SERINGUEIRA II REDD+ PROJECT

Terra Vista Gestora de Recursos Ltd.

http://terravista.eco.br

Project Title	Seringueira II REDD+
Version	1.0
Date of Issue	March 02 2023
Project Location	Municipality of Ipixuna, Amazonas State, Brazil
Project Proponent(s)	• Terra Vista Gestora de Recursos Ltd. Rômulo P. S. Arantes projetos@terravista.eco.br +55 (11) 4883-1165 • Família Mappes Laiz Mappes laiz@ac.sebrae.com.br +55 (11) 4883-1165
Prepared by	Terra Vista Gestora de Recursos Ltd.
Validation Body	Ruby Canyon Environmental
Project Lifetime	17 July 2020 to 17 July 2050; 30-year lifetime

GHG Accounting Period	July 17, 2020 to July 17, 2050; 30 years total period
History of CCB Status	Not applicable
Gold Level Criteria	The Seringueira II project plays an important role in reducing the impacts of climate change, mitigating social differences, and conserving biodiversity. The project area presents a dense hydrographic network composed of springs and watercourses and will contribute to the conservation of water resources in the Amazon river basin. The project will therefore contribute to preventing the biome from reaching the point of no return, which is when the ecosystem is no longer able to sustain itself from the point of view of its hydrological cycle, according to IPCC: Climate change 2021(GL1). The Gold Level for exceptional community benefits is achieved because it has been identified that the project zone is in an administrative area of a medium human development country where at least 50% of the households within the communities are below the national poverty line. Infrastructure and sanitation programs will enable access to water, electricity, education and information for low-income traditional extractive communities, enabling them to adapt to local climate impacts (GL2). The Seringueira II project provides exceptional biodiversity, according to the vulnerability criteria described by the CCB for presenting flora and fauna species classified in the "Endangered" category (IUCN Red List), such as: *Aniba ferrea*, *Aniba permollis, Lecythis prancei, Mezilaurus duckei, Tabernaemontana muricata, Virola surinamensis*, *Ateles chamek, Inia geoffrensis, Lagothrix lagothricha* ssp. *cana, Lagothrix lagothricha* ssp. *poeppigii, Pteronura brasiliensis* e *Sotalia fluviatilis*; and in the category "Critically Endangered" (IUCN Red List), the flora species *Dicypellium manausense.*
Expected Verification Schedule	April 2023

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1 SUMMARY OF PROJECT BENEFITS

The Seringueira II project will be developed in the municipality of Ipixuna, Amazonas State, Brazil. It falls under the Agriculture, Forestry and Other Land Uses (AFOLU) sector within the Reducing Emissions from Deforestation and Forest Degradation (REDD+) category. The project will conserve 23,851.88 hectares of native Amazon rainforests in a region where deforestation pressure is mainly due to land use conversion activities from forests to pastures aimed at raising livestock. The project area (16,483.02 ha) will be allocated to Avoided Unplanned Deforestation (AUD), and it is estimated that at the end of the project the emission of 591,917.73 tons of Greenhouse Gases (GHG) (tCO_2e) will have been avoided.

The project will be developed considering the **CCB** Standard, with benefits for **Climate, Community and Biodiversity**. As benefits to the climate, the maintenance of forest cover results in exceptional benefits for adapting to the impacts caused by climate change, such as changes in the rainfall regime, as the area presents a dense hydrographic network that contributes to the provision and quality of water in the Amazon river basin.

As benefits to the communities, the project will implement systems of underground water collection, installation of solar panels for electricity generation, provision of satellite internet service, construction of toilets with septic tanks, training of fire brigades, training of women in entrepreneurship, provision of assistance in the formation of community associations, and construction of a school. These measures will enable water security and access to information to minimize the impacts caused by climate change in traditional, low-income extractive communities.

In addition, the project will enable the protection of a significant forest fragment for local communities that traditionally use the area for income generation and food security. These actions go hand in hand with the conservation of other ecosystem services, such as air purification, water and food provisioning, soil formation and regulation of soil degradation, among others that are of high importance for the reproduction of these communities' livelihoods. This is expected to ensure 90% of the community's food security, increase the sources of monetary income from non-timber forest products by 50%, improve social and productive infrastructure by 70%, and ensure 100% use of the landscape for leisure, contemplation, and spirituality. The project also intends to minimize the impacts caused by climate change on traditional extractive communities through community development by establishing programs that promote social technologies.

The maintenance of forest cover also ensures the conservation of biodiversity, the maintenance of ecosystem functioning (e.g., nutrient cycling) and of ecosystem services provisioning (e.g., carbon sequestration) performed by living organisms. It is noteworthy that the project includes a high priority area for biodiversity conservation, according to the CCB Gold Level vulnerability criteria, with species classified in the categories Endangered (EN) and Critically Endangered (CR) according to the IUCN red list, such as the flora species *Dicypellium manausense, Aniba ferrea*, *Aniba permollis, Lecythis prancei, Mezilaurus duckei, Tabernaemontana muricata* and *Virola surinamensis* and the fauna species, *Ateles chamek, Inia*

geoffrensis, Lagothrix lagothricha ssp. *cana, Lagothrix lagothricha* ssp. *poeppigii, Pteronura brasiliensis* and *Sotalia fluviatilis*.

1.1. Unique Project Benefits

The expected outcomes or impacts of the activities of the Seringueira II project during its lifetime are presented in Table 1.

Table 1. Summary of the expected benefits from the Seringueira II project.

Outcome or Impact Estimated by the End of Project Lifetime	Section Reference
1) Provide a better quality of life for the local community based on the pillars of sustainability, where autonomy is developed to achieve their aspirations and in the definition of strategies to strengthen the five dimensions of their ways of life.	4.2.3
2) Strengthen the bases of the material and financial dimensions (equipment, infrastructure and net income) so that extractive activities and support for the protection of forest fragments can be carried out with good practices and greater revenue generation.	4.2.3
3) Complement the knowledge and knowledge of extractivists, contributing to the improvement of the execution of their productive and community tasks that strengthen the mechanisms of sustainability of their livelihoods.	4.2.3
4) Guarantee the maintenance of the functioning of the Amazon biome through the conservation of the forests and the watershed in the project area, preventing the biome from losing its ability to sustain itself.	2.1.5
5) Conserve an area of 23,851.88 ha of Amazon rainforest with great biological importance, resulting in positive impacts and conservation for the biodiversity of the region.	5.1.5

1.2. Standardized Benefit Metrics

The estimates of the net benefits that the Seringueira II project intends to generate during its lifetime is presented in Table 2.

Table 2. Estimates of the net benefits of different metrics that the Seringueira II project aims to achieve during the project lifetime.

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
GHG emission reductions or removals	Net estimated emission removals in the project area, measured against the without-project scenario	not applicable	-
	Net estimated emission reductions in the project area, measured against the without-project scenario	591,917.73 tCO_2e	G1.9
Forest Cover	For REDD projects: Estimated number of hectares of reduced forest loss in the project area measured against the without-project scenario	16.483,02	G1.3
	For ARR 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* practices are expected to occurred 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 occurred 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	103	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	40	G1.5
Employment	Total number of people expected to be employed in project activities, expressed as number of full-time employees	4	G1.5

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
	Number of women expected to be employed as a result of project activities, expressed as number of full-time employees	2	G1.5
Livelihoods	Total number of people expected to have improved livelihoods or income generated as a result of project activities	103	G1.5
	Number of women expected to have improved livelihoods or income generated as a result of project activities	40	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	103	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	40	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	103	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	40	G1.5
Water	Total number of people who are expected to experience increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	103	G1.5
	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	40	G1.5
Well-being	Total number of community members whose well-being is expected to improve as a result of project activities	103	G1.5

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
	Number of women whose well-being is expected to improve as a result of project activities	40	G1.5
Biodiversity Conservation	Expected change in the number of hectares managed significantly better by the project for biodiversity conservation, measured against the without-project scenario	16.483,02	2.1.5
	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	13 species (7 flora; 6 fauna)	5.5.1

2 GENERAL

2.1 Project Goals, Design and Long-Term Viability

2.1.1 Summary Description of the Project (G1.2)

The Seringueira II project is the result of a partnership between Terra Vista Gestora de Recursos Ltd. and Banco do Brasil (Bank of Brazil), which is a mixed economy society, with the Brazilian Federal Government holding 50% of the shares. It is one of the five state-owned banks of the Brazilian government, having as shareholders, besides the Union, foreign capital, free national capital and treasury stock.

The Seringueira II project is located in the western region of the municipality of Ipixuna, in the state of Amazonas, Brazil. According to data from the PRODES system (INPE)[1], the municipality of Ipixuna is among the 50 most deforested municipalities in the country (37th in 2021) and, between 2008 and 2022, had an average annual deforestation rate of 21.3% and an accumulated deforestation increase of 91.32 km² (Figure 1).

With the aim of generating benefits for the climate, communities and biodiversity through the implementation of carbon projects, the Seringueira II project expects to contribute to the mitigation of climate change by avoiding the net emission of more than half million tCO_2e over the 30-year crediting period, and expects to bring positive net benefits to communities and biodiversity through the implementation of activities that prevent unplanned deforestation (AUD).

[1] Available at: <http://www.dpi.inpe.br/prodesdigital/prodesmunicipal.php>. Accessed on: 30/01/2023

The project aims to generate economic incentives for landowners to conserve Amazon rainforests on their private lands, providing positive net impacts for traditional communities and for biodiversity conservation According to the Brazilian Forest Code (Law No. 2.651/12)[2], landowners must conserve 80% of the forest cover in properties located in the Legal Amazon. This guarantees the legality of converting 20% of forest cover to other commercial uses, such as livestock or agriculture, with the proper authorization from the responsible environmental agencies

In addition, the project seeks to contribute to local social development by offering benefits to traditional communities, achieved through actions of social engagement, education, digital inclusion, health, access to water, employment and income generation, training and qualification, rural extension, and infrastructure.

Finally, the Seringueira II project aims to guarantee the conservation of forest areas, resulting in the maintenance of forest cover under pressure from illegal deforestation. Forest monitoring will be done through satellite images, forest biomass inventory associated with the use of drones and innovative aerial photogrammetry techniques (e.g., drone LiDAR), patrimonial vigilance, monitoring of forest fires, fire prevention and firefighting activities, protection of threatened species and social orientation activities with traditional communities living in the project area and surrounding areas.

[2] Available at: <http://www.planalto.gov.br/ccivil_03/_ato2011-2014/2012/lei/l12651.htm>. Accessed on: 30/01/2023

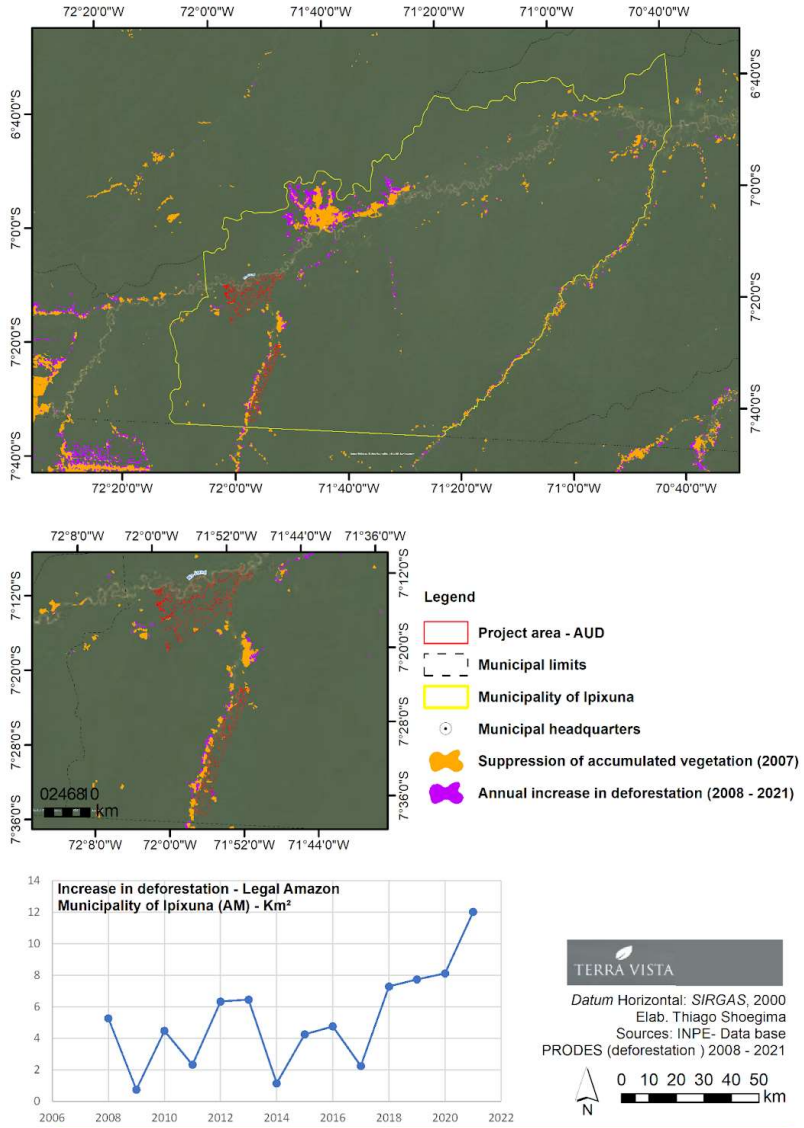

Figure 1. Annual increase in deforestation (2008-2021) in the municipality of Ipixuna (AM) where the Seringueira II project is located.

In the absence of the project, the advance of deforestation and degradation in the area would cause negative impacts on biodiversity. Habitat loss and landscape fragmentation can result in the loss of species, especially those that are less mobile (e.g., species that depend on large dispersing animals) and have more specialized characteristics (e.g., species adapted to dense, closed, undisturbed forests).

Therefore, the implementation of the project guarantees the conservation of the forest in a region with a high rate of deforestation and of recognized biological importance, since the region presents a mosaic of Conservation Units with a great diversity of species of animals and plants, some of which are endemic to the Amazon and threatened with extinction. In addition, protecting the area favors the

maintenance of continuous forest environments, ensuring the maintenance of gene flow of the species and the ecosystem services performed by species (e.g. provision of food, fresh water, wood), which favors local communities.

The development, implementation, monitoring and certification of the Seringueira II project is the responsibility of Terra Vista Gestora de Recursos Ltd. The landowner's counterpart is to allow project activities to be implemented on his property and to freely commit to its long-term conservation.

2.1.2 Project Scale

Table 3. Seringueira II project scale.

Project Scale	
Project	X
Large Project	

2.1.3 Project Proponent (G1.1)

Table 4. Contact information for the proponents of the Seringueira II project.

Organization Name	Terra Vista Gestora de Recursos Ltd.
Contact person	Rômulo P. S. Arantes
Title	Technical Director
Address	Rua Gumercindo Saraiva, nº 54, Sala 04, Jardim Europa, São Paulo, Zip Code: 01449-070, Brazil
Telephone	+55 11 4883-1165
Email	projetos@terravista.eco.br

Organization Name	Terra Vista Gestora de Recursos Ltd.
Contact person	Guilherme Rosseto Nunes de Oliveira
Title	Legal Director
Address	Rua Gumercindo Saraiva, nº 54, Sala 04, Jardim Europa, São Paulo, Zip Code: 01449-070, Brazil
Telephone	+55 11 4883-1165
Email	projetos@terravista.eco.br

Organization Name	Members of the Mappes family: Verusca Maria Montenegro Mappes, Laiz Maria Montenegro Mappes, Glauber Ueyke Montenegro Mappes, Sandra Magda Montenegro Mappes Costa, Sueli Magida Mappes Maia, Tania Mara Mappes Tavernard de Alencar, José Maurício Montenegro Barroso and Maria Alaíde Montenegro Mappes.

Contact person	Laiz Mappes
Title	Landowner
Address	Avenida 25 de agosto, 1572, 25 de Agosto, Cruzeiro do Sul, Acre, Zip Code: 69980-000, Brazil
Telephone	+55 68 999236367
Email	laiz@ac.sebrae.com.br

2.1.4 Other Entities Involved in the Project

Table 5. Contact information for other entities involved in the Seringueira II project.

Organization Name	Banco do Brasil S/A
Contact person	Henrique Vasconcellos
Title	Head of Sustainable Finance at Banco do Brasil
Address	SAUN, Block 5, Lot B, Ed. Banco do Brasil, 3rd floor, Zip Code: 70040-912, Brasília, Distrito Federal, Brazil
Telephone	+55 61 99111-0671
Email	hvasconcellos@bb.com.br

2.1.5 Physical Parameters (G1.3)

Project location

The Seringueira II project is located in the municipality of Ipixuna, Amazonas State, Brazil, within the geographical coordinates 7º14'5.63" S and 71º55'1.54" O and 7º29'7.99" S and 71º53'47.11"O. The municipality of Ipixuna is in the mesoregion of Southwest Amazon, more specifically in the microregion of Juruá, covering a geographical area of about 12,109.779 km², located approximately 1,380 km from the city of Manaus. Its name comes from the Ipixuna river, one of the main tributaries of the Juruá river, with a length of about 300 km[3] [4] [5].

The area of the Seringueira II project is located in the southwestern portion of the municipality and presents a total of 16,483.02 ha located on the Seringal São Luiz, Seringal São José, Seringal São

[3] Available at: https://www.ibge.gov.br/cidades-e-estados/am/ipixuna.html Accessed on: 01/10/2022

[4] SDS – Secretaria de Estado do Meio Ambiente e Desenvolvimento Sustentável. 2010. Plano de Gestão da Reserva Extrativista do Rio Gregório. Manaus/ Amazonas. Available at: https://documentacao.socioambiental.org/ato_normativo/UC/2121_20160315_152957.pdf Accessed on 01/10/2022

[5] Parra, A.M.R. 2015. Melhoria da Atenção à saúde das crianças entre zero e 72 meses da Unidade Básica de Saúde Ivaneide Cordeiro, Ipixuna, AM. Universidade Federal de Pelotas. Available at: https://pesquisa.bvsalud.org/portal/resource/pt/una-6409 Accessed on: 01/10/2022

Raimundo, Seringal São Vicente, Liberdade, Deserto da Liberdade and Redenção properties (Figure 2). The main access to the project area is by river transport through the Juruá river.

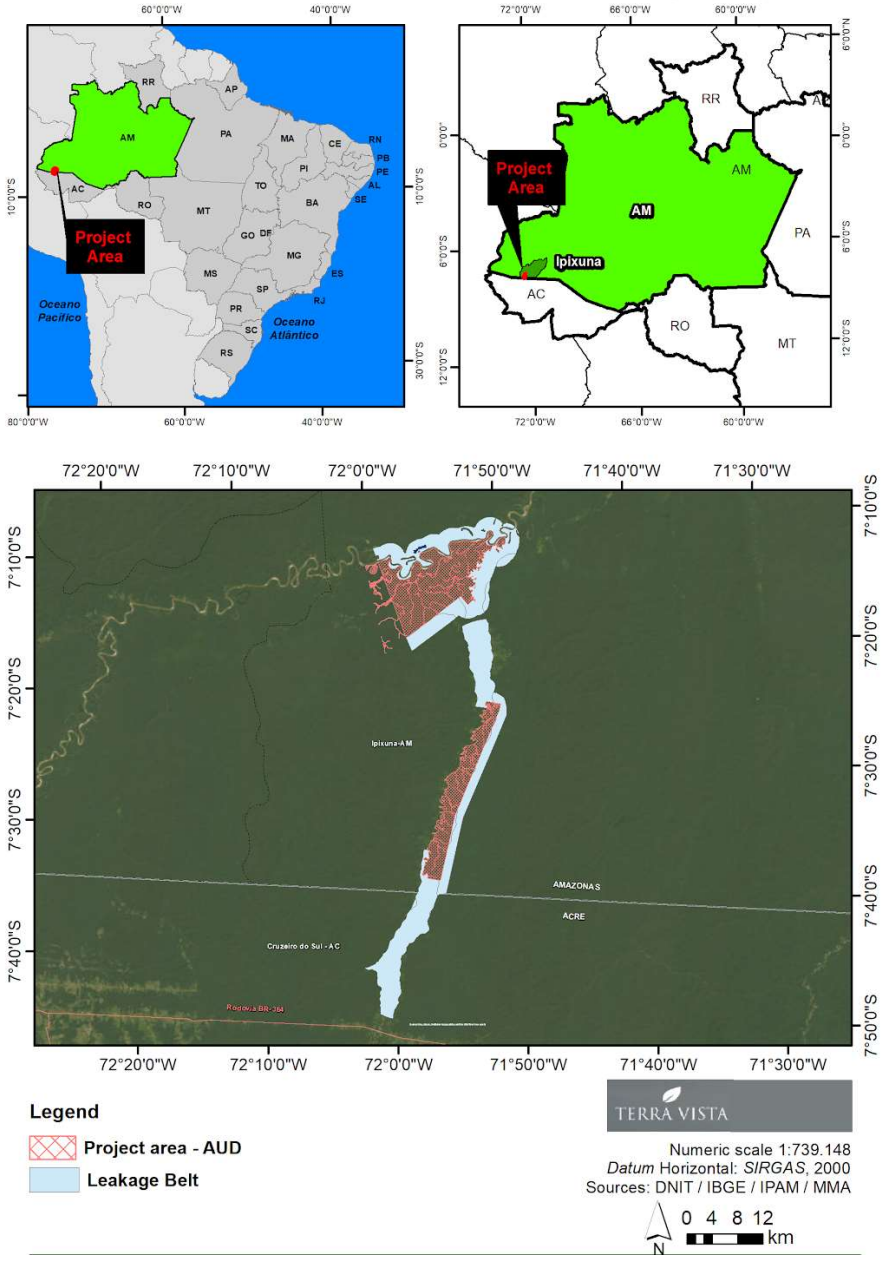

Figure 2. Location of the Seringueira II project, Municipality of Ipixuna, Amazonas State, Brazil.

Geology, Geomorphology and Topography

The Amazonas State is characterized by an extensive Phanerozoic sedimentary cover (spanning the last 542 million years) deposited over a Precambrian rock substratum (ranging from 4.5 billion years ago to the Phanerozoic).

The project area is located on Cenozoic sediments, covering mainly the Quaternary-Holocene and Neogene-Miocene periods, and is inserted mainly in the Indiscriminate Cenozoic Coverage Province (65.53%), and to a lesser extent in the Amazonas-Solimões Province (34.47%) (Figure 3).

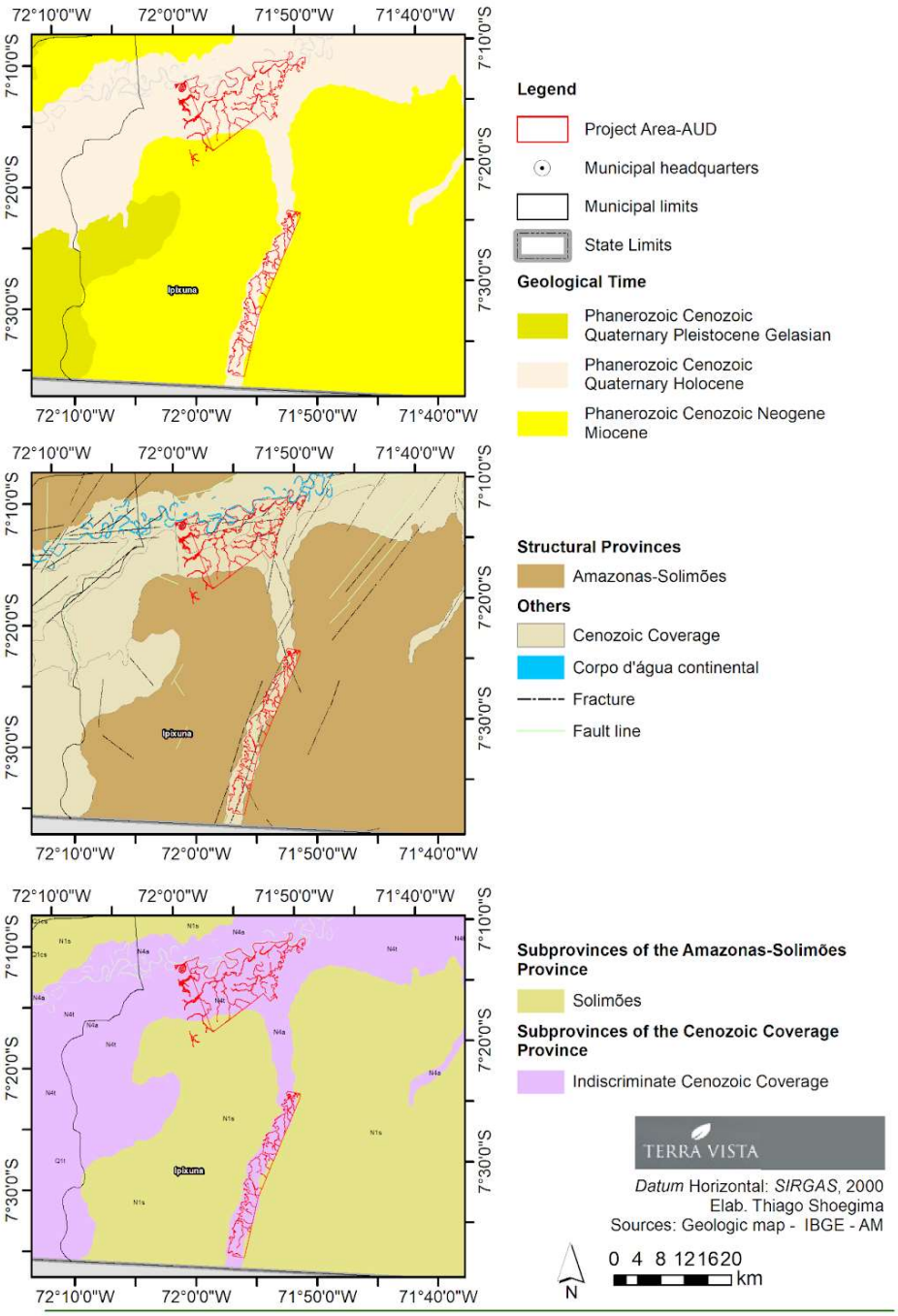

Figure 3. Geology of the region where the Seringueira II project is located.

The Amazon has reliefs of different shapes that are defined from the variation of altitudes of its plains According to Ross' classification[6], the relief of Southern Amazonia presents two types of

[6] Ross, J. L. S., 1996. Geomorfologia: Ambiente e Planejamento. São Paulo. Ed. Contexto. 85p.

geomorphological units represented by Crystalline Basement, namely the Residual Plateaus of Southern Amazon and the Depression of Southern Amazon. The Morphostructural Domains represent large structural sets that generate regional relief arrangements, corresponding to the macro-structures[7].

The relief of the project area is predominantly formed on Unconsolidated Sedimentary Deposits (60.30%) and to a lesser extent over Sedimentary Basins and unconsolidated covers (39.70%) (Figure 4A). The project area lies mostly on the Amazon Plain and to a lesser extent on the Juruá Depression - Iaco (Figure 4B). The predominant relief form of the project area is Terrace and Plain, with some stretches of Top Convex and Tabular Dissected relief.

[7] Bellia, V; Ross, J. L. S; Perez, R. G; Crepani, E; Casseti, V; Moraes, J. F. L.; Arboz, G; Olmos, F; Menk, J. R. F; Menezes, L. A; Delorenci, C. C. F; Vieira, C; Dias, R. R. 2004. Projeto de Gestão Ambiental Integrada da Região do Bico do Papagaio. Zoneamento Ecológico-Econômico. Secretaria do Planejamento e Meio Ambiente (Seplan). Available at: http://zoneamento.sefaz.to.gov.br/Publicacoes_Tecnicas/Norte_Tocantins/Relatorios_Tecnicos_Norte/Relatorio_Plano_ZEE_Norte_TO.pdf Accessed on: 01/10/2022

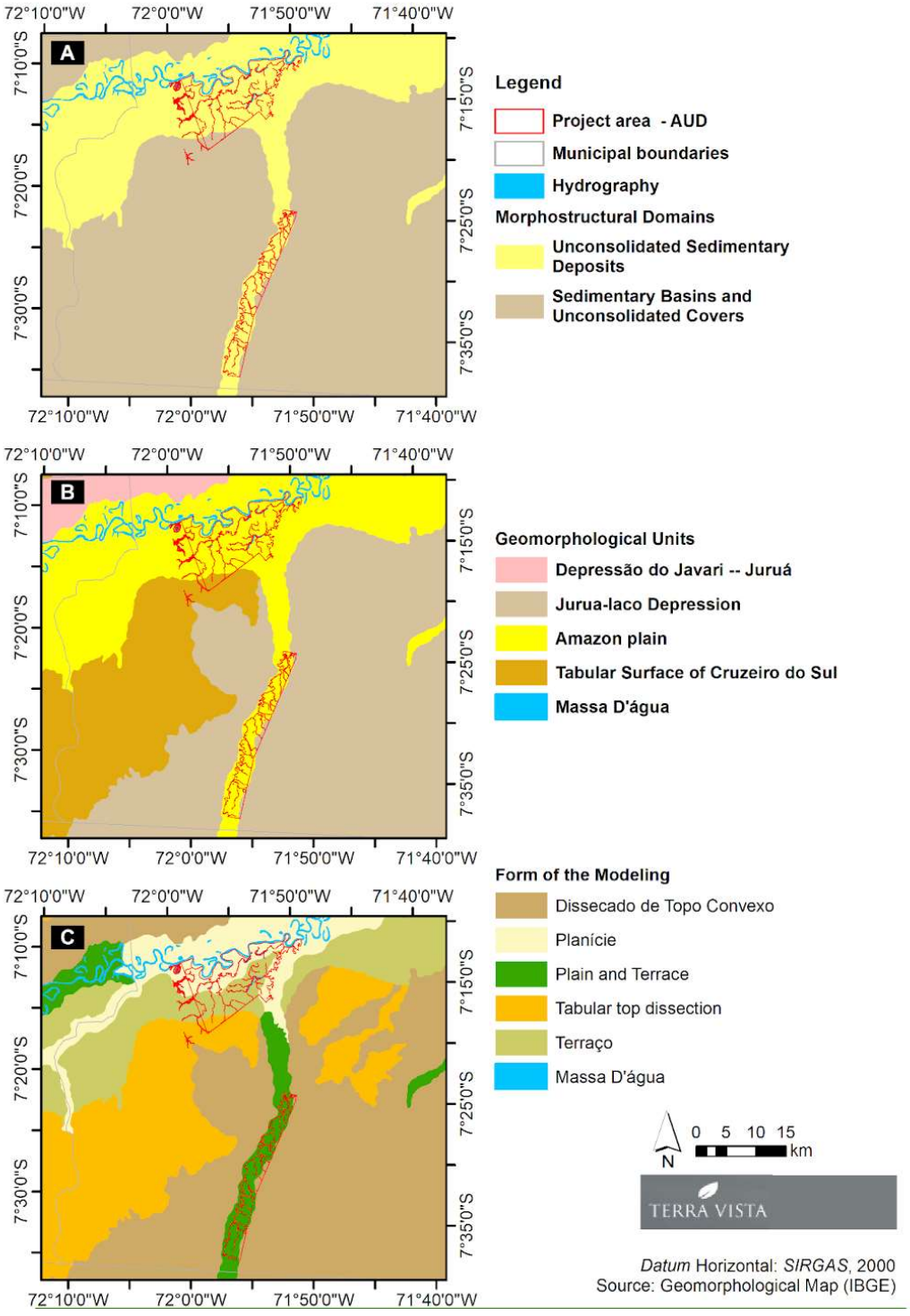

Figure 4. Geomorphology of the region where the Seringueira II project is located.

Soil

Natural factors such as climate, relief, weather, and parent materials, combined with different intensities, form the diverse soil types observed in the region. The project area lies over the following soil types: Red-Yellow Argissol - PVA (53.11%); Chromic Luvissol - TC (34.47%); Haplic Plinthosol - FX (10.53%); and Haplic Gleysol - GX (1.89%) (Figure 5).

The Red-Yellow Argissol and the Chromic Luvissol are the most predominant in the project area. The Argissols are mineral soils, not hydromorphic, with textural B horizon immediately below the A or E horizon, which hinders water infiltration, allowing prolonged waterlogging after the rainy season[8] [9]. They are deep, low fertility soils (dystrophic, low base saturation), strongly to moderately acid, of medium or sandy texture[10]. The Red-Yellow Argissols are chemically poor in essential nutrients for cultivated plants; especially in relation to calcium, magnesium, potassium, and phosphorus, a deficiency that is quite common in the Rainforest dystrophic soils[11].

Luvisols (Alfisols) are mineral soils, non-hydromorphic, with a textural B horizon with high activity clay and high base saturation (eutrophic), immediately below the A or E horizon; they are usually shallow and vary from well to imperfectly drained[12]. The textural B horizon has a higher clay content than the more superficial horizons (A or E), which hinders water infiltration, allowing prolonged waterlogging after the rainy season. The Chromic character refers to the bright colors in the B horizon and, although there is no direct agronomic importance, it indicates that these soils do not have restriction of use due to imperfect drainage.[13]

[8] PRM, 2010. Geodiversidade do Estado do Amazonas. Ministério de Minas e Energia. Available at: https://www.terrabrasilis.org.br/ecotecadigital/pdf/geodiversidade-do-estado-do-amazonas.pdf Accessed on: 28/09/202.

[9] ICMBIO. 2011. Plano de Manejo do Parque Nacional do Juruena. Available at: https://documentacao.socioambiental.org/ato_normativo/UC/1587_20140813_154621.pdf. Accessed on: 28/09/2022.

[10] EMBRAPA. 2018. Sistema Brasileiro de Classificação de Solos / Humberto Gonçalves dos Santos … [et al.]. – 5. ed., rev. e ampl. – Brasília, DF : Embrapa. Available at: <https://www.embrapa.br/solos/sibcs > Accessed on: 25/09/2022.

[11] Embrapa. 2001. Caracterização e Classificação dos solos de Presidente Figueiredo, Estado do Amazonas. Documento no 123. Available at: https://ainfo.cnptia.embrapa.br/digital/bitstream/item/63716/1/Oriental-Doc123.PDF Accessed on 01/10/2022.

[12] Available at: <https://www.embrapa.br/en/agencia-de-informacao-tecnologica/tematicas/solos-tropicais/sibcs/classificacao-do-perfil/atributos-diagnosticos/carater-cromico > Accessed on: 13/10/2022.

[13] EMBRAPA. 2018. Sistema Brasileiro de Classificação de Solos / Humberto Gonçalves dos Santos … [et al.]. – 5. ed., rev. e ampl. – Brasília, DF : Embrapa. Available at: <https://www.embrapa.br/solos/sibcs > Accessed on: 25/09/

2022.

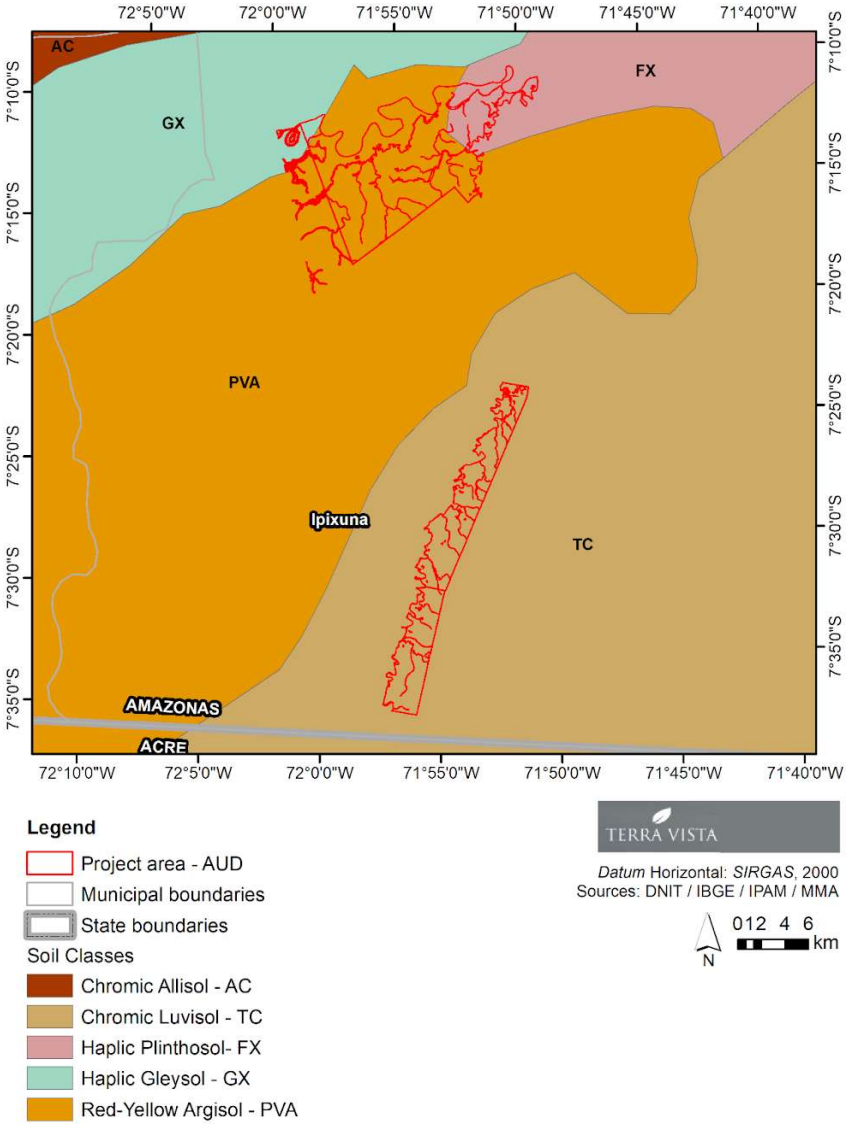

Figure 5. Soil classes in the region where the Seringueira II project is located.

Climate

The climate in the region is classified as hot and humid equatorial, characterized by high temperatures, high rates of rainfall, and high relative humidity. The average annual temperature is around 24.5°C, with the maximum recorded at 32°C[14].

[14] Queiroz, A.M., Ortega, G. P., Valente, R. A. S.; Junio, F. P. Z. 2013 Crimes contra a fauna registrados no município de Cruzeiro do Sul – Acre, Guajará e Ipixuna – Amazonas no Período de 2003 a 2009. Enciclopédia Biosfera. Centro Científico Conhecer - Goiânia, v.9, N.16; p. 2013.C. Available at: https://conhecer.org.br/ojs/index.php/biosfera/article/view/3520 Accessed on: 01/10/2022

The following atmospheric systems act in the region: Continental Equatorial Air Mass, Intertropical Convergence Zone, Tropicalized Polar Mass, Atlantic Equatorial and Atlantic Tropical Air Mass, Continental Tropical Mass of Chaco Low and the Atlantic Polar Front[15].

The region of the municipality of Ipixuna has a high precipitation, with rainfall of 2,250mm to 7,750mm per year. The period from June to September has the lowest rainfall rates, and the rainy season is from December to March. The monthly precipitation (historical series 1950 to 2000) for the study area is presented in Figure 6.

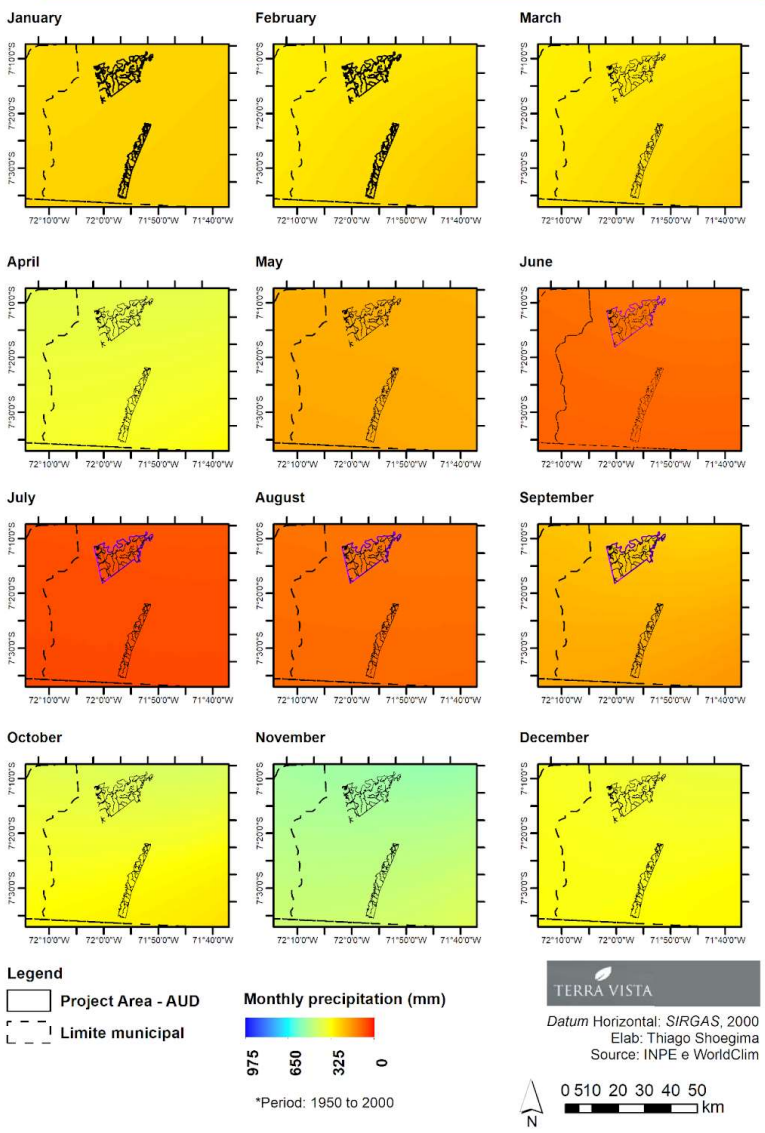

Figure 6. Average monthly rainfall in the region (historical series 1950 to 2000) where the Seringueira II project is located.

