implementation of the project, as it is responsible for land and financial planning and monitoring
The owners	Agrofrut	Right to use the property to apply improved management techniques Right to obtain CCB & VCS seal	Interest in contributing to the social organisation of the region and promoting economic, social and sustainable development Interest in monitoring and following the progress of	Relevant to the economic, social and sustainable development of the region; Relevant for improvements in sustainable management techniques, positively impacting their conditions; Relevant for effective project monitoring and information sharing among stakeholders.

			communities.	
Public authorities	Town hall of Urucará, Nhamundá, São Sebastião do Uatum; Amazonas State Environmental Protection Institute (IPAAM) of Parintins; Development Institute Sustainable Agriculture and Forestry of Parintins (IDAM)- Urucara and Nhamundá; Secretary of the Environment Rural Production of Nhamundá, and Urucará and	Partnership in the implementation and/or improvement of public policies with local stakeholders. Rights to Verify the Veracity and Legality of the Information Provided on Stakeholders; Improve the progress of possible project obstacles.	Strengthen the relationship with beneficiary communities; Raising awareness of the benefits of REDD+ projects and the project in particular on the dimensions of communities, climate and biodiversity; Spread and intensify control over areas of deforestation.	Responsible for generating accessible data for use in the project; Purpose is environmental management, implementation, and execution of national and state environmental policies; The prefectures are responsible for the application of local public policies that can influence, mainly, the quality of life of the project's beneficiary population or the progress of the project's planned activities. Validate the project's work in the communities.

	Parintins; National Research Institute Applied (INPA)- FOREST MANAGEMENT LABORATORY – LMF of Manaus.			
The beneficiaries	Communities Involved: Marajazinho; Boa Esperança; São João, Tapera; Jerusalém; Apeua.	Participation and Consultation: The right to be informed and consulted about project activities that are linked to their communities and lands; Fair Compensation: Right to fair compensation for environmental services provided, such as the reduction of greenhouse gas	Greater control over deforestation on and around their properties	They are of paramount importance to the project because they are the community that lives and sustains itself around or within the project areas, indirectly and directly influencing the progress of the project. Essential for controlling project areas. They contribute to reducing deforestation

		emissions due to forest preservation; Sustainable Development: Participation in decisions related to sustainable development, aiming to improve the living conditions of local communities in an equitable manner; Training and Education: Access to training and education programs that can strengthen local capacities for informed and meaningful participation in the		

		project.		
Third Secor	**Agrofrut (producers' association).**	Stakeholders are partners in defending social rights and sustainable development.	Make project stakeholders aware of their rights; Strengthening association relations.	Works to improve relations.

APPENDIX 2: PROJECT ACTIVITIES AND THEORY OF CHANGE TABLE

Activity description	**Outputs (short term)**	**Outcomes (medium term)**	**Impacts (long term)**
Training about Drying Mechanization in Agricultural Production	Increase in awareness and understanding of mechanization techniques among the small producers	Consistent and controlled processing conditions, resulting in higher-quality agricultural products	Access to new markets, generating new economic partnerships for small producers and economic growth for the community
Training about Fair Trade Practices	Gain of knowledge about fair pricing, ethical trading, and the importance of sustainable and socially responsible production	The dissemination of fair compensation and ethical trading activities among the community	Fair income distribution and ethical labor practices contribute to better living standards for small producers
Training about	Implementation of proper	Establishment of a	Enhanced market competitiveness

Activity description	Outputs (short term)	Outcomes (medium term)	Impacts (long term)
Agroindustry - Hygiene and Quality	sanitation methods, personal hygiene practices and facility cleanliness	quality-focused agroindustry within the community.	
Training about Practices for Organic Certification	Introduction to the certification requirements for organic, allowing small producers to become familiar with the documentation and practices needed to achieve and maintain organic certification	Transition to certified organic production in a bigger scale within the community	Establishment of sustainable agriculture practices within the community, allowing organic crop diversity and soil health management, thus contributing to long-term sustainability in the region.
Training about Irrigation and Solar Energy	Gain of knowledge about efficient water management practices and operation of solar-powered irrigation systems	Increase of crop yields and water access	Economic empowerment and environmental conservation
Training for the Use of Agroindustry Machinery	Acquirement of operational skills	Improvement in the quality of agricultural products processed locally	Improvement of production and overall economic growth for the community
Training for the Implementation of	Learning of practical skills related to cultivation	Diversification of harvests within the	Increasement of income for small producers and opening of new

Activity description	Outputs (short term)	Outcomes (medium term)	Impacts (long term)
New Crops	management	community, allowing small producers to experience an increased variety in their agricultural output	markets and opportunities
Training for Machinery Operation - Fruit Processing	increasement of knowledge among small producers regarding the functions and capabilities of fruit processing	Optimization of fruit processing and improvement in the quality and diversification of products	improvement of products quality, leading to higher income levels and the development of a more robust local economy
Training for Machinery Operation - Oil Extraction	Dissemination of knowledge about the importance of safety measures and implementation of safety protocols	Facilitation of a more efficient extraction process	Increasement of outcomes related to the diversification of oil-based products, reduction of waste through efficient extraction, optimization of resource use and minimization of environmental impact

APPENDIX 3: PROJECT RISKS TABLE-

APPENDIX 4: COMMERCIALLY SENSITIVE INFORMATION

Section	Information	Justification
Contract between the bidders	Not disclosed due to commercial sensitivity.	Contains confidential terms and pricing that could harm the competitive position if disclosed.
Documents referring to property rights	Not disclosed due to commercial sensitivity.	Contains details of property ownership that are private and could be misused if public.
Registers of community residents	Not disclosed due to commercial sensitivity.	Contains personal information of residents that must be protected for privacy reasons.
Documents proving financial health	Not disclosed due to commercial sensitivity.	Includes sensitive financial information that could impact stakeholder and investor relations.
Financial statement	Not disclosed due to commercial sensitivity.	Reflects the financial status of the project which is confidential and proprietary.

Bank statements	Not disclosed due to commercial sensitivity.	Contains confidential transactional information and bank account details.
Management financial statements	Not disclosed due to commercial sensitivity.	Provides insight into internal financial management and strategies that are proprietary.