[15] SDS – Secretaria de Estado do Meio Ambiente e Desenvolvimento Sustentável. 2010. Plano de Gestão da Reserva Extrativista do Rio Gregório. Manaus/ Amazonas. Available at: https://documentacao.socioambiental.org/ato_normativo/UC/2121_20160315_152957.pdf Accessed on 01/10/2022

Hydrology

The municipality of Ipixuna is bathed by the hydrographic basin of the Juruá river, which cuts the municipality in a southwest/northeast direction. In the project area are several water bodies totaling about 256.51 km, and the main rivers that border the area are the Riozinho da Liberdade and the Juruá river (Figure 7).

The Juruá river is considered an important tributary of the Amazon hydrographic basin, originating in Peru and running through the states of Acre and Amazonas for a length of 3,280 km until it flows into the right bank of the Solimões river[16]. In general, the Juruá river floods its plains from December to May, and in its lower course the flooding can last until August, due to the damming effect of the Solimões/Amazonas[17].

Due to its exuberant and numerous meanders, typical of floodplains, the Juruá river is considered the most sinuous river in the world, presenting a large floodplain and thousands of lakes [18] [19] [20]. This basin, because of its attributes, has the title of "Ramsar Site", which recognizes wetlands of international importance. The list of internationally important wetlands is the instrument adopted by the Ramsar Convention - an intergovernmental treaty with the objective of promoting cooperation among countries in the conservation and rational use of wetlands worldwide[21].

[16] Costa, A. C. S.; Souza, L. P. Delgado, R. C. Gomes, F. A. 2012. Períodos de cheia e vazante do rio Juruá na região de Cruzeiro do Sul, Acre, ENCICLOPÉDIA BIOSFERA, Centro Científico Conhecer - Goiânia, v.8, N.14; p. 1 3 4 3. Available at: https://conhecer.org.br/ojs/index.php/biosfera/article/view/3957 Accessed on: 01/10/2022

[17] WCS - Wildlife Conservation Society. 2019. Available at: http://pt.aguasamazonicas.org/ basins/main-subbasins/jurua/. Accessed on: 09/10/2022.

[18] WCS - Wildlife Conservation Society. 2019. Available at: http://pt.aguasamazonicas.org/ basins/main-subbasins/jurua/. Accessed on: 09/10/2022.

[19] Acre - Secretaria de Estado de Meio Ambiente. Plano estadual de recursos hídricos do Acre – Rio Branco: SEMA. pp. 243, 2012. Available at: https://d3nehc6yl9qzo4.cloudfront.net/downloads/plano_estadual_recursos_hidricos_acre.pdf Accessed on: 01/10/2022.

[20] Sousa, M. M; Oliveira, W. 2016. Identificação de feições anômalas dos sistemas de drenagem na região do Alto Juruá – AC/AM, utilizando dados de sensoriamento remoto. Revista Brasileira de Geografia Física, v.09, n.04 1254-1267. Available at: https://periodicos.ufpe.br/revistas/rbgfe/article/view/233468/27159 Accessed on: 01/10/2022.

[21] Abel, E. L. S. 2019. Dinâmica ambiental da Bacia Hidrográfica do Rio Juruá na Amazônia Ocidental. Tese submetida como requisito parcial para obtenção do grau de Doutor em Ciências Ambientais e Florestais, Área de Concentração em Conservação da Natureza. UFRRJ. Available at: https://tede.ufrrj.br/jspui/handle/jspui/5747 Accessed on: 01/10/2022.

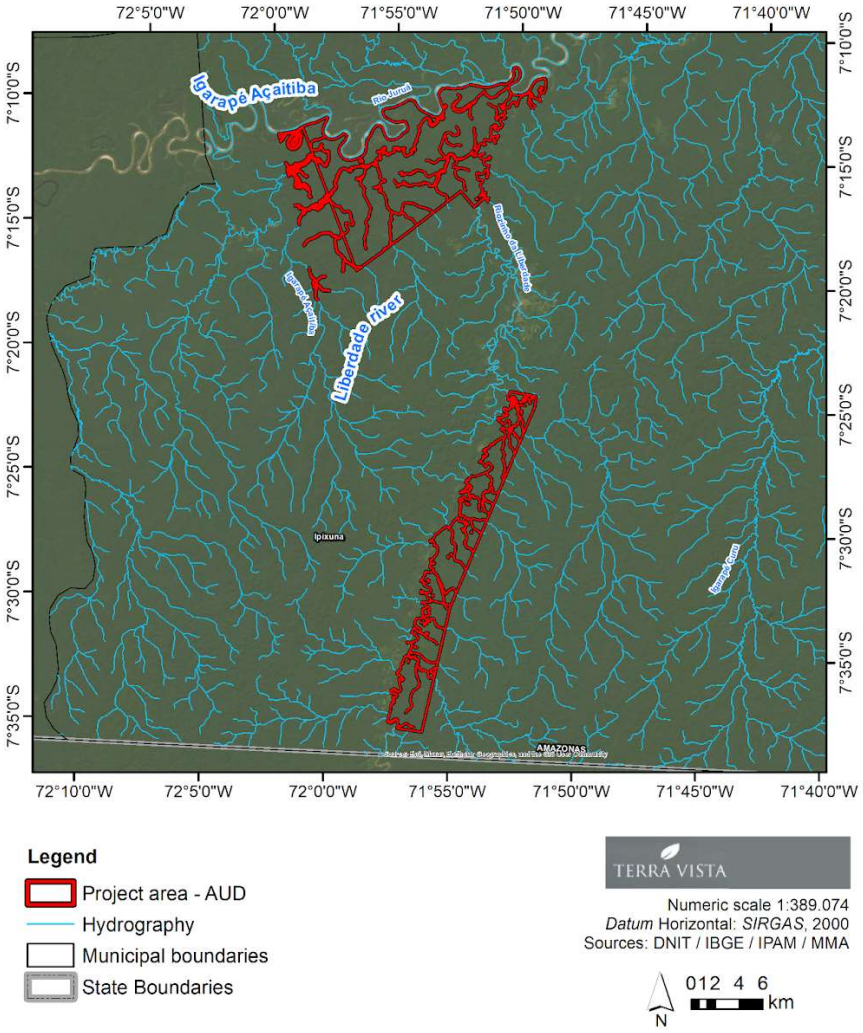

Figure 7. Hydrographic network in the Seringueira II project area.

Vegetation Types

The area of the Seringueira II project is located in the Amazon Biome, and is predominantly characterized by the presence of Open and Dense Ombrophylous Forests, classified by the following classes, according to the IBGE - RADAM classification: (i) Alluvial Open Ombrophylous Forest with palm trees; (ii) Alluvial Dense Ombrophylous Forest with emerging canopy; (iii) Lowland Open Ombrophylous Forest with palm trees and and (iv) Lowland Dense Ombrophylous Forest with emerging canopy (Table 6, Figure 8).

Table 6. Types of vegetation found in the Seringueira II project area based on the Brazilian vegetation classification (IBGE).

Vegetation Classes	Area (ha)	Area (%)
Alluvial Open Ombrophylous Forest with palm trees (Aop)	7,452.72	45.21
Alluvial Dense Ombrophylous Forest with emerging canopy (Ade)	4,810.37	29.18
Lowland Open Ombrophylous Forest with palm trees (Lop)	3,596.90	21.82
Lowland Dense Ombrophylous Forest with emerging canopy (Lde)	623.03	3.78
Total	16,483.02	100

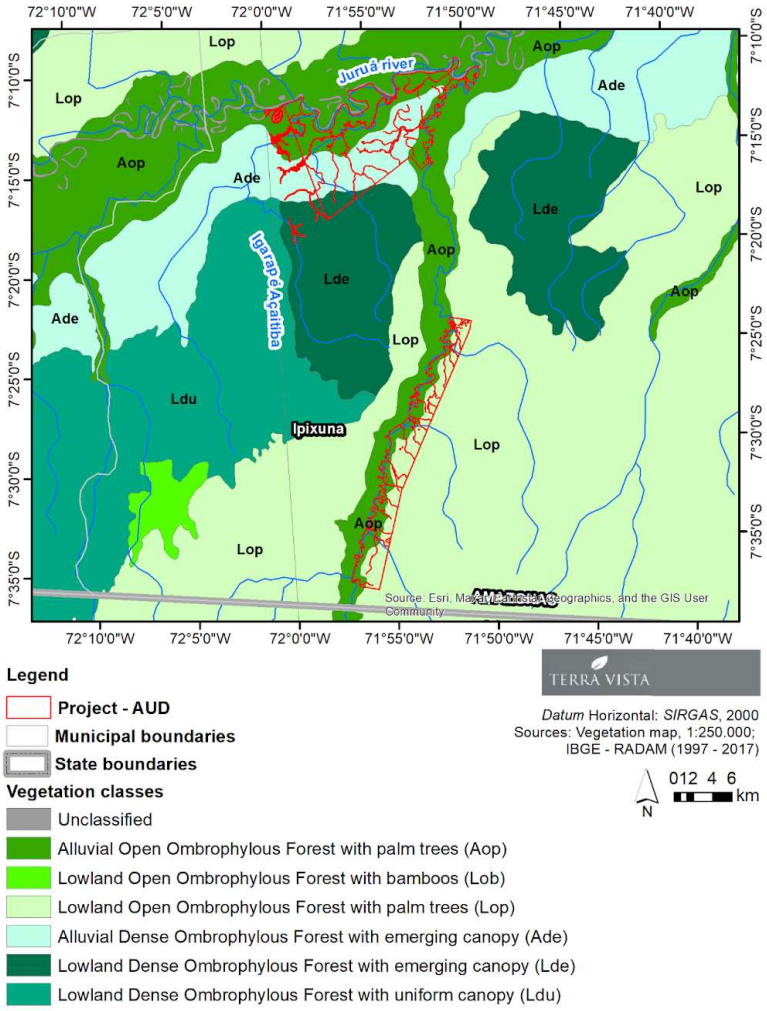

Figure 8. Vegetation types of the region where the Seringueira II project is located.

The Open Ombrophylous Forest is composed of more widely spaced trees, with a shrub stratum that is not very dense and is characterized by rosy phanerophytes and woody lianas. The Ombrophylous Forest of the Lowlands is a formation that occurs in altitudes that vary from 5 to 100m and with a predominance of palm trees. The Alluvial Open Ombrophylous Forest, predominant in the project area, is a formation established along the waterways, occupying the periodically or permanently flooded plains and terraces, which in the Amazon constitute the forests of varzea or igapó, respectively. It presents a predominant floristic composition and ecological characteristics, highlighting a large number of large palm trees.[22]

The Lowland Dense Ombrophylous Forest is a formation that in general develops on the pliopleistocene Coastal Tablelands of the Barreiras Group, which are sedimentary plateaus with an average altitude of 50 to 100 meters that gently decrease towards the Atlantic Ocean, following the entire coastline from the Northeast to Rio de Janeiro[23], while the Alluvial Dense Ombrophylous Forest is the riverine formation that occurs along the watercourses, occupying the ancient terraces of the Quaternary plains, and is composed of fast-growing macro, meso, and micro phanerophytes, in general with smooth bark, conical trunk, sometimes with the characteristic shape of a bottle, and tabular roots, often presenting a uniform emerging canopy[24].

Protected and Priority Areas for Conservation

The Seringueira II project is located near Conservation Units (or Protected Areas) of Sustainable Use, which aim to make nature conservation compatible with the sustainable use of its natural resources

Based on the mapping carried out, the project area is located near important Conservation Units, such as RESEX Rio Gregório, Floresta Estadual do Mogno and RESEX Riozinho da Liberdade (Figure 9). In the figure below, it is possible to observe that the Seringueira II project area does not overlap with any Conservation Unit of Sustainable Use or Full Protection.

[22] IBGE. 2012. Manual Técnico da Vegetação Brasileira. 2 edição revista e ampliada. Available at:https://www.terrabrasilis.org.br/ecotecadigital/pdf/manual-tecnico-da-vegetacao-brasileira.pdf Accessed on: 20/08/2022

[23] IBGE. 2012. Manual Técnico da Vegetação Brasileira. 2 edição revista e ampliada. Available at:https://www.terrabrasilis.org.br/ecotecadigital/pdf/manual-tecnico-da-vegetacao-brasileira.pdf Accessed on: 20/08/2022.

[24] IBGE. 2012. Manual Técnico da Vegetação Brasileira. 2 edição revista e ampliada. Available at:https://www.terrabrasilis.org.br/ecotecadigital/pdf/manual-tecnico-da-vegetacao-brasileira.pdf Accessed on: 20/08/2022

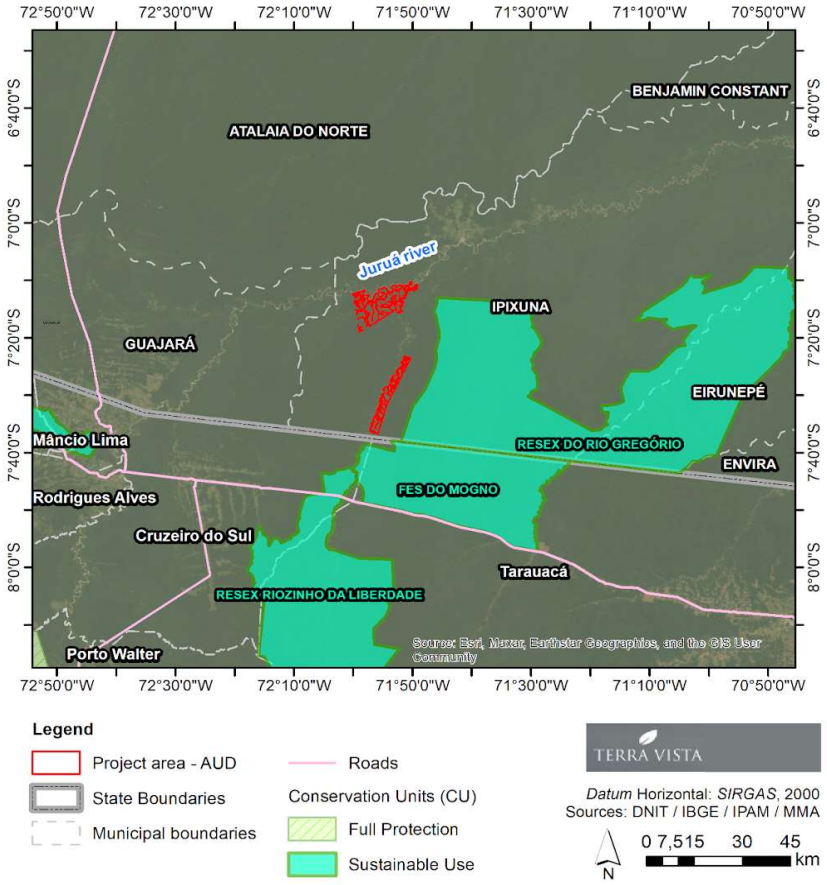

Figure 9. Protected Areas (or Conservation Units) in the region where the Seringueira II project is located.

The Priority Areas for Conservation, established by Decree No. 5.092/2004[25], 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 [26].

As provided in MMA Ordinance No. 463/2018[27], the areas selected for conservation are subject to the formulation and implementation of public policies, programs, projects and activities under the responsibility of the Federal Government aimed at: In situ conservation of biodiversity; Sustainable use of biodiversity components; Sharing of benefits derived from access to genetic resources and associated

[25] Available at: http://www.planalto.gov.br/ccivil_03/_ato2004-2006/2004/decreto/d5092.htm Accessed on: 11/13/2022

[26] Instituto de Pesquisas Ecológicas - IPÊ. 2018. Áreas Prioritárias para conservação, uso sustentável e repartição de benefícios da biodiversidade da mata atlântica. Available at: https://issuu.com/canoadocs/docs/produto01_ip_mataatlantica180220 Accessed on: 10/08/2022

[27] Available at: https://www.in.gov.br/materia/-/asset_publisher/Kujrw0TZC2Mb/content/id/55881195/do1-2018-12-19-portaria-n-463-de-18-de-dezembro-de-2018-55880954 Accessed on: 13/11/2022

traditional knowledge; Research and inventories on biodiversity; Recovery of degraded areas and overexploited or threatened species; and Economic valuation of biodiversity.

Also, according to the aforementioned Administrative Rule, the actions will be implemented considering two classes of biological importance and prioritization of action: Classes of Biological Importance (extremely high, very high, high, and insufficiently known) and Classes of Priority for Action (extremely high, very high, and high).

The Seringueira II project area, according to the Ministry of Environment (MMA), overlaps with zones considered of “High” biological importance and priority for conservation (Zones AMZ-519 and AMZ-506) and "Extremely High" (Zone AMZ-263) (Figure 10).

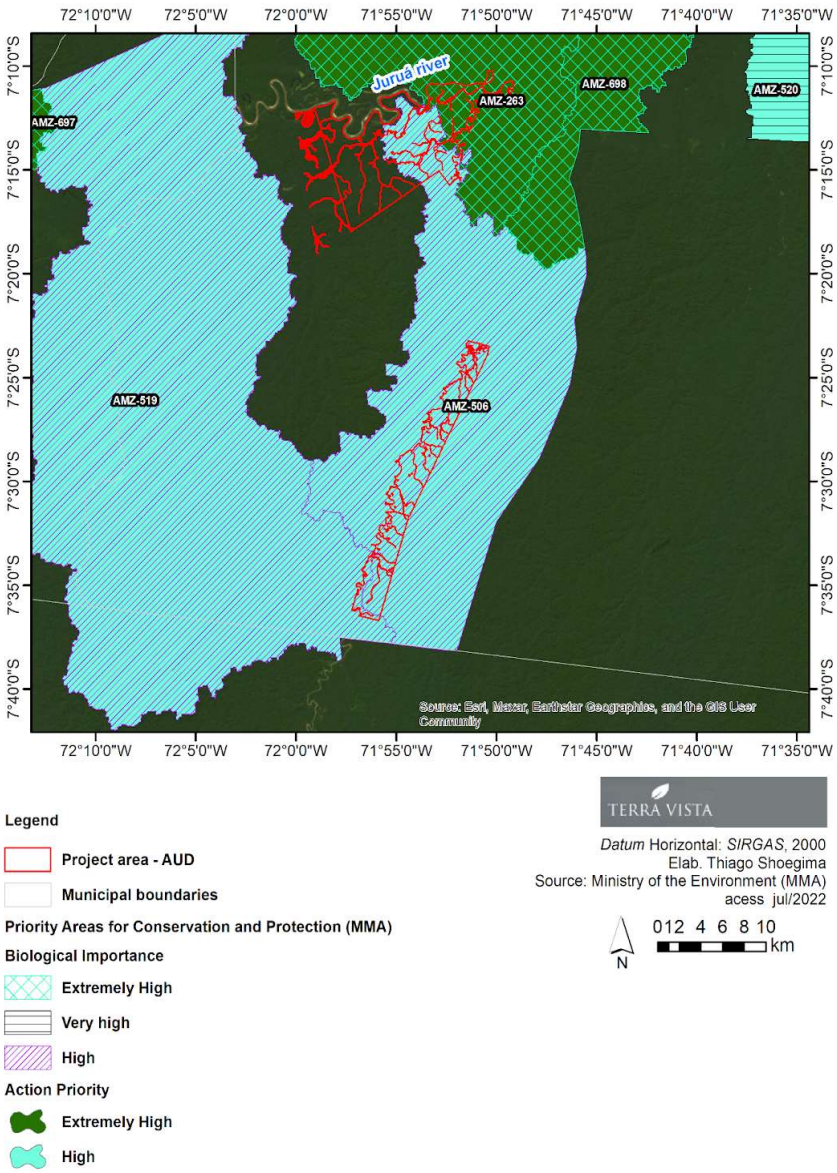

Figure 10. Priority Areas for Conservation in the region where the Seringueira II project is located.

2.1.6 Social Parameters (G1.3)

For the analysis of secondary data on the municipality of Ipixuna, three main indices were selected: Firjan Municipal Development Index (IFDM), the Firjan Fiscal Management Index (IFGF) and the Social Progress Index (IPS). The use of these indices is justified because they present more recent and aggregated data at the municipal level at a time when the Census of the Brazilian Institute of Geography and Statistics (IBGE), prepared in 2010, is outdated. Another advantage is that it groups official data around themes, facilitating the capture and description of the current conditions of the municipality in the areas of business, health, quality of life, municipal management, among others, being important indicators to establish a comprehensive knowledge of the socio-environmental reality. Finally, these three indices were selected because they satisfactorily cover different aspects of their respective areas, as will be shown below. In this analysis, data from official research institutions such as the IBGE[28][29], Ministry of Health[30], National Institute of Educational Studies and Research Anísio Teixeira (INEP)[31], Institute of National Artistic Heritage (IPHAN)[32], and two projects developed at the initiative of the Climate Observatory, MapBiomas[33], and the System of Estimates of Emissions and Removals of Greenhouse Gases (SEEG)[34], to address issues that are not sufficiently covered by the indices.

The IFDM is an index created from the monitoring of three main areas: employment and income; education and health[35]. For each sector, statistics are selected from the Ministry of Labor and Employment, Health, and Education, which are grouped and normalized on a scale ranging from 0 to 1, where the closer to 1 the higher the level of development for a given sector. Taking this range as a reference, the index ranks four stages of development: low (0 to 0.4); fair (0.4 to 0.6), moderate (0.6 to 0.8), and high (0.8 to 1). Its main objective is to provide a historical series that allows tracking whether the municipality has shown annual development in each of its aspects and in general. Table 7, taken from the IFDM 2018 publication, presents the components of each area.

[28] IBGE - Instituto Brasileiro de Geografia e Estatística. Censo Demográfico 2010. Available at: https://sidra.ibge.gov.br/pesquisa/censo-demografico/demografico-2010/inicial

[29] IBGE - Instituto Brasileiro de Geografia e Estatística. Censo Agropecuário 2017 - Resultados definitivos. Available at:: <https://sidra.ibge.gov.br/pesquisa/censo-agropecuario/censo-agropecuario-2017

[30] Ministério da Saúde. DATASUS. Estabelecimento de Saúde. Available at: http://cnes2.datasus.gov.br/

[31] INEP - Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira. Resultados Inep. Available at: <https://www.gov.br/inep/pt-br/areas-de-atuacao/pesquisas-estatisticas-e-indicadores/censo-escolar/resultados

[32] IPHAN – Instituto do Patrimônio Histórico Artístico Nacional. Patrimônio cultural imaterial em processo de registro. Available at: <http://portal.iphan.gov.br/

[33] Projeto MapBiomas. Mapeamento de cicatrizes de fogo no Brasil – Coleção 1. Available at: https://mapbiomas.org/estatisticas

[34] Plataforma SEEG - Sistema de Estimativa de Emissões de Gases de Efeito Estufa. Available at https://seeg.eco.br/

[35] Firjan: Federação das Indústrias do Estado do Rio de Janeiro - FIRJAN. IFDM 2018: Índice Firjan de Desenvolvimento Municipal: ano base 2016. Metodologia. Available at: https://firjan.com.br/data/files/E8/06/F0/D5/58E1B610E6543AA6A8A809C2/Metodologia%20IFDM%20-%20Final.pdf

Table 7. Summary of the IFDM components by development area[36].

Employment and Income	Education	Health
Generation of formal employment	Early childhood education service	Proportion of adequate prenatal care
Labor market formalization rate	Elementary school dropouts	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 Hospitalization (ISAB)
Gini index of income inequality in formal work	Basic Education Development Index (IDEB) results in elementary education	

The Firjan Fiscal Management Index (IFGF) provides an overview of the fiscal management efficiency at the municipal level. It monitors four aspects of municipal management: Autonomy, which is the capacity to finance the administrative structure; Personnel Expenses, which means the degree of budget rigidity; Liquidity, which deals with the fulfillment of the financial obligations of the municipalities; and Investments, which is the ability to generate well-being and competitiveness.[37]. Each of these aspects receive the same weight, 25%, for the calculation of the general index, which is divided into four classifications: management excellence (> 0.8); good management (0.8 - 0.6); management in difficulty (0.6 - 0.4); critical management (<0.4).

Finally, the Social Progress Index (IPS) was created from the perception that the most famous indices used to measure development, such as the Gross Domestic Product (GDP) and the Human Development Index (HDI), place excessive emphasis on income component and, therefore, have limitations in capturing a social and environmental dimension of the countries represented. The IPS therefore aims not only to include income, but also to measure the social and environmental performance of territories.

For the IPS, the concept of social progress is understood as "the ability of a society to meet the basic human needs of its citizens, to establish the essential elements for improving and maintaining the

[36] Firjan: Federação das Indústrias do Estado do Rio de Janeiro - FIRJAN. IFDM 2018: Índice Firjan de Desenvolvimento Municipal: ano base 2016. Metodologia. Available at: https://firjan.com.br/data/files/E8/06/F0/D5/58E1B610E6543AA6A8A809C2/Metodologia%20IFDM%20-%20Final.pdf

[37] Firjan: Federação das Indústrias do Estado do Rio de Janeiro - IFGF, Índice Firjan de Gestão Fiscal. Edição 2021. Metodologia. Available at: https://www.firjan.com.br/data/files/BA/F4/E3/6A/752CC710CCD10AC7A8A809C2/IFGF%20-%20Anexo%20Metodologico%20-%202021-v2.pdf

quality of life of people and communities, and to create the conditions for all individuals to achieve full potential"[38].

The IPS Amazônia was the first initiative created to adapt this index, until then performed for countries, to sub-national scale, at the level of states and municipalities. Similar to the IPS Global, the index is aggregated into three dimensions: Basic Human Needs, Foundations for Well-Being and Opportunities − and 12 components namely: Nutrition and Basic Medical Care; Water and Sanitation; Housing; Personal Security; Access to Basic Knowledge; Access to Information and Communication; Health and Wellness; Environmental Quality; Individual Rights; Individual Freedoms and Choice; Social inclusion; Access to Higher Education.

The complementation of the data from official institutions intends to draw the general panorama of the municipality in its population, educational, economic, territorial, services and public administration, and cultural and archaeological heritage aspects. For the contextualization of the municipality with the Brazilian climate and environmental issue, data from the projects were also used: MapBiomas[39], which aims to annually map the coverage and use of land in Brazil and monitor changes in the territory; and SEEG[40], an initiative that aims to document and analyze the evolution of greenhouse gas emissions and removals in Brazil. These two projects were developed as an initiative of the Climate Observatory, a network of Brazilian civil society entities formed with the objective of discussing climate change in the context of Brazil and global warming.

For community-level characterization, the Sustainable Livelihoods (MVS) methodology was adopted[41] with auxiliary tools of Rapid Participatory Rural Diagnosis (DRP)[42]. The MVS was consolidated in Brazil under the leadership of the United Kingdom's sustainable development support agency (DFID[43]) in the version adapted to the Brazilian context in partnership with CARE - Brazil (an entity created in the post Second World War to contribute to overcoming disasters by the most vulnerable communities, fighting the causes of poverty and promoting local sustainable development).

Considering that in impact assessments of socio-environmental strengthening projects in communities that are residents and users of areas that provide environmental services, among which are non-wood forest products or those with high carbon sequestration potential, it is necessary to adopt a

[38] Mosaner, M.; Santos, D.; Seifer, P. Índice de Progresso Social na Amazônia Brasileira - IPS Amazônia 2021. Resumo Executivo. Belém: Imazon, 2021a

[39] Projeto MapBiomas. Mapeamento de cicatrizes de fogo no Brasil – Coleção 1. Available at: https://mapbiomas.org/estatisticas.

[40] Plataforma SEEG - Sistema de Estimativa de Emissões de Gases de Efeito Estufa. Available at https://seeg.eco.br/.

[41] DFID BRAZIL. Manual de treinamento em desenvolvimento social. Brasília: DFID, 2005 [2002].

[42] Brose, M. (org.) Metodologia participativa – Uma introdução a 29 instrumentos. Porto Alegre: Tomo Editorial, 2001, 306p. Klausmeyer, Afonso; Ramalho, Luiz. Introdução a metodologias participativas. Recife: SACTES/ABONG, 1995. 249 p. WHITESIDE, M. Diagnóstico rápido participativo: manual de técnicas. Moçambique: Comissão Nacional do Meio Ambiente, mar. 1994.

[43] Sigla em inglês para “Department for International Development” (Departamento para Desenvolvimento Internacional) que foi substituído em 2020 pelo Foreign, Commonwealth & Development Office (FCDO). UNITED KINGDOM. The Department for International Development has closed. It's been replaced by the Foreign, Commonwealth & Development Office (FCDO). About us. N/A. Available at: < https://www.gov.uk/government/organisations/department-for-international-development/about#history-of-dfid >.

methodology capable of describing and measuring the ways of life of local communities and their relationship with the environmental conservation of the territory. This methodology provides an integrating axis of indicators that allows us to mark out and guide what is expected to be accomplished in the probable carbon credit projects that should be defined in a participative way and have a positive impact on the conservation of the contracted forest fragments and on the livelihoods of the residents who help in this conservation. In accordance with the certification standards for carbon credit projects such as the CCB, the MVS is understood as a participatory approach, which favors the generation of information with autonomy and criticism by the people, families and communities to be beneficiaries, making them co-responsible for the process of environmental conservation and generation of carbon credits.

The methodology brings in a theoretical construct that helps to organize the categories of the ways of life of people, families, and communities in order to look at the situation before, during, and after the projects that will be chosen for implementation, considering the material and immaterial factors of these community ways of life and the standards derived from the principles of sustainability. This methodological proposal argues that livelihoods will be increasingly sustainable, healthy and lasting, when a dynamic and organic balance is reached between the assets that people, families and the community have access to and that drive and are driven by their aspirations and dreams. The assets are distributed over five dimensions that can be in balance or imbalance in direct relation to other interests in dispute within the development of society as a whole. The dimensions and indicators that will be used to capture and monitor the livelihoods of communities are presented in Table 8.

Table 8. Dimensions and indicators that comprise sustainable livelihoods[44].

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

[44] DFID BRASIL. Manual de treinamento em desenvolvimento social. Brasília: DFID, 2005 [2002]. Adapted by Terra Vista.

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 visualized by the 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 Rural Participatory Diagnosis (DRP) were also used according to the need to obtain information in the contacts with the communities, aiming to complete the characterization of the ways of life and consolidate the description of the use of the carbon credit project areas. The main ones used were: crosswalk, seasonal calendar, maps and sketches of areas of use and distances, and Venn diagram[46].

[45] Kobo Toolbox allows the creation of free quizzes, with simultaneous synchronization between accounts via the internet. More information cf. <https://www.kobotoolbox.org>

[46] Brose, M. (org.) Metodologia participativa – Uma introdução a 29 instrumentos. Porto Alegre: Tomo Editorial, 2001, 306p Klausmeyer, Afonso; Ramalho, Luiz. Introdução a metodologias participativas. Recife: SACTES/ABONG, 1995. 249 p. WHITESIDE, M. Diagnóstico rápido participativo: manual de técnicas. Moçambique: Comissão Nacional do Meio Ambiente, mar. 1994.

Population dynamics

According to estimates by the Brazilian Institute of Geography and Statistics (IBGE), the population of the municipality of Ipixuna for the year 2021 was 31,172 people[47]. When considering the 2010 census, which counted 22,254 people, the municipality shows an upward trend in population growth[48].

The 2010 census indicated that the municipality had mainly a young population, in which there is a higher concentration among the age groups up to 4 years old, and from 5 to 9 years old (Figure 11)[49]. The observed population pyramid structure with wider bases differs from the pattern presented by Brazilian municipalities and the population pyramid of Brazil, which tend to present narrow bases and the young adult range a little wider. The large leap in the young population between 25 to 29 years old to the 30 to 39 age group and a reduced population in the 20 to 24 age group indicates that the municipality has not generated regular opportunities for youth inclusion in the labor market and there are emigrations from these age groups, especially to seek their first job. The structure of the population pyramid in Ipixuna with the widest bases might also be an indication of a high birth rate. As for sex, the last Census indicated that despite the population balance between the sexes, in Ipixuna the population counted 11,355 men, which corresponds to 51% of this total population[50].

[47] IBGE - Instituto Brasileiro de Geografia e Estatística, População estimada. Diretoria de Pesquisas. Coordenação de População e Indicadores Sociais, Estimativas da população residente com data de referência 1º de julho de 2021. Available at: <https://cidades.ibge.gov.br/brasil/am/ipixuna/panorama.>. Accessed on: 23/09/2022

[48] IBGE - Instituto Brasileiro de Geografia e Estatística. Censo Demográfico 2010. População no último censo. Available at: <https://cidades.ibge.gov.br/brasil/am/ipixuna/panorama>. Accessed on: 23/09/2022.

[49] IBGE - Instituto Brasileiro de Geografia e Estatística. Amostra Características Gerais da População. População residente, por sexo, situação e grupos de idade. Available at https://sidra.ibge.gov.br/pesquisa/censo-demografico/demografico-2010/amostra-caracteristicas-gerais-da-populacao-religiao-e-deficiencia. Accessed on: 23/09/2022

[50] IBGE - Instituto Brasileiro de Geografia e Estatística. Amostra Características Gerais da População. População residente, por sexo, situação e grupos de idade. Available at https://sidra.ibge.gov.br/pesquisa/censo-demografico/demografico-2010/amostra-caracteristicas-gerais-da-populacao-religiao-e-deficiencia. Accessed on: 23/09/2022

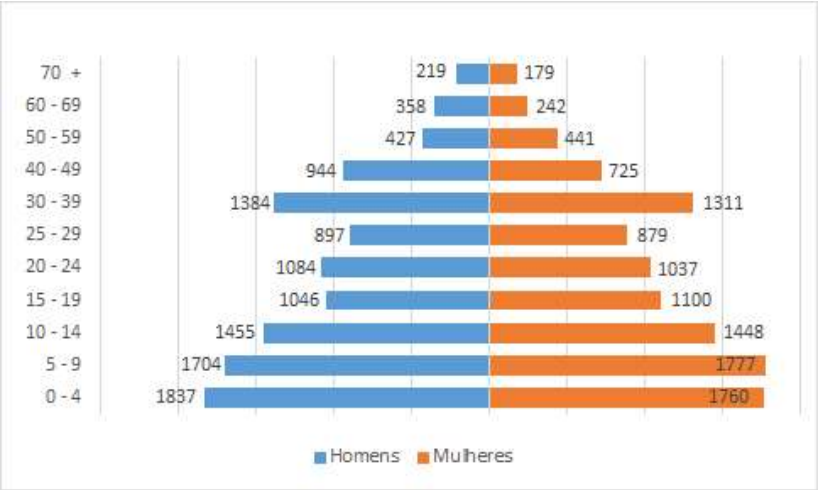

Figure 11. Population Pyramid (age-sex pyramid) showing the distribution by age groups and sex of the population of Ipixuna, Amazonas State, Brazil.[51]

According to the 2010 Census, Ipixuna also differs from the scenario presented by the other Brazilian municipalities in the proportional relationship between urban and rural population. In this aspect, Ipixuna had a mostly rural population, which in 2010 totaled 12,755 people, or 57% of the total population[52].

The 2010 Census pointed out a homogeneous aspect regarding the origin of the population residing in Ipixuna. In this sense, this resident population was composed of 99% of people who were born in the northern region of Brazil[53]. The homogeneity found in the origin of the residents of Ipixuna may be associated with the geographical isolation of the municipality, which can only be accessed by navigating through the Juruá river and by air. Regarding self-identification by color or race, the 2010 Census showed that the resident population of Ipixuna identified itself mostly as brown (*parda*). In this population distribution, 55% of the inhabitants declare themselves as brown (*parda*), 30% white, 8 % indigenous, 7% black, and 0.5% yellow[54].

[51] IBGE - Instituto Brasileiro de Geografia e Estatística. Amostra Características Gerais da População. População residente, por sexo, situação e grupos de idade. Available at https://sidra.ibge.gov.br/pesquisa/censo-demografico/demografico-2010/amostra-caracteristicas-gerais-da-populacao-religiao-e-deficiencia. Accessed on: 23/09/2022

[52] IBGE - Instituto Brasileiro de Geografia e Estatística. Amostra Características Gerais da População. População residente, por sexo, situação e grupos de idade. Available at https://sidra.ibge.gov.br/pesquisa/censo-demografico/demografico-2010/amostra-caracteristicas-gerais-da-populacao-religiao-e-deficiencia Accessed on: 23/09/2022

[53] IBGE - Instituto Brasileiro de Geografia e Estatística. Amostra Resultados da Amostra - Nupcialidade, Fecundidade e Migração. Available at https://sidra.ibge.gov.br/pesquisa/censo-demografico/demografico-2010/amostra-nupcialidade-fecundidade-e-migracao. Accessed on: 23/09/2022

[54] IBGE - Instituto Brasileiro de Geografia e Estatística. Resultados do Universo - Características da População e dos Domicílios. População residente, por cor ou raça, segundo a situação do domicílio, o sexo e a idade. Available at https://sidra.ibge.gov.br/pesquisa/censo-demografico/demografico-2010/universo-caracteristicas-da-populacao-e-dos-domicilios. Accessed on: 23/09/2022

With a total area of 12,109.779 km^2, the municipality presented a demographic density of 1.85 inhabitants per kilometer for the year 2010 [55] [56]. Despite indicating that the population is sparsely distributed throughout the municipal territory, in comparison with the other Amazonian municipalities, the demographic density of Ipixuna occupies the 29th position in the ranking of the 62 municipalities[57]. Although it belongs to the state of Amazonas, Ipixuna is linked to the region of influence of Cruzeiro do Sul, state of Acre[58]. In the Brazilian territorial division, the municipality is located in the intermediate region of Tefé, close to Eirunepé, in the Amazon Southwest, microregion of Juruá[59].

Health

In 2009, the municipality of Ipixuna had six health facilities Unified Health System[60]. According to DATASUS, Ipixuna has three health clinics, four Basic Health Units, one being a pluvial one, and a hospital unit that is prepared for specialized diagnostic services, urgency and emergency services[61]. Although the inhabitants of Ipixuna can count on the Fluvial Health Unit, which can travel along the rivers and streams to attend the dispersed population, with the exception of the Santa Catarina Health Post, which is in the rubber plantation of the same name, the Santa Maria Health Post, in the Boca do Puca community, and the Health Post of the Pernambuco community, all other health care facilities are located in the county seat[62]. This distribution of health facilities does not effectively cover the entire population of Ipixuna, which is spread over an extensive municipal territory with low population density and occupies mostly the rural area. Thus, in order to have access to medical care, the residents of the countryside have to go to the headquarters of the nearby municipalities.

[55] IBGE - Instituto Brasileiro de Geografia e Estatística. Área da unidade territorial: 2021. Rio de Janeiro: IBGE, 2022. Available at: <https://cidades.ibge.gov.br/brasil/am/ipixuna/panorama>. Accessed on: 23/09/2022

[56] IBGE - Instituto Brasileiro de Geografia e Estatística. Densidade demográfica. Censo Demográfico 2010. Área territorial brasileira. Rio de Janeiro: IBGE, 2011 Available at: <https://cidades.ibge.gov.br/brasil/am/ipixuna/panorama>. Accessed on: 23/09/2022

[57] IBGE - Instituto Brasileiro de Geografia e Estatística. Densidade demográfica. Censo Demográfico 2010. Área territorial brasileira. Rio de Janeiro: IBGE, 2011 Available at: <https://cidades.ibge.gov.br/brasil/am/ipixuna/panorama>. Accessed on: 23/09/2022

[58] IBGE - Instituto Brasileiro de Geografia e Estatística. *Região de influência*: IBGE. Regiões de Influência das Cidades 2018. Rio de Janeiro: IBGE, 2020. Available at: <https://cidades.ibge.gov.br/brasil/am/ipixuna/panorama>. Accessed on: 23/09/2022.

[59] IBGE - Instituto Brasileiro de Geografia e Estatística. Região imediata: IBGE, Divisão Territorial Brasileira - DTB 2021. Available at: <https://cidades.ibge.gov.br/brasil/am/ipixuna/panorama>. Accessed on: 23/09/2022.

[60] IBGE - Instituto Brasileiro de Geografia e Estatística. Assistência Médica Sanitária 2009. Available at: <https://cidades.ibge.gov.br/brasil/am/ipixuna/panorama>. Accessed on: 23/09/2022.

[61]Ministério da Saúde. DATASUS. Estabelecimento de Saúde. Available at: <http://cnes2.datasus.gov.br/Listar_Mantidas.asp?VCnpj=04191078000191&VEstado=13&VNome=PREFEITURA%20MUNICIPAL%20DE%20IPIXUNA >. Accessed on: 23/09/2022

[62]Ministério da Saúde. DATASUS. Estabelecimento de Saúde. Available at: <http://cnes2.datasus.gov.br/Listar_Mantidas.asp?VCnpj=04191078000191&VEstado=13&VNome=PREFEITURA%20MUNICIPAL%20DE%20IPIXUNA >. Accessed on: 23/09/2022

According to IPS (2021)[63], the infant mortality rate was 37.23 deaths for every thousand live births in the year 2019. Data from the Ministry of Health (2016) also pointed out 2.1 hospitalizations for diarrhea per thousand inhabitants[64]. The infant mortality rate indicated by IBGE (2020) in Ipixuna was 14.62 deaths per thousand live births[65]. Compared to IBGE data from other municipalities in Amazonas, Ipixuna ranked 26th out of 62 in terms of deaths for live births, and 17th out of 62, for hospitalizations due to diarrhea, and in the national comparison, it ranked 1,746th and 1485th from 5570, respectively.

The municipality's IFDM for Health reached a score of 0.1849 points for the year 2016, which is considered a regular development. In the IFDM historical series (Figure 12), it is possible to verify that Ipixuna presented a development below the national average (0.765) and the state average (0.546)[66]. Besides presenting an IFDM for health considered low, the municipality occupied the 5,565th position in the national ranking out of 5,570, indicating that, in this aspect, it is among those with the worst performance. Analyzing the historical series starting in 2005, it can be seen that the current position is the result of a sharp decline that occurred between the years 2010 and 2015. In the year 2016, a year that coincided with elections for mayors and councilors, there was a small increase in the grade.

[63] Mosaner, M.; Santos, D.; Seifer, P. Índice de Progresso Social na Amazônia Brasileira - IPS Amazônia 2021. Banco de dados exportados. Available at https://ipsamazonia.org.br/dashboard#aspects%5B%5D=1&aspects%5B%5D=2&aspects%5B%5D=3&aspects%5B%5D=4&map-view=city&map-type=performance&active-cat=1&page=1&tab=map.>. Accessed on: 23/09/2022

[64] IBGE - Instituto Brasileiro de Geografia e Estatística. Internações por diarreia 2009. Available at: <https://cidades.ibge.gov.br/brasil/am/ipixuna/panorama>. Accessed on: 23/09/2022

[65] IBGE - Instituto Brasileiro de Geografia e Estatística. Mortalidade Infantil. Ministério da Saúde, Departamento de Informática do Sistema Único de Saúde - DATASUS 2020. Available at: <https://cidades.ibge.gov.br/brasil/am/ipixuna/panorama>. Accessed on: 23/09/2022.

[66] Firjan: Federação das Indústrias do Estado do Rio de Janeiro. FIRJAN. IFDM 2018: Índice Firjan de Desenvolvimento Municipal: ano base 2016. Rio de Janeiro: Firjan, 2018, p. 9. Available at: https://firjan.com.br/data/files/67/A0/18/D6/CF834610C4FC8246F8A809C2/IFDM_2018.pdf. Accessed on: 23/09/2022.

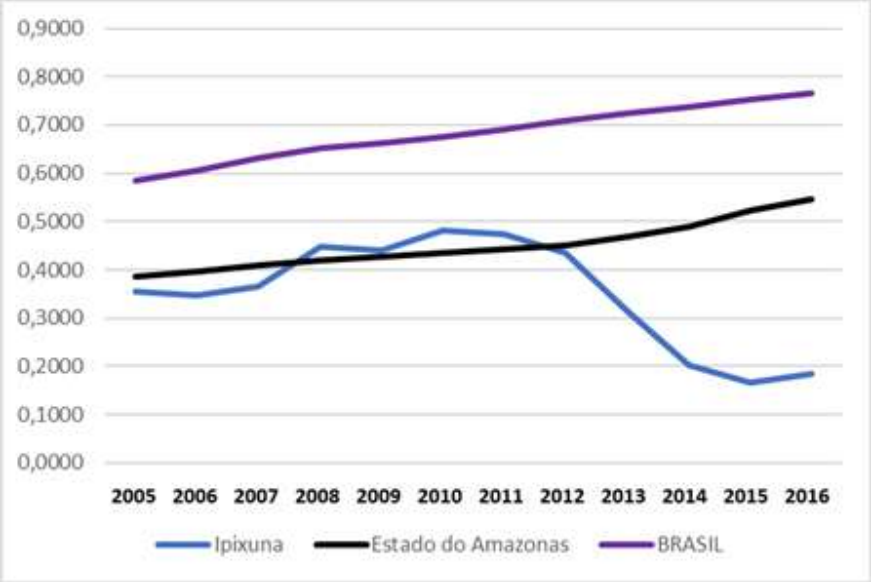

Figure 12. Historical series of the IFDM for health in the municipality of Ipixuna, Amazonas state, Brazil[67].

In the nutrition and basic health care component of the IPS 2021[68], Ipixuna had a maternal mortality rate of 3.37 deaths per 100,000 live births. In this component, malnutrition mortality was 26.95 deaths per 100,000 live births. The malnutrition rate reached 8.01% of the population, and deaths from infection reached a total of 265.96 deaths per 100,000 inhabitants.

According to the IPS 2021 of Health and Well-Being[69], the death rate from diabetes mellitus in the year 2019 was 10.24 per 100,000 population. In this component, cancer mortality in the same year was 6.47 deaths per 100,000 inhabitants. Circulatory diseases, on the other hand, totaled 30.31 deaths per 100,000 inhabitants. Finally, on a smaller scale, deaths from respiratory disease and suicide accounted for 3.37 deaths per 100,000 inhabitants, each.

Thus, as represented by the municipality's IFDM - Health, Ipixuna presents a precarious infrastructure to serve its citizens. The limitations in the local health care network are due both to the lack of qualified professionals to provide more sophisticated care, and to the lack of equipment, services that can only be found in the state capital. This precariousness of the municipality's health system is also

[67] Firjan: Federação das Indústrias do Estado do Rio de Janeiro. FIRJAN. IFDM 2018: Índice Firjan de Desenvolvimento Municipal: ano base 2016. Rio de Janeiro: Firjan, 2018, p. 9. Available at: https://firjan.com.br/data/files/67/A0/18/D6/CF834610C4FC8246F8A809C2/IFDM_2018.pdf. Accessed on: 23/09/2022.

[68] Mosaner, M.; Santos, D.; Seifer, P. Índice de Progresso Social na Amazônia Brasileira - IPS Amazônia 2021. Banco de dados exportados. Available at https://ipsamazonia.org.br/dashboard#aspects%5B%5D=1&aspects%5B%5D=2&aspects%5B%5D=3&aspects%5B%5D=4&map-view=city&map-type=performance&active-cat=1&page=1&tab=map. Accessed on: 23/09/2022.

[69] Mosaner, M.; Santos, D.; Seifer, P. Índice de Progresso Social na Amazônia Brasileira - IPS Amazônia 2021. Banco de dados exportados. Available at https://ipsamazonia.org.br/dashboard#aspects%5B%5D=1&aspects%5B%5D=2&aspects%5B%5D=3&aspects%5B%5D=4&map-view=city&map-type=performance&active-cat=1&page=1&tab=map. Accessed on: 23/09/2022.

evidenced by the 2021 IPS data that show high rates of malnutrition, infant mortality, and undernourishment, among the inhabitants of Ipixuna.

Education

In terms of education, in 2010, Ipixuna had a schooling rate of 65.4% from 6 to 14 year olds[70]. According to INEP, in 2021 the municipality of Ipixuna counted 3,472 elementary school enrollments and 859 high school enrollments[71] [72]. For the same period, INEP pointed out that the 37 elementary schools had 172 teachers, while the 3 high schools had 48 teachers[73] [74] [75] [76].

The municipality's IFDM for Education reached a score of 0.5253 points for the year 2016, which is considered a low development[77]. With this score, Ipixuna occupied the 5,461st position in the national ranking, which, as pointed out for the education item, places the municipality among the ones that had the worst performances at the national level. Analyzing the historical series shown by Figure 13, after an improvement registered between 2005 and 2009, there was a decrease in the index. In the final years, between 2013 and 2015, there was an improvement, but in 2016 there was a small drop in the score, when compared to the previous year. Thus, compared to the state and national scenario, the municipality is in a low educational development position, being below the national and regional lines.

[70] IBGE - Instituto Brasileiro de Geografia e Estatística. *Taxa de escolarização de 6 a 14 anos de idade*: Censo Demográfico 2010. Available at: <https://cidades.ibge.gov.br/brasil/am/ipixuna/panorama>. Accessed on: 24/09/2022

[71] INEP - Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira. Matrículas no ensino fundamental. Sinopse Estatística da Educação Básica 2021. Brasília: Inep, 2022. Available at <https://www.gov.br/inep/pt-br/areas-de-atuacao/pesquisas-estatisticas-e-indicadores/censo-escolar/resultados>. Accessed on: 24/09/2022.

[72] INEP - Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira. Matrículas no ensino médio. Sinopse Estatística da Educação Básica 2021. Brasília: Inep, 2022. Available at <https://www.gov.br/inep/pt-br/areas-de-atuacao/pesquisas-estatisticas-e-indicadores/censo-escolar/resultados. Accessed on: 24/09/2022.

[73] INEP - Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira. Docentes no ensino fundamental. Sinopse Estatística da Educação Básica 2021. Brasília: Inep, 2022. Available at: <https://www.gov.br/inep/pt-br/areas-de-atuacao/pesquisas-estatisticas-e-indicadores/censo-escolar/resultados>. Accessed on: 24/09/2022.

[74] INEP - Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira. Docentes no ensino médio. Sinopse Estatística da Educação Básica 2021. Brasília: Inep, 2022. Available at: <https://www.gov.br/inep/pt-br/areas-de-atuacao/pesquisas-estatisticas-e-indicadores/censo-escolar/resultados>. Accessed on: 24/09/2022.

[75] INEP - Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira. Número de estabelecimentos de ensino fundamental. Sinopse Estatística da Educação Básica 2021. Brasília: Inep, 2022. Available at: <https://www.gov.br/inep/pt-br/areas-de-atuacao/pesquisas-estatisticas-e-indicadores/censo-escolar/resultados>. Accessed on: 24/09/2022.

[76] INEP - Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira. Número de estabelecimentos de ensino médio. Sinopse Estatística da Educação Básica 2021. Brasília: Inep, 2022. Available at: <https://www.gov.br/inep/pt-br/areas-de-atuacao/pesquisas-estatisticas-e-indicadores/censo-escolar/resultados>. Accessed on: 24/09/2022.

[77] Firjan: Federação das Indústrias do Estado do Rio de Janeiro. FIRJAN. IFDM 2018: Índice Firjan de Desenvolvimento Municipal: ano base 2016. Rio de Janeiro: Firjan, 2018, p. 9. Available at: https://firjan.com.br/data/files/67/A0/18/D6/CF834610C4FC8246F8A809C2/IFDM_2018.pdf. Accessed on: 24/09/2022

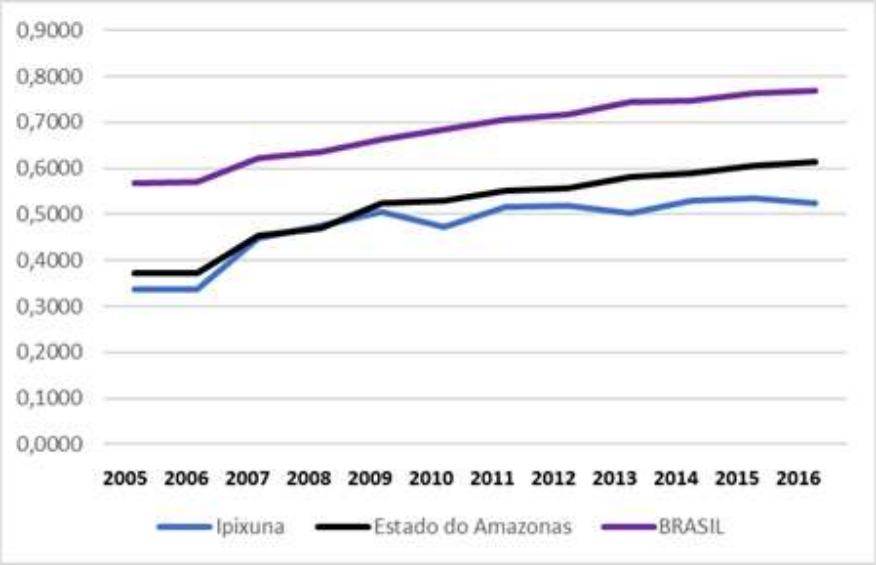

Figure 13. Historical series of the IFDM for education in the municipality of Ipixuna, Amazonas State, Brazil[78].

For the municipality of Ipixuna, the access to basic knowledge component of the 2021 IPS was 37.22 points[79]. This score is below the national average and the average of the Amazonian municipalities. According to the IPS, in 2019, elementary school dropout and failure rates were 5.2% and 13.7% respectively. The age/grade distortion in elementary school was 38.3%, and in high school, 58.8%[80].

Income and public management

In terms of income and public management, the IFDM of Employment and Income of Ipixuna for the year 2016 was 0.2540 points, being considered a low performance[81]. With this score, the municipality occupied the 5,339th place in the national ranking, and, in line with the education and health aspects, it is among the municipalities with the worst performance. According to the IFDM historical series (Figure 14),

[78] Firjan: Federação das Indústrias do Estado do Rio de Janeiro. FIRJAN. IFDM 2018: Índice Firjan de Desenvolvimento Municipal: ano base 2016. Rio de Janeiro: Firjan, 2018, p. 9. Available at: https://firjan.com.br/data/files/67/A0/18/D6/CF834610C4FC8246F8A809C2/IFDM_2018.pdf. Accessed on: 24/09/2022.

[79] Mosaner, M.; Santos, D.; Seifer, P. Índice de Progresso Social na Amazônia Brasileira - IPS Amazônia 2021. Banco de dados exportados. Available at https://ipsamazonia.org.br/dashboard#aspects%5B%5D=1&aspects%5B%5D=2&aspects%5B%5D=3&aspects%5B%5D=4&map-view=city&map-type=performance&active-cat=1&page=1&tab=map. Accessed on: 23/09/2022.

[80] Mosaner, M.; Santos, D.; Seifer, P. Índice de Progresso Social na Amazônia Brasileira - IPS Amazônia 2021. Banco de dados exportados. Available at https://ipsamazonia.org.br/dashboard#aspects%5B%5D=1&aspects%5B%5D=2&aspects%5B%5D=3&aspects%5B%5D=4&map-view=city&map-type=performance&active-cat=1&page=1&tab=map. Accessed on: 23/09/2022.

[81] Firjan: Federação das Indústrias do Estado do Rio de Janeiro. FIRJAN. IFDM 2018: Índice Firjan de Desenvolvimento Municipal: ano base 2016. Rio de Janeiro: Firjan, 2018, p. 9. Available at: https://firjan.com.br/data/files/67/A0/18/D6/CF834610C4FC8246F8A809C2/IFDM_2018.pdf. Accessed on: 24/09/2022

there was an improvement in the index between 2005 and 2006, followed by a drop in 2007 and subsequent rise in 2008. Between 2008 and 2013, the score remained stable, and from 2013 onwards there was a sharp drop that leads back to the levels of 2005. Only in 2015 did an upward development begin to resume, but below the development of other municipalities in the state of Amazonas and from Brazil.

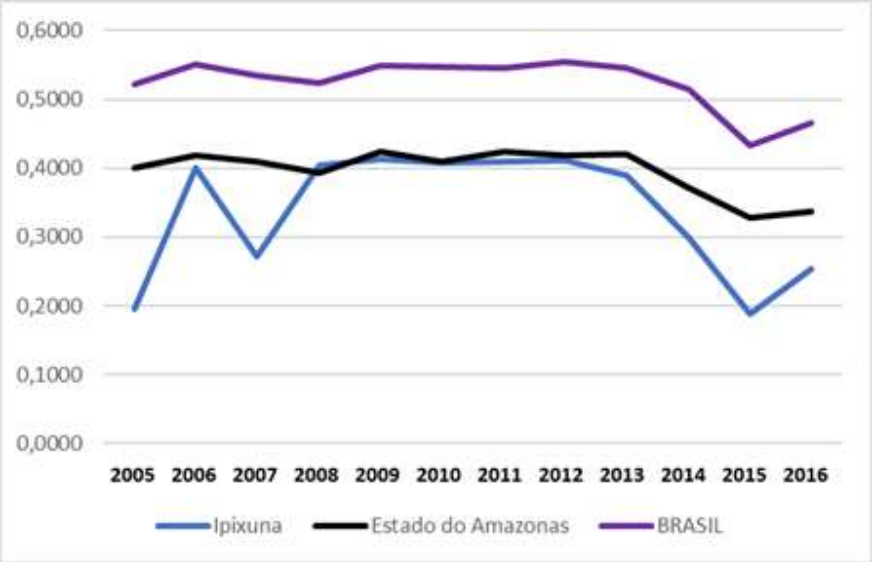

Figure 14. Historical series of the IFDM for employment and income in the municipality of Ipixuna, Amazonas State, Brazil[82].

According to the Central Registry of Companies, consulted through the IBGE's Cities portal, in 2020 the average monthly salary of formalized workers in Ipixuna was 1.7 minimum wages[83]. However, only 1.1% of its population was engaged in a regular remunerated activity and, considering the monthly incomes of up to half a minimum wage per person, Ipixuna had 50.6% of its population in this condition[84]. This indicates a situation of wide wage inequality and a labor market characterized by high informality. Thus, when comparing the situation of the average salary with the average of the state of Amazonas, Ipixuna occupies an average position, 31st out of 62, and when compared to other municipalities in Brazil, occupies the 3,792nd position out of 5,570. Comparing the proportion of people employed in the labor market in the municipality with the average found in Amazonas and in Brazil, Ipixuna ranked 61st, and in the comparison with other municipalities in Brazil, 5,559th out of 5570.

[82] Firjan: Federação das Indústrias do Estado do Rio de Janeiro. FIRJAN. IFDM 2018: Índice Firjan de Desenvolvimento Municipal: ano base 2016. Rio de Janeiro: Firjan, 2018, p. 9. Available at: https://firjan.com.br/data/files/67/A0/18/D6/CF834610C4FC8246F8A809C2/IFDM_2018.pdf. Accessed on: 24/09/2022

[83] IBGE - Instituto Brasileiro de Geografia e Estatística. Salário médio mensal dos trabalhadores formais. IBGE, Cadastro Central de Empresas 2020. Rio de Janeiro: IBGE, 2022. Available at <https://cidades.ibge.gov.br/brasil/am/ipixuna/panorama>. Accessed on: 24/09/2022

[84] IBGE - Instituto Brasileiro de Geografia e Estatística. População ocupada. IBGE, Cadastro Central de Empresas (CEMPRE) 2020 (data de referência: 31/12/2020), IBGE, Estimativa da população 2020 (data de referência: 1/7/2020). Available at: <https://cidades.ibge.gov.br/brasil/am/ipixuna/panorama>. Accessed on: 24/09/2022

According to data from the IPS Opportunities 2021[85], when considering the proportion of jobs with higher education in relation to totals, only 5% are held by people with higher education. This 5% rate was the same as that found among women with higher education jobs in relation to total employment. Thus, the local economy, besides being largely uneven and informal, the existing formal jobs do not require higher education, which, as shown by Rocha et. al. (2017)[86], tend to pay lower wages.

In terms of public administration, the municipality of Ipixuna in 2020 scored 0.419 in the Firjan Fiscal Management Index (IFGF), being classified as a "bad management"[87]. In the historical series that goes from 2013 to 2020, the municipality followed a trend of improvement in management, but remained below the national and state average (Figure 15). Despite the low performance, according to the foundation, the liquidity and investment components were the main responsible for the rise in the score. This upward development, although still lagging behind the state of Amazonas and Brazil, may be associated with a decrease in outstanding amounts accrued by management and an increase in public investment in local economic activities that generate well-being for the population. Regarding autonomy, Ipixuna performed above the average of the state of Amazonas, but below the average of Brazil. The personnel expenditure score shows a performance below the state and national averages. This low performance can be associated with factors such as: the inability to generate revenue to finance the administrative structure and the high commitment of the municipal budget with the payroll of municipal servers and postponement of payments by the municipal power.

[85] Mosaner, M.; Santos, D.; Seifer, P. Índice de Progresso Social na Amazônia Brasileira - IPS Amazônia 2021. Banco de dados exportados. Available at https://ipsamazonia.org.br/dashboard#aspects%5B%5D=1&aspects%5B%5D=2&aspects%5B%5D=3&aspects%5B%5D=4&map-view=city&map-type=performance&active-cat=1&page=1&tab=map. Accessed on: 23/09/2022.

[86] Rocha, R.; Filho, N.; Oliveira, A.; Komatsu, B. A relação entre o ensino superior público e privado e a renda e emprego nos municípios brasileiros. Revista PPE, v. 47, n. 3, 2017, p. 39-69.

[87] Firjan: Federação das Indústrias do Estado do Rio de Janeiro FIRJAN. IFGF 2021: Índice Firjan de Gestão Fiscal. Rio de Janeiro: Firjan, 2021. Rio de Janeiro: Firjan, 2021. Available at: < https://www.firjan.com.br/data/files/2E/D2/DD/93/82E9C7109125A9C7A8A809C2/firjan-IFGF-edicao-2021.pdf>. Accessed on: 24/09/2022.

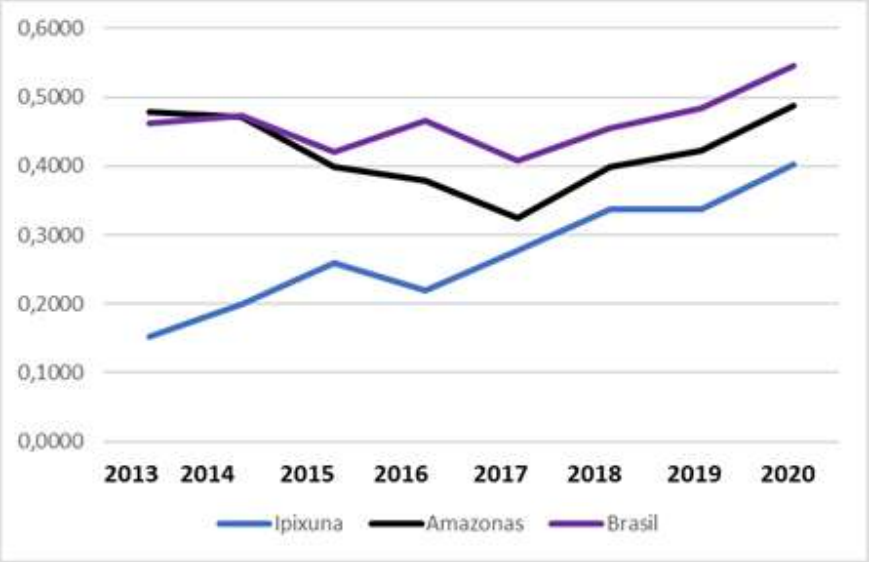

Figure 15. Historical series of the General IFGF of the municipality of Ipixuna, Amazonas State, Brazil[88].

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The interviewed residents of the communities presented systematic complaints that the municipality is very absent and provides precarious public services, especially for these populations that live in locations far from the headquarters and close to the borders with other municipalities and the state of Acre.

As for the Municipal Gross Domestic Product, a survey by the IBGE in partnership with the Superintendence of the Manaus Free Trade Zone (SUFRAMA) pointed out that in 2019, the administration and public services sector (defense, education, public health, and social security) had the highest added value. The public sector contribution totaled 87%, with 15% from public utilities and 72% from public administration[89]. Agriculture and livestock contributed 9% of GDP, and industry 4%. This indicates that most of the local economy's resources revolve around and depend on the jobs generated by public service, while other productive sectors are atrophied.

Land use and cover

[88] Firjan: Federação das Indústrias do Estado do Rio de Janeiro FIRJAN. IFGF 2021: Índice Firjan de Gestão Fiscal. Rio de Janeiro: Firjan, 2021. Rio de Janeiro: Firjan, 2021. Available at: < https://www.firjan.com.br/data/files/2E/D2/DD/93/82E9C7109125A9C7A8A809C2/firjan-IFGF-edicao-2021.pdf>. Accessed on: 24/09/2022

[89] IBGE - Instituto Brasileiro de Geografia e Estatística, em parceria com os Órgãos Estaduais de Estatística, Secretarias Estaduais de Governo e Superintendência da Zona Franca de Manaus – SUFRAMA, 2019. Available at: < https://cidades.ibge.gov.br/brasil/am/ipixuna/pesquisa/38/46996>. Accessed on: 24/09/2022.

According to the IPS Environmental Quality dimension[90], about 38% of the total area of Ipixuna is occupied by legally protected areas (e.g., Conservation Units, Indigenous Lands and others), but the municipality conserves a large area of forest which corresponds to about 97% of the total territory[91]. According to the 2017 Agricultural Census[92], the municipality had about 1,099 agricultural establishments occupying an area of 27,243 hectares, which corresponds to 2.25% of the municipal territory. Of these areas occupied with farming activities, about 56.3% were dedicated to livestock and other animal husbandry. The Census also pointed out that 59% of the areas destined for livestock or other animal breeding were occupied by pastures.

According to a survey carried out by MapBiomas[93], the municipality of Ipixuna presented an evolution of burned areas with more intense peaks in the years 2005, 2017 and 2019 (Figure 16). The year 2005 had the highest amount of burned area in the period from 1985 to 2020, reaching 3,096.53 hectares. In the year 2020, Ipixuna had an area of 1,010.46 hectares burned by anthropic fire.

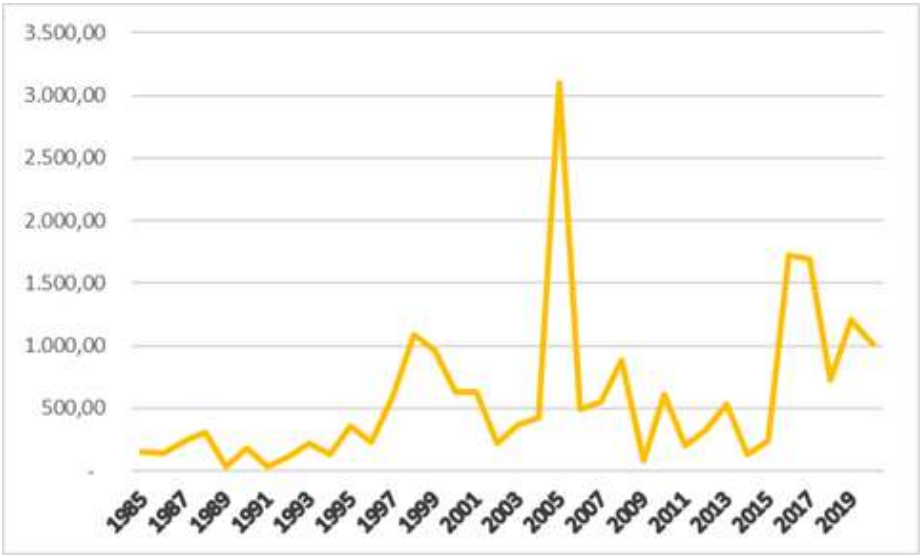

Figure 16. Historical series of burned area (hectare) per year in the municipality of Ipixuna, Amazonas State, Brazil[94].

[90] Mosaner, M.; Santos, D.; Seifer, P. Índice de Progresso Social na Amazônia Brasileira - IPS Amazônia 2021. Banco de dados exportados. Available at https://ipsamazonia.org.br/dashboard#aspects%5B%5D=1&aspects%5B%5D=2&aspects%5B%5D=3&aspects%5B%5D=4&map-view=city&map-type=performance&active-cat=1&page=1&tab=map. Accessed on: 23/09/2022.

[91] IBGE - Instituto Brasileiro de Geografia e Estatística. Censo Agropecuário 2017 - Resultados definitivos. Available at: <https://sidra.ibge.gov.br/pesquisa/censo-agropecuario/censo-agropecuario-2017. Accessed em: 24/09/2022.

[92] IBGE - Instituto Brasileiro de Geografia e Estatística. Censo Agropecuário 2017 - Resultados definitivos. Available at: <https://sidra.ibge.gov.br/pesquisa/censo-agropecuario/censo-agropecuario-2017. Accessed on: 24/09/2022.

[93] Projeto MapBiomas. Mapeamento de cicatrizes de fogo no Brasil – Coleção 1. Available at: <https://mapbiomas.org/estatisticas>. Accessed on: 24/09/2022.

[94] Projeto MapBiomas. Mapeamento de cicatrizes de fogo no Brasil – Coleção 1. Available at: <https://mapbiomas.org/estatisticas>. Accessed on: 24/09/2022.

According to MapBiomas data, in 2019, Ipixuna was the 20th municipality that burned the most pasture in the state of Amazonas[95]. Unlike what happens in other countries, where the largest share of carbon dioxide pollution is caused by the burning of fossil fuels, in Brazil, the largest sources of Greenhouse Gases (GHG) emissions are: land use change, which contributes with 41%, and agriculture and livestock, with 29% of total GHG emissions[96]. As observed in the municipalities of the Legal Amazon, where there is a large portion of preserved forest, activities that involve changes in land use are the ones that most contribute to GHG emissions. In Ipixuna, this pattern is no different, as land use change activities were responsible for 94% of total GHG emissions[97]. In the ranking of GHG emissions of Brazilian municipalities, Ipixuna occupied the 478th place[98]. Compared to other Brazilian municipalities, Ipixuna has a higher amount of GHG emissions than those found in mostly urban and large municipalities. In 2019, the total gross emission of Ipixuna was 699,398 tons of CO_2e (GWP-AR5)[99].

The IPS data on the 'Environment Quality' component corroborates the aforementioned data.The municipality of Ipixuna had 78.03 points in 2021 for the Environmental Quality component[100], an index above the state average (Figure 17). The IPS 2021 index of total accumulated deforestation in 2020 corresponded to 2.14% of the municipality area, and recent deforestation in 2019 and 2020 was 8.95% of the total accumulated deforestation[101]. In 2020, total hotspots were 3.25 per 1000 inhabitants and CO_2 emissions were 23.47 tons per inhabitant, the 23rd highest in the state[102]. In addition to the fires that

[95] Projeto MapBiomas. Mapeamento de cicatrizes de fogo no Brasil – Coleção 1. Available at: <https://mapbiomas.org/estatisticas>. Accessed on: 24/09/2022.

[96] Plataforma SEEG - Sistema de Estimativa de Emissões de Gases de Efeito Estufa. Participação das principais fontes de emissão de GEE do município em relação ao perfil nacional. Available at: < https://plataforma.seeg.eco.br/territories/am-ipixuna/card?year=2019&cities=true>. Accessed on: 24/09/2022.

[97] Plataforma SEEG - Sistema de Estimativa de Emissões de Gases de Efeito Estufa. Perfil das Emissões nos municípios. Available at: < https://plataforma.seeg.eco.br/territories/am-ipixuna/card?year=2019&cities=true>. Accessed on: 24/09/2022.

[98] Plataforma SEEG - Sistema de Estimativa de Emissões de Gases de Efeito Estufa. Perfil das Emissões nos municípios. Available at : https://plataforma.seeg.eco.br/cities/statistics. Accessed on: 24/09/2022.

[99] Plataforma SEEG - Sistema de Estimativa de Emissões de Gases de Efeito Estufa. Participação das principais fontes de emissão de GEE do município em relação ao perfil nacional. Available at: < https://plataforma.seeg.eco.br/territories/am-ipixuna/card?year=2019&cities=true>. Accessed on: 24/09/2022.

[100] Mosaner, M.; Santos, D.; Seifer, P. Índice de Progresso Social na Amazônia Brasileira - IPS Amazônia 2021. Banco de dados exportados. Available at https://ipsamazonia.org.br/dashboard#aspects%5B%5D=1&aspects%5B%5D=2&aspects%5B%5D=3&aspects%5B%5D=4&map-view=city&map-type=performance&active-cat=1&page=1&tab=map. Accessed on: 23/09/2022.

[101] Mosaner, M.; Santos, D.; Seifer, P. Índice de Progresso Social na Amazônia Brasileira - IPS Amazônia 2021. Banco de dados exportados. Available at https://ipsamazonia.org.br/dashboard#aspects%5B%5D=1&aspects%5B%5D=2&aspects%5B%5D=3&aspects%5B%5D=4&map-view=city&map-type=performance&active-cat=1&page=1&tab=map. Accessed on: 23/09/2022.

[102] Mosaner, M.; Santos, D.; Seifer, P. Índice de Progresso Social na Amazônia Brasileira - IPS Amazônia 2021. Banco de dados exportados. Available at https://ipsamazonia.org.br/dashboard#aspects%5B%5D=1&aspects%5B%5D=2&aspects%5B%5D=3&aspects%5B%5D=4&map-view=city&map-type=performance&active-cat=1&page=1&tab=map. Accessed on: 23/09/2022.

compromise ecosystems on which local populations depend for subsistence and income generation, the IBGE registered 1,527 people who were in areas at risk of flooding, flash floods and landslides[103].

In a general overview, the municipality of Ipixuna presented a relatively neutral IPS obtaining a score of 51.27, but with a ranking of 632nd among the 771 Amazonian municipalities (Figure 17). However, the Opportunities dimension performed relatively poorly, scoring only 35.37. In this dimension, the components that had the most negative impact on the municipality were: 'social inclusion', indicating a high rate of violence against indigenous peoples and women; and 'access to higher education', with a weak indication for jobs with higher education.

Although the Foundations of Wellbeing dimension showed a relatively neutral development, the Access to Basic Knowledge component showed relatively low values (Figure 17). Its critical indicators are the School Dropout Rate, Age/Grade Distortion in Elementary School and in High School, and the High School Pass Rate. The Environmental Quality component also showed a critical indicator for Recent Deforestation. On the other hand, the dimension Basic Human Needs presented critical indicators for Infant Mortality and Mortality from infectious diseases within the Basic Human Needs component.

[103] IBGE - Instituto Brasileiro de Geografia e Estatística. População exposta ao risco: População em Áreas de Risco no Brasil – 2010. IBGE, 2018. Available at: <https://www.ibge.gov.br/geociencias/informacoes-ambientais/estudos-ambientais/21538-populacao-em-areas-de-risco-no-brasil.html?=&t=acesso-ao-produto. Accessed on: 24/09/2022.

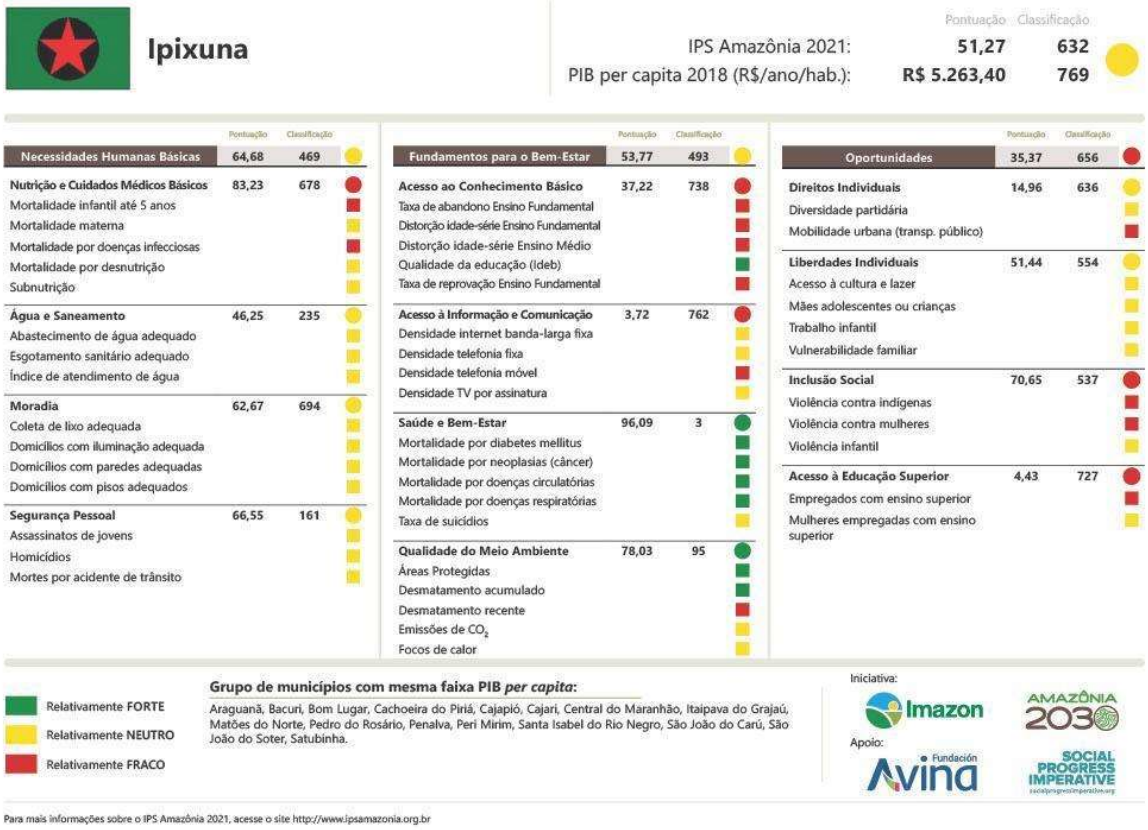

Figure 17. Scorecard of the municipality of Ipixuna according to the dimensions of the IPS Amazônia 2021.[104]

Cultural and Archaeological Heritage

In the scope of the Cultural Heritage, the municipality of Ipixuna presents some cultural manifestations and practices of the intangible sphere recognized and registered by the National Institute of Historic and Artistic Heritage (IPHAN). As it is located in the northern region of Brazil, Ipixuna is in the cultural region stipulated by IPHAN for the occurrence of the Craft of Tacacazeira in the North Region. With a national scope and mainly being present in the interior of the Amazon and Brazil, the Knowledge and Practices of Traditional Midwives in Brazil are also recognized by IPHAN as Heritage. Both the Craft of Tacacazeira in the North Region, and Knowledge and Practices of Traditional Midwives in Brazil are in the process of being registered by the federal agency[105].

The Roda de Capoeira and the Capoeira Masters Craft are intangible cultural assets registered by IPHAN, inscribed in the Registration Book of Forms of Expression and the Registration Book of

[104] Mosaner, M.; Santos, D.; Seifer, P. Índice de Progresso Social na Amazônia Brasileira - IPS Amazônia 2021. Scorecards do estado do Amazonas. Belém: Imazon, 2021.

[105] IPHAN – Instituto do Patrimônio Histórico Artístico Nacional. Patrimônio cultural imaterial em processo de registro. Available at: <http://portal.iphan.gov.br/>. Accessed on: 25/09/2022.

Knowledge, respectively, and distributed throughout the national territory, consequently being present in the municipality of Ipixuna. It is also important to highlight that Roda de Capoeira is on the Representative list of Intangible Cultural Heritage in Brazil recognized by UNESCO[106].

The Craft of the Baianas de Acarajé, registered in the IPHAN's Registration Book of Knowledge, is also an intangible cultural asset that is distributed throughout the state of Amazonas. Due to the migration of northeasterners to the northern region, this knowledge and practice, which was almost exclusively women's domain, spread to all the states in the northern region (IPHAN)[107].

According to IPHAN records of identification and location of archaeological sites consulted through the SICG (Integrated System of Knowledge and Management) platform, no archaeological sites were located in the territory belonging to the municipality of Ipixuna[108]. However, when accessing this information, six archaeological sites were found along the banks of the Juruá river in the municipality of Rodrigues Alves, Acre State. This is a group of sites with ceramic and litho-ceramic remains that are distributed along or near the banks of the Juruá river. This set of archeological sites is located along the banks and proximity of the Juruá river, about 130 km from Ipixuna.

Although there are no archaeological sites registered in the SICG for the municipality, the region of Ipixuna and the Juruá river have a high archaeological potential due to the preservation of large areas with native forest, the presence of archaeological remains in the soil and the dense past occupation of indigenous and riverside communities along the rivers and streams of the Amazon.

The lack of identified archaeological sites is conditioned, most likely, to the lack of research and studies in the region. Hence, it is assumed that the probability of the existence of archaeological sites in Ipixuna is high.

In this way one can draw a parallel and correlate the preservation of forests with the preservation and protection of archaeological sites. In this relationship, forests, besides performing the maintenance and conservation of its biodiversity, climate and traditional communities, act in a similar way with the archeological vestiges and sites. In this perspective, once preserved, the forest protects the soil and consequently the archaeological remains and sites.

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

The Seringueira II project zone (Figure 18) encompasses the geographic limit of the Amazon biome, the project area (initial instance) which is located in the municipality of Ipixuna - AM, in the

[106] IPHAN – Instituto do Patrimônio Histórico Artístico Nacional. Patrimônio cultural imaterial, Bens em processo de registro, Patrimônio Cultural Material e Imaterial do Brasil. IPHAN – Instituto do Patrimônio Histórico Artístico Nacional. Available at: < http://portal.iphan.gov.br/>. Accessed on: 25/09/2022.

[107] IPHAN – Instituto do Patrimônio Histórico Artístico Nacional. Patrimônio cultural imaterial, Bens registrados Patrimônio Cultural Material e Imaterial do Brasil. IPHAN – Instituto do Patrimônio Histórico Artístico Nacional. Available at: <http://portal.iphan.gov.br/>. Accessed on: 25/09/2022.

[108] Plataforma SICG - Sistema Integrado de Conhecimento e Gestão. Sítios Arqueológicos. Available at: < https://sicg.iphan.gov.br/sicg/pesquisarBem>. Accessed on: 25/09/2022.

Seringais: Liberdade, Redenção, Deserto da Liberdade - new instances may be included - and a supplementary area where additional project activities will be carried out.

Thus, the project area includes the communities of Açaituba, Porto Mappes, Campinas, Tigre and Deus é por Nós on the Juruá river, and the São José and São Luiz communities on the Liberdade river, identified in sections **2.1.8** and **2.1.9**, whose population will benefit from the project activities. In addition, areas of high conservation value (HCV) for biodiversity, such as priority areas and protected areas, are also found in the project zone.

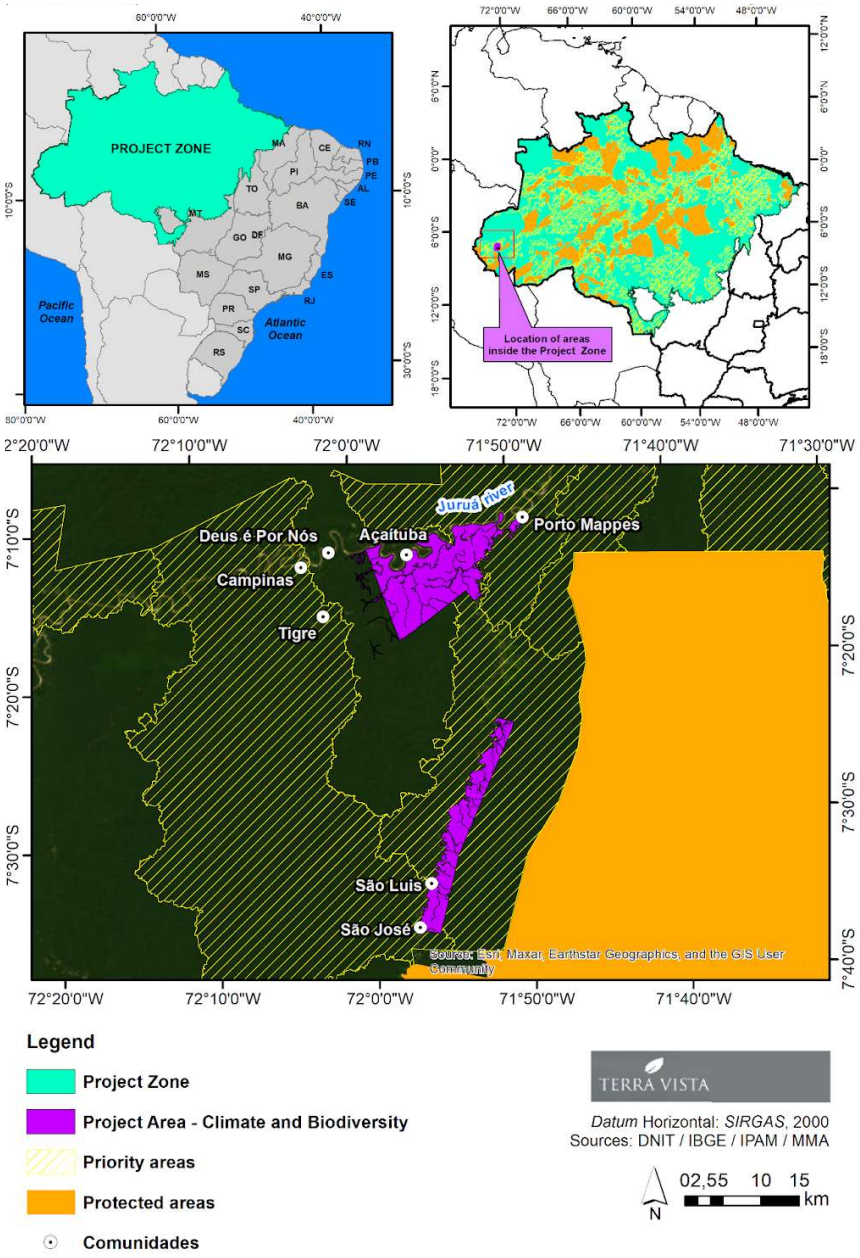

Figure 18. Seringueira II project zone, Amazonas State, Brazil.

2.1.8 Stakeholder Identification (G1.5)

Corresponding the first step in developing carbon projects, the identification of stakeholders was done in two main steps[109]. The first step was conducted remotely, based on the reading of bibliographic references about the municipality and the region, internet searches, consultation with the landowners, and contact with local people. The second was a face-to-face step, conducted during the first field campaign, with the application of rapid-participatory diagnostic methods, questionnaires on sustainable livelihoods, and semi-structured interviews.

The stakeholder identification process aimed to find actors who maintain a relationship with the territory, either directly or indirectly. In this way, we seek to detect organizations or actors that, even if they don't live on the property or close to the project area, can make use of it or help create a network aimed at favoring conservation actions and strengthening sustainable economic chains.

In the first step of the stakeholder identification process, an internet survey was conducted on August 1st and 2nd, 2022, and a second check on September 7th and 8th, 2022. On these occasions, search engines were consulted, especially Google, combining keywords such as the name of the municipality (e.g., "Ipixuna") and the categories of organizations of interest (e.g., "NGO" or "company", "association"). This search was complemented by consulting more specific sites aimed at registering companies[110], official websites of public authorities[111], of transparency agencies[112], and NGOs[113]. The search privileged stakeholders who act, whether in the public power, in the market, or in the third sector, in activities related to conservation, agriculture and livestock, and mainly linked to the handling of timber and non-timber forest products. As a result, a list of 73 stakeholders from various sectors active in the municipality of Ipixuna - AM and Cruzeiro do Sul - AC was generated. This list provided us with an overview of the organizations present in the municipality and served as a basis to guide the technical team's field work and primary data analysis.

Concomitantly, satellite images were used to identify possible buildings within the property and the surrounding area. In accordance with the AFOLU Non-Permanence Risk Tool v4.0, this sweep respected the 20 km buffer radius from the project area. The objective was, through photointerpretation, to identify possible residents in the vicinity of the project so that they can be integrated in the stakeholder identification steps. The property boundary, the project area, the 20 km buffer, and the presence of buildings are shown in green in Figure 19.

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[109] Richards, M. and Panfil, S.N. 2011. Social and Biodiversity Impact Assessment (SBIA) Manual for REDD+ Projects: Part 1 - Core Guidance for Project Proponents. Climate, Community & Biodiversity Alliance, Forest Trends, Fauna & Flora International, and Rainforest Alliance. Washington, DC. 89 pgs.

[110] Empresas do Brasil. Available at: <https://empresasdobrasil.com>, Accessed on: 01/09/22.

[111] Prefeitura Municipal de Ipixuna, Amazonas. Available at: https://ipixuna.am.gov.br/. Accessed on: 01/09/22. Governo do Estado do Amazonas. Available at: < https://www.amazonas.am.gov.br>. Accessed on: 01/09/22.

[112] Portal de Acesso à Informação e Transparência dos Municípios do Estado do Amazonas. Available at: < https://transparenciamunicipalaam.org.br>. Accessed on: 02/09/22.

[113] ONGs Brasil. Available at: < http://www.ongsbrasil.com.br>. Accessed on: 02/09/22.

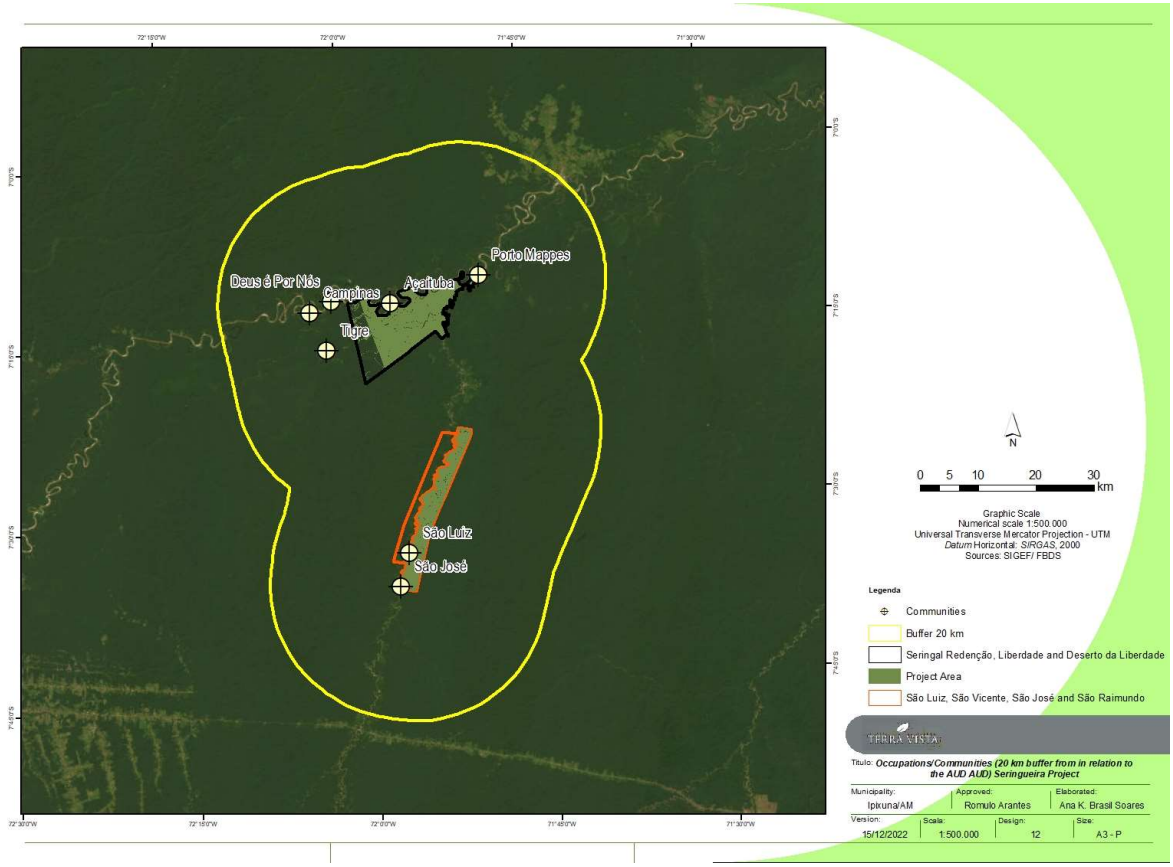


Figure 19. Location of communities identified in the region of the Seringueira II project.

These remote steps subsidized the fieldwork for the Terra Vista technical team between August 15th and 19th, 2022. The technical team visited the Seringal Redenção, Seringal Deserto da Liberdade, and Seringal Liberdade properties located on the banks of the Juruá river on August 15th, 18th, and 19th. On the 16th and 17th of August, the properties Seringal São Luiz and São José, located on the banks of the Liberdade river, were visited. This effort was aimed at identifying communities and residents of the properties.

Access to all the properties is by the river. During the Amazon summer period, it is possible to reach the properties located on the banks of the Juruá river (Seringal Redenção, Seringal Deserto da Liberdade, and Seringal Liberdade) by boat powered by a pulp-type engine. In this case, it is possible to reach the properties in a four-and-a-half-hour trip from the town of Cruzeiro do Sul[114]. As for the properties located on the Liberdade river, the São Luiz and São José rubber plantations, access is only possible by rabeta boat. In this case, it is necessary to travel 80 km by car over a stretch of BR-364 from Cruzeiro do Sul to the bridge over the Liberdade river, and from there to travel by boat for over 2 hours 30 minutes.

[114]Estimate based on a 200 hp pulp engine.

During the Amazon winter, the duration of these trips can be significantly shortened due to the rivers' improved navigation conditions.

Seven communities were identified. On the banks of the Liberdade river are the communities São José and São Luiz (Table 9). On the banks of the Juruá river are the communities Campinas, Deus é por Nós, Açaituba, Porto Mappes, and a community at Igarapé Tigre (Table 10). During the technical team's visit, it was clarified by the interlocutors that the residents of the isolated houses are usually relatives of those who live in the aforementioned communities, to whom they resort in cases of illness, trade, or leisure.

Table 9. Communities, location and number of families on the Liberdade river.

Community name	Location	Number of families
São José	7°36'15.25 "S 71°57'8.15 "W	12
São Luiz	7°33'29.61 "S 71°56'14.43 "W	34

Table 10. List of communities, location and number of families found close to the Liberdade river.

Community name	Location	Number of families
Açaituba	7°12'31.13 "S 71°56'27.87 "W	15
Porto Mappes	7°10'35.19 "S 71°48'56.01 "W	8
Campinas	7°12'55.10 "S 72° 3'14.75 "W	14
Tigre	7°16'7.31 "S 72° 2'1.63 "W	21
Deus é por nós	7°12'4.40 "S 72° 1'26.55 "W	5

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

Based on the current data, the stakeholders were grouped into the following groups: project proponent, public authorities, communities, and the third sector. The description of the stakeholders according to their right, interest and relevance in participating in the project is summarized in Table 11.

Table 11. Description of the Seringueira II project stakeholders.

Group of Stakeholders Involved in the Project	Rights Regarding the Project	Interests in Participation in the Project	Relevance in Participation
Project Proponent	Owner of the farm where the Seringueira II project will be developed, he is co-owner of the credits and responsible for meeting the legal conditions for the development and permanence of the project.	Ensure support to the technical team to develop the studies for generating carbon credits in the project area, ensure access to community members that depend on the project area, and support through projects their aspects of life determined as priorities, such as education, health, income generation, human rights, environment, and culture.	High - The engagement of this project proponent is an essential condition for the development of actions related to the CCB certification.
Public Authorities: Chico Mendes Institute for Biodiversity Conservation (IBAMA); National Institute of Colonization and Agrarian Reform (INCRA); City Hall of Ipixuna; Municipal Secretariat for the Environment (SEMA) of Ipixuna; Municipal Secretary of Education (SEDUC) of Ipixuna; Municipal Health Secretariat (SMS) of Ipixuna; Municipal Secretary of Production and Supply of Ipixuna; Municipal Secretary of Social Assistance of Ipixuna; Municipal Civil Defense - Ipixuna; Secretary of State for the Environment (Sema - AM); Institute for Sustainable Agricultural and Forestry Development of the state of Amazonas (IDAM)	Partners for the implementation or improvement of public policies with local stakeholders.	Strengthen the relationship between the communities benefited by the project's activities and the government, raising awareness of its benefits, especially in terms of communities, climate, and biodiversity.	High - Organizations are responsible for developing and enforcing social and environmental policies, as well as monitoring them.

Group of Stakeholders Involved in the Project	Rights Regarding the Project	Interests in Participation in the Project	Relevance in Participation
Institute for Environmental Protection of Amazonas (IPAAM)			
Extractive communities: Juruá river: Açaítuba (15 families), Porto Mappes (8 families), Campinas (14 families), Tigre (21 families) and Deus é Por Nós (5 families); Liberdade river: São José (12 families) and São Luiz (34 families) .	Beneficiaries of projects related to the CCB certification and users of the property authorized by the owner. Legitimate and legal utilities and occupants of the project area.	Continue to access and use areas in which they can extract non-timber products and access projects for improving the production chain, associativism, and improving the quality of life.	High - Essential agents for surveillance of the territory, control of deforestation and propagation of management practices, sustainability and strengthening of productive chains of non-timber forest products.
Third Sector: Z-1 Fishermen's Colony in Cruzeiro do Sul (AC); Sustainable Amazon Foundation (FAS); Ipixuna Agroextractivism Support Association; Mixed Agricultural Cooperative of Rural Producers of the Juruá Valley; Rural Union of Cruzeiro do Sul; Associação dos Agropecuaristas de Ipixuna - Am; Community and Evangelical Culture Municipal Association of Ipixuna; Cooperative of Family Farming and Solidarity Economy Producers of Nova Cintra (COOPERCINTRA); Cooperative of Family Producers and Solidarity Economy of the Mahogany Forest (COOPERMOGNO)	Partners stakeholders in the defense of social rights and facilitation of integration into higher value production chains.	Raise awareness of the project's beneficiary stakeholders about their rights, strengthen associative relationships, provide access to the productive chain of higher value non-timber forest products.	Medium - They are not executors of public policies, but they can help improve productive chains, offer training to add value to the products, and strengthen the associations of communities benefited by the project. Eventually, they can act as a representative body of community members.
Universities/Research Centers - Universidade Do Estado do Amazonas - UEA Ipixuna; Universidade Federal do	Stakeholder partners in improving techniques and management of agricultural production and non-timber forest	Support and dissemination of good extractivism and post-harvest processing practices.	Medium - They are not executors of public policies, but they can help improve productive chains, offer training to

Group of Stakeholders Involved in the Project	Rights Regarding the Project	Interests in Participation in the Project	Relevance in Participation
Acre (UFAC) - Campus Cruzeiro do Sul; Agência de Assistência Técnica e Extensão Rural (ATER)/IDAM.	resources with a view to adding value to the product.	More productive and more conservationist extractive techniques of the target species. Logistics and production packaging	add value to the products, and strengthen the associations of communities benefited by the project. Eventually, they can act as a representative body of community members.

2.1.10 Sectoral Scope and Project Type

- Sectoral Scope: AFOLU (Scope 14): Agriculture, Forestry, and Other Land Uses;
- Project Category: REDD (Reducing Emissions from Deforestation and Forest Degradation).
- Project Activity: AUD (Avoided Unplanned Deforestation).

The Seringueira II project is not a grouped project.

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

The main objective of the Seringueira II project is to promote actions aimed at reducing greenhouse gasses (GHG) emissions from unplanned 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.

A brief description of the activities that make up the theory of change of the Seringueira II project is presented below.

Maintenance of forest cover:

Maintenance of 16,483.02 ha of forest coverage and reduction of 591.917,73 GHG emissions (tCO_2e) by stopping deforestation. 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 containment 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, Seringueira II 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.

Strategies for improving quality of life and technology transfer:

Based on the socio-economic diagnosis, the result of interviews and meetings held with the participating communities, with the aim of getting to know the local reality and the expectations of the target audience, the field team identified the main social demands and the mitigating actions capable of promoting improvements in 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 water collection and distribution systems using filters for treatment; c) toilets with a dry pit d) Implementation of collective internet access systems; e) Implementation a school (São José community) and f) Acquisition of a vessel for monitoring the project area.

The communities involved will also benefit from training and courses aimed at: a) Strengthening the productive chain flour and meliponiculture, adding value to the product and community 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) Encourage the training and involvement of young people and women in economic activities, increasing inclusion and strengthening vulnerable social groups.

As a result, the project activity will have a positive impact by strengthening the autonomy of families, providing decent conditions for community infrastructure and ensuring better conditions for permanence in the territory and development of new knowledge to improve productive capacities in an inclusive way.

2.1.12 Sustainable Development

One of the goals of the Seringueira II project is to promote sustainable development in the region, with the joint actions of all stakeholders being the drivers of net benefits for the local communities, climate and biodiversity, under the facilitation and encouragement of Terra Vista Gestora de Recursos Ltd. Based on this support and according to the expected impacts, the project will contribute to the United Nations Sustainable Development Goals (SDGs) described below.

	<u>Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture</u> The project brings together the socio-economic demands of the communities with local opportunities for more resilient economic activities, through the promotion and fostering of sustainable practices. To this end, the project makes environmental education and community training actions possible, in association with different partners and extensionists, in order to promote knowledge about the importance of reconciling good productive practices with the preservation and maintenance of natural resources. In addition to fostering perceptions about the relevance and advantages of sustainable production systems, the project also works to raise awareness among families about the value of sustainable exploitation of non-timber forest sustainable exploitation of non-timber forest resources for their survival, income generation, well-being and, consequently, the maintenance of the standing forest.

	<u>Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all</u> The project enables and encourages access to education through technical courses and training focused on the environmental and socioeconomic areas, especially on resilient agricultural and livestock production practices, sustainable extraction of non-timber forest products, education on hunting, fishing, and preservation of threatened species. To do this, it relies on the support and collaboration of specialized partners and the articulation with related public agencies, in order to guarantee effectiveness and stakeholder engagement. These capacity-building activities promoted by the project allow for the strengthening of local governance, the consolidation of a sense of belonging, access to information, better employment conditions, and income diversification; especially for extractive and small rural producers, consequently leading to the maintenance of the forest and its resources.

	Goal 12. Ensure sustainable consumption and production patterns The project includes the "Fostering sustainable practices" with actions aimed at identifying potential activities related to resilient subsistence agriculture, sustainable livestock farming, and low-impact extractivism and forest management; according to the demand and profile of local communities. In this sense, the project works on the dissemination of knowledge, instructions, and experiences focused on the efficient use of natural resources and environmental preservation; focusing on sustainable business chains through greater integration among the stakeholders, thus generating income, well-being, and cultural identity for the fostered communities.

	Goal 13. Take urgent action to combat climate change and its impacts All the activities developed by the project aim to take actions to combat climate change and its impacts and, consequently, to reduce environmental degradation in the project area. In addition to stakeholder engagement and governance strengthening, the project also promotes satellite and field monitoring of deforestation. The heritage surveillance within the Seringueira II project area, supplied with geospatial information, is effective and assertive in the actions to prevent and stop the conversion of forest lands. The project has the potential to reduce 1,100,000 tCO2e of GHG emissions in 30 years, collaborating directly with the Brazilian goal of reducing emissions.

	Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss The project area is located in a region considered extremely relevant for biodiversity conservation, creating ecological corridors in a region that presents great pressure from deforestation, which imposes a high impact on biodiversity. Thus, the project focuses efforts on long-term monitoring of ecological indicators associated with practices arising from conservation activities on populations and ecosystems both on and off property. Consequently, the project aims to minimize habitat loss, changes in landscape, and climate change. To this end, it seeks to engage, involve, and sensitize all stakeholders about the importance of biodiversity (fauna and flora) in providing ecosystem services, maintaining landscape connectivity, controlling environmental degradation, and limiting the overuse of natural resources. Environmental education lectures on hunting and fishing, sustainable livelihood training, and workshops and activities on local ecological aspects are aimed primarily at surrounding community groups, who eventually pass through the property and use the forest resources. This participatory involvement and knowledge of good production practices promotes the strengthening of local governance and the awareness of the value and socio-environmental importance of the forest, ensuring positive impacts on the biodiversity in the project area.

Some national policies for the inclusion of riverside populations that extract products from standing forests, such as the development of family farming (National Support Program for Family Farming - PRONAF - Federal Law nº 11,326 /2006) and the Sharing of Benefits (Biodiversity Law - Federal Law nº.

13,123/2015), among others, were initiatives adapted in the Amazon to promote the sustainable development of riverside populations. These policies on the side of strengthening the more environmental, economic, and productive dimensions should be analyzed together with others related to social strengthening, such as the Unified Health System (SUS - Federal Law nº 8,080/1990) and policies to achieve education quality goals, accompanied by the national education evaluation system (PNE - Law nº 13,005/2014 and updates).

These policies depend essentially on the states and municipalities for their application throughout the national territory. As we have seen that the municipality of Ipixuna ranks in several very low positions in various indicators of the application of these public policies and of its own management, the Seringueira II project may come to provide complementary capillarity in all these dimensions of the livelihoods of the communities directly related to the project.

Strengthening the means for environmental and forest protection, meeting the aspirations of the communities, as the project also facilitates access to energy, internet, drinking water and improvements in the productive system will allow the resource bases to improve and provide a better quality of life for the target population.

2.1.13 Implementation Schedule (G1.9)

The summary schedule of activities related to the development and implementation of the Seringueira II project is presented in Table 12.

Table 12. Detailed implementation schedule of the main activities related to the Seringueira II project.

Date	Milestone(s) in the project's development and implementation
July 2020	Start date
July 2022	First field visit to the project area: identification of residents, validation of the socio-environmental characterization (forest cover, biodiversity and communities) and preliminary presentation of information about the Seringueira II project.
August 2022	Meeting with stakeholders, mapping priority demands to communities and prior presentation of the scope and activities of the project.
September 2022	Consolidation of the project design and action plan
	Free, prior and informed consent by the landowners
November 2022	Biomass forest inventory in the project area with floristic survey and phytosociological analysis.
December 2022	Feedback on the social baseline diagnosis and community public consultation: São José and São Luiz communities
	Contracting the validation and verification body and the credit registry platform

	Submission of the Project Description (PD) summary in the Verra registry system
January 2023	Feedback on the social baseline diagnosis and community public consultation: Açaituba, Porto Mappes, Campinas, Tigre and Deus é por Nós Communities
March 2023	Validation and verification: production of monitoring reports for validation and verification, field audit follow-up, credit record
July 2023 to July 2050	Development of socio-environmental and governance programs, annual validations, monitoring of forest cover, biodiversity, and project emissions

2.1.14 Project Start Date

On July 17, 2020, Laiz Maria Montenegro Mappes, one of the owners of the rural properties "Seringal Liberdade, Seringal Deserto da Liberdade and Seringal Redenção," requested georeferencing for the land and environmental regularization of the properties, aiming at the development of forest preservation projects for the origination of carbon credits. Land regularization is the first investment for project development. Therefore, considering the methodology criteria, the project start date is July 17, 2020.

2.1.15 Benefits Assessment and Crediting Period (G1.9)

The crediting period of the Seringueira II project will be from July 17, 2020 (the start date) to July 17, 2050, spanning 30 years.

There will be ongoing monitoring of the benefits to climate, communities and biodiversity, and reports will be submitted to the CCB for verification throughout the project's lifetime.

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

The crediting period for the Seringueira II 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 are made.

The development of activities related to the climate, community, and biodiversity scope, along with the monitoring of parameters related to these scopes, occurs through a second major investment of the project. This investment is made by charging the first credits, which come from the first verification of the project through the VCS certification. In this way, the assessment of changes related to climate, community and biodiversity benefits starts soon after the start of the project's crediting period.

2.1.17 Estimated GHG Emission Reductions or Removals

The annual estimates of GHG emission reductions or removals over the duration of the Seringueira II project are presented in Table 13.

Table 13. Estimated reductions or removals of GHG emissions for the Seringueira II project.

Year	Emissions (tCO_2e)
2021	19,730.59
2022	19,730.59
2023	19,730.59
2024	19,730.59
2025	19,730.59
2026	19,730.59
2027	19,730.59
2028	19,730.59
2029	19,730.59
2030	19,730.59
2031	19,730.59
2032	19,730.59
2033	19,730.59
2034	19,730.59
2035	19,730.59
2036	19,730.59
2037	19,730.59
2038	19,730.59
2039	19,730.59
2040	19,730.59
2041	19,730.59
2042	19,730.59
2043	19,730.59
2044	19,730.59
2045	19,730.59
2046	19,730.59
2047	19,730.59

2048	19,730.59
2049	19,730.59
2050	19,730.59
Total estimated ERs	591,917.73
Total number of crediting years	30
Average annual ERs	19,730.59

2.1.18 Risks to the Project (G1.10)

The “AFOLU Non-Permanence Risk Tool, v4.0”, of September 19, 2019, version 4.0, establishes the procedures for carrying out the non-permanence risk analysis and matching the credit buffer for voluntary projects within the AFOLU sector. Table 14 shows the impact of the project on each of the risk categories (internal, external, and natural). As specified in the methodology, the minimum risk rate of an AFOLU project must be equal to 10%, therefore, the final risk value was rounded up to that. The information described on the assessment of each risk factor in each category and subcategory can be found in attachment 3. All data, grounds, assumptions, and justifications were provided to the validation/verification bodies.

Table 14. Summary of the Risk Analysis of Non-Permanence of the Seringueira II project.

Category	Score
Internal Risk	7
External Risk	0
Natural Risk	0
Overall score	**10**

Other potential risks to the expected climate, community and biodiversity benefits as well as mitigation measures were also identified (Table 15).

Table 15. Potential risks to the benefits of climate, community and biodiversity and their mitigation measures.

Identify 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
Frustration due to suspicion or confrontation with the memory of ownership of the project lands	Emergence of land and civil lawsuits that may affect the project's relationship with the communities	Transparent land delimitation by the owner, respecting the ownership rights and the traditional and generational use of the area
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 in order to identify illegal deforestation as quickly as possible and take action.

2.1.19 Benefit Permanence (G1.11)

To maintain and increase the climatic, social and biodiversity benefits in the scenario with the project, a set of actions organized in basic socio-environmental programs will be carried out. Terra Vista Gestora de Recursos Ltd. and its investors have the necessary financial resources to maintain the project activities until the first verification. From then on, the project's resources will come from 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 residents of the

communities. To this end, structuring actions will be implemented to provide water security, basic sanitation, electricity, and internet access. There are also actions to improve the infrastructure of education, with the construction of a school in the São José Community. Added to these actions are the courses and training to strengthen the productive chain, new income alternatives, associativism, and female training, generating benefits that will last from the medium to the long term. In addition,the acquisition of a boat for river transport is planned, with the aim of effectively monitoring the area of the Seringueira II project. To ensure that the activities are having the expected positive impacts, continuous communication and consultation will be maintained throughout the life of the project.

Biodiversity

For biodiversity activities and benefits, a fauna diagnosis and forest inventory will be carried out. Threatened species will be subject to specific monitoring programs to guarantee the conservation status of the area. The areas will be monitored systematically with permanent plots to evaluate the dynamics of the vegetation and fauna survey campaigns to evaluate the conservation of biodiversity.

2.1.20 Financial Sustainability (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.

2.1.21 Grouped Projects

This is a grouped project of Avoided Unplanned Deforestation (AUD) developed by applying the VM0007 v1.6 methodology. The project activities are designed to include more than one "project activity instance", such as new communities or landowners joining the project over its lifetime. This grouped project is designed to allow the expansion of the project activity, after its validation.

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

The incorporation of new areas called "new instances" into the project must follow the following conditions of applicability:

- The project activities described in this PD must be the same ones that will be implemented in future areas of the project.
- The new instances must comply with the applicability conditions established by methodology VM0007;
- The new instances must be located within the same sector scope as the reference region of the Seringueira II project;

- If exceptionally a new instance is located outside the reference region, it will be guaranteed that all assumptions will respect the same conditions of similarity of historical deforestation rates applied to the initial instances of the project;
- Deforestation agents in future instances should act with the same conduct adopted in current instances;
- A single baseline scenario is determined for the entire designated geographic area (reference region), according to the VM0007 methodology, based on the initial instances of the project activity (geodetic polygons of the Seringueira II project area), which are presented in this PDD CCB;
- The new instances should have similar characteristics to the initial instance in terms of additionality;
- They are subject to the same community and non-project biodiversity scenarios determined for the project;
- New instances are subject to the same stakeholder engagement processes (see section **2.3**) and respect for rights to lands, territories and resources, including free, prior and informed consent (see section **2.5**);
- New entities must have sufficient information to implement the proposed monitoring plans for each of the project components, i.e. climate, community and biodiversity (see sections **3.3**, **4.4** and **5.4**).

2) Scalability Limits for Grouped Projects (G1.15)

The scalability of the project is delimited by the geographical area that in this project is defined as the reference region. New project instances can be included on the premise that the similarity criteria are met.

3) Risk Mitigation Approach for Grouped Projects (G1.15)

The risks of non-permanence of the project's benefits are reduced since the project activities proposed for the new instances will be developed by the multidisciplinary technical team of the proponent Terra Vista Gestora de Recursos Ltd., which has the competence to define the project's strategies and activities in addition to being responsible for the proper execution of socio-environmental programs and the monitoring of indicators. Thus, the technical and scientific follow-up of the proponent guarantees a work of excellence and constant improvement.

2.2 Without-project Land Use Scenario and Additionality

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

For the determination of the land use scenario in the absence of the project, the tool for Demonstrating and Assessing Additionality in VCS - Agriculture, Forestry and Other Land Uses (AFOLU) - VT0001 (v3.0)[115] was used as a basis.

The alternative land use scenarios to the proposed VCS AFOLU project activity are credible and non-exclusive:

SCENARIO 1: Continuation of pre-project land use:

Under the pre-project scenario, it is necessary to hire at least one agent for each of the six properties for surveillance and maintenance of the properties, all of which have no economic activity, which implies costs for the landowner.

SCENARIO 2: Project activity on the land within the project boundaries carried out without being registered as the VCS AFOLU project:

Project activities carried out without being registered as the VCS AFOLU project. As there are no economic activities other than REDD+ being implemented, the scenario involves costs but no income. These average annual costs are estimated to be R$298,333.00 throughout the project. The forest conservation and maintenance activity in Scenario 2, therefore, is not financially attractive without revenue from carbon credits.

SCENARIO 3: Conversion of forest to pasture for beef cattle ranching:

Cattle ranching is the predominant component of the regional economy as well as post-deforestation land use in the reference region, in which pasture represents over 99%.

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.

[115] Available at: https://verra.org/methodologies/vt0001-tool-for-the-demonstration-and-assessment-of-additionality-in-vcs-agriculture-forestry-and-other-land-use-afolu-project-activities-v3-0/

2.2.2 Most-Likely Scenario Justification (G2.1)

The most likely scenario observed in the Seringueira II project is that of conversion of land use and land cover from forest to areas destined for cattle ranching illegally through encroachment, logging, and illegal mining (AUD).

For the Seringueira II project, the conversion of forest land to non-forest land in the baseline scenario is considered to be given under the

In the baseline scenario, it is considered the projection of 1,914.10 hectares of deforested forest considering the illegal extraction of timber and firewood, followed by the transformation of deforested areas into pastureland during the project crediting period (detailed in section **3.2.1**) .

Unplanned deforestation is expected to occur on the property in the absence of the Seringueira II project, since the landowner's capacity to afford the efforts and costs to maintain long-term surveillance of the project boundary to avoid unplanned deforestation and eventual encroachment is not real. Although it is illegal to convert forest in protected areas (for the boundary of this project, these are Legal Reserve and Permanent Preservation Area), this has not restricted the expansion of the activity in the region (sections **3.1.4** and **3.1.5**).

2.2.3 Community and Biodiversity Additionality (G2.2)

The main objective of the Seringueira II project is to conserve 23,851.88 ha of the Amazon Rainforest in a region where deforestation pressure is mainly due to land use conversion activities from forest to pasture for cattle ranching. In the absence of the project, the expected scenario would be the advancement of deforestation and degradation of the area. The scenario with the presence of the Seringueira II project will guarantee the allocation of resources necessary for the conservation and protection of the area designated for the project (16,483.02 ha), ensuring multiple benefits for the community and the biodiversity of the region.

Regarding the community, we highlight the implementation of strategies aimed at improving the quality of life of local communities, which would not occur in the absence of the project, such as the implementation of a family photovoltaic system, systems for the collection and distribution of treated water, toilets with dry septic tanks, internet access, construction of a school and acquisition of a boat for monitoring the project area. In addition, the communities will benefit from training and courses aimed at strengthening the production chain of flour and meliponiculture, with management training to diversify the economy, adding value to marketed products, providing more job opportunities and improved income for families, all with an inclusive awareness of socially vulnerable groups.

For biodiversity, the main benefits of the project that would not occur in its absence refer to the conservation of vegetation. The maintenance of continuous forest environments guarantees the maintenance of the gene flow of species and the ecosystem services of the region, promoting the conservation of fauna and flora. Also, the project will allow a greater knowledge of the local biodiversity,

encouraging scientific research in the region through the environmental monitoring planned during its life cycle.

By preserving the forest area used for extractivism and subsistence and which 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.

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

The Seringueira II project is not intended to use any benefits to communities and biodiversity as compensation.

2.3 Stakeholder Engagement

2.3.1 Stakeholder Access to Project Documents (G3.1)

The installation of a private carbon credit project, which has the potential to generate positive impacts and socio-environmental solutions and is thus offered to the market, is associated with a detailed process of accreditation and control of variables and indicators that should measure and demonstrate its deliverables, accomplishments and concrete achievements for forest conservation and the improvement of the living conditions of the populations associated with it.

In view of the feasibility and the establishment of an efficient and assertive communication with the different stakeholders, the project will focus, over time, on the training of local multipliers, through the dissemination of knowledge and information about the project in all its phases. This will demonstrate a maturing of society itself as it takes ownership of the consequences of the presence of local and territorial commitment to the carbon credit, reversing the logic of deforestation as the only alternative.

The project information will be available in an adequate and public language for the broad knowledge of all stakeholders. The documentation will be freely accessible through meetings between the community and the project's technical staff, in written form through printed versions of the project description, monitoring report, validation and verification report, and virtual, through the VERRA and Terra Vista Gestora de Recursos Ltd.

In order to establish such efficient and assertive communication channels, enhancing the capacity for positive feedback between the Seringueira II project, the government, the community of which it will be a part, society in general, and the market, communication will be in accordance with the following premises:

- Adopt ways and channels of communication that encourage dialogue;
- Adopt communication languages that consider the different education levels;
- Adopt means of communication that are easy to update, considering the conditions of logistical access and local infrastructure;
- Recognize and value the specificities of the local/regional culture, which will guide the proposed initiatives and activities;

- Establish directed communication, transmitting information in a guided and frequent way to specific segments of the population, according to the definitions of publics of relationship of this Plan, not prioritizing only mass media and the digital media of low access due to the precarious situation of the digital infrastructure;
- Always seek to take a stance that takes into consideration the perspectives and points of view of each public relationship, seeking to facilitate, on the proponents' side, the understanding and comprehension about the territory's issues and those related to forest conservation and biodiversity as a means of generating carbon credits.

2.3.2 Dissemination of Summary Project Documents (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 Terra Vista Gestora de Recursos Ltd.

2.3.3 Informational Meetings with Stakeholders (G3.1)

The first meetings with extractivist communities were carried out in the period from August 15 to 19, 2022 with the technical team of communities from Terra Vista Gestora de Recursos Ltd. The meetings were carried out to inform people about the implementation of the carbon project, ask questions and get a perception of the communities about the project. The Seringueira II project was presented to the community and a Participatory Rural Appraisal workshop was held with the elaboration of mind maps of the area and diagrams of impacts and interviews based on the Sustainable Livelihoods methodology. The presentation of the project used adequate language to the participating public.

Between December 7th and December 9th, 2022, and between January 11th and January 14th, 2023, new meetings and interviews were held. During the activities, there was the dissemination of information about the Seringueira II project, Participatory Rural Appraisal workshops, and interviews.

The three cycles of meetings were held with the communities from the seven community nuclei already described in section **2.1.9** (Description of Stakeholders). Community issues and positions were raised that shaped the project design decisions. The project results and updates will be publicly available on the internet and will be communicated to the communities and local stakeholders in accessible language.

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

During meetings held with riverside and extractive communities in the project region, information on costs *x* risks *x* benefits was collected using the Participatory Rural Diagnosis methodology. The diagnosis aimed to analyze the level of understanding and the current situation in which they find themselves in order to better understand the process of implementing 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 an expert social group, which communicated in a way that all those present could understand.

From the participatory dialogue, the technical staff and the community listed the following issues:

Costs:

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

Risks:

- Being threatened by invaders (external agents) when they take a position to protect the forest fragments of the project.

Benefits:

- Improvement of home infrastructure with the implementation of a family photovoltaic system, treated water collection and distribution systems, dry pit toilets, and internet access;
- Improvement of educational infrastructure with the construction of the school in the São José community;
- Improvement in river transportation with the acquisition of a boat to monitor the project area;
- New learning that adds value to the commercialized products and generates new income alternatives, providing more job opportunities and improvement in the families' income;
- Strengthening of associativism and community management capacity;
- Strengthening the inclusion of socially vulnerable groups in productive activities.

During 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 funded by the project proponents. The activities are planned to improve the quality of life and make a positive impact. In addition, 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.

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

To inform stakeholders about the validation and verification process, meetings are 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.

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 the project was made available.

2.3.6 Site Visit Information and Opportunities to Communicate with Auditor (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.

2.3.7 Stakeholder Consultations (G3.4)

The articulation between the stakeholders began in August 2022 with meetings between the riverside communities along the Liberdade and Juruá rivers, in the municipality of Ipixuna, which use the project area for extractivism, and the technical staff of Terra Vista Gestora de Recursos Ltd. The meetings were held based on the principles of Participatory Rural Diagnosis (PRD), in which mind maps and experience diagrams were drawn from the information about the project, for the development of a work proposal that would meet the needs of the communities. The photographs of the workshops and the public meeting held with the communities participating in the project, are represented by figures 20 and 21 below.

Figure 20. Application of the MVS questionnaire with the families of the Porto Mappes community.

Figure 21. Presentation of the results of the MVS questionnaire with the families of the Campina community.

In December 2022 and January 2023, public meetings were held with communities to consult with stakeholders who traditionally use the project area. The public meetings addressed both questions regarding potential impacts related to project implementation, expectations regarding benefits, as well as community consent for participation.

To ensure the right to traditional use of the project area, free community access to the area for the extraction of non-timber forest products was established.

During the period September and December 2022, interviews were also conducted with community members in order to establish a baseline that reflects the way of life and the needs of the people. This information, based on the human, social, environmental, physical, and financial dimensions of the MVS, provides a quantitative and qualitative panorama of the socioeconomic and cultural indicators of the localities.

Based on the results obtained, a work plan was developed with activities aimed at reducing the impacts caused by climate change and providing a better adaptation of the communities to climate change. The activities to be implemented to cause exceptional benefits were elaborated following additionality criteria, having as a parameter the real needs listed by the participatory discussions in the meetings with community members and by the analysis of the data obtained from the questionnaires. Figures 22 and 23 show the photos from the territoriality mapping workshop and public consultation held with the communities participating in the project.

Figure 22. Workshop held in the São José Community.

Figure 23. Public consultation held in the Açaituba Community.

The results obtained were discussed and consolidated with the communities in December 2022 and January 2023 in public meetings, one in each community: São José, São Luiz, Campina, Açaituba, Deus é por Nós, Porto Mappes, and Tigre. The meetings were recorded in minutes and approved after consultation with the communities. These meetings were attended by family groups and community presidents.

After the discussion and consolidation of the results obtained, the benefits adequate to the local reality were established and agreed upon, as well as the community participation in the project.

2.3.8 Continued Consultation and Adaptive Management (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 favorable 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 Terra Vista Gestora de Recursos Ltd. 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.

2.3.9 Stakeholder Consultation Channels (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 seringueira2@terravista.eco.br, 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.

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

The project values activities that favor 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.

Based on the mapping of stakeholders, the contacts made, the registration of people and the applied questionnaires, a specific mobilization was carried out through telephone contact with community leaders, in order to participate in the public hearing, in which the current status of the project was presented. For this audience, there was also mobilization via a face-to-face invitation through the visit of technicians from Terra Vista Gestora de Recursos Ltd. in the residences of the communities participating in the project.

In order to strengthen the process of social dialogue with the communities directly involved with the project, residents of riverside communities were invited to participate in a deliberative public hearing on the projects of their interests.

The articulation of the public hearing provided the presence of local communities and enabled a meeting with active participation of community groups. In the meetings, the community is 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.

2.3.11 Anti-Discrimination Assurance (G3.7)

Terra Vista Gestora de Recursos Ltd. has a Code of Ethics and Conduct in common with the other companies that make up the Economic Group (section **2.1.3**). The document governs some guidelines on the behavior of the Group's employees, among them, the contribution to the "development of a workplace free of discrimination based on origin, race, color, gender, age, religion, marital status, physical condition or any other personal characteristic, as well as any form of intimidation or harassment, whether moral, sexual, religious, political or organizational".

Communities are instructed to report potentially unethical and/or illegal conduct, or inappropriate and abusive behavior that generate discomfort and humiliation, as well as any suspicion of sexual and/or

moral harassment, attacks on physical integrity and threats to their superior and/or reporting channel (e-mail and telephone), which may or may not be anonymous.

Terra Vista Gestora de Recursos Ltd. is proud to act with ethics, integrity, transparency and respect for people and requires that these values also be exercised by its employees, customers, service providers, suppliers and partners. The company has a reporting channel that was implemented with the aim of helping to report possible violations of its Code of Conduct, applicable laws or company policies and standards. Collaborators and third parties can make a report, anonymous or not, at their convenience, directly through the website https://my.safe.space/company/terravista.

2.3.12 Feedback and Grievance Redress Procedure (G3.8)

The project proponent understands that stakeholders want and need to be involved in project design, implementation, monitoring and evaluation throughout project lifetime. Therefore, a formal channel was established to receive complaints, compliments or suggestions from the community in general.

This channel also guarantees the option of confidentiality for those who access it, and serves for stakeholders to continuously express their concerns and solve any problems during the planning, implementation and monitoring of the project. Communication can be made via the project's email seringueira2@terravista.eco.br, which is managed by the Terra Vista Gestora de Recursos Ltd., or via the reporting channel https://my.safe.space/company/terravista.

The records will be registered for the control of the manifestations until the availability of answers when the manifestation so requires, respecting the normative deadline of ombudsmen of 20 days plus 20 days for complex subjects such as maximum response time. The responses will be prepared, forwarded, tracked and controlled to ensure the effectiveness of the service.

The procedures of complaint return and redress will have as the main objective a consensus between the parties. If there is no agreement between them, the claims and complaints will be formally recorded in the minutes of the meeting for later verification of new possibilities for negotiation. If there is no understanding between the actors, the conflict will be directed to the judicial instances.

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

The manifestations presented by the communities will be carried out by email or through the complaint channel (whistleblowing channel) with the completion of a digital form. Manifestations will be forwarded for discussion and feedback, under the responsibility of the Terra Vista Gestora de Recursos Ltd. 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.

2.3.14 Worker Training (G3.9)

Technical training and local development are fundamental for the consolidation of a carbon credit generation project. Mainly when the place of origin is used traditionally through extractivism. The realization of extractivism as a management of non-timber products depends on keeping the forest standing. In this cycle, in which the maintenance of the forest is made possible by the exploration of the flora by the extractivists in a sustainable way, and from another point of view, it allows the carrying out of traditional activities of non-timber forest products, the training and strengthening of the technical capacity associated with the valuing traditional knowledge will result in the continuity of the project and an improvement in the quality of life in local communities.

In general, the technical training proposed by the Seringueira II project intends to integrate social technologies in the communities of the Juruá and Liberdade rivers and share the knowledge produced with the families. The training proposal also intends to address the strengthening of the extractive productive chain and institutionally strengthen the local association. The training proposal can be seen in the Activities and Theory of Change table. Below is a summary of activities.

Training in social technologies:

- Training for maintenance of water collection and distribution systems;
- Training for maintenance of the photovoltaic system;
- Training for maintenance of the communication system;

Strengthening the extractive production chain:

- Training and courses aimed at valuing the product; Working capital; Encourage the participation of young people and women;
- Training aimed at diversifying the production chain and processing non-timber forest products; Encourage the participation of young people and women;
- Establishment of rules for use and responsibility for the maintenance of equipment received by projects.

2.3.15 Community Employment Opportunities (G3.10)

The job opportunities offered by the Project to the communities that use the project area cover all positions, including management positions, provided that the requirements for the vacancy are fulfilled. The employee hiring process must follow the parameters and guidelines of a selection process that allows transparency and effectiveness for all involved.

For hiring, the following criteria will not be adopted: race, gender, sexual orientation, color, religion, age, ethnicity, physical or mental disability or social class. The hiring of the employee will be based on requirements and criteria established by the job description, with a minimum qualification being desirable.

As a way to encourage professional qualification and promote an improvement in family income, the Seringueira II project intends to carry out training for community members without any distinction by race, gender, sexual orientation, color, religion, age, ethnicity, physical or mental disability or social class.

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

Employees of the Seringueira II project will be guaranteed employment in accordance with Brazilian labor 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 labor;
- 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 Organization;
- Convention OIT 088 – Organization 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.

2.3.17 Occupational Safety Assessment (G3.12)

To promote occupational safety among employees, the Seringueira II project will follow all official norms instituted by the federal and state governments. In addition to respecting the labor legislation and the conventions of the International Labor Organization, 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 Seringueira II project.

2.4 Management Capacity

2.4.1 Project Governance Structures (G4.1)

The project is managed by the proponent Terra Vista Gestora de Recursos Ltd. Among its responsibilities are the coordination and execution of the socioeconomic and environmental diagnostics; baseline and carbon stock studies; elaboration of the project design document (PD); monitoring and implementation of the proposed activities; assistance in conducting field audits for validation and future verifications; and commercialization of the credits generated.

Terra Vista Gestora de Recursos Ltd. has eight departments that are jointly responsible for project management (Figure 24). The "Carbon Project Origination" department is responsible for project development and implementation, its technical team is subdivided into six interconnected teams (Figure 25) and counts mainly on the support of the legal, technological and financial departments.

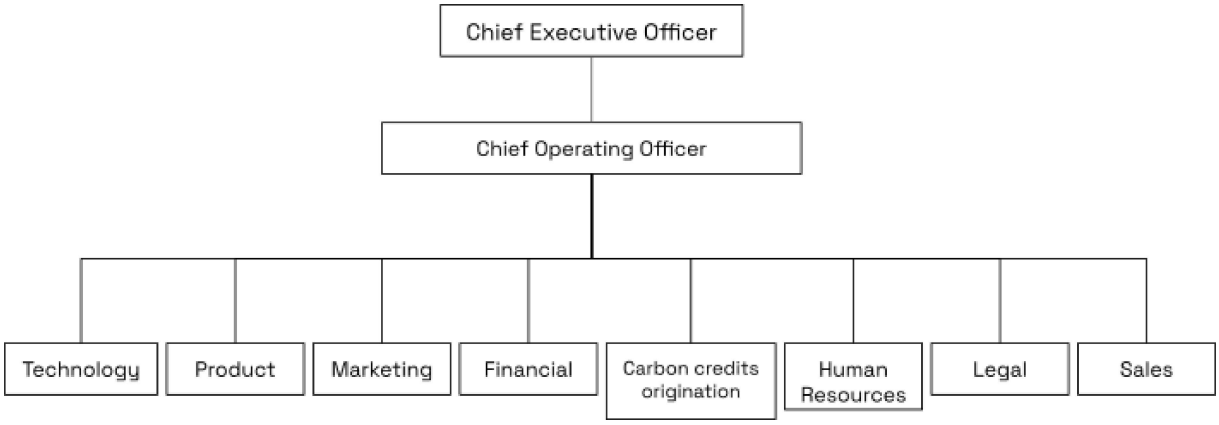


Figure 24. Executive Governance Structure of Terra Vista Gestora de Recursos Ltd.

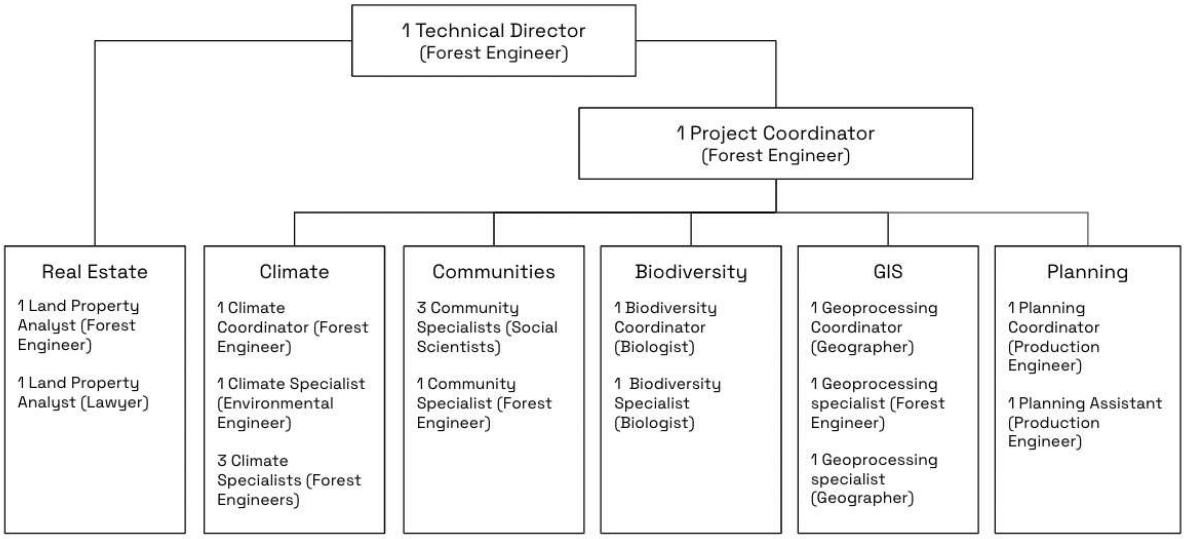


Figure 25. Technical governance structure of the "Carbon Project Origination" department.

The responsibilities of each team part of the Carbon Project Origination department are described below:

i. Real Estate: Team responsible for the environmental and land analysis of the properties, essential to analyze the viability of the project. It works mainly in synchrony with the legal department.

ii. Climate: Team responsible for conducting the project's general and climate chapters following the CCB+VCS standard and for project risk analysis. Acts in the collection of forest biomass data from the literature and in loco through forest inventories.

iii. Communities: Team responsible for socioeconomic diagnosis and engagement and articulation with communities and other stakeholders. It also operates in the development and monitoring of social indicators.

iv. Biodiversity: Team responsible for carrying out the biodiversity diagnosis and conducting the project's biodiversity chapter following the CCB+VCS standard. Acquires data from third parties, performs bibliographic research and validates field data.

v. GIS (Geographic Information System): Team responsible for collecting all the project's geospatial data and executing all the maps necessary for its development. Acts by supporting all other areas of the project.

vii. Planning: Team responsible for administrative and financial management of the generation projects, involving cash control and financial projections, as well as support in planning field logistics for the communities.

2.4.2 Required Technical Skills (G4.2)

In order to implement the Seringueira II 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 Terra Vista Gestora de Recursos Ltd. allocated in the project.

2.4.3 Management Team Experience (G4.2)

The management team is made up of qualified professionals (Table 16) who have the necessary technical skills for the implementation and execution of the project.

Table 16. Members of Terra Vista Gestora de Recursos Ltd. who are part of the Seringueira II project management team, their respective positions and qualifications.

Name	Position and Role in the Project	Technical Qualification and Professional Experience
Rômulo Pereira da Silva Arantes	Project Development Director	Forest Engineer, with postgraduate degree in Environmental Management, MBA in Project Management and Master student in Ecology and Geotechnologies. Experience in Reduction of Emissions from Deforestation and forest Degradation (REDD) projects and participation on the first project that originated forest carbon credits in Brazil. Over 15 years of experience in baseline diagnostics for assessing environmental impacts on climate, communities and biodiversity.
Ana Karoline Brasil Soares	Environmental and land property Analyst	Forest Engineer by Universidade Federal University do Amazonas (UFAM). Postgraduate in Socio-Environmental Business by ESCAS IPÊ. More than 3 years of market experience in Timber Forest Management projects, Forest Inventories, Degraded Areas Recovery Projects and CAR Rural Environmental Registry in the States of Amazonas, Roraima, Rondônia and Pará.
Karoline Pantoja do Nascimento	Environmental and land property Analyst	Bachelor of Laws from the Universidade da Amazônia - UNAMA. Post graduate in Environmental Law from Estácio de Sá. Post graduate in Agri-Environmental Law from CESUPA. Specialist in triple environmental responsibility. Experience in environmental and land regularization of rural properties. Vice President of the Rural Properties Commission of the Environmental Law Institute -IDAM.

Alan de Brito	Projects Coordinator	Forest Engineer and Master Dregree in Management of Production Forests by Universidade Federal de Lavras (UFLA). Ph.D. sandwich in Earth System Science by instituto nacional de pesquisa espacial (INPE/Humboldt-Universität zu Berlin-HU). Experience in monitoring native vegetation and deforestation projects, as well as accounting for Greenhouse Gas (GHG) emissions. Member of the Technical Working Group on Reduction of Greenhouse Gas Emissions from Deforestation and Forest Degradation (GTT REDD+) of Ministerio do Meio Ambiente (MMA). Currently working in the technical coordination of REDD+ and Forest Restoration projects.
Rafaela Martins	Climate Coordinator	Forest Engineer and Master in Environmental and Forestry Sciences with emphasis in Silviculture and Forest Management (UFRRJ), and Ph.D. student in Forest Sciences with emphasis in Silviculture at Universidade Federal de Viçosa (UFV).
Leandro Silva Rodrigues	Climate Specialist	Forest Engineer by Universidade Federal de Lavras (UFLA) with 15 years of experience in environmental and land tenure consulting for rural properties, georeferencing, forest management and forest inventory of native forests.
Ana Carla Netto da Silva	Climate Specialist	Environmental Engineer, Master degree in Environmental Technology and Water Resources. One year of professional experience as a Climate Change consultant.
Luciane Cristina Lazzarin	Climate Specialist	Forest Engineer by Universidade do Contestado (UnC). Master degree in Forest Science by the Universidade do Estado de Santa Catarina (UDESC). Ph.D. in Forestry Sciences by Universidade Estadual Paulista (UNESP). Ph.D. Sandwich in Kansas State University - USA. Experience in the preparation of environmental licensing projects. Over 15 years of experience teaching undergraduate and graduate courses (Forest Engineering, Environmental Engineering, Civil Engineering, Agronomy, Biology, Architecture); Guidelines for project of course conclusion and environmental sustainability in partnership with Community. Currently working as a Climate Change Specialist on REDD+ and Forest Restoration projects.

Maria de Fátima Sandoval Nery	Climate Specialist	Forest Engineer by the Federal University of Amazonas, Post-graduate student in Management, Auditing and. Over 2 years of experience in environmental project analysis, Technical Reports, Maps, Geoprocessing, inspection surveys, Fauna and Flora inventories, environmental licensing.
Gustavo Fernandes Moura	Community Specialist	Bachelor in Social Sciences and graduate student in Data Science at the Universidade de São Paulo.Over 9 years of experience in research and development of socioeconomics, culture, cultural heritage, and archeological heritage projects with traditional communities.
Vivian Fernanda Carneiro Martins	Community Specialist	Forest Engineer, postgraduate in Sustainable Regional Development and in Quality, Environment and Safety Management. Over 15 years of experience in the elaboration and coordination of socio-environmental projects in the Amazon.
Arthur Augusto Santos	Community Specialist	Bachelor of Social Sciences by Universidade Federal do Espírito Santo (UFES). Master's student in Social Sciences with a focus on Socio-environmental Studies, Cultures and Identities - PGCSO/UFES. Experience planning and evaluating actions to repair socio-environmental damages, focusing on indigenous peoples, quilombolas and other peoples and traditional communities, and experience in environmental licensing with a focus on the socio-economic area, mainly with regard to the way of life of rural populations, fishermen and traditional.
Henrique Hugbert de Oliveira Reis	Community Specialist	Social Scientist graduated by Universidade Federal do Pará. Experience in REDD+ projects with traditional communities, reports and project documents in VCS and CCB methodology, monitoring audits in REDD+ projects, production and execution of participatory rural diagnosis and socioeconomic surveys.
Gabriela Magalhães	Biodiversity Coordinator	Biologist, specialist in Environment by COPPE/UFRJ, Master in Botany and MBA in Business Management by USP. Over 8 years of experience in the development and coordination of socio-environmental projects, biodiversity analysis and environmental licensing.

Nathália Vieira Hissa Safar	Biodiversity Specialist	Biologist, Master in Botany and PhD student in Botany with emphasis in Forest Ecology at Universidade Federal de Viçosa, over 7 years of experience in forest dynamics studies, assessing the resilience of tropical forests and their role in biodiversity conservation and carbon mitigation.
Thiago França Shoegima	Geoprocessing Coordinator	Geographer graduated by USP, specialist in Environmental Management by SENAC/SP and Graphic Design by Anhembi Morumbi. Master Degree in Physical Geography by USP, Ph.D. student in Environmental and Territorial Analysis at UNICAMP. Over 15 years of experience in Spatial Analysis, Licensing and Environmental Impact Assessment projects.
Neuro Salvador da Silva Junior	Geoprocessing Specialist	Forest Engineer, postgraduate in Precision Forest Management by Universidade Federal do Paraná. Experience in monitoring land use and occupation, using remote sensing and geoprocessing in the Google Earth Engine platform, ArcgisPro, Jupyter notebook/Google Colab, and python language.
Henrique Lemes Bezerra	Geoprocessing Specialist	Bachelor degree in Geography by the Federal University of Mato Grosso (2019). Master degree in Physical Geography by Universidade de São Paulo (USP). Experience in soil erosion control, pedology and clay mineralogy. Experience in geoprocessing and remote sensing techniques using ArcGIS and QGIS software. Experience in analysis and description of the physical environment: geomorphology, geology, land use, pedology and climate variables (ADA, AID and AII). Experience teaching at the university level (undergraduate and graduate). Experience in Rural Environmental Cadastre as Environmental Analyst at SEMA-MT (2022 - 2023). Theoretical and practical experience in carbon credit (REDD+) projects of Verra certification (VCS & CCB), in delimiting reference regions (RRL, RRD), leakage belt, deforestation rate and baseline (of AFOLU scope AUD).
Luíza Pagel Classen	Planning Coordinator	Production Engineer graduated by UFRGS, with a sandwich degree at ESB Business School, in Germany, and specialization in Strategy and Marketing at the University of La Verne, USA. Several complementary management courses, such as Project Management and Management by OKR. Over 8 years of experience in company and project management, with emphasis on structuring and optimizing processes and workflows. She has worked in the financial market in a VC and PE fund

		manager, in the tourism market as Planning and Expansion Coordinator (CVC Viagens) and also with international experience at BMW, in Germany. Currently she is the Planning Coordinator of the company, also accumulating the role of PMO of the carbon credit origination projects.
Tiago Fronza Machado	Planning Assistant	Production Engineering by Universidade Federal do Rio Grande do Sul, with international experience at Hult International Business School (USA) and Universidad de Valladolid (Spain). He has experience with management consulting and controlling, economic feasibility analysis processes, and project management.

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

Not applicable

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

Terra Vista Gestora de Recursos Ltd. is a Brazilian company with proven experience in the environmental carbon credit market and has investors who support the company's business plan for the coming years.

The company has a financial department responsible for cash flow management. The project budget is defined and revised monthly, based on the analysis of the balance between the 'actual vs. budgeted' expenditure related to the foreseen activities. Terra Vista Gestora de Recursos Ltd. raised enough funds from investors to guarantee the execution and maintenance of the project.

The documents that prove the financial health of the structure created to develop the project and of the company Terra Vista Gestora de Recursos Ltd. are classified as Commercially Sensitive Information and will be shared with the audit team on a confidential basis.

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

Terra Vista Gestora de Recursos Ltd. Gestora de Recursos has a common Code of Ethics and Conduct used by the entire Economic Group to which it belongs. The document provides guidelines for its employees to fight and denounce all forms of corruption, especially when its objective is the control of information, and also provides, as prohibited acts in the corporate environment, the maintenance of any involvement in irregular or corrupt practices.

2.4.7 Commercially Sensitive Information (*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:

- 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 Statutory and Customary Property Rights (G5.1)

The project area is privately owned by the Mappes family, who have all rights of ownership, access and use. The owners of the project area are Verusca Maria Montenegro Mappes, Laiz Maria Montenegro Mappes, Glauber Ueyke Montenegro Mappes, Sandra Magda Montenegro Mappes Costa, Sueli Magida Mappes Maia, Tania Mara Mappes Tavernard de Alencar, José Mauricio Montenegro Barroso, and Maria Alaíde Montenegro Mappes, herein referred to as the 'Mappes family'.

Seven rural properties are part of the project area: Redenção, Liberdade, Deserto da Liberdade, São José, São Luiz, São Raimundo and São Vicente. The land documents that prove the rights of use and possession of the seven properties were made available for auditing.

The Redenção property was titled by the Amazonas state government and has the registration number 617 of the Fernandes notary's office in Eirunepé, Amazonas. It is described as a lot of land called "Redenção", situated on the right bank of the Juruá river, municipality of Ipixuna, State of Amazonas, measuring an area of 8.061,97 ha. The owners are: Maria Alaide Montenegro Mappes, Tania Mara Montenegro Mappes, Glauber Ueyke Montenegro Mappes, Verusca Maria Montenegro Mappes, Laiz Maria Montenegro Mappes, José Maurício Montenegro Barroso and Sandra Magda Montenegro Mappes Lopes da Costa.

The Liberdade property was titled by the Amazonas State Government and registered under the number 612 of the Fernandes Notary in Eirunepé, Amazonas, according to the Inteiro Teor certificate. The property is described as a parcel of land called "Liberdade", situated on the right bank of the Juruá river, in the municipality of Ipixuna - State of Amazonas, measuring 41,287.670 m^2. The owners of the area are: Maria Alaide Montenegro Mappes, Tânia Mara Montenegro Mappes, Glauber Ueyke Montenegro Mappes, Verusca Maria Montenegro Mappes, Laiz Maria Montenegro Mappes, José Maurício Montenegro Barroso, Sandra Magda Montenegro Mappes Costa, Sueli Magda Mappes Maia.

The Deserto da Liberdade property was titled by the Amazonas state government and registered under number 619 in the Fernandes de Eirunepé, Amazonas registry office. The property is described as a parcel of land called "Desert of Liberty", situated on the bank of the Riozinho da Liberdade, municipality of Ipixuna, State of Amazonas, measuring an area of 20,000.000 m² The owners of the area are: Maria Alaide Montenegro Mappes, Tania Mara Montenegro Mappes, Glauber Ueyke Montenegro Mappes, Verusca Maria Montenegro Mappes, Laiz Maria Montenegro Mappes, José Maurício Montenegro Barroso and Sandra Magda Montenegro Mappes Lopes da Costa.

The São José property was titled by the Amazonas state government and registered under the number 616 of the Fernandes notary's office in Eirunepé, Amazonas. The property is described as a plot of land called "São José", situated on the bank of the Riuzinho da Liberdade, municipality of Ipixuna, state of Amazonas, measuring an area of 22,620.000 m². The owners of the area are: Maria Alaide Montenegro Mappes, Tania Mara Montenegro Mappes, Glauber Ueyke Montenegro Mappes, Verusca Maria Montenegro Mappes, Laiz Maria Montenegro Mappes, José Maurício Montenegro Barroso and Sandra Magda Montenegro Mappes Lopes da Costa.

The São Luiz property was titled by the Amazonas state government and registered under the number 615 of the Fernandes Notary's Office in Eirunepé, Amazonas, according to the Inteiro Teor certificate. The property is described as a plot of land called "São Luiz", situated on the right bank of Rio da Liberdade, municipality of Ipixuna, Amazonas state, measuring an area of 34,930.000 m². The owners of the area are, jointly: Maria Alaide Montenegro Mappes, Tania Mara Montenegro Mappes, Glauber Ueyke Montenegro Mappes, Verusca Maria Montenegro Mappes, Laiz Maria Montenegro Mappes, José Maurício Montenegro Barroso, Sandra Magda Montenegro Mappes Lopes da Costa and Sueli Magida Mappes Maia.

The São Vicente property was titled by the Amazonas state government and registered under the number 621 of the Fernandes de Eirunepé, Amazonas registry office. The property is described as a plot of land called "São Vicente", situated on the right bank of the Riozinho da Liberdade, municipality of Ipixuna, Amazonas state, measuring an area of 1,749.647 m². The owners of the area are, jointly: Maria Alaide Montenegro Mappes, Tania Mara Montenegro Mappes, Glauber Ueyke Montenegro Mappes, Verusca Maria Montenegro Mappes, Laiz Maria Montenegro Mappes, José Maurício Montenegro Barroso, Sandra Magda Montenegro Mappes Lopes da Costa and Sueli Magida Mappes Maia.

The São Raimundo property was titled by the Amazonas state government and registered under the number 613 of the Fernandes Notary in Eirunepé, Amazonas. The property is described as a parcel of land called "São Raimundo", situated on both sides of the Riozinho da Liberdade river, municipality of Ipixuna, Amazonas state, measuring an area of 62,284.450 m². The owners of the area are, jointly: Maria Alaide Montenegro Mappes, Tania Mara Montenegro Mappes, Glauber Ueyke Montenegro Mappes, Verusca Maria Montenegro Mappes, Laiz Maria Montenegro Mappes, José Maurício Montenegro Barroso, Sandra Magda Montenegro Mappes Lopes da Costa and Sueli Magida Mappes Maia.

The areas have been certified by the National Institute of Colonization and Agrarian Reform (INCRA), the Brazilian federal agency whose purpose is to maintain the national registry of rural properties. The properties are registered in separate registries before INCRA (CCIR) and the Brazilian IRS (NIRF/CIB).

Both properties are registered and certified by the Land Management System - SIGEF. The polygonal of the areas does not overlap with any other polygonal registered and georeferenced by INCRA. The appropriate documentation was made available to the project's auditors.

Adaptations to the Brazilian Forest Code

The following definitions of the Brazilian Forest Code stand out as relevant:

“III – Legal Reserve: area located within a rural property, excluding the Permanent Preservation Area, necessary for the sustainable use of natural resources, conservation and recovery of ecological processes for the conservation of biodiversity and shelter and protection of fauna and flora native.

VI - Legal Amazon: States of Acre, Pará, Amazonas, Roraima, Rondônia, Amapá and Mato Grosso, and the regions located north of the 13th parallel S, in the states of Tocantins and Goiás, and west of the 44th meridian, in the State of Maranhão .”

The Legal Reserve (LR) must be registered in a property deed at the Real Estate Registry Office: its location must be officially known, and future owners must know where it is located, its limits and borders. The LR can be located anywhere within the rural property. The Brazilian Forest Code determines that, once allocated, the LR cannot be changed even in cases of real estate transfer, land subdivision or area changes.

According to Provisional Measure No. 2.166-67 of August 24, 2001:

“Art. 16. Forests and other types of native vegetation, except those located in Permanent Preservation Areas, as well as those not subject to the restricted use policy or subject to specific legislation, are subject to suppression, provided that the vegetation is preserved, as a Reserve Legal, at a minimum:

I - 80% (eighty percent), on rural properties located in forest areas located in the Legal Amazon.

Every Brazilian rural property must be registered in the National Rural Environmental Cadastre System (Sicar). The project properties were aggregated into two properties for registration purposes. The first property contains the Redenção, Liberdade, and Deserto da Liberdade properties, under CAR registration AM-1301803-B470.D2A7.B0AB.4809.B799.F25E.B619.08FB. The second rural property is formed by the properties São José, São Luiz, São Vicente, and São Raimundo, under CAR registration AM-1301803-BE94.FA7A.E139.41EB.98BF.7AAC.864A.6772. The registration of the rural property in the CAR proves that the areas relating to Permanent Preservation Areas (PPA), restricted use areas, and Legal Reserve (LR) have been duly registered. Figure 26 shows the properties that make up the Seringueira II project, the project area, and the land use on the properties.

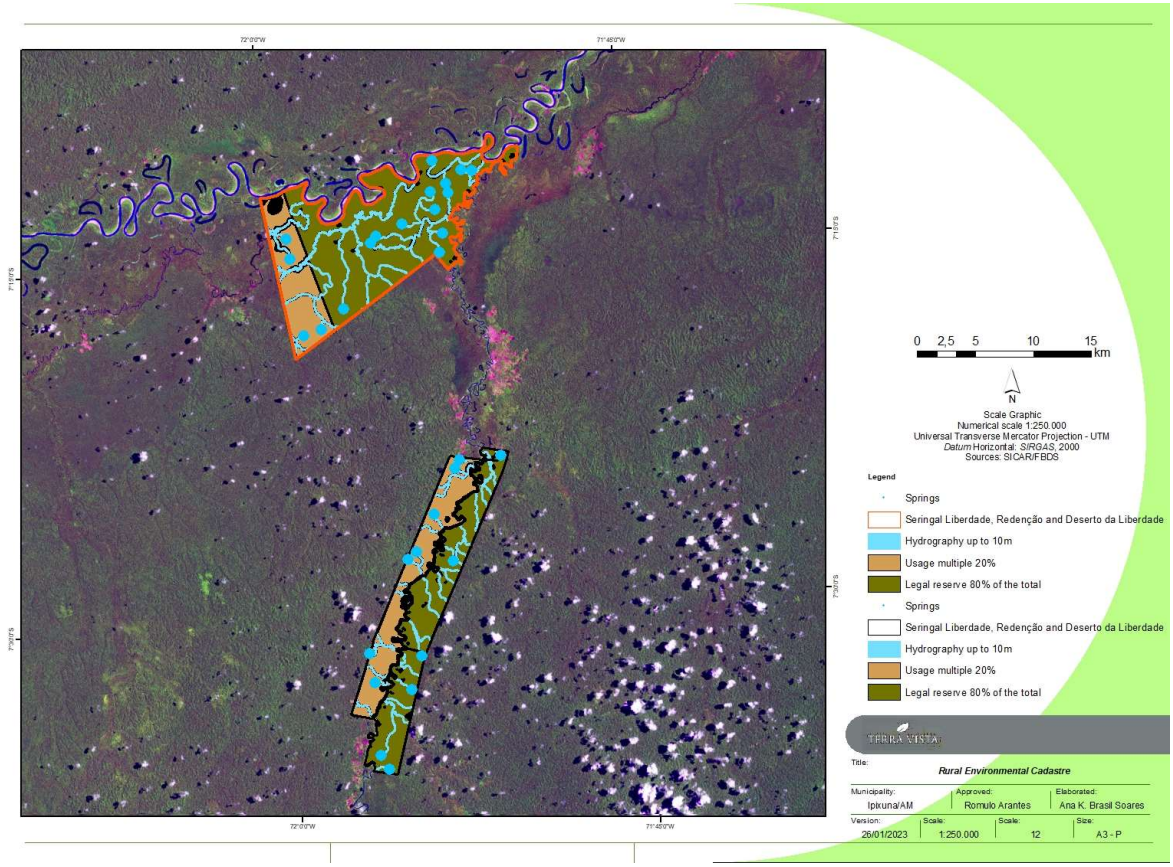


Figure 26. Properties that compose the Seringueira II project, project area, and land use.

2.5.2 Recognition of Property Rights (G5.1)

The project area is the private property of the proponent family Mappes. and their property rights are recognized, respected and supported by Brazilian law. The property's land documentation will be made available to the validation and verification body at the time of the audit.

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

The necessary consent for the development of the project was obtained from the partner-owner of the project area, a fully capable agent, willing to voluntarily execute the project, free of vices of consent. The contract was widely and freely negotiated, being accepted and signed by those who had the legal right to do so, as demonstrated by the signed partnership contract.

Riverside communities that use the project area for extractivism of non-timber forest products expressed their consent to be part of the project in public consultations that were conducted after the prior disclosure of the project and the clarification of all doubts of the community.

In order to carry out the public consultations, the project was concerned with meeting four established stages with the aim of making the consultation process more participatory and open to the communities.

Pre-mobilization

After the first contact and identification of the communities, prior contact was made with the community members, informing in advance the date of the meeting and the purpose of the public consultation.

Mobilization

Based on contacts by internet, the field team visited the communities, articulating with the residents the ideal date for carrying out the consultation (Figures 27 and 28). It was established in agreement with the project's development team, that in order to better serve the communities, seven public meetings would be held, one in each community: São José, São Luiz, Campina, Tigre, Deus é por Nós, Açaituba, and Porto Mappes.

Figure 27. Mobilization in the Campina community.

Figure 28. Mobilization in the Açaituba community.

Execution

In December 2022, two public consultations were held in a meeting with community groups and in January 2023 another 5 public consultations were held to formalize consent for the Seringueira II project. Information about the stages of project development was passed on at the meeting (Figures 29 and 30).

Community members expressed their expectations regarding the project, the impacts they perceived and their considerations regarding participation. For disclosure and transparency of the consultation process, minutes were drawn up containing the matters discussed, attendance lists and

photos of the meeting. The minutes were signed by community members and technicians from Terra Vista Gestora de Recursos Ltd. and made available digitally to people with internet access and a smartphone.

The minutes and attendance lists of the consultations held in the seven communities will be made available for consultation by the validation and verification body.

Figure 29. Public Consultation in the Deus é por Nós community.

Figure 30. Public consultation in the Açaituba community.

Publicization

The results of the consultation, in addition to being duly clarified during execution, were recorded and published in different means of communication with appropriate language for all stakeholders.

Explanatory folders were distributed with the channels for access to complaints and doubts about the Seringueira II project (Figure 31).

The guarantee of continuity of the traditional use of the project area by the communities was established. In this pact, community members are guaranteed access to the project area for non-timber plant extraction, as well as subsistence fishing and hunting during the collection period.

Figure 31. Consultation mobilization workshop in the Tigre community.

2.5.4 Property Rights Protection (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. With regard to public entities, whether state, federal or municipal, directly or indirectly administered, the certificates analyzed indicate the legitimacy of the title and ownership of the property.

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.

2.5.5 Illegal Activity Identification (G5.4)

The deforestation and illegal hunting affects areas near the community of Porto Mappes, on the Liberdade river, and covers another area near a tributary of the Tigre Igarapé. In these areas, there are reports of deforestation for timber removal and illegal hunting.

To combat the illegal activities identified, it is necessary to implement socio-educational actions with the aim of engaging the community and other regional actors, land inspection and property surveillance in the project area. The planned actions to prevent illegal activities in the Seringueira II project area are described in Table 17.

Table 17. Actions and methods of operation for measures against illegal activities in the Seringueira II project area.

Actions and methods of operation for measures against illegal activities	
Actions	Construction of a logistical support headquarters within the project area
	Carry out surveillance and monitoring of the project area

	Promote the prevention of illegal deforestation and fires, land grabbing and illegal mining in and around the project area
	Promote awareness and engagement in the environmental and climate issue of local actors and other stakeholders
	Disseminate socio-educational actions among regional actors and stakeholders
	Maintain a good relationship with the Aripuanã river community that use the area for subsistence extractivism
	Support to State police and inspection authorities
	Surveillance via fluvial patrol along rivers and streams with flying boats and motorized canoes
	Surveillance by aerial monitoring by planes and satellite images
Operation Methods	Sending a security team to the place of occurrence to investigate the fact
	Activation of the legal sector
	Registration of incident report at the police station
	Activate IBAMA and the Environmental Police when there is an environmental crime

2.5.6 Ongoing Disputes (G5.5)

In the last 20 years there have not been or are any conflicts or legal disputes over land rights or resources.

The right to rural land is governed by the Constitution, the Land Statute and the Civil Code of 2002 (Law No. 10,406), which deals with family, inheritance, possession and property rights. In Brazil, land can be acquired through purchase, transfer of ownership (for example, through inheritance) and government allocations. The right to acquire land by prolonged occupation (usucapion) has existed in Brazil since 1916. It is relevant to mention the various Brazilian laws on the rights of squatters – adverse possession – which can be categorized as:

- Ordinary, governed by Law No.10,406;
- Extraordinary, covered by article 1,238 of the Civil Code;
- Rural special, described in article 191 of the Federal Constitution and;
- Extrajudicial measures, which may be carried out in a notary's office, and whose framework is provided for in art. 1071 of the Civil Code No. 13,105/15.

The clauses of these laws establish that if a person owns an area, in some cases limited to 50 hectares, as if it were his own, for an uninterrupted period of five to 15 years, depending on the context, he is entitled to acquire the property document.

This is the main legal framework within which legitimate property rights claims can be made in the context of this project. However, no legal action related to ownership or possession of the properties has been identified and would not even be possible, as mentioned earlier, there are no communities inhabiting the project area.

2.5.7 National and Local Laws (G5.6)

Proponents of the Seringueira II project are committed to complying with applicable and relevant national, state and local laws, including statutes and regulatory frameworks.

International agreements:

- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1975;
- Cartagena Protocol on Biosafety to the Convention on Biological Diversity, 2000;
- International Tropical Timber Agreement (ITTA), 1994;
- Convention on Biological Diversity (CBD), 1992;
- United Nations Framework Convention on Climate Change (UNFCCC), 1992;
- United Nations Declaration on the Rights of Indigenous Peoples, 2007;
- Kyoto Protocol, 1997;
- Paris Agreement, 2015.

National laws:

- Brazilian Federal Constitution of 1988, under Title VIII, of the social order, in its Chapter VI, on the environment, article 225 "*Everyone has the right to an ecologically balanced environment, a good for common use by the people and essential to a healthy quality of life, imposing on the Public Power and the community the duty to defend and preserve it for present and future generations" and in its 1st paragraph, item III, provides "to define, in all units of the Federation, territorial spaces and their components to be specially protected, alteration and deletion being permitted only by law, any use that compromises the integrity of the attributes that justify their protection is prohibited*";.

  Still in the aforementioned article, the Law provides in its § 4th "*The Brazilian Amazon Forest, the Atlantic Forest, the Serra do Mar, the Mato-Grossense Pantanal and the Coastal Zone are national heritage, and their use will be made, in law, under conditions that ensure the preservation of the environment, including the use of natural resources*".

Art. 68. Permanent ownership is recognized for the remnants of the quilombo communities that are occupying their lands, and the State must issue them the respective titles.

Art. 215. The State will guarantee to all the full exercise of cultural rights and access to sources of national culture, and will support and encourage the appreciation and dissemination of cultural manifestations.

§ 1º The State will protect the manifestations of popular, indigenous and Afro-Brazilian cultures, and those of other groups participating in the national civilizing process.

In its chapter II, which deals with social rights, in its articles n° 7, 8, 9, 10 and 11 there are labor laws.

- National Environmental Policy, provided for in Law 6,938 of 1981. The aforementioned Law determines in its Art. 6 "The bodies and entities of the Union, the States, the Federal District, the Territories and the Municipalities, as well as the foundations instituted by the Public Power, responsible for the protection and improvement of the environmental quality, will constitute the National Environment System - SISNAMA, structured like this:

“IV - executing agencies: the Brazilian Institute for the Environment and Renewable Natural Resources - IBAMA and the Chico Mendes Institute for Biodiversity Conservation - Chico Mendes Institute, with the purpose of executing and enforcing the governmental policy and guidelines established for the environment, according to their respective competences”; "

Furthermore, the Law provides in its Art. 9 that "The following are instruments of the National Environmental Policy:

VI - the creation of territorial spaces specially protected by the federal, state and municipal government, such as areas of environmental protection, of relevant ecological interest and extractive reserves”.

- Forest Code, Law 12,651 of 2012. Provides for the protection of native vegetation; In your Art. 12 that:

“Every rural property must maintain an area with native vegetation cover, as a Legal Reserve, without prejudice to the application of the rules on Permanent Preservation Areas, observing the following minimum percentages in relation to the area of the property, except for the cases provided for in art. 68 of this Law:

I - located in the Legal Amazon:

a) 80% (eighty percent), in the property located in a forested area;

b) 35% (thirty-five percent), in the property located in a cerrado area;

c) 20% (twenty percent), in the property located in an area of general fields;

Also, its article 4 provides that "A Permanent Preservation Area is considered, in rural or urban areas, for the purposes of this Law:

I - the marginal strips of any perennial and intermittent natural watercourse, excluding ephemeral ones, from the edge of the channel of the regular bed, with a minimum width of:

a) 30 (thirty) meters, for water courses less than 10 (ten) meters wide;

b) 50 (fifty) meters, for water courses that are from 10 (ten) to 50 (fifty) meters wide;

c) 100 (one hundred) meters, for water courses that are 50 (fifty) to 200 (two hundred) meters wide;

d) 200 (two hundred) meters, for water courses that are from 200 (two hundred) to 600 (six hundred) meters wide;

e) 500 (five hundred) meters, for water courses that are more than 600 (six hundred) meters wide;

II - the areas surrounding natural lakes and ponds, in a strip with a minimum width of:

a) 100 (one hundred) meters, in rural areas, except for water bodies with up to 20 (twenty) hectares of surface, whose marginal range will be 50 (fifty) meters;"

- National Policy on Climate Change, provided for in Law 12,187 of December 29, 2009.
- National Payment Policy for Environmental Services, provided for in Law 14,119 of January 13, 2021. This Law establishes the National Payment Registry for Environmental Services (CNPSA) and the Federal Payment for Environmental Services Program (PFPSA).
- Civil Code, instituted by Law 10.406 of January 10, 2002. Article 1245 “Transfers between living persons to propertyCivil Code, instituted by Law 10,406 of January 10, 2002.”.

Art. 1,238. Whoever, for fifteen years, without interruption or opposition, owns a property as his own, acquires the property, regardless of title and good faith; being able to request the judge to declare it so by sentence, which will serve as a title for the registration in the Real Estate Registry Office.

Art. 1,242. The person who, continuously and undisputedly, with just title and in good faith, owns it for ten years also acquires the property of the property.

- Code of Civil Procedure, Law 13.105 of March 16, 2015.
- Statute of the Indigenous, Law 6001 of December 19, 1973.
- National Policy for Sustainable Development of Traditional Peoples and Communities, instituted by Decree 6040, of February 7, 2007. Art. 3. “I - Traditional Peoples and Communities: culturally differentiated groups that are recognized as such, that have their own

forms of social organization, that occupy and use territories and natural resources as a condition for their cultural, social, religious, ancestral and economic reproduction, using knowledge, innovations and practices generated and transmitted by tradition;"

III - Sustainable Development: the balanced use of natural resources, aimed at improving the quality of life of the present generation, guaranteeing the same possibilities for future generations.

- Consolidation of Labor Laws (CLT), Decree-Law No. 5,452, May 1, 1943.
- Regulatory Norms for Rural Work, established by Law 5,889 of June 8, 1973.

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.

2.5.8 Approvals (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.

2.5.9 Project Ownership (G5.8)

As previously informed, the project area is private property belonging to the Mappes family and is composed of seven rural properties: Redenção (mat. no. 617), Liberdade (mat. no. 612), Deserto da Liberdade (mat. no. 619), São José (mat. no. 616), São Luiz (mat. no. 615), São Raimundo (mat. no. 613) and São Vicente (mat. no. 621), all registered in the Fernandes notary 's office - Eirunepé, Amazonas.

There is a partnership contract between the proponents for the development of the present project. In this document, it is stated that the responsibility for the execution and results of the project is exclusive to Terra Vista and that it acts in the development, implementation, and monitoring of all stages of the project. It also states that Terra Vista is the administrator of the project and responsible for its administration before Verra.

Therefore, it is believed that Mappes and Terra Vista jointly have the legal right to control and operate the project activities, meeting the definition of project owner as specified in the Program Definitions document.

2.5.10 Management of Double Counting Risk (G5.9)

The project does not intend to generate or receive any form of environmental or social credit, including certificates related to GHG emissions reductions or renewable energy. Emissions reductions resulting from the implementation of these project activities will not be used to meet emissions reduction targets of any other REDD program or mechanism.

2.5.11 Emissions Trading Programs and Other Binding Limits

Not applicable. This is the first time that a carbon credit project is developed in this area, with no overlapping of the area with any other program for issuing credits.

2.5.12 Other Forms of Environmental Credit

Not applicable. The project is not registered nor is it seeking registration in any other GHG program besides the VCS and CCB.

2.5.13 Participation under Other GHG Programs

Not applicable. The project is not registered nor is it seeking registration in any other GHG program besides the VCS and CCB.

2.5.14 Projects Rejected by Other GHG Programs

Not applicable. The project is not registered nor is it seeking registration in any other GHG program besides the VCS and CCB.

2.5.15 Double Counting (G5.9)

Not applicable.

3 CLIMATE

3.1 Application of the Methodology

3.1.1 Title and Reference of Methodology

This REDD project is applying the Climate, Communities and Biodiversity (CCB) and Verified Carbon Standard (VCS) with the intention of reducing unplanned CO_2 emissions (AUD) compared to baseline levels. As required by VM0007, the project area consists of contiguous and discrete areas covered by forests that meet the definition of eligible forest, which would be an area that has been forested for at least 10 years before the project start date

The list below refers to the methodologies, modules and tools used in the project scope.

Approved VCS Methodology:

- VM0007 “Methodological Framework for REDD+ (REDD + MF)”, v1.6.

Carbon Reservoir Modules:

- VMD0001 “Estimate of carbon stocks in the above- and below-ground biomass of the reservoir of living and non-tree trees” (CP AB), v1.1”.
- VMD0005 “Estimated Carbon Stocks in the Long-Term Wood Products Reservoir (CP W), v1.1”

Baseline Module:

- VMD0007 “Estimated baseline changes in carbon stock and greenhouse gas emissions from unplanned deforestation and unplanned wetland degradation (BL UP), v3.3”.

Leakage Module:

- VMD0010 “Estimated Emissions from Change of Activity to Avoid Unplanned Deforestation and Prevent Unplanned Wetland Degradation (LK ASU), v1.2”.
- VMD0011 “Estimated Market Effects Emissions (LK ME), v1.1”.

Miscellaneous Modules:

- VMD0013 “Estimated Greenhouse Gas Emissions from Burning Biomass and Peat (E BPB), v1.2”.
- VMD0016 “Methods for stratifying the project area (X STR), v1.2”.
- VMD0017 “Uncertainty estimation for REDD project activities (X UNC), v2.2”.

Tools:

- CDM “Combined tool to identify baseline scenario and demonstrate additionality in A/R CDM project activities (T ADD), v01”.
- CDM “Executive Council. Tool to test the significance of GHG emissions in A/R CDM project activities (v01)” EB 31.

- AFOLU "Non-Permanence Risk Tool". Procedural Document, VCS, v4.0.[116]

3.1.2 Applicability of Methodology

The applicability conditions of the VM0007 methodology and its associated modules are detailed in Table 18.

Table 18. Applicability criteria for the Seringueira II project.

Applicability criteria	Description
All project activities	
All land areas registered under the CDM or any other GHG program (whether voluntary or compliance-oriented) must be transparently reported and excluded from the project area. Exclusion of land in the project area from any other GHG program must be monitored over time and reported in monitoring reports.	The Seringueira II project is not registered in any carbon trading system or program.
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 into the categories of unplanned deforestation (VCS AUD category) ● Leakage prevention activities do not include: i) Agricultural land that is flooded to increase production (eg rice paddies); ii) Intensification of livestock production through the use of feedlots and/or manure ponds.	Land in the Seringueira II project area has been qualified as forest (following the definition used by the VCS and the Brazilian National Agency - SNIF definition of forest, 2018) for at least the 10 years prior to the project start date. Baseline deforestation in the project area falls into the activity categories: Unplanned deforestation (VCS category AUD); Activities to prevent leaks do not include: i) Agricultural land that is flooded to increase production (eg paddy rice); ii) Intensify animal production through the use of feedlots and/or manure reservoirs.
Unplanned Deforestation Avoided	
Unplanned deforestation prevention activities are applicable under the following conditions: ● The primary drivers of deforestation must: (i) clear land for tree harvesting, settlement, agricultural (farmer) production or livestock or aquaculture, where such deforestation for agricultural or livestock production or aquaculture does not represent large-scale industrial agriculture or aquaculture; (ii) have no documented and uncontested legal right to clear land for these purposes; and (iii) be residents of	The activity to prevent unplanned deforestation is applicable. Deforestation agents in the baseline scenario clear land for livestock as the final land use. These agents do not have the legal right to use or deforest the land. These deforestation agents are from nearby communities or immigrants in search of land for illegal logging and conversion of land to pasture.

[116]AFOLU "Non-Permanence Risk Tool" VCS Version 4, Procedural Document. Available in:http://www.vcs.org/programdocuments. Accessed on: 04/19/2022.

the deforestation reference region or be immigrants. Under any other condition, this methodology should not be used. • If, in the baseline scenario to avoid unplanned deforestation project activities, the post-deforestation land use constitutes reforestation, this methodology cannot be used. • Where, pre-project, unsustainable firewood collection is occurring within project boundaries, the BL-DFW and LK-DFW modules should be used to determine possible leakages	In the baseline scenario of this activity land use after deforestation does not constitute reforestation (i.e. pasture is the final land use) No logging is carried out within the project area.
VMD0001 "Estimating carbon stocks in above-ground and below-ground biomass in living tree and non-tree reservoirs" (CP-AB), v1.1	
The module allows the *ex ante* estimation of carbon stocks in tree and non-tree biomass above and below ground in the baseline scenario (both for pre- and post-deforestation stocks) and in the project case and for the *ex ante* estimation. post the change in aboveground and belowground tree biomass carbon stocks in the project case.	This module is applicable to all forest phytophysiognomies and age classes. The inclusion of the aboveground tree biomass reservoir as part of the project boundary is mandatory according to the REDD-MF module.
VMD0005 “Estimating carbon stocks in the long-term wood product pool” (CP-W), v1.1	
This module allows *ex ante* estimation of carbon stocks in the long-term wood products pool in the baseline scenario. The carbon stocks treated here are those remaining in wood products after 100 years; most of the emissions associated with harvesting, processing and wasting wood and eventual withdrawal 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 wood is harvested for conversion into wood 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 boundaries, as per applicability criteria in the REDD-MF structural module, specifically: • Timber extraction takes place 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 SIG).
VMD0007 "Estimating Changes in Baseline Carbon Stock and Greenhouse Gas Emissions from Unplanned Deforestation and Unplanned Wetland Degradation" (BL-UP)”, v3.3	
This module allows you to estimate changes in carbon stock and GHG emissions related to unplanned deforestation and unplanned degradation of wetlands in the baseline scenario. Forest degradation is not considered. The following conditions must be met to apply this module. The forest landscape configuration can be mosaic, transition or border.	The applicability conditions of this module are met in this module: • the landscape configuration is transitional, as discussed in section **3.2.1**; • grassroots agents of deforestation clear land for livestock (see item 3.1.4 Baseline Scenario);

The module should be applied to all project activities where baseline drivers of deforestation: (i) clearing land for settlement, agricultural (farmer) production, livestock or aquaculture, where such deforestation for agricultural, livestock or aquaculture production does not represent large-scale industrial agro/aquaculture activities;" (ii) "have no documented and uncontested legal right to clear land for these purposes; It is" (iii) "residents in the region (reference region) or immigrants".	• their practices are predominantly illegal and not within their legal rights, as argued in section **3.1.5** Additionality, in Scenario 3.
VMD0010 "Estimating Emissions from Activity Change to Avoid Unplanned Deforestation and Unplanned Wetland Degradation" (LK-ASU), v1.2	
This module provides methods for estimating displacement emissions from unplanned deforestation and unplanned wetland degradation (leakage due to activity change). Activities subject to potential displacement are the conversion of forest areas to pasture, crops and other land uses, or the conversion of intact or partially degraded wetlands to drained or degraded wetlands.	The module is mandatory if the BL-UP module is used to baseline, and the applicability conditions in the BL-UP module must be fulfilled in full.
VMD0011 "Estimating Market Effects Emissions" (LK-ME)", v1.1	
The module allows estimating GHG emissions caused by leakage of market effects related to the extraction of wood for wood, fuelwood or charcoal at the baseline for carbon projects. It is applicable to calculate the leakage of market effects from REDD projects that are expected to substantially and permanently reduce levels of logging. When REDD project activities result in reductions in wood harvesting, 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 required where: • The deforestation process involves harvesting wood for commercial markets. • Baseline is calculated using BL-DFW AND firewood or charcoal is harvested for commercial markets. In all other circumstances, the module must not be used.	The module is mandatory when the deforestation process involves extracting wood for commercial markets.
VMD0013 "Estimating Greenhouse Gas Emissions from Burning Biomass" (E-BB), v1.2	
This module provides a step-by-step approach to estimating greenhouse emissions from biomass and peat burning. This module is applicable to REDD project activities with emissions from burning biomass and REDD-WRC project activities with emissions from biomass and/or burning peat. This module is also applicable to RWE and	In the baseline scenario, fire is used to clear land, resulting in CO_2, N_2O and CH_4 emissions. When used in the baseline, accounting shall occur both under the baseline and in the project scenario and both in the project area

ARR-RWE project activities with emissions from peat burning.	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 Stratifying the Project Area” (X-STR), v1.2	
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 estimates of changes in carbon stock.	The strata are only used for forest classes under deforestation pressure and are the same in the baseline case and in the project scenario. The post-deforestation (conversion) scenario is not stratified, instead the average of carbon stock values referring to land uses after deforestation is applied observing the guidelines of modules BL-UP and BL-PL.
VMD0017 “Uncertainty Estimation for REDD Project Activities” (X-UNC), v2.2	
The module allows you to estimate uncertainty in baseline estimates and in project sequestration, emissions, and leakage estimates. The module focuses on the following sources of uncertainty: ● Determining 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 design 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 Demonstration and Assessment of Additionality in Agriculture, Forestry and Other Land Use (AFOLU) VCS Project Activities” (T-ADD), v3.0	
● AFOLU activities the same or similar to the proposed project activity on the ground within the proposed project boundary, executed with or without registration as a VCS AFOLU project, will not lead to the violation of any applicable law, even if the law is not applied. ● The use of this tool to determine 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 must ensure consistency between the determination of a baseline scenario and the determination of the additionality of a project activity.	1) As stated in section **2.3.16**, the project complies with all relevant laws, statutes and regulatory frameworks. 2) The approach to baseline using this tool was described in section **3.1.4.**

3.1.3 Project Boundary

The Seringueira II project area is not continuous and is made up of seven properties, located in the municipality of Ipixuna, in the state of Amazonas, inserted in the two pairs of central geographic coordinates: 7º14'5.63" S and 71º55'1.54"W (contemplating the areas of Liberdade, Deserto da Liberdade and Redenção) and 7º29'7.99" S and 71º53'47.11"W (corresponds to São Luiz, São José, São Vicente and São Raimundo) (Figure 32).

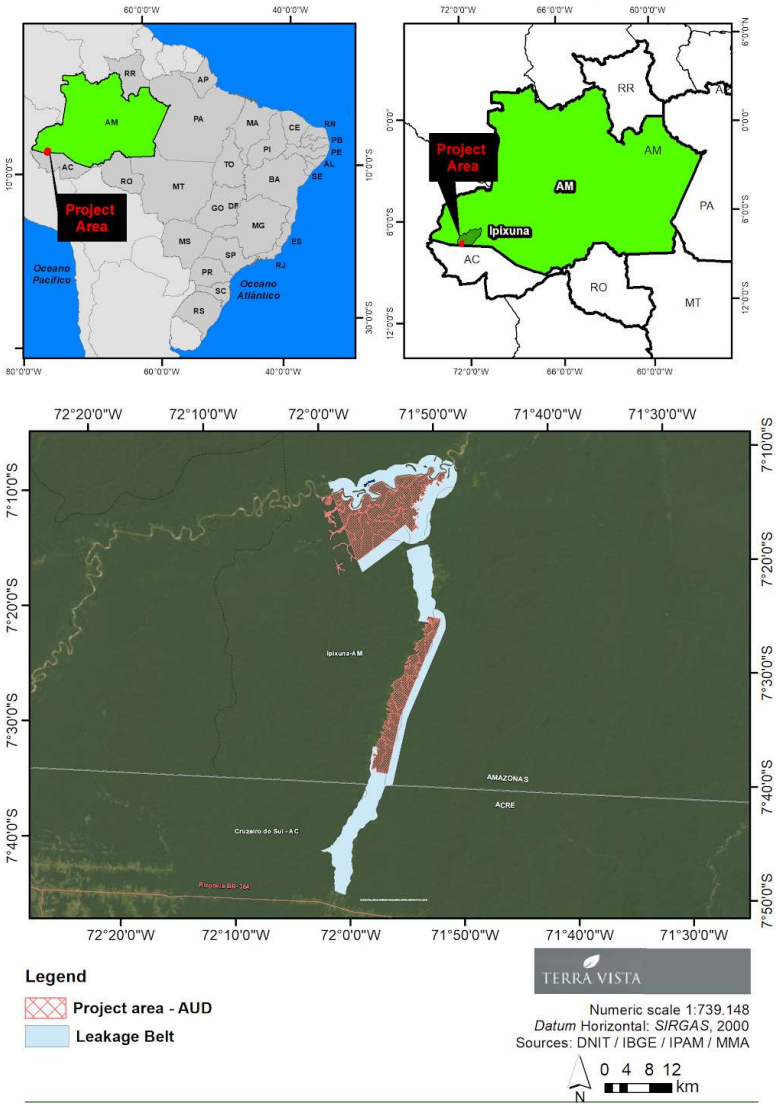


Figure 32. Geographic boundaries of the Seringueira II project.

The project area, the leakage belt and the reference region for projecting rate of deforestation (RRD) were defined according to the specifications of module VMD0007 (BL-UP) (Table 19).

Table 19. Area (ha) of the project area, leakage belt, and reference region for projecting rate of deforestation.

Spatial boundaries	Area (ha)
Project area	16,483.02
Leakage belt	13,605.56
Reference region for projecting rate of deforestation	326,098.04

Sources of GHG Emissions

The VM0007 methodology includes the six carbon pools listed in Table 20, indicating whether they were included or excluded within the proposed AUD project activity, as well as their respective justifications.

Table 20. GHG sources included or excluded within the boundaries of the Seringueira II project area.

Source		Gas	Included	Justification/Explanation
Baseline	Biomass burning	CO_2	Excluded	Excluded as recommended by the applied methodology. Counted as change in carbon stock.
		CH_4	Included	Included as non-CO_2 emissions from biomass burning in the baseline scenario, according to the methodology.
		N_2O	Included	Included as non-CO_2 emissions from biomass burning in the baseline scenario, according to the methodology.
		Other	Excluded	No other GHG gasses were considered in this project activity.
	Livestock emissions	CO_2	Excluded	Not a significant source
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
		Other	Excluded	No other GHG gasses were considered in this baseline activity.
Project	Biomass burning	CO_2	Excluded	No biomass burning increase is predicted to occur in the project scenario compared to the baseline case. Therefore, it is considered insignificant.

		CH_4	Included	Included as non-CO_2 emissions from biomass burning in the project scenario, according to the methodology.
		N_2O	Included	Included as non-CO_2 emissions from biomass burning in the project scenario, according to the methodology.
		Other	Excluded	No other GHG gasses were considered in this project activity.
	Livestock emissions	CO_2	Excluded	Not a significant source.
		CH_4	Excluded	No livestock increase is predicted to occur in the project scenario compared to the baseline case. Therefore, it is considered insignificant.
		N_2O	Excluded	No livestock increase is predicted to occur in the project scenario compared to the baseline case. Therefore, it is considered insignificant.
		Other	Excluded	No other GHG gasses were considered in this project activity.

Temporal Boundary

A historical reference period from 2010 to 2020 was used to define project eligibility, and deforestation and forest degradation rates for *ex ante* estimates of GHG emissions in the project scenario, following criteria VM0007 v1.6, section **5.2.1** and VMD0015 v2.2, section **2**. The start and end dates of the Seringueira II project's crediting period are defined in sections **2.1.14** and **2.1.15**, respectively. Baseline emissions are presented in sections **3.2.1** and **3.2.1**, are valid for the first 10 year period after the project start date.

Carbon Stocks

The carbon stocks included in the project, as well as their justification, are shown in Table 21, considering the proposed scope of AUD activities.

Table 21. Carbon storage compartments included or not in the Seringueira II project.

Carbon stocks	Included/ Excluded	Justification
Aboveground Biomass	Tree: included	Changing the carbon stock in this stock is always significant and mandatory according to VM0007.
	Non-tree: included	Stock included in the forestry class in the baseline scenario.

Belowground Biomass	Tree: included	Significant carbon stock.
	Non-tree: included	Significant carbon stock.
DeadWood	Included	Not required by the methodology. Included in the project because it represents more than 5% of the woody biomass of trees, therefore significant as indicated by the T-SIG tool.
Litterfall	Excluded	Stock considered insignificant in REDD projects, its inclusion is optional.
Soil Organic Carbon	Excluded	Recommended when forests are converted into agricultural crop areas. Not to be measured in conversion to pastures and crops.
Long term wood products	Excluded	Project activities do not include logging for commercial purposes.

3.1.4 Baseline Scenario

For the Seringueira II project, it is considered that the conversion of forest land into non-forest land in the baseline scenario is given from the perspective of Avoided Unplanned Deforestation (AUD). The landowner's ability to bear the efforts and costs to maintain long-term surveillance of project boundaries to prevent unplanned deforestation and eventual encroachments is not real.

In the baseline scenario, the projection of 1,914.10 hectares of deforested forest is considered, taking into account the illegal extraction of wood and firewood, followed by the transformation of deforested areas into pastures during the crediting period of the project, as detailed below. .

The stepwise approach of the Combined T-ADD tool to identify the baseline scenario and demonstrate additionality in CDM A/R project activities is presented in section **3.1.5** Additionality.

The baseline will be reviewed every 6 years in accordance with VCS Standard v. 4.3, item **3.2.7**.

Selection of the most likely baseline scenario for the project

The Seringueira II project activity will prevent the illegal deforestation of 16,483.02 ha between 2020 and 2050. This component concerns forest lands protected by Law nº 12,651/2012. This law determines that all rural properties must maintain an area covered by native vegetation, as a Legal Reserve (LR) and Permanent Preservation Area (PPA), observing a minimum percentage in relation to the area of the property. In the Legal Amazon region, this value is 80% for properties located in forest areas.

The driver of deforestation in the baseline scenario is the landowner. Although extremely important for the environment, these areas have been greatly degraded in recent decades. The PPA and LR areas constitute, on the one hand, important mechanisms for environmental preservation, but, at the same time, limit the expansion of agricultural activity with losses to producers who, being eventually

outside the legal requirements, would be obliged to reduce the area grown to serve them.[117] In other words, it is an area located inside a rural property that must, according to the minimum percentages established by law, remain intact, covered by native vegetation. From the analysis of these legal provisions, considering the perspective of the rural owner, the constitution of RL and APP, is treated as a negative administrative limitation to the right of ownership, since they are free and general, imposed by the Public Power, and are intended to serve the public interest. The owner of land in the Amazon biome, who decides to comply with these legal specifications, is conditioned to suppress a percentage of 20% of forests or native vegetation that originally existed on his rural property.

Thus, under the areas of PPA and LR there are problems of an economic and administrative nature, the restrictions that affect the full use of the entire rural property, limit its use, and are considered a particular and individual responsibility of the owner of the property, so that require the conservation of vegetation in the demarcated area of the PPA and LR, which directly influences the valuation of properties covered by such areas. The costly denotation attributed to the protection of PPA and LR, reinforces the culture of "cleaning the land", converting forest into other land uses in the project region.

In Brazil, 69.5% of all deforested areas in 2021 was on private properties, including 14.1% in rural settlements. Similarly, in the Amazon biome, the highest percentage of deforestation occurs in private areas (44.6%), followed by rural settlements (22.2%), public areas (17.2%) and protected areas (except APAs) with 8.5%.

According to the most recent edition of the Annual Report on Deforestation in Brazil (RAD), by MapBiomas[118], the deforestation alerts that cross rural properties registered in the rural environmental register (CAR) correspond to 77% of the total deforested area. This means that in at least 3/4 of the deforestation it is possible to find someone responsible. One third (33%) of all alerts detected in Brazil in 2021 overlapped with areas registered as a Legal Reserve (LR). This represents 22% of the total area deforested in the country. The number of alerts that overlap with Permanent Preservation Areas (PPA) declared in the CAR reached 5% of the total (in area, 0.6%).

The socioeconomic dynamics of the state of Amazonas is conditioned by the "availability" of public areas and the low price of land enables the growth of extensive livestock, which tends to replace agriculture, since cattle profitability is associated with logging, prospecting, commerce, and, mainly, land grabbing. Logging is usually the first activity that occurs in the establishment of squatters in the region and is organized under a complex system, from traditional processes, with the use of chainsaws, to industrial processes (charcoal, mining) of legal or illegal processing. This activity is associated with increased deforestation and pressure on Protected Areas, since wood stocks with market value are also located in these areas.[119]

[117]Souza, GC, Bastos, JM, Galvão, CA, & Adamczyk, W. (2022). Rural Environmental Registry: An exploratory analysis of environmental indicators.Available at: https://repositorio.enap.gov.br/jspui/bitstream/1/7416/1/2022.06.10%20-%20Cadastro%20Ambiental%20Rural%20-%20an%C3%A1lise%20de%20indicadores%20ambiental. Pdf Accessed on: 02/10/23

[118] Available at: https://s3.amazonaws.com/alerta.mapbiomas.org/rad2021/RAD2021_Completo_FINAL_Rev1.pdf

[119]Castro, E. Socioeconomic dynamics and deforestation in the Amazon. New Notebooks NAEA, Belém, 8 (2), 5-39, 2005.

Regarding the baseline, studies indicate that the municipality of Ipixuna was the center of livestock expansion in the southern region of the State of Amazonas. The municipality has the second largest cattle herd in the state, second only to Boca do Acre. Cattle farming represents 51% of the most recent municipal GDP presented in the agricultural census de 2017[120]. This agricultural production is strongly linked to the levels of legal and illegal deforestation, with a positive correlation being observed between the growth of livestock and the deforestation curve in the municipality[121].

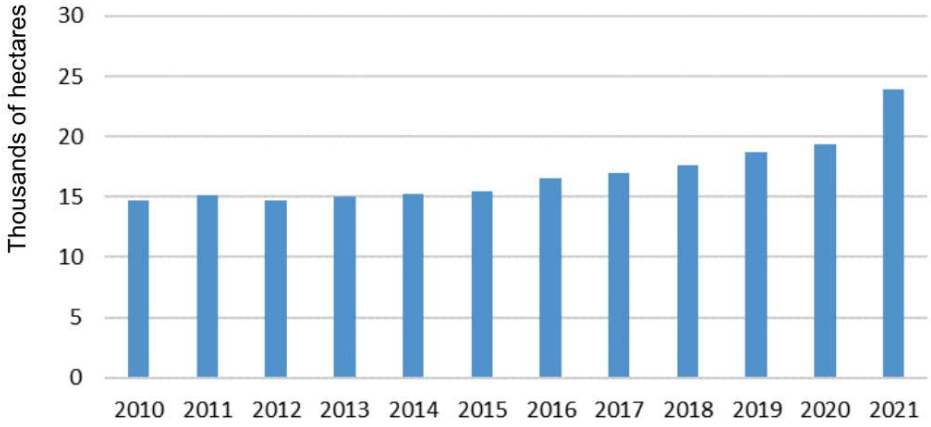


Figure 33. Evolution of the pasture area in the municipality of Ipixuna – AM.[122]

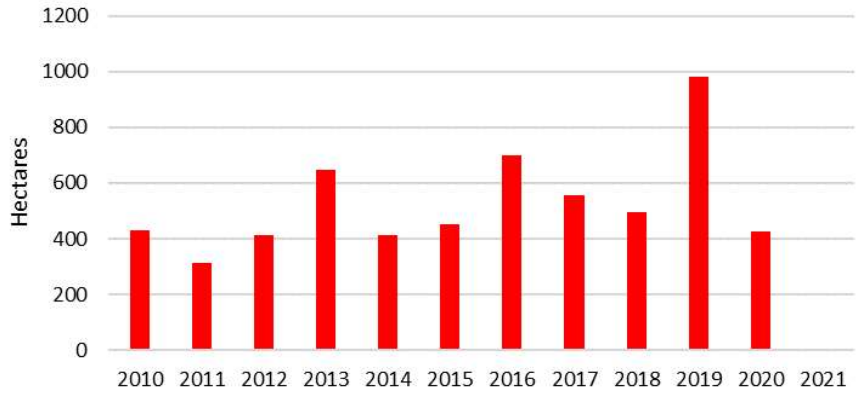


Figure 34. Area deforested between 2010 and 2020 in the municipality of Ipixuna - Amazonas.[123]

[120] 2017 Agro Census. Available at: https://censoagro2017.ibge.gov.br/ . Accessed on: 12/14/2022.

[121] Extensive system versus intensive silvopastoral system for dairy farming in the Brazilian Amazon: productivity, socioeconomic and ecosystem benefits for mitigation and adaptation to climate change. Available at: < https://www.researchgate.net/publication/344548254_Sistema_extensivo_versus_sistema_silvipastoril_intensivo_para_pecuaria_de_leite_na_Amazonia_Brasileira_produtividade_beneficios_socioeconomicos_e_ecosistemicos_para_mitigacao_e_adaptacao_as_mudancas_ > Accessed on: 12/14/2022.

[122] Available at: https://plataforma.brasil.mapbiomas.org

[123] Available at: https://plataforma.brasil.mapbiomas.org

According to this correlation between livestock and deforestation, the analysis of the reference region for projecting rate of Deforestation (RRD) over the reference historical period, confirms pastures as the most likely land use in non-forested areas in 2010 (0%, where the land use in the RRD was 100% forest), and in 2021 (4%), as shown in the table below.

Table 22. Land use change between 2010 and 2021 in RRD.

Class	2010		2021	
	Area (ha)	%	Area (ha)	%
Forest	326,098.04	100%	312,212.97	96%
Pasture	-	-	12,502.91	4%
Flooded Field and Swampy Area	-	-	487.25	-
River, Lake and Ocean	-	-	1,207.26	-
Field Training	-	-	178.48	-
Savanna	-	-	0.09	-
Urbanized area	-	-	1.07	-
Total	326,098.04	-	326,590.02	-

Considering real estate speculation on the rise in the region and the difficulties currently faced with sustainable forest management and land tenure, land sales would be an alternative means of alleviating expenses related to surveillance and legal assistance. In the latter case, it is highly likely that the new landowners will subsequently prioritize activities involving deforestation and implementation of the most common land uses in the region (i.e., pastures for raising livestock). These other land uses are analyzed and justified in section **3.1.5**.

Unplanned deforestation is expected to occur in the project area in the absence of the REDD project. In line with the prevailing characteristics of the region, the baseline scenario is cattle ranching leading to illegal levels of deforestation.

As previously reported, deforestation is closely correlated with the increase in grazing area and cattle raising.

In the absence of the REDD project, it is assumed that the PA would suffer deforestation - to be supplanted by cattle ranches - at an average annual rate of 0.39% per year, resulting in a total of 1,914.10 hectares deforested by July 2050.

The deforestation rate adopted for calculating the benefits of the REDD project was obtained from historical measurements of deforestation using Mapbioma sources, in accordance with the requirements of methodology VM0007.

Aboveground and belowground carbon pools were determined through a literature search of the Project region. Considering that the underlying process of deforestation involves the extraction of wood for commercial markets, the fixed carbon content in long-term wood products was also considered in the calculation of net emissions from deforestation. It is assumed that the project activity preserves soil

organic carbon and litter and deadwood pools to a greater extent than BAU activities. However, for conservation purposes, the project proponents have decided not to include soil carbon pools, litter and deadwood in the REDD project benefits.

Fossil fuel emissions were not accounted for in the reference area (base case) or for the project activity. It is assumed that the project activity also reduces emissions from burning fossil fuels compared to the BAU activities. However, this factor was also not accounted for for conservation purposes and monitoring difficulties during the project period.

In summary, regarding the AUD activity of the Seringueira II project, Scenario 3: Small-scale beef cattle is the baseline scenario of the current REDD project, as justified by the gradual application of the VCS Additionality Tool VT0001 v3.0, which is fully presented in section **3.1.5** below.

3.1.5 Additionality

In accordance with the procedure defined in methodology VM0007, the most recent version of the tool referenced in the T-ADD was used to identify credible alternative land use scenarios and to assess alternatives and proposed design scenarios, and to demonstrate the additionality of the project: “Combined tool to identify baseline scenario and demonstrate additionality in A/R CDM project activities (T-ADD) (Version 01)”.

The tool is applicable to this project, observing the applicability conditions of the tool: as detailed described in section **2.5.7**, the project complies with all relevant local, regional and national laws, statutes and regulatory frameworks, therefore satisfying this applicability condition. The project does not involve afforestation and reforestation, as pointed out in section **2.1.10**.

The additionality analysis, applying the T-ADD tool v1, is presented below for the AUD activity.

STEP 0: Preliminary screening based on the start date of the project activity VCS AFOLU

According to the step, "If project participants claim that the VCS AFOLU project activity of reforestation or reforestation has a start date after December 31, 1999 but before the date of their application, then project participants must:

I. Provide evidence that the start date of the VCS AFOLU project activity was after December 31, 1999, and
II. Provide evidence that the incentive of the planned sale of CERs was seriously considered in the decision to proceed with the project activity. This evidence must be based on documentation (preferably official, legal and/or other business documentation) that was available to third parties at or before the start of the project activity".

The project start date is defined as July 27, 2022. All project properties have expressed explicit contractual intentions to conserve forests and REDD+ projects after December 31, 1999, as evidenced by

the contract between Terra Vista Gestora de Recursos Ltd. and the proponent of the project (related to the properties comprising seven rural properties: Redenção, Liberdade, Deserto da Liberdade, São José, São Luiz, São Raimundo and São Vicente). The sale of carbon credits, in this case VERs, was seriously considered in the decision to proceed with the project activity. This is evidenced by the contract between the project proponents and Terra Vista Gestora de Recursos Ltd. For this purpose, the evidence is duly provided in the audit.

STEP 1: Identification of alternative land use scenarios for the proposed AFOLU project activity

Substep 1a. Identify credible alternative land use scenarios for the proposed VCS AFOLU project activity

a) The alternative land use scenarios to the proposed activity of the VCS AFOLU project are credible and non-exclusive:

SCENARIO 1: Continuation of pre-project land use:

Under the pre-project scenario, it is necessary to hire at least one agent for each of the six properties for surveillance and maintenance of the properties, all without economic activity, which implies costs for the landowner.

Scenario 1 has been included as per the requirements of the A/R CDM project activities (T-ADD).

SCENARIO 2: Project activity on the ground within the project boundaries carried out without being registered as the VCS AFOLU project:

Project activities carried out without being registered as the VCS AFOLU project. As there are no economic activities other than REDD+ being implemented, the scenario involves costs but no income. These average annual costs are estimated at R$298,333.00 throughout the entire project. Scenario 2 forest conservation and maintenance activities are therefore not financially attractive without revenue from carbon credits.

Despite this fact, Scenario 2 was included as per the requirements of the A/R CDM project activities (T-ADD).

SCENARIO 3: Conversion of forest into pasture for raising beef cattle:

As argued in the previous section (**3.1.4**), livestock is the predominant component of the regional economy, representing the majority (51%) of the municipal GDP, as well as post-deforestation land use in the RRD, in which pastures represent more than 99%. So this is a believable scenario.

b) All land use scenarios identified above can be considered realistic and credible, as they currently exist and are technically feasible in the project region. For all land use scenarios, credibility is supported by current BAU practices as attested by literature and local observations.

c) Outcome of sub-step 1a: The alternative credible land use scenarios that could have occurred on the land within the project boundary are SCENARIOS 1, 2 and 3, above.

Substep 1b. Consistency of credible land use scenarios with applicable mandatory laws and regulations

i) Demonstration that all land use scenarios identified in sub-step 1a are in compliance with all applicable mandatory legal and regulatory requirements:

SCENARIOS 1 and 2:The maintenance of the forest in the area is what is specified as legal within the Law:

Documentation of legal ownership of the property is the only relevant aspect of the law in relation to the non-economic activity components of the scenario. Therefore, this scenario complies with legal and regulatory requirements.

ii) Demonstration that applicable mandatory legal requirements are not systematically applied and that non-compliance with requirements is widespread:

SCENARIO 3: Conversion of forest into pasture for raising beef cattle

In this case, the activity does not comply with mandatory legal requirements. We can observe that this scenario is generalized through its connection with livestock, which is the main economic activity associated with land use in the project region, and in the reference region of the project, post-deforestation land use dominates (>98%), as argued in section **3.4**. And spatial monitoring studies note illegal levels of deforestation associated with the expansion of cattle ranching. Therefore, it can be concluded that most of the rural properties in the municipality and in the reference region fit this scenario. After illegal deforestation in the region, livestock is commonly installed in deforested areas. As noted earlier, in the project's RRD.

Therefore, this scenario does not comply with applicable mandatory legal requirements that are not systematically applied. This scenario is widespread.

b) Result of Sub-step 1b: It was demonstrated that SCENARIOS 1, 2 and 3 are plausible alternative land use scenarios to this VCS AFOLU project activity.

Substep 1c. Base scenario selection:

SCENARIO 3: Conversion of forest to pasture for raising beef cattle is selected as the baseline scenario for the Seringueira II project, as it is the predominant land use in the project region (see substep 1a) and although it is illegal in protected areas (see substep 1b), this has not restricted the expansion of the activity.

SCENARIO 3: the conversion of forest into pasture for raising beef cattle is the baseline scenario of the current REDD project.

Considering that the scenarios above were identified, according to the CDM AR-AM Tool, we move on to step 2 (Barrier Analysis).

STEP 2: Barrier analysis

The list below shows the most relevant barriers that would prevent the implementation of the proposed type of project activity without the revenue from the sale of VCUs (Outcome of VT0001 v3.0 sub-step 3a):

- Barriers to investment: financial flows for the conservation of private areas are insignificant in Brazil;
- Institutional barriers: lack of enforcement of forestry or land-use legislation is typical in the Seringueira II project geographic region;
- Barriers related to local tradition: local customs and market conditions favor the raising of cattle as a livelihood for local communities;
- Barriers due to social conditions and land use practices: Widespread illegal practices are well known in the Seringueira II project geographic region.

Substep 2c. Determining the baseline scenario (if barrier analysis allows)

The identified barriers do not prevent the implementation of scenario “3”. On the contrary, the lack of financial resources for conservation, effective public policies to reduce deforestation and promote sustainable socioeconomic development, associated with the inherent difficulty of public authorities in containing illegal activities, drives illegal deforestation in Brazil (Resultado do VT0001 v3.0 sub - step 3b).

In this sense, according to the tool: "Afforestation" (or the REDD project activity in this case) "without being registered as a VCS AFOLU project activity" is not included in the list of land use scenarios that are not impeded by any barriers.

The list contains only one land use scenario, it is necessary to continue with Step 4: Common practice test.

STEP 4: Common practice test

According to T-ADD "CDM Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities", the previous steps are complemented with an analysis of the extent to which similar activities have already spread in the geographic area of the proposed VCS AFOLU project activity. This test is a credibility check to demonstrate additionality that complements the barrier analysis (Step 2). Other registered VCS AFOLU project activities should not be included in this analysis.

This analysis took into account similar activities in the project region, considering the municipality of Ipixuna - AM, and the type of land area analyzed were private natural heritage reserves, a category of protected area known as RPPN in Brazil. This is because they are private conservation reserves, and in this sense they are comparable to the Seringueira II project area.

Based on data provided by the official body ICMbio, in the state of Amazonas there are only 14 RPPNs, with an average of 62.8 ha. In Ipixuna there are no registered RPPNs. Therefore, we can cite at least two essential differences: the private conservation areas in the State of Amazonas are incomparably smaller in size compared to the Seringueira II project, and they are not allocated in the same jurisdictional area (municipality) of the project.

In conclusion, there are no similar activities widespread in the same geographic area, or activities considered similar have essential distinctions for Projeto Seringueira. Therefore, the activity of Projeto Seringueira is additional.

3.1.6 Methodology Deviations

The Seringueira II project has no methodology deviations.

3.2 Quantification of GHG Emission Reductions and Removals

3.2.1 Baseline Emissions

In the Seringueira II project area there are three strata, considering the AUD components. Area stratification was based on module VMD0016 (“X-STR Methods for project area stratification, version 1.1”), as shown in Table 23.

Table 23. Strata of the Seringueira II project.

Estratos	Descrição	Área (ha)	(%)
Ao	Alluvial Open Ombrophylous Forest	7,452.72	45.21
Lo	Lowland Open Ombrophylous Forest	3,596.90	21.82
Ad	Alluvial Dense Ombrophylous Forest	4,810.37	29.18
Ld	Lowland Dense Ombrophylous Forest	623.03	3.78

Total	16,483.02	100.00

The net changes in the baseline carbon stock as well as the project greenhouse gas emissions were estimated from the application of module VMD0007 “Estimating the changes, in the baseline, in the carbon stock and greenhouse gas emissions. greenhouse effect from unplanned deforestation and unplanned degradation of wetlands (BL-UP), v3.3”, according to the specifications of methodology VM0007. The following steps were considered: i) definition of boundaries, ii) estimates of unforeseen annual deformation zones, iii) location and quantification of unplanned deforestation transport and iv) estimation of changes in carbon stocks and greenhouse gas emissions.

To estimate baseline carbon stock changes, module BL-UP Equation.22:

$$\Delta C_{BSL.\,i,t} = A_{unplanned,\,i,t} \times \left(\Delta C_{ABtree,\,i} - \Delta C_{WP,\,i} + \Delta C_{ABnontree,\,i} + \Delta C_{LI,\,i}\right) + \left(\sum_{t-10}^{t} A_{unplanned,\,i,t}\right) \times \left(\Delta C_{BBtree,\,i,t} - 10 + \Delta C_{BBnontree,\,i} + \Delta C_{DW,\,i}\right) \times \left(\frac{1}{10}\right) + \left(\sum_{t-20}^{t} A_{unplanned\,i,t}\right) \times \left(C_{WP100,\,i} + \Delta C_{SOC,\,i}\right) \times \left(\frac{1}{20}\right) t$$

Where:

$\Delta C_{BSL.\,i,t}$ = Sum of change in baseline carbon stocks of all terrestrial reservoirs in stratum i in year t, t CO_2e (calculated separately for project area [PA] and leakage strip [LB]);

$A_{unplanned,\,i,t}$ = Area of unplanned deforestation in forest stratum i in year t; ha;

$\Delta C_{WP,\,i}$ = Carbon stock entering the pool of wood products in stratum i; t CO_2e ha^{-1};

$C_{WP100,\,i}$ = Carbon stock entering the wood products reserve at the time of deforestation expected to be emitted over 100 years from stratum i; t CO_2e ha^{-1};

$\Delta C_{ABtree,\,i}$ = Change in baseline carbon stock in aboveground tree biomass in stratum i; t CO_2e ha-1;

$\Delta C_{BBtree,\,i}$ = Change in baseline carbon stock in belowground tree biomass in stratum i; t CO_2e ha-1;

$\Delta C_{ABnontree,\,i}$ = Change in baseline carbon stock in aboveground non-tree biomass in stratum i; t CO_2e ha-1;

$\Delta C_{BBnontree,\,i}$ = Change in baseline carbon stock in non-tree belowground biomass in stratum i; t CO_2e ha-1;

$\Delta C_{DW,i}$ = Change in base carbon stock in dead wood in stratum i; t CO_2e ha^{-1};

$\Delta C_{LI,i}$ = Change in baseline carbon stock in waste in stratum i; t CO_2e ha^{-1};

$\Delta C_{SOC,i}$ = Baseline carbon stock change in terrestrial soil organic carbon in stratum i; t CO_2e ha^{-1}

$i_{1, 2, 3, ...}$ = *M* strata;

*1, 2, 3, ... t** years elapsed since the planned start of the project activity.

Estimation of annual area of unplanned baseline deforestation in RRD

Table 24. Projected baseline annual unplanned deforestation for the project area at Alluvial Open Ombrophylous Forest stratum.

Alluvial Open Ombrophylous Forest		
Year	ha/year	ha (cumulative)
2021	63.80	63.80
2022	63.80	127.61
2023	63.80	191.41
2024	63.80	255.21
2025	63.80	319.02
2026	63.80	382.82
2027	63.80	446.62
2028	63.80	510.43
2029	63.80	574.23
2030	63.80	638.03
2031	63.80	701.84
2032	63.80	765.64
2033	63.80	829.44
2034	63.80	893.25
2035	63.80	957.05
2036	63.80	1,020.85
2037	63.80	1,084.66
2038	63.80	1,148.46
2039	63.80	1,212.26

2040	63.80	1,276.07
2041	63.80	1,339.87
2042	63.80	1,403.67
2043	63.80	1,467.48
2044	63.80	1,531.28
2045	63.80	1,595.09
2046	63.80	1,658.89
2047	63.80	1,722.69
2048	63.80	1,786.50
2049	63.80	1,850.30
2050	63.80	1,914.10

Table 25. Projected baseline annual unplanned deforestation for the project area at Lowland Open Ombrophylous Forest stratum.

Lowland Open Ombrophylous Forest		
Year	ha/year	ha (cumulative)
2021	0	63.80
2022	0	0
2023	0	0
2024	0	0
2025	0	0
2026	0	0
2027	0	0
2028	0	0
2029	0	0
2030	0	0
2031	0	0
2032	0	0
2033	0	0
2034	0	0
2035	0	0
2036	0	0

2037	0	0
2038	0	0
2039	0	0
2040	0	0
2041	0	0
2042	0	0
2043	0	0
2044	0	0
2045	0	0
2046	0	0
2047	0	0
2048	0	0
2049	0	0
2050	0	0

Table 26. Projected baseline annual unplanned deforestation for the project area at Alluvial Dense Ombrophylous Forest stratum.

Alluvial Dense Ombrophylous Forest		
Year	ha/year	ha (cumulative)
2021	0	63.80
2022	0	0
2023	0	0
2024	0	0
2025	0	0
2026	0	0
2027	0	0
2028	0	0
2029	0	0
2030	0	0
2031	0	0
2032	0	0
2033	0	0
2034	0	0
2035	0	0
2036	0	0

2037	0	0
2038	0	0
2039	0	0
2040	0	0
2041	0	0
2042	0	0
2043	0	0
2044	0	0
2045	0	0
2046	0	0
2047	0	0
2048	0	0
2049	0	0
2050	0	0

Table 27. Projected baseline annual unplanned deforestation for the project area at Lowland Dense Ombrophylous Forest stratum.

Lowland Dense Ombrophylous Forest		
Year	ha/year	ha (cumulative)
2021	0	63.80
2022	0	0
2023	0	0
2024	0	0
2025	0	0
2026	0	0
2027	0	0
2028	0	0
2029	0	0
2030	0	0
2031	0	0
2032	0	0
2033	0	0
2034	0	0
2035	0	0
2036	0	0

2037	0	0
2038	0	0
2039	0	0
2040	0	0
2041	0	0
2042	0	0
2043	0	0
2044	0	0
2045	0	0
2046	0	0
2047	0	0
2048	0	0
2049	0	0
2050	0	0

As a result, the average annual deforestation rate in the Alluvial Open Ombrophylous Forest stratum (Aa) is 0.39%.

Change in Carbon Stock in the Baseline Scenario

This section presents the expected changes in carbon stocks by reservoir in the baseline scenario. Initial and post-deforestation stocks are taken from peer-reviewed literature.

Were identified four classes of forests in the project area: Alluvial Open Ombrophylous Forest (45.21%), Lowland Open Ombrophylous Forest (21.82%), Alluvial Dense Ombrophylous Forest (29.18%) and Lowland Dense Ombrophylous Forest (3.8%). Carbon stock values for all forest types were obtained from the literature: Ministry of Science, Technology and Innovation (2020)[124], with values above ground ranging from 473 to 616.37 t CO_2/ha (Table 28). To calculate the carbon stocks (above and below ground) in each stratum, the carbon values (tC/ha, from the literature) were multiplied by the conversion factor 44/12 (conversion factor from tC to tCO_2).

[124] Available at: https://www.gov.br/mcti/pt-br/acompanhe-o-mcti/sirene/publicacoes/relatorios-de-referencia-setorial/pdf/invetario4/lulucf-jan21.zip

Table 28. Carbon stocks above (CAB_tree,bsl,i) and below ground (CBB_tree,bsl,i) in different strata in the project area.

Stratum	(%)	CAB_tree,bsl,i	CBB_tree,bsl,i	Total (t CO_2e ha^{-1})
Alluvial Open Ombrophylous Forest	45.21	430.10	42.90	473.00
Lowland Open Ombrophylous Forest	21.82	490.97	49.13	540.10
Alluvial Dense Ombrophylous Forest	29.18	331.83	103.03	434.87
Lowland Dense Ombrophylous Forest	3.78	470.43	145.93	616.37

For the post-deforestation carbon stock (i.e. pasture carbon stock), the value (27.5 tCO_2/ha) adopted by the authority responsible for the National GHG Inventory (Ministry of Science, Technology and Innovation, 2020) was used in the calculations.

Baseline emissions from unplanned deforestation

For the estimation of emissions from unplanned deforestation that would occur in the project area in the absence of the project, the estimated annual area of deforestation was multiplied by the sum of aboveground and belowground carbon stocks in the forest for each stratum. The result is shown in the tables below. The tables below show the projection of baseline gross emissions from unplanned deforestation for each stratum present in the project area.

Table 29. Projected baseline gross emissions from unplanned deforestation within the project area, at Alluvial Open Ombrophylous Forest stratum.

Year	ha/year	tCO_2e/year	tCO_2e (Accumulated)
2021	63.80	21,829.49	21,829.49
2022	63.80	21,829.49	43,658.97
2023	63.80	21,829.49	65,488.46
2024	63.80	21,829.49	87,317.94
2025	63.80	21,829.49	109,147.43
2026	63.80	21,829.49	130,976.91
2027	63.80	21,829.49	152,806.40
2028	63.80	21,829.49	174,635.88
2029	63.80	21,829.49	196,465.37

2030	63.80	21,829.49	218,294.85
2031	63.80	21,829.49	240,124.34
2032	63.80	21,829.49	261,953.82
2033	63.80	21,829.49	283,783.31
2034	63.80	21,829.49	305,612.79
2035	63.80	21,829.49	327,442.28
2036	63.80	21,829.49	349,271.77
2037	63.80	21,829.49	371,101.25
2038	63.80	21,829.49	392,930.74
2039	63.80	21,829.49	414,760.22
2040	63.80	21,829.49	436,589.71
2041	63.80	21,829.49	458,419.19
2042	63.80	21,829.49	480,248.68
2043	63.80	21,829.49	502,078.16
2044	63.80	21,829.49	523,907.65
2045	63.80	21,829.49	545,737.13
2046	63.80	21,829.49	567,566.62
2047	63.80	21,829.49	589,396.10
2048	63.80	21,829.49	611,225.59
2049	63.80	21,829.49	633,055.07
2050	63.80	21,829.49	654,884.56
Total	1914.10	654,884.56	-

Observing the criteria of the Location Analysis, conservatively the emissions in the Lowland Open Ombrophylous Forest, Alluvial Dense Ombrophylous Forest and Lowland Dense Ombrophylous Forest strata were estimated as zero for the Seringueira II project's lifetime.

Baseline biomass burning emissions

Greenhouse gas emissions from biomass burning were determined based on the IPCC 2006 Inventory Guidelines, project area as follows:

$$E_{Biomassburn,\,i,\,t} = \sum_{g=1}^{G} \left(\left(A_{burn,i,t} * B_{i,t} * Comb_{i} * G_{g,i} \right) * 10^{-3} \right) * GWP_{G})$$

Where:

$E_{Biomassburn,\,i,\,t}$ = Greenhouse gas emissions due to biomass burning as part of deforestation activities in stratum i in year t; tCO_2e of each GHG (CO_2, CH_4, N_2O);

$A_{burn,i,t}$ = Area burned for stratum i at time t; there is;

$B_{i,t}$ = Average aboveground biomass stock before burning of stratum i, time t; tons t; dm ha^{-1};

$Comb_i$= Combustion factor for stratum i; dimensionless (default value derived from IPCC Table 2.6, 2006);

$G_{g,i}$= Emission factor of stratum i for gas g; kg t^{-1} dry matter burned (default values derived from IPCC Table 2.5, 2006);

GWP_G= Global warming potential of gas g; tCO_2/t gas g (IPCC default values: CH_4 = 28; N_2O = 265);

g= 1, 2, 3 ... Greenhouse gases;

i= 1, 2, 3 ... M stratum;

t= 1, 2, 3 ... t years have passed since the start of the REDD project activity;

The parameters used to calculate biomass burning for the AUD component baseline scenario are presented in Table 30. The results of CH_4 and N_2O emissions generated as a result of the incomplete burning of non-commercial wood biomass after logging also in the AUD, during a period of 30 years are presented in Table 31.

Table 30. Parameters used to calculate biomass burning in the baseline scenario of the project.

Component	Value	Unit
$Comb_i$[125]	0.50	dimensionless
G_{CH4}[126]	4.8	g/kg dry matter burned
$G_{N20}7$	0.2	g/kg dry matter burned
$GWP^{127}{}_{CH4}$	28	dimensionless
GWP_{N2O}	265	dimensionless

[125] Available at: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_02_Ch2_Generic.pdf. Accessed on: 02/24/2023.

[126] Available at: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_02_Ch2_Generic.pdf. Accessed on: 02/24/2023.

[127] Available at: https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter08_FINAL.pdf. Accessed on: 02/24/2023.

Table 31. Results of CH_4 and N_2O emissions generated as a consequence of incomplete burning of non-commercial wood biomass after logging.

Year	ha/year	tCO_2e/year	tCO_2e (Accumulated)
2021	63.80	2,390.98	2,390.98
2022	63.80	2,390.98	4,781.97
2023	63.80	2,390.98	7,172.95
2024	63.80	2,390.98	9,563.93
2025	63.80	2,390.98	11,954.92
2026	63.80	2,390.98	14,345.90
2027	63.80	2,390.98	16,736.88
2028	63.80	2,390.98	19,127.87
2029	63.80	2,390.98	21,518.85
2030	63.80	2,390.98	23,909.84
2031	63.80	2,390.98	26,300.82
2032	63.80	2,390.98	28,691.80
2033	63.80	2,390.98	31,082.79
2034	63.80	2,390.98	33,473.77
2035	63.80	2,390.98	35,864.75
2036	63.80	2,390.98	38,255.74
2037	63.80	2,390.98	40,646.72
2038	63.80	2,390.98	43,037.70
2039	63.80	2,390.98	45,428.69
2040	63.80	2,390.98	47,819.67
2041	63.80	2,390.98	50,210.65
2042	63.80	2,390.98	52,601.64
2043	63.80	2,390.98	54,992.62
2044	63.80	2,390.98	57,383.60
2045	63.80	2,390.98	59,774.59
2046	63.80	2,390.98	62,165.57
2047	63.80	2,390.98	64,556.56
2048	63.80	2,390.98	66,947.54
2049	63.80	2,390.98	69,338.52
2050	63.80	2,390.98	71,729.51
Total	1914.10	71,729.51	-

Carbon stock of wood products at baseline

To estimate the biomass carbon of the commercial volume extracted in the deforestation process, the following equation was applied, applicable to the Seringueira II project, according to "Option 2: Commercial inventory estimation", as recommended in CP-W:

$$C_{xb,\,i} = C_{ABtree,\,i} \times \left(\frac{1}{BCEF}\right) \times Pcom_i$$

Where:

$C_{xb,\,i}$ = Average carbon stock of the biomass extracted from stratum i; $tCO_2e\ ha^{-1}$;

$C_{ABtree,\,i}$ = Average carbon stock of aboveground biomass in stratum i; $tCO_2e\ ha^{-1}$;

$BCEF$ = Biomass expansion and conversion factor (BCEF) for marketable volume conversion in total aboveground tree biomass; dimensionless;

i = 1,2,3, … M strata.

Conservatively, the proportion of carbon present in the biomass extracted in long-term (100 years) wood products, it is assumed that all extracted biomass not retained in long-term wood products after 100 years is emitted in the year of harvest , CP-W equations (5) and (6) were combined, described below::

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

and

$$C_{WP100,\,i} = C_{WP,\,i} - C_{WP,\,i} \times \left(1 - SLF_{ty}\right) \times \left(1 - OF_{ty}\right)$$

to arrive at

$$C_{WP100,\,i} = \sum_{ty=s,w,oir,p,o} C_{XB,\,ty,\,i} \times \left(1 - WW_{ty}\right) \times \left(1 - \left(1 - SLF_{ty}\right) \times \left(1 - OF_{ty}\right)\right)$$

Where:

$C_{WP,i}$ = Carbon stock in the long-term wood products pool (remaining stock in wood products after 100 years) of stratum i after deforestation; $tCO_2e\ ha^{-1}$;

$C_{WP100,i}$ = Carbon stock entering the wood products pool at the time of deforestation expected to be emitted over 100 years from the *i* stratum; $t\ CO_2e\ ha^{-1}$;

$C_{XB,ty,i}$ = Average carbon stock of extracted biomass by class of wood product in the year t of stratum i; $tCO_2e\ ha^{-1}$;

WW_{ty} = Waste wood. The fraction immediately issued for mill inefficiency by wood product class t;; dimensionless (0.24 for developing countries; Winjum et al. 1998 cited by CP-W);

SLF_{ty} = Fraction of wood products that will be emitted into the atmosphere within 5 years after wood harvesting, by class of wood product;dimensionless (0.2 for lumber; Winjum et al. 1998 cited by CP-W);

OF_{ty} = Fraction of wood products that will be emitted into the atmosphere between 5 and 100 years of logging by class of wood product in year t; dimensionless (0.80 for lumber in tropical forests; Winjum et al. 1998 cited by CP-W);

ty = product class – defined here as lumber(s), wood-based panels (w), other industrial logs (oir), paper and cardboard (p) and other (o).

The parameters used in the calculation of the carbon pool of wood products at baseline, as well as the results of the estimates (sum of strata) for the entire project period are shown in the Tables 32 and 33.

Table 32. Parameters used in the calculation of the carbon pool of wood products in the baseline.

Stratum	*CAB_tree* (tCO_2e/ha)	*BCEF*	*Pcom*	*CXB* (tCO_2e/ha)	*CWP* (tCO_2e/ha)
Alluvial Open Ombrophylous Forest	430.10	1.32	0.08	15.17	11.53
Lowland Open Ombrophylous Forest	490.97	1.32	0.08	15.17	11.53
Alluvial Dense Ombrophylous Forest	331.83	1.32	0.08	15.17	11.53
Lowland Dense Ombrophylous Forest	470.43	1.32	0.08	15.17	11.53

Table 33. Carbon stock in wood products at the baseline of unplanned deforestation.

CWP, bsl, i			
Year	ha/year	tCO_2e/year	tCO_2e (Accumulated)
2021	63.80	735.47	735.47
2022	63.80	735.47	1,470.94
2023	63.80	735.47	2,206.41
2024	63.80	735.47	2,941.88
2025	63.80	735.47	3,677.35
2026	63.80	735.47	4,412.82
2027	63.80	735.47	5,148.29
2028	63.80	735.47	5,883.76
2029	63.80	735.47	6,619.23
2030	63.80	735.47	7,354.69
2031	63.80	735.47	8,090.16
2032	63.80	735.47	8,825.63
2033	63.80	735.47	9,561.10
2034	63.80	735.47	10,296.57
2035	63.80	735.47	11,032.04
2036	63.80	735.47	11,767.51
2037	63.80	735.47	12,502.98
2038	63.80	735.47	13,238.45
2039	63.80	735.47	13,973.92
2040	63.80	735.47	14,709.39
2041	63.80	735.47	15,444.86
2042	63.80	735.47	16,180.33
2043	63.80	735.47	16,915.80
2044	63.80	735.47	17,651.27
2045	63.80	735.47	18,386.74
2046	63.80	735.47	19,122.21
2047	63.80	735.47	19,857.68
2048	63.80	735.47	20,593.15
2049	63.80	735.47	21,328.62
2050	63.80	735.47	22,064.08
Total	1914.10	71,729.51	-

Carbon stock in post-deforestation land use (pasture) at baseline

To calculate the remaining carbon stock in the land after deforestation, we apply the conservative value of 27.50tCO_2e ha^{-1}; adopted by the country in the Fourth National Communication to the Convention - United Nations Framework on Climate Change - Reference Report: Land Use Sector, Land Use Change and Forestry, 2020. The table below summarizes the results obtained for carbon pools in pastures in the baseline scenario, for 30 years of the project.

Table 34. Baseline post-deforestation (pasture) carbon stock.

Year	ha/year	tCO_2e/year	tCO_2e (Accumulated)
2021	63.80	1,754.59	1,754.59
2022	63.80	1,754.59	3,509.19
2023	63.80	1,754.59	5,263.78
2024	63.80	1,754.59	7,018.37
2025	63.80	1,754.59	8,772.97
2026	63.80	1,754.59	10,527.56
2027	63.80	1,754.59	12,282.16
2028	63.80	1,754.59	14,036.75
2029	63.80	1,754.59	15,791.34
2030	63.80	1,754.59	17,545.94
2031	63.80	1,754.59	19,300.53
2032	63.80	1,754.59	21,055.12
2033	63.80	1,754.59	22,809.72
2034	63.80	1,754.59	24,564.31
2035	63.80	1,754.59	26,318.91
2036	63.80	1,754.59	28,073.50
2037	63.80	1,754.59	29,828.09
2038	63.80	1,754.59	31,582.69
2039	63.80	1,754.59	33,337.28
2040	63.80	1,754.59	35,091.87
2041	63.80	1,754.59	36,846.47
2042	63.80	1,754.59	38,601.06
2043	63.80	1,754.59	40,355.66
2044	63.80	1,754.59	42,110.25

2045	63.80	1,754.59	43,864.84
2046	63.80	1,754.59	45,619.44
2047	63.80	1,754.59	47,374.03
2048	63.80	1,754.59	49,128.62
2049	63.80	1,754.59	50,883.22
2050	63.80	1,754.59	52,637.81

3.2.2 Project Emissions

The Seringueira II project does not include activities within the project areas, therefore, there are no project emissions to be accounted for at this time.

3.2.3 Leakage

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

$$LK_{MarketEffects,\,timber} = \sum_{i=1}^{M}\left(LF_{ME} \times LK_{MAF} \times AL_{T,i}\right)$$

Where:

$LK_{MarketEffects,\,timber}$ = Total GHG emissions due to leakage market effects through reduced wood harvesting; tCO_2-e;

LF_{ME} = Leakage factor for market effects calculations; dimensionless;

$AL_{T,i}$ = Summed emissions from logging in stratum i in case of baseline potentially displaced by carbon project implementation; tCO_2-e;

LK_{MAF} = Leak management adjustment factor (dimensionless);

i = 1,2,3,… strata.

According to module VMD0011 (LK-ME), when the average biomass is more than 15% greater than the biomass within the project boundary, the LFMe should be considered 0.2, which is applicable for the case of this project. The leakage belt was allocated considering the similarity of the deforestation

factors of the leakage belt and the general characteristics of the forest (stratification, forest type, carbon stocks), therefore, the same parameters were applied for the project area and the leak belt.

The carbon footprint due to displaced logging has two components: the carbon from the biomass of the logged wood and the carbon from the biomass in the forest damaged in the logging process. The estimate of carbon displaced by wood extraction was accessed based on the equation:

$$C_{BSL,XBT,i,t} = \left(\left(V_{BSL,XE,i,t} \times D_{mn} \times CF\right) + \left(V_{BSL,XE,i,t} \times LDF\right) + \left(V_{BSL,XE,i,t} \times LIF\right)\right) \times \left(\frac{44}{12}\right)$$

Where:

$C_{BSL,XBT,i,t}$ = Carbon emission due to displaced wood harvests in the baseline scenario in stratum i at time t; tCO_2-e;

$V_{BSL,XE,i,t}$ = Volume of wood projected to be harvested within the project boundary during the baseline in stratum i at time t; m^3;

D_{mn} = Average wood density of commercially harvested species; t dmm^{-3};

CF = Carbon fraction of biomass for commercially harvested species j; t C td.m.-1;

LDF = Registry Damage Factor; $tC.m^{-3}$ (standard 0.53 t $tC.m^{-3}$);

LIF = Timber infrastructure factor; tC m^{-3} (standard 0.29 $tC.m^{-3}$);

i = 1,2,3,… strata;

t = 1, 2, 3, …*t* years have passed since the planned start of REDD project activity.

The Table 35 summarizes the results of the market leakage estimates for the Seringueira II project.

Table 35. Market leakage from the Seringueira II project.

Year	LKMarketEffects,timber	LKMarketEffects,FW/C
	tCO_2e/year	tCO_2e/year
2021	903.0	34.0
2022	903.0	34.0
2023	903.0	34.0
2024	903.0	34.0
2025	903.0	34.0

2026	903.0	34.0
2027	903.0	34.0
2028	903.0	34.0
2029	903.0	34.0
2030	903.0	34.0
2031	903.0	34.0
2032	903.0	34.0
2033	903.0	34.0
2034	903.0	34.0
2035	903.0	34.0
2036	903.0	34.0
2037	903.0	34.0
2038	903.0	34.0
2039	903.0	34.0
2040	903.0	34.0
2041	903.0	34.0
2042	903.0	34.0
2043	903.0	34.0
2044	903.0	34.0
2045	903.0	34.0
2046	903.0	34.0
2047	903.0	34.0
2048	903.0	34.0
2049	903.0	34.0
2050	903.0	34.0

Leak outside the Leak Belt (Step 4 - LK-ASU)

Immigrants prevented from migrating and clearing the project area are conservatively assumed to migrate to an alternative forest area and cause deforestation in the alternative area, which may overlap the leakage belt area. The proportion that migrates to the leakage belt is calculated as the ratio of the ratio between the leakage belt area and the total available forest area in the country (AVFOR), estimated as follows:

$$AVFOR = TOTFOR - PROTFOR - MANFOR$$

Where:

AVFOR = Total area of national forest available for unplanned deforestation; there is;
TOTFOR = Total available national forest area; there is;
PROTFOR = Total area of nationally fully protected forests; there is;
MANFOR = Total area of forests underactive national management; there is.

The table below presents the parameters applied for the AVFOR calculation in the baseline scenario of the project.

Table 36. Parameters applied for the AVFOR calculation in the project's baseline scenario.

Parameter	Area (ha)
TOTFOR	486,461,572
PROTFOR	88,566,400
MANFOR	1,400,000

As a result, the estimated AVFOR is 396,495,172 ha.

The ratio of area between the leakage belt and the total available national forest area ($PROP_{LB}$) was calculated by dividing the leakage belt area (LBFOR; 13,605.56 ha) by the AVFOR. This procedure results in $PROP_{LB}$ equal to 0.00003431.

Similarly, the proportion of the carbon stock in the leakage belt in relation to the carbon stock in the forest area outside the project boundary ($PROP_{CS}$). Considering the similarity between the project area and the leak belt area, the $PROP_{CS}$ was calculated by dividing the carbon stock outside the leak belt (C_{OLB} = 578.1 tCO_2/ha) and the stock inside the leak belt (C_{LB} = 439, 36 tCO_2/ha), which results in a value of 1.1658.

The proportion of baseline deforestation caused by the immigrant population ($PROP_{IMM}$) considered the period from 2012 to 2020. According to the number of immigrants[128], the proportion of deforestation attributed to immigrant agents ($PROP_{IMM}$) is 1.13%.

To calculate the proportional leak displaced by immigrant populations (LK_{PROP}) the equation was applied:

[128]Resident population estimates for municipalities and states | IBGE. Available in: Resident population estimates for municipalities and states | IBGE. Available at: https://www.ibge.gov.br/estatisticas/sociais/populacao/9103-estimativas-de-populacao.html?=&t=resultados

$$LK_{PROP} = PROP_{IMM} \times \left(1 - PROP_{LB}\right) \times PROP_{CS}$$

Where:

LK_{PROP} = Proportional leakage for areas with immigrant populations;

$PROP_{IMM}$ = Estimated proportion of baseline deforestation caused by the immigrant population; proportion;

$PROP_{LB}$ = Forest area available for unplanned deforestation as a proportion of the total national forest area available for unplanned deforestation;

$PROP_{CS}$ = Proportional difference in stocks between forest areas available for unplanned deforestation inside and outside the leakage belt.

O LK_{PROP} estimated is 0.125.

The emissions *ex ante* GHG emissions due to unplanned deforestation shifted outside the leakage belt were estimated according to the equation, as per VMD0010 LK-ASU:

$$\Delta C_{LK-ASU,OLB} = \left(\Delta C_{BSL,LK,unplanned} - \Delta C_{P,LB}\right) \times LK_{PROP}$$

Where:

$\Delta C_{LK-ASU,OLB}$ = Net CO_2e emissions due to unplanned deforestation moved outside the leakage belt; *t* CO_2-e;

$\Delta C_{BSL,LK,unplanned}$ = Net CO_2e emissions at baseline from unplanned deforestation in the leakage belt; tCO_2-e;

$\Delta C_{P,LB}$ = Net CO_2e emissions within the leakage belt in the case of the project; tCO_2-e;

LK_{PROP} = Proportional leakage for areas with immigrant populations; proportion.

In each monitoring period, measure the deforested area in the project area (ADefPA,*i*,*t*) and the leakage (ADefLB,*i*,*t*), observing the M-REDD guidelines.

For the difference in emissions from unplanned deforestation within the leakage belt in the baseline and in the project case, a factor of 10% was applied, so $\Delta C_{P,LB}$ was adjusted 10% larger than $\Delta C_{BSL,LK}$). This is assumed conservatively, as the project proponent will adopt a series of activities to mitigate leaks. Table 37 summarizes the results obtained for the leakage estimates outside the leakage belt.

Table 37. Estimated leakage of GHG emissions outside the leakage belt.

Year	ΔCBSL,LK,unplanned	ΔCP,LB	ΔCLK-ASU,OLB
2021	22,877.23	24,012.43	- 165.44
2022	22,877.23	24,012.43	- 165.44
2023	22,877.23	24,012.43	- 165.44
2024	22,877.23	24,012.43	- 165.44
2025	22,877.23	24,012.43	- 165.44
2026	22,877.23	24,012.43	- 165.44
2027	22,877.23	24,012.43	- 165.44
2028	22,877.23	24,012.43	- 165.44
2029	22,877.23	24,012.43	- 165.44
2030	22,877.23	24,012.43	- 165.44
2031	22,877.23	24,012.43	- 165.44
2032	22,877.23	24,012.43	- 165.44
2033	22,877.23	24,012.43	- 165.44
2034	22,877.23	24,012.43	- 165.44
2035	22,877.23	24,012.43	- 165.44
2036	22,877.23	24,012.43	- 165.44
2037	22,877.23	24,012.43	- 165.44
2038	22,877.23	24,012.43	- 165.44
2039	22,877.23	24,012.43	- 165.44
2040	22,877.23	24,012.43	- 165.44
2041	22,877.23	24,012.43	- 165.44
2042	22,877.23	24,012.43	- 165.44
2043	22,877.23	24,012.43	- 165.44
2044	22,877.23	24,012.43	- 165.44
2045	22,877.23	24,012.43	- 165.44
2046	22,877.23	24,012.43	- 165.44
2047	22,877.23	24,012.43	- 165.44

2048	22,877.23	24,012.43	- 165.44
2049	22,877.23	24,012.43	- 165.44
2050	22,877.23	24,012.43	- 165.44
Total	686,316.77	720,373.02	- 4,963.34

Shifting leakage factor

Considering the expected effectiveness of the proposed REDD+ project activities, the changes in carbon stock and greenhouse gas emissions in the leakage belt that may occur due to the implementation of the REDD+ project activity were conservatively estimated to be 10% greater in the case of the project. Thus, the leakage factor applied corresponds to 10% of the sum of the previously estimated leakage components (ie Market Leakage + Leakage Outside the leakage belt), the results are shown in Table 38 below.

Table 38. Final leakage of the Seringueira II project throughout its lifetime.

Year	ΔCLK-REDD		
	ha/year	tCO_2e/year	tCO_2e (Accumulated)
2021	52.7	93.7	93.7
2022	52.7	93.7	187.4
2023	52.7	93.7	281.1
2024	52.7	93.7	374.8
2025	52.7	93.7	468.5
2026	52.7	93.7	562.2
2027	52.7	93.7	655.9
2028	52.7	93.7	749.6
2029	52.7	93.7	843.3
2030	52.7	93.7	937.0
2031	52.7	93.7	1,030.7
2032	52.7	93.7	1,124.4
2033	52.7	93.7	1,218.1
2034	52.7	93.7	1,311.8
2035	52.7	93.7	1,405.6
2036	52.7	93.7	1,499.3
2037	52.7	93.7	1,593.0
2038	52.7	93.7	1,686.7
2039	52.7	93.7	1,780.4

2040	52.7	93.7	1,874.1
2041	52.7	93.7	1967.8
2042	52.7	93.7	2,061.5
2043	52.7	93.7	2,155.2
2044	52.7	93.7	2,248.9
2045	52.7	93.7	2,342.6
2046	52.7	93.7	2,436.3
2047	52.7	93.7	2,530.0
2048	52.7	93.7	2,623.7
2049	52.7	93.7	2,717.4
2050	52.7	93.7	2,811.1

3.2.4 Net GHG Emission Reductions and Removals

The net reductions and removals of GHG emissions estimated for the Seringueira II project can be summarized as the "Estimated line emissions" minus the "Estimated project emissions" minus the "Estimated leakage emissions", presented in Table 39 below.

Table 39. *Ex ante* estimates of GHG emission reductions and removals related to the Seringueira II project.

Year	Estimated baseline removals (tCO_2e)	Project estimated emissions or removals (tCO_2e)	Leakage Emissions (tCO_2e)	Estimated net reductions in GHG emissions(NERREDD)
2021	21,761.33	-	93.70	19,730.59
2022	21,761.33	-	93.70	19,730.59
2023	21,761.33	-	93.70	19,730.59
2024	21,761.33	-	93.70	19,730.59
2025	21,761.33	-	93.70	19,730.59
2026	21,761.33	-	93.70	19,730.59
2027	21,761.33	-	93.70	19,730.59
2028	21,761.33	-	93.70	19,730.59
2029	21,761.33	-	93.70	19,730.59
2030	21,761.33	-	93.70	19,730.59
2031	21,761.33	-	93.70	19,730.59
2032	21,761.33	-	93.70	19,730.59
2033	21,761.33	-	93.70	19,730.59
2034	21,761.33	-	93.70	19,730.59

2035	21,761.33	-	93.70	19,730.59
2036	21,761.33	-	93.70	19,730.59
2037	21,761.33	-	93.70	19,730.59
2038	21,761.33	-	93.70	19,730.59
2039	21,761.33	-	93.70	19,730.59
2040	21,761.33	-	93.70	19,730.59
2041	21,761.33	-	93.70	19,730.59
2042	21,761.33	-	93.70	19,730.59
2043	21,761.33	-	93.70	19,730.59
2044	21,761.33	-	93.70	19,730.59
2045	21,761.33	-	93.70	19,730.59
2046	21,761.33	-	93.70	19,730.59
2047	21,761.33	-	93.70	19,730.59
2048	21,761.33	-	93.70	19,730.59
2049	21,761.33	-	93.70	19,730.59
2050	21,761.33	-	93.70	19,730.59
Total	652,839.88	-	2,811.10	591,917.73

The number of credits to be held in the AFOLU joint buffer account is determined as a percentage of the total carbon stock benefits. For this project, this is equal to the baseline net GHG emissions minus the net emissions in the case of the project. Leakage emissions are not considered in buffer calculations. Non-CO_2 emissions from fossil fuels and fertilizer use were conservatively excluded from the scope of the project. The buffer is calculated using equation VM0007 v1.6 8. The buffer retention percentage is calculated according to the AFOLU Non-Permanence Risk Tool v4.0 (Appendix 03). The overall non-permanence risk rating for the Seringueira II project is 10%.

Uncertainty analysis

Module VMD0017 v2.2 is used to perform an uncertainty analysis within the Seringueira II project. This module combines uncertainty information and conservative estimates and produces an overall uncertainty estimate of total net reductions in GHG emissions. The estimated net cumulative reductions in anthropogenic GHG emissions will be adjusted at each time point to account for uncertainty, as indicated in module X-UNC. The X-UNC module calculates an adjusted value for NERREDD+ for any point in time.

The uncertainty in the baseline estimates was estimated through an assessment of deforestation rates, stocks in carbon pools, and changes in carbon stocks.

Net greenhouse gas emissions for unplanned deforestation (AUD) were determined by applying module VMD0007. The uncertainty in the baseline deforestation rate is set to zero, as the applied value

was accessed by the long-term average for the activity (AUD-BL-UP) of this project, where the deforestation rate was taken as the average of the reference period.

Regarding baseline and post-deforestation carbon stocks, baseline forest carbon stock data were obtained from peer-reviewed literature applied to the geographic region of the project, according to biome, and climate regime such as in the project area. project. All values were obtained from the National GHG Inventory (Ministry of Science, Technology and Innovation, 2020).The uncertainty in the combined carbon stocks and sources of greenhouse gases in the REDD baseline scenario is estimated to be zero. No assumptions resulted in uncertainty, as the uncertainty allowed in this REDD+ MF methodology is +/- 15% at a 95% confidence level.

3.3 Monitoring

3.3.1 Data and Parameters Available at Validation

Table 40. Data and parameters that are determined or available at validation and remain fixed throughout the project crediting period.

Data / Parameter	CF
Data Unit	$tCt/td.m^{-1}$
Description	Fraction of carbon in dry matter in t Ct^{-1} dm
Data source	IPCC 2006 INV GLs AFOLU Chapter 4 Table 4.3)
Applied value	0.47
Justification for data choice or description of applied measurement methods and procedures	The default value was used for conservatism purposes.
Purpose of data	• Calculation of baseline emissions • Calculation of project emissions • Calculation of leakage
Comments	

Data / Parameter	44/12
Data Unit	Dimensional
Description	Mass of carbon to CO_2e mass conversion factor
Data source	2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 AFOLU
Applied value	44/12
Justification for data choice or description of applied	Conversion from C to CO_2 based on molecular weights

measurement methods and procedures	
Purpose of data	• Calculation of baseline emissions • Calculation of project emissions • Calculation of leakage
Comments	IPCC default value

Data / Parameter	R
Data Unit	t root dmt-1 shoot dm
Description	Root/shoot ratio or type of forest/biome suitable for the species; note that, as defined here, the root to shoot ratio is applied as belowground biomass per unit area: aboveground biomass per unit area (not per stem)
Data source	As per CP-AB - pg. 17; "Tropical forest"; “>125 $t.ha^{-1}$”.
Applied value	0.37
Justification for data choice or description of applied measurement methods and procedures	Local values are not known, and the value proposed in CP-AB is conservative.
Purpose of data	• Calculation of baseline emissions • Calculation of project emissions • Calculation of leakage
Comments	N/A

Data / Parameter	WW_{ty}
Data Unit	Dimensionless
Description	Fraction of biomass effectively extracted and emitted to the atmosphere during production by wood product class *ty*
Data source	Standard value for developing countries: CP-W - page 14.
Applied value	0.24
Justification for data choice or description of applied measurement methods and procedures	As per CP-W.
Purpose of data	• Calculation of baseline emissions
Comments	Parameter values to be updated if new peer reviewed empirically based findings become available.

Data / Parameter	SLF_{ty}
Data Unit	Dimensionless
Description	Fraction of wood products that will be emitted into the atmosphere within 5 years of production by wood product class ty
Data source	As per CP-W: Lumber, page 13.
Applied value	0.20
Justification for data choice or description of applied measurement methods and procedures	Standard conservative value prescribed by CP-W.
Purpose of data	• Calculation of baseline emissions
Comments	N/A

Data / Parameter	OF_{ty}
Data Unit	Dimensionless
Description	Fraction of wood products that will be emitted into the atmosphere between 5 and 100 years of logging by wood product class ty
Data source	OF_{ty} is the complementary number of SLF_{ty}: the sum of both parameters must equal 1 (that is, 100%).
Applied value	0.80
Justification for data choice or description of applied measurement methods and procedures	According to CP-W.
Purpose of data	• Calculation of baseline emissions
Comments	Parameter values to be updated if new peer reviewed empirically based findings become available.

Data / Parameter	$Pcom_i$
Data Unit	Dimensionless
Description	Commercial volume as a percentage of total aboveground volume in stratum *i*.
Data source	To calculate this parameter, the volume of marketable wood under exploration (in m^3/ha) is based on data from Imazon (Institute for Man and Environment of the Amazon), 2013 (30.02 m^3/ha)[129], given the similarity with the project area, noting forest classes, soil, climate and activity.

[129] Available at: https://registry.verra.org/mymodule/ProjectDoc/Project_ViewFile.asp?FileID=52137&IDKEY=9lksjoiuwqowrnoiuomnckjashoufifmln902309ksdflku098l71896923. Accessed on: 10/09/2021.

	Thus, as prescribed in the CP-W, a forest inventory of a proxy area in the same region, representing the same forest type and age class, was chosen for the calculation of this parameter.
Applied value	Alluvial Dense Ombrophylous Forest: 0.0585
Justification for data choice or description of applied measurement methods and procedures	As prescribed in CP-W, a forest inventory of a proxy area in the same region, representing the same forest type and age class was chosen for the calculation of this parameter.
Purpose of data	• Calculation of baseline emissions
Comments	Updated at time of baseline review (at least every 10 years). Applying the trading percentage of total volume introduces the simplifying assumption (and conservative as it is only used in baseline *ex ante* calculations) that all stocks are drawn

Data / Parameter	$C_{WP,i}$
Data Unit	$tCO_2e\ ha^{-1}$
Description	Average carbon stock being incorporated into the pool of wood products from the stratum *i*.
Data source	VCS module VMD0005 REDD+ Methodological Module: Estimation of Carbon Stocks in the Long-Term Wood Products Pool (CP-W)131. This parameter was calculated using default values prescribed in the CP-W.
Applied value	11.53 $tCO_2e\ ha^{-1}$ for all three strata.
Justification for data choice or description of applied measurement methods and procedures	According to CP-W.
Purpose of data	Calculation of baseline emissions
Comments	N/A

Data / Parameter	C_{ab_tree}
Data Unit	$tCO_2e\ ha^{-1}$
Description	Average aboveground carbon stock in stratum *i*
Data source	The value is the result of dividing the total carbon pool by stratum by area.
Applied value	

Stratum	(%)	CAB_tree,bsl,i
Alluvial Open Ombrophylous Forest (Ao)	45.21	430.10

	Lowland Open Ombrophylous Forest (Lo) | 21.82 | 490.97 Alluvial Dense Ombrophylous Forest (Ad) | 29.18 | 331.83 Lowland Dense Ombrophylous Forest (Ld) | 3.78 | 470.43
Justification for data choice or description of applied measurement methods and procedures	As indicated in the CP-AB module.
Purpose of data	• Calculation of baseline emissions
Comments	N/A

Data / Parameter	C_{bb_tree}
Data Unit	$tCO_2e\ ha^{-1}$
Description	Average belowground carbon stock in stratum *i*
Data source	The value is the result of dividing the total carbon pool by stratum by area, as indicated in Table 78.
Applied value	Stratum | (%) | CBB_tree,bsl,i Alluvial Open Ombrophylous Forest (Ao) | 45.21 | 42.90 Lowland Open Ombrophylous Forest (Lo) | 21.82 | 49.13 Alluvial Dense Ombrophylous Forest (Ad) | 29.18 | 103.03 Lowland Dense Ombrophylous Forest (Ld) | 3.78 | 145.93
Justification for data choice or description of applied measurement methods and procedures	As indicated in the CP-AB module.
Purpose of data	• Calculation of baseline emissions
Comments	N/A

Data / Parameter	C_{XB}
Data Unit	$tCO_2e\ ha^{-1}$
Description	Average carbon stock of biomass extracted from the stratum *i*
Data source	Presented in section **3.2.4** Net GHG Emission Reductions and Removals, Wood Products subsection

Applied value	15.17
Justification for data choice or description of applied measurement methods and procedures	Calculated according to CP-W module
Purpose of data	• Calculation of baseline emissions
Comments	N/A

Data / Parameter	Pasture carbon pool
Data Unit	tCO_2e
Description	Pasture carbon pool in the baseline scenario
Data source	Fourth Brazilian Inventory of Anthropogenic Greenhouse Gas Emissions and Removals Reference Reports Sector Land Use, Land Use Change and Forestry . Ministry of Science, Technology and Innovation, 2015.
Applied value	27.5
Justification for data choice or description of applied measurement methods and procedures	The post-deforestation biomass (pasture) according to the National GHG Inventory was multiplied by the deforestation measured through MapBiomas data.
Purpose of data	• Calculation of baseline emissions
Comments	Calculation based on country-specific values.

Data / Parameter	BCEF
Data Unit	Dimensionless
Description	Biomass conversion and expansion factor for converting commercial wood volume per unit area to total trees aboveground biomass per unit area
Data source	As per CP-AB - page 14, being the average of the three proposed factors.
Applied value	1.32
Justification for data choice or description of applied measurement methods and procedures	The BCEF was applied to convert marketable volume into total aboveground tree biomass
Purpose of data	• Calculation of baseline emissions • Calculation of project emissions • Calculation of leakage
Comments	N/A

Data / Parameter	Cab_{icl}
Data Unit	tCO_2/ ha
Description	Average carbon stock per hectare in aboveground biomass carbon pool of initial forest class *icl*
Data source	National Inventory Data: Ministry of Science, Technology and Innovation, 2020).
Applied value	

Stratum	CAB_tree,bsl,i
Alluvial Open Ombrophylous Forest (Ao)	430.10
Lowland Open Ombrophylous Forest (Lo)	490.97
Alluvial Dense Ombrophylous Forest (Ad)	331.83
Lowland Dense Ombrophylous Forest (Ld)	470.43

Justification for data choice or description of applied measurement methods and procedures	The Biomass Expansion Factor (BCEF) was applied to convert the marketable volume into total tree biomass above ground, according to CP-AB - page 14, being the average of the three factors presented in the module, for conservatism. A wood density of 0.589 t/m^3 was applied, according to Nogueira (2008).
Purpose of data	• Calculation of baseline emissions
Comments	N/A

Data / Parameter	Cbb_{icl}
Data Unit	tCO_2/ ha
Description	Average carbon stock per hectare in belowground biomass carbon pool of initial forest class *icl*
Data source	National Inventory Data: Ministry of Science, Technology and Innovation, 2020).
Applied value	

Stratum	CBB_tree,bsl,i
Alluvial Open Ombrophylous Forest (Ao)	42.90
Lowland Open Ombrophylous Forest (Lo)	49.13
Alluvial Dense Ombrophylous Forest (Ad)	103.03

	Lowland Dense Ombrophylous Forest (Ld) | 145.93
Justification for data choice or description of applied measurement methods and procedures	A root-shoot ratio (R) of 0.37 was applied, according to "2006 IPCC Guidelines for National Greenhouse Gas Inventories", V. 4, chap. 4, AFOLU, pg. 4.49, Table 4-4.
Purpose of data	• Calculation of baseline emissions
Comments	Literature studies used for this assessment, as well as the respective calculations, are available for consultation by the audit team.

Data / Parameter	$C_{ABnon-treepost,i}$; $C_{BBnon-tree,post,i}$
Data Unit	tCO_2/ ha
Description	Post-deforestation carbon stock in non-trees aboveground vegetation in stratum *i*; $tCO_2e\ ha^{-1}$; Post-deforestation carbon stock in non-tree belowground biomass in stratum *i*; $tCO_2e\ ha^{-1}$
Data source	Fourth Brazilian Inventory of Anthropogenic Emissions and Removals of Greenhouse Gases, Reference Reports Sector Land Use, Land Use Change and Forestry). Ministry of Science, Technology and Innovation, 2020.
Applied value	27.8 (sum of above and belowground biomass)
Justification for data choice or description of applied measurement methods and procedures	Value used in the National GHG Inventory.
Purpose of data	• Calculation of baseline emissions
Comments	Country-specific value provided for above and below ground pasture biomass.

Data / Parameter	Cabfcl
Data Unit	tCO_2/ ha
Description	Average carbon stock per hectare in aboveground biomass Final post-deforestation class carbon pool
Data source	Weighted average (by area taken from the Terra Class database): 2006 IPCC Guidelines for National Greenhouse Gas Inventories, V. 4, Chapter 6: Grassland, pg. 6.27, Table 6.4 (for Pasture: 76.1% of the area) 2006 IPCC Guidelines for National Greenhouse Gas Inventories, V. 4, Chapter 4: Forest Land, pg. 4.63, Table 12 (for Pasture with regeneration: 23.9% of the area) Value applied: 61.1
Applied value	27.8

Justification for data choice or description of applied measurement methods and procedures	IPCC conservative default value, for estimating carbon stock from land use after deforestation.
Purpose of data	• Calculation of baseline emissions • Calculation of project emissions • Calculation of leakage
Comments	Conservative average to be used in calculations, based on uncertainties in the source values.

Data / Parameter	COMF
Data Unit	Dimensionless
Description	Combustion factor for stratum *i* (type of vegetation)
Data source	E-BPB refers to Table 2.6 of the 2006 IPCC Guidelines for Greenhouse Gas Inventories, Volume 4 Agriculture, Forestry, and Other Land Uses, Chapter 2, “Primary Moist Tropical Forest” 134
Applied value	0.5
Justification for data choice or description of applied measurement methods and procedures	The value was applied in accordance with the E-BPB: Table 2.6 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4 Agriculture, Forestry and Other Land Uses, Chapter 2, “Tropical Primary Rainforest”
Purpose of data	• Calculation of baseline emissions • Calculation of project emissions
Comments	N/A

Data / Parameter	Ggi
Data Unit	g kg^{-1} burnt dry matter
Description	Emission factor for stratum *i* for gas *g*
Data source	The standards can be found in Volume 4, Chapter 2 of the IPCC 2006 Inventory Guidelines in table 2.5 (see Annex 2: Emission Factors for Various Types of Burns for CH_4e N_2O).
Applied value	GCH_4= 4.8 GN_20 = 0.2
Justification for data choice or description of applied measurement methods and procedures	IPCC 2006 conservative default values.
Purpose of data	• Calculation of baseline emissions • Calculation of project emissions • Calculation of leakage

Comments	N/A

Data / Parameter	Deforestation
Data Unit	ha
Description	Maps of forest cover areas converted into non-forest areas
Data source	Measured using MapBiomas database
Applied value	Annual variable: deforestation values are presented for the reference region, leakage belt and project area (projections) in section **3.2.1**
Justification for data choice or description of applied measurement methods and procedures	The MapBiomas project contributes to understanding the dynamics of land use in Brazil. The data generated by this program is used in this project. 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 will be performed (Landsat 8) to measure the deforested area. The mapping of land use and land cover is evaluated using images with a spatial resolution greater than 30 meters. The acquisition of images is carried out during the period of low incidence of clouds and rain in the region, in the months of July and September. The images undergo geometric correction through georeferencing, using topographic maps as a reference or orthorectified images from the USG-NASA. For analysis of areas with cloud cover, the visual interpretation of the radar image would be performed. 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 high.
Purpose of data	• Calculation of baseline emissions
Comments	N/A

Data / Parameter	D_{mm}

Data Unit	t dmm^{-3}
Description	Average wood density of commercially harvested species
Data source	Source: Brown, S., AJR Gillespie and AE Lugo, 1989. Biomass estimation methods for tropical forests with applications to forest inventory data. Forest Science, 35:881-902. See pg. 890,
Applied value	0.59
Justification for data choice or description of applied measurement methods and procedures	Country-specific data obtained in the same biome.
Purpose of data	• Calculation of baseline emissions • Calculation of project emissions • Calculation of leakage
Comments	N/A

Data / Parameter	LDF
Data Unit	t C m^{-3}
Description	Factor for calculating deadwood biomass created during logging operations per cubic meter extracted (i.e., cutting damage factor)
Data source	VMD0001 LK-ME135
Applied value	0,53
Justification for data choice or description of applied measurement methods and procedures	It is the default value for hardwood and mixed forests, according to module VMD0001 LK-ME. Default value for broadleaf and mixed forests of 0.53 t C m^{-3} from 774 clearings measured by Winrock International in Bolivia, Belize, Republic of Congo, Brazil and Indonesia can be used for tropical broadleaf forests.
Purpose of data	• Calculation of project emissions • Calculation of leakage
Comments	N/A

Data / Parameter	LIF
Data Unit	t C m^{-3}
Description	Calculation factor for emissions arising from the creation of logging infrastructure during logging operations per cubic meter
Data source	LK-ME, page 8
Applied value	0.29

Justification for data choice or description of applied measurement methods and procedures	Conservative default value of 0.29 tCO_2e m^{-3} calculated from 1,839 hectares of logging concessions analyzed by Winrock International in the Republic of Congo and Brazil can be used for tropical forests.
Purpose of data	• Calculation of project emissions • Calculation of leakage
Comments	N/A

Data / Parameter	LF_{ME}
Data Unit	Dimensionless
Description	Leakage factor for market effects calculations
Data source	VMD0011 (LK-ME)
Applied value	0.2
Justification for data choice or description of applied measurement methods and procedures	When the average biomass is more than 15% greater than the biomass within the project boundary, the LFME will be considered 0.2.
Purpose of data	• Calculation of leakage
Comments	N/A

Data / Parameter	C_{LB}
Data Unit	tCO_2e ha^{-1}
Description	Area-weighted average aboveground tree carbon stock for forests available for unplanned deforestation within the leakage belt
Data source	Project area data
Applied value	439.36
Justification for data choice or description of applied measurement methods and procedures	Based on the similarity analysis, the project area data were applied to the leakage belt area. A weighted average of the aboveground biomass within the project area was taken.
Purpose of data	• Calculation of leakage
Comments	N/A

Data / Parameter	C_{OLB}
Data Unit	tCO_2e ha^{-1}
Description	Area-weighted average aboveground tree carbon stock for forests available for unplanned deforestation outside the leakage belt

Data source	Saatchi, RA Houghton, RC dos Santos Alvalá, JV Soares, and Yifan Yu. Distribution of Live Aerial Biomass in the Amazon Basin. 2007. According to LK-ASU, the number is derived from peer reviews and appropriate literature as it considers the same biome.
Applied value	578.1
Justification for data choice or description of applied measurement methods and procedures	The value of 578.1 tCO_2/ha is the average total biomass for the floodplain forest in the Amazon basin of 157.66 tC/ha (according to Table 7 of the previously cited study), multiplied by 44/12, the tC conversion factor for tCO_2.
Purpose of data	• Calculation of leakage
Comments	N/A

Data / Parameter	*DLF*
Data Unit	%
Description	Displacement leakage factor
Data source	Local assessment
Applied value	10
Justification for data choice or description of applied measurement methods and procedures	If deforestation agents do not participate in leakage prevention activities and project activities, the Displacement Factor will be 100%. Where leak prevention activities are implemented, the factor should equal the proportion of baseline agents estimated to have the opportunity to participate in leak prevention activities and project activities. The project design team estimates that 100% of potential deforestation agents in the reference region will have the opportunity to participate in leakage prevention activities. Given that the PP is publicizing the project activity and recruiting new project instances, it can be said that most neighbors are having the opportunity to participate in leak prevention activities. Thus, the "Displacement Leakage Factor" (DLF) was conservatively set to 10%.
Purpose of data	• Calculation of leakage
Comments	This value is an *ex ante* estimate. Accurate and actual values will be monitored and reported on verification periods

3.3.2 Data and Parameters Monitored

Table 41. Data and parameters to be monitored during the Seringueira II 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 methods 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	tCO_2/year
Description	Net CO_2 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 methods 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 79.
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	MANFOR
Data unit	hectare
Description	Total area of forests under active management (nationally)
Source of data	Official country-specific data from IBAMA.
Description of measurement methods and procedures to be applied	According to the LK-ASU, it is necessary to demonstrate that the areas will be protected against deforestation. Such demonstrations must include sufficient numbers of rangers to prevent illegal colonization and an active management plan detailing harvest plans and return intervals and/or evidence that the concession owner has already expelled illegal settlers/invaders from forest areas. *Ex ante* it can be assumed that MANFOR should remain constant.
Frequency of monitoring/recording	Annually
Value applied	1.400.000
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	PROTFOR
Data unit	hectare
Description	Total area of nationally fully protected forests.
Source of data	Official ISA country-specific data.
Description of measurement methods and procedures to be applied	According to the LK-ASU, it is necessary to demonstrate that the areas will be protected against deforestation. Such demonstrations are made by governmental mechanisms and national policies. *Ex ante* it can be assumed that PROTFOR must remain constant.
Frequency of monitoring/recording	Annually
Value applied	88,566,400
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	TOTFOR
Data unit	hectare
Description	Total available national forest area
Source of data	Official country-specific data. As the country has a wide variety of forest biomes throughout its extension, TOTFOR considered only the Amazon Forest biome. This is a conservative approach. Thus, as a representation of the total area of the Amazon Forest in Brazilian territory, TOTFOR consisted of multiplying the size of the Brazilian Amazon by 97%, which represents its preserved area, according to SEMA.
Description of measurement methods and procedures to be applied	According to LK-ASU, forest areas suitable for conversion to livestock, it can be conservatively assumed that TOTFOR should remain constant for the baseline period.

Frequency of monitoring/recording	Annually
Value applied	486,461,572
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	$\Delta C_{P, LB}$
Data unit	tCO_2e
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 methods 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	PROPIMM
Data unit	Proportion

Description	Estimated proportion of baseline deforestation caused by immigrant population
Source of data	Official country-specific data (government). The proportion of baseline deforestation caused by the immigrant population (PROPIMM) was estimated for a period from 2012 to 2020. For the calculation of PROPIMM, local data for births, deaths and population were used. It is then assumed that the total annual population growth of a given municipality is attributed to: i) births and ii) immigration. Thus, by subtracting the number of annual births from the total annual population growth, it is possible to infer the number of immigrants.
Description of measurement methods and procedures to be applied	Estimated as a proportion of the area deforested in the last 5 years by the population that migrated to the leakage belt and project area in the last 5 years (all areas within 2 km of the project area boundaries design and leakage belt should be considered here).
Frequency of monitoring/recording	Annually
Value applied	1.13
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 methods 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,l,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 methods 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 methods 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. Remote sensing images.
Description of measurement methods 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

Comments	N/A

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 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 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 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 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

3.3.3 Monitoring Plan

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

I. Monitoring of project implementation;
II. Monitoring of changes in the current carbon stock, GHG emissions and leakage;
III. Estimation of *ex post* net changes in carbon stock and greenhouse gas emissions;
IV. Review of Baseline for future project crediting periods.

I. Monitoring of the project implementation

The project implementation will be monitored considering the previously defined project activity. Table 57 below presents relevant information for this task, following the criteria of section **9.3.1** of VM0007. Terra Vista Gestora de Recursos Ltd. and Mappes Family will be responsible for the implementation of the project activity and its monitoring. The implementation of specific project activities may be carried out by external consultants operating under the supervision of Terra Vista Gestora de Recursos Ltd. Digital files will be stored in the Terra Vista database and hard copies will be archived at its headquarters.

Table 42. Standardized benefits Category, project activities and technical description of the monitoring task.

Standardized Benefit Category	Project Activities	Technical Description of Monitoring Task
Forest coverage/reduction of GHG emissions	Improvement of heritage surveillance	Deforestation, forest degradation and fire scars will be monitored annually through satellite images and field verifications. Land use change maps will be collected from PRODES and DETER/INPE[130],

[130] Available at: http://terrabrasilis.dpi.inpe.br/ . Accessed on: 12/12/2022.

		MapBiomas[131] and orbital images from the *European Space Agency*[132].
Reduction of GHG emissions	Remote Biomass Monitoring	Maps of land use change will be used from scientifically recognized data sources, such as Mapbiomes. Remote monitoring of the area will also be carried out annually using satellite images and drone and radar flyovers in order to assess the conservation status of the project area and zone, more specifically, to assess whether there have been changes in forest cover during the period of monitoring.
Reduction of GHG emissions	Preventing and Combating Forest Fires	Training will be offered on good practices in handling and combating fires to communities living in the project area, in order to prevent the spread of forest fires. 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 recorded through activity reports. The number of training sessions will be informed in each monitoring report. Forest fires should also be avoided by setting up firebreaks. The number and length of firebreaks implemented will be monitored and reported in each monitoring report.

Project implementation will be monitored through schedules, activity reports, meeting minutes, attendance lists, financial statements, forest cover maps.

From the monitoring of the implementation of the Seringueira II project, it is possible to monitor the processes, enabling learning and continuous improvements, guaranteeing the quality and efficiency of the project.

Terra Vista Gestora de Recursos Ltd. It has digital data storage on the Google Drive platform[133], which will be managed throughout the duration of the project (30 years).

All required documents will be made available to Validation and Verification Teams (VVBs) in each verification process.

The processes described will be the responsibility of Terra Vista Gestora de Recursos Ltd. and other proponents.

II. Monitoring changes in current carbon stock, GHG emissions and leakage

[131] Available at: https://mapbiomas.org/ . Accessed on: 12/12/2022.

[132] Available at: https://sentinels.copernicus.eu/web/sentinel/home. Accessed on: 12/12/2022.
[133] Available at: https://www.google.com/intl/pt-BR/drive/. Accessed at:12/01/2022

This monitoring task will follow the criteria set out in module VMD00015 V.2, which provides methods to monitor *ex post* GHG emissions and removals due to deforestation, forest degradation, disturbance of natural resources and increase of the carbon stock in the project area and leakage belt. The monitoring of changes in the current carbon stock and GHG emissions is carried out in three stages, presented in the next sections.

a) Selection and analysis of land use and land cover change data sources

This project uses different data sources to monitor land use and land cover changes in the project area and the Leakage Belt. Classified orbital images from the PRODES project of the National Institute for Space Research (INPE) are used to assess deforestation. The PRODES project uses images compatible with those generated by Landsat series satellites, called “Landsat class”. These images are characterized by having spatial resolution in the range of 30 meters and at least 3 spectral bands. Currently, images from the Landsat-8, SENTINEL-2 (European Union) or CBERS-4 of INPE/CRESDA (Brazil/China) satellites are also used. Accuracy assessments are made with the SENTINEL satellite series of the European Space Agency (ESA), with a spatial resolution of 10x10m. Classified orbital images from INPE's DETER service are used to assess deforestation and forest degradation alerts. The DETER service uses images from WFI sensors, from the Sino-Brazilian Earth Resources Satellite (CBERS-4) and AWiFS, from the Indian Remote Sensing Satellite (IRS), with 64 and 56 meters of spatial resolution, respectively.

b) Land use and land cover change data processing

Landsat-8, SENTINEL-2 and CBERS-4 images are available from their suppliers already orthorectified, with a refined system of geometric correction through control points and digital models of terrain elevation . This corresponds to the highest level of geometric correction and means that the images are ready to be used in conjunction with existing maps and field measurements without the need for further processing, in accordance with current cartographic standards. The PRODES project composes images for several satellites (and dates) to reduce cloud cover in a scene and evaluate the increase in deforested area. The DETER system has high temporal resolution. Visual analysis of each scene is performed by INPE technicians to assess image quality, selecting images that are not excessively contaminated with clouds.

c) Post-processing and accuracy assessment

PRODES project data[134] will be used annually to monitor land use change on all land managed by the identified driver of deforestation (including the Project Area and land outside the project boundary). Reference maps of forest cover will be generated and updated as soon as the data are released by INPE.

[134] Available at: http://www.dpi.inpe.br/prodesdigital/dadosn/. Accessed on: 12/12/2022.

Data from DETER services will be used monthly to assess deforestation and forest degradation alerts (ADegW,I, ADistPA,*i*,*t*, Aburn,*i*,*t*). Deforestation and forest degradation alerts will be verified in the field by direct observation, every four months. If deforestation is confirmed by PRODES data, it will be used to estimate GHG emissions due to Project Area deforestation (ADefPA,*i*,*u*,*t*) or leakage due to activity displacement (ADefLK,*i*,*u*,*t*) in the project scenario. If DETER data is not confirmed by PRODES, but is verified in the field through direct observation, it will be used to update the forest cover reference maps and, therefore, will also be accounted for as deforestation of the project Area or leakage. DETER data have higher temporal resolution and lower spatial resolution than PRODES data, which makes them suitable for generating deforestation alerts, which can be used to guide rapid responses by Project proponents.

d) Interpretation and Analyzes

PRODES project data will be used to monitor project area deforestation (ADefPA,i,u,t) and activity displacement leakage (ADefLK,i,u,t) in the project scenario. The net change in the carbon stock as a result of deforestation in the project area and the leakage belt will be calculated taking into account the net changes in the carbon stock in all reservoirs in the project scenario ($\Delta C_{pools,Def,u,i,t}$). The calculations will be made according to equations 03 to 06 of module VMD0015 v2.2 and equations 01 to 07 of module VMD0009 v1.3.

An initial participatory rural assessment of communities in and around the Project Area was carried out to determine if there was potential for illegal logging to occur. Considering the initial scope of the project, it was characterized that all families living within the project area explore the forest in search of wood and fuel, which should be considered a low-impact activity aimed at subsistence purposes. No logging or firewood economic activity was perceived by proponents. In this sense, the proponents assumed that the extraction of trees for wood or firewood is a constant in the property where the presence of the community is perceived. A participatory rural assessment will be carried out every two years, as established in the methodology.

In line with common practice in Amazonia, it is assumed that fire is used for land clearing after deforestation in the project area, baseline and project scenarios. Non-CO2 emissions due to biomass burning are considered according to equation 30 of module VMD00015 v2.2 and equations 01 and 02 of module VMD0013 v1.2.

e) Documentation

The monitoring report will bring relevant information about the time series of data on land use change and GHG emissions, considering data sources and processing protocols, data classification and accuracy assessment, following module VMD0015 v2.2.

The digital files will be stored in the proponents' database. The proponents, Terra Vista Gestora de Recursos Ltd. and Mappes family, have accounts for storing digital data on the Google Drive platform, which will be managed throughout the duration of the project (30 years).

Printed copies of all documents will be filed at the headquarters of Terra Vista Gestora de Recursos Ltd., being made available to the validation and verification body (VVBs) at each verification process.

III. Estimation of *ex post* in net carbon stock and GHG emissions

Ex post estimates are performed according to the methodological procedures described in section 3.2. The technical description of the monitoring task and an overview of the data collection procedures are described in section 3.3.3. section 3.3.3.2.3 provides information on applicable quality control and assurance procedures.

IV. Baseline revision for future project crediting periods

The baseline will be updated considering the methodological procedures described in section 3.1.4 after six (6) years from the project start date.

3.3.4 Dissemination of Monitoring Plan and Results (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

The Seringueira II project must incorporate climate change adaptation benefits.

3.4.1 Regional Climate Change Scenarios (GL1.1)

The Amazon Rainforest is threatened by ongoing climate changes, which are expected to make this region increasingly hot and dry. These effects are more intense in global climate simulations by models that connect the temperature peaks of surface waters in the Pacific Ocean with the El Niño phenomenon. Past events suggest that the connection between Pacific Ocean surface temperature and El Niño is real. The estimated impacts of climate change in the Amazon are even worse in models that include biospheric feedback effects, pointing to the disappearance of forested areas and consequent heating of exposed soil, which leads to greater carbon emissions that further affect the climate and kill more forests.

A previously unconsidered climate threat became apparent in 2005, when a devastating drought hit the Amazon. This type of drought is linked to a water temperature gradient from the North Atlantic to

the South, which is part of an increasingly intense oscillation. The formation of the hot water patch in the tropical North Atlantic is worsening due to the reduction of aerosol loads on this part of the ocean, a situation that is expected to intensify in the coming decades due to continued global warming. Whether such a scenario happens or not depends on our efforts to limit greenhouse gas emissions from burning fossil fuels and deforestation. Brazil is among the countries with the most to lose from global warming, possibly risking the loss of the Amazon rainforest[135].

Different climate models produce a wide range of results for the future climate of the Amazon. One model in particular, the UK Meteorological Center's Hadley Center model, indicates a catastrophic shift to a drier, warmer climate in the Amazon, resulting in the death of nearly all forest by 2080[136][137]. The Intergovernmental Panel on Climate Change[138] 's Fourth Assessment Report (AR-4) and several other models indicated that the Amazon was becoming significantly drier, including the US National Center for Atmospheric Research (NCAR) model, and the ECHAM model from the *Max Planck Institute* in Germany. Some models, such as the CSIRO in Australia, indicated no change in the Amazon, while a model from the Geophysical Fluid Dynamics Laboratory (GFDL) in the US indicated more rainfall in the Amazon[139].

The indication of increased rainfall in the Amazon in the GFDL model was the result of an error in the already corrected model[140]. Even so, the results are quite varied and it is important to evaluate the different models for specific purposes of representing the future climate in the Amazon, as well as to consider the best way to interpret the meaning of the remaining uncertainty for the policy. The catastrophic results of the *Hadley Center* were first published in the journal Nature in 2000. It is extremely concerning that nine years of intensive work by several research groups have not identified a specific error that would invalidate this result, although results from other models are comparatively less catastrophic. Some comfort for us derives from the fact that Hadley's model indicates a current climate in

[135] Fearnside, P.M. 2009. A Vulnerabilidade da Floresta Amazônica perante as Mudanças Climáticas. Oecologia Brasiliensis 13(4): 609-618.Available at: http://philip.inpa.gov.br/publ_livres/2009/Vulnerabilidade%20da%20floresta%20Amaz%C3%B4nica.pdf. Accessed on:14/12/2022.

[136] Cox, P.M., Betss, R.A., JONES, C.D., Spall, S.A., Totterdell, I.J. 2000. An Acceleration Of Global Warming Due to Carbon-Cycle Feedbacks in a Coupled Climate Model. Nature 408: 184- 187. Available at: https://www.researchgate.net/publication/31936509_Cox_PM_Betts_RA_Jones_CD_Spall_SA_Totterdell_IJ_Acceleration_of_global_warming_due_to_carbon-cycle_feedbacks_in_a_coupled_climate_model_Nature_408_184-187 . Accessed on 14/12/2022.

[137] Cox, P.M., Betss, R.A., JONES, C.D., Spall, S.A., Totterdell, I.J. 2000. An Acceleration Of Global Warming Due to Carbon-Cycle Feedbacks in a Coupled Climate Model. Nature 408: 184- 187. Available at: https://www.researchgate.net/publication/31936509_Cox_PM_Betts_RA_Jones_CD_Spall_SA_Totterdell_IJ_Acceleration_of_global_warming_due_to_carbon-cycle_feedbacks_in_a_coupled_climate_model_Nature_408_184-187 . Accessed on 14/12/2022.

[138] Intergovernmental Panel on Climate Change [IPCC]. 2007. AR-4 Mitigation of Climate Change. IPCC Working Group III, Contribution to Fourth Assessment Report.BONN. Available at: https://www.ipcc.ch/site/assets/uploads/2018/03/ar4_wg2_full_report.pdf . Accessed on: 14/12/2022.

[139] Kundzewicz, Z.W. L.J. Mata, N.W. Arnell, P. Döll, P. Kabat, B. Jiménez, K.A. Miller, T. Oki, Z. Sen and I.A. Shiklomanov. 2007. Freshwater Resources and their Management. PP. 173-210. IN: M.L. PARRY, O.F. CANZIANI, J.P. PALUTIKOF, P.J. VAN DER LINDEN, AND C.E. HANSON (EDS.). Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of working. Available at: https://pt.scribd.com/document/536957936/PDD-ZeroCarbon-15-Set-2021 . Accessed on: 14/12/2022.

[140] Fearnside, P.M. 2009. Vulnerabilidade da Floresta Amazônica perante as Mudanças Climáticas. Oecologia Brasiliensis 13(4): 609-618. Available at: http://philip.inpa.gov.br/publ_livres/2009/Vulnerabilidade%20da%20floresta%20Amaz%C3%B4nica.pdf. Accessed on:14/12/2022.

Amazonia that is hotter and drier than the actual climate of today[141]. This means that the numerical values for temperature and drought in the simulated future climate are likely to be exaggerated as well. However, the simulated future climate goes well beyond the tolerance limits of trees in the Amazon rainforest, which would cause high mortality even if the changes were less extreme than the simulations indicate.

Climate change is already happening and is already having impacts, and the greater the warming, the greater the future impacts and risks that humanity will face, including the possibility of irreversible damage to ecosystems, biodiversity, agricultural production and the economy and society generally. Effective inclusion of adaptation to climate change can help build a more resilient society in the medium term.

In the Amazon, observed warming from 1949 to 2017 ranges from 0.6 to 0.7°C, according to various sources of temperature data. While there are some systematic differences, all sources point to greater warming in recent decades, with 2017 being the warmest year since the mid-20th century[142]. Figure 35 presents the observed temperature anomaly over 1961-1990 obtained from three data sources for the Amazon.

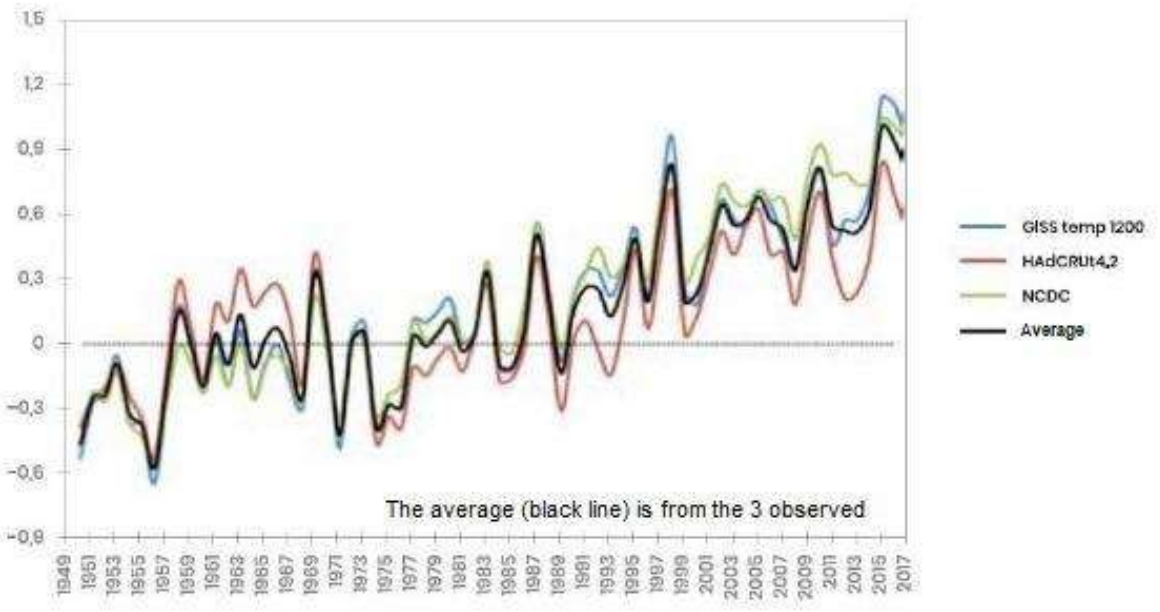


Figure 35. Observed temperature anomaly for 1961-1990 obtained from three data sources for Amazonia. Sources: GISS-NASA Goddard Institute for Space Studies, USA, NCDC-National Climatic Data Center, USA, HAdCRU-Hadley Centre-Climate Research United, United Kingdom.

[141] Cândido, L.A.; Manzi, A.O.; Tota, J.; da Silva, P.R.T.; Santos, R.N.N.; Correia, F.W.S. 2007. O clima atual e futuro da Amazônia nos cenários do IPCC: a questão da savanização. Ciência e cultura 59(3): 44-47. Available at: http://cienciaecultura.bvs.br/scielo.php?script= sci_arttext & pid=S0009-67252007000300017 .Accessed on: 14/12/2022.

[142] 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.

Climate change scenarios for the Amazon, projected by complex climate models and presented by the IPCC, point to an increase in the average air temperature projected by the end of the 21st century well above 4ºC and a reduction in rainfall of up to 40% in the Amazon (Figure 35). This change in air temperature has the potential to generate major imbalances in vital ecosystems for the survival of humanity. According to the National Plan for Adaptation to Climate Change, South America is the continent with the highest risk of species extinction (23%). The attribution of causes suggests that human influence may be more important compared to natural causes, according to previous IPCC reports and the recent summary on global warming above 1.5°C (Figure 36).

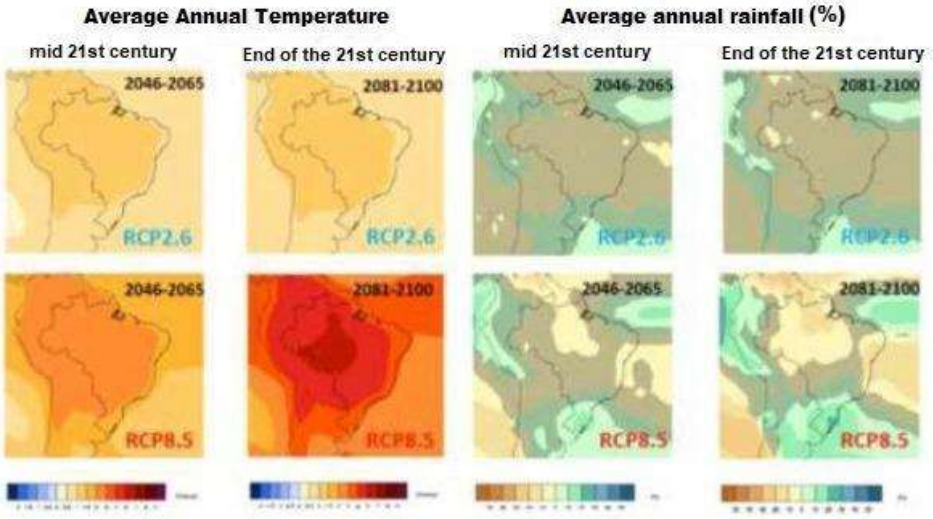


Figure 36. Projections of temperature and precipitation changes in the tropical region of South America produced by the IPCC AR5 model defined for 2046-2065 and 2081-2100 with low emission (RCP2.6) and high emission (RCP8.5) scenarios, for the period from 1981 -2010 [143].

[143] 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.

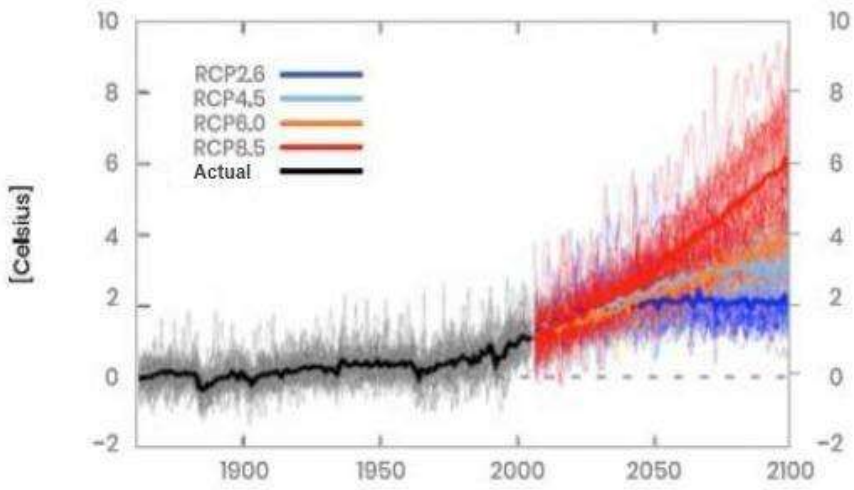


Figure 37. Projections of temperature changes up to 2100 for the various IPCC A5 emission scenarios for the Amazon[144].

3.4.2 Climate Change Impacts (GL1.2)

Global warming can have the most diverse consequences, many terrestrial, aquatic and marine species have already changed their geographic distribution, seasonal activities, migration patterns, abundance and intraspecific interactions in response to ongoing climate change (high confidence). According to IPCC AR5, the impacts of extreme weather events such as droughts and fires reveal the significant vulnerability and exposure of some ecosystems – and many human systems – to current climate variability. The impacts of such climate-related extremes include changing ecosystems, as is the case in the Amazon.

Human-induced climate change is recognized as one of the main threats to biodiversity in the 21st century. However, species/populations are not equally affected by climate change. Therefore, identifying where and which species are most vulnerable to climate change is especially important to guide conservation efforts. Ribeiro et al. (2016) [145] evaluated the exposure of mammals to climate change and assessed the effectiveness of the Amazonian network of Protected Areas (PAs) as a buffer for the impacts of climate change on "critically exposed" species. The authors also developed a spatial conservation scheme for mammals in the Brazilian Amazon that efficiently identifies highly exposed areas within current and future species distributions where conservation efforts should be directed in order to mitigate the impacts of climate change on the biodiversity encountered in the Brazilian Amazon. The authors found that mammals may face high exposure to climate change and Protected Areas are unlikely to be efficient enough to prevent the impacts of climate change on "critically exposed" species.

[144] 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.
[145] Ribeiro, B.R., Sales, L.P., de Marco Jr, P., Loyola, R. 2016. Assessing Mammal Exposure to Climate Change in the Brazilian Amazon. PLOS ONE 11(11): E0165073. Available at: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0165073 . Accessed on:14/12/2022.

Climate change will have profound effects on biodiversity and carbon storage capacity in the Amazon, a critical region for the world's climate. Each scientific expedition describes new species at all levels of the phylogenetic scale, but their biology and ability to adapt to environmental changes are unknown. The effects of climate change can be opposite, depending on biology, adaptive capacity and the distribution and occurrence of species in different ecosystems. Supposedly, species with restricted habits and that occur in small populations are more vulnerable than species that have greater adaptive plasticity and are continuously distributed in wider regions. Species that suffered or suffer fragmentation in their environments may have a decrease in the size of their populations due to the increase of inbreeding that generates loss of genetic variability that, in turn, result in the reduction of the adaptive capacity and, consequently, in a reduction of the reproductive capacity. Populations of territorial fish species are naturally more structured than migratory species, which generally consist of only one population. Recent molecular studies, based on the characteristics of mitochondrial and nuclear DNA, have provided the identification of the real genetic diversity of animal and plant populations, subsidizing management plans for species under environmental pressure. Microsatellite loci (SSR – *Single String Repeats*) are the most used in this type of study. Therefore, the fragmentation of ecosystems in the Amazon could potentiate the effects of climate change in the region [146].

Climate change will also have negative impacts on the well-being of communities and biodiversity in the Seringueira II project region. Weather events increase the vulnerability of human and natural systems. Global environmental and climate changes have been worsening over the last few decades, but only publicized by the media in recent years. This process poses a challenge to society and the government regarding the causes and role of environmental changes in health conditions. Climate change can impact human health in different ways. On the one hand, it impacts directly, as in the case of heat waves, or deaths caused by other extreme events, such as hurricanes and floods. But often this impact is indirect, being mediated by changes in the environment, such as changes in ecosystems and biogeochemical cycles, which can increase the incidence of infectious diseases, but also non-communicable diseases, which include malnutrition and mental illness. It should be noted, however, that not all health impacts are negative. For example, the high mortality observed in winters can be reduced with increasing temperatures. The increase in areas and periods of drought can also reduce the propagation of some vectors. However, it is generally considered that the negative impacts will be more intense than the positive ones[147].

Seasonal climate fluctuations affect the dynamics of vector diseases, such as the higher incidence of dengue fever in summer and of malaria in the Amazon during the dry season. Extreme events introduce considerable fluctuations that can affect the dynamics of waterborne diseases such as

[146] Val, AL; VAL, VMF DE A. Climate Change and Biodiversity in the Amazon. Conference Biodiversity in the Amazon X Climate Change: Causes and Consequences. 60th Annual Meeting of the Brazilian Society for the Progress of Science (SBPC), CAMPINAS, SP. 2008. Available at: http://www.sbpcnet.org.br/livro/60ra/textos/CO-AdalbertoVal.pdf . Accessed on 12/14/2022.

[147] Barcellos, C.; Monteiro, A.M.V.; Corvalán, C.; Gurgel, H.C.; Carvalho, M.S.; Artaxo, P.; Hacon, S.; Ragoni, V. Mudanças Climáticas e Ambientais e as Doenças Infecciosas: Cenários de Incerteza Para o Brasil. Epidemiologia e Serviços de Saúde, V. 18, N. 3, P. 285-304, 2009. Available at: http://scielo.iec.gov.br/pdf/ess/v18n3/v18n3a11.pdf . Accessed on: 14/12/2022.

leptospirosis, hepatitis, diarrheal diseases, etc. These diseases can be made worse by floods or droughts that affect water quality and access. Respiratory diseases are also influenced by fires and the effects of thermal inversions that concentrate pollution, directly impacting air quality, especially in urban areas. In addition, situations of malnutrition can be caused by losses in agriculture, mainly subsistence, due to droughts and sudden floods, among others.

The main impacts expected in the project area and its surroundings are the following:

- Gradual savannization of the Amazon, mainly in the southern portion where the project area is located, with changes in ecosystems and in the patterns of natural occurrence of species;
- Loss of plant and animal populations, mainly endemic species;
- Forest fragmentation and habitat loss;
- Extreme weather events, with more intense rains and storms, also affecting family members and subsistence agriculture;
- Increased temperature, with a higher incidence of droughts and fires, and agricultural losses, affecting food security in the region;
- Migration of people from the communities in search of conditions and life in neighboring cities, and in other larger cities;
- Impacts on the ichthyofauna and effects on artisanal fishing, also affecting the food security of communities;
- Increased incidence of tropical diseases and other types of medium/large scale epidemics (possibly even pandemics);
- Stress and higher incidence of diseases in animals raised for the production of animal protein by traditional communities;
- Impacts on nutrient cycling and soil biota, reducing productivity in cultivated areas and in the forest itself.

3.4.3 Measures Needed and Designed for Adaptation (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 43.

Table 43. 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 for the region	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
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	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

	events					
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 (CM1.1)

The characterization of the communities located around the properties Seringais Redenção, Liberdade, Deserto da Liberdade, situated on the banks of the Juruá river, and the properties São Luiz and São José located on the banks of the Liberdade river, were performed together. Despite being distant, this global characterization is justified because both have similar livelihoods based on agriculture, especially the planting of cassava (with the artisanal processing of flour) and watermelon, the practice of fishing and hunting, and other minor forest products.

The primary data mobilized here is a result of the application of the MVS questionnaire over the months of August and September 2022 by local field agents in 46 households as presented in Figure 38.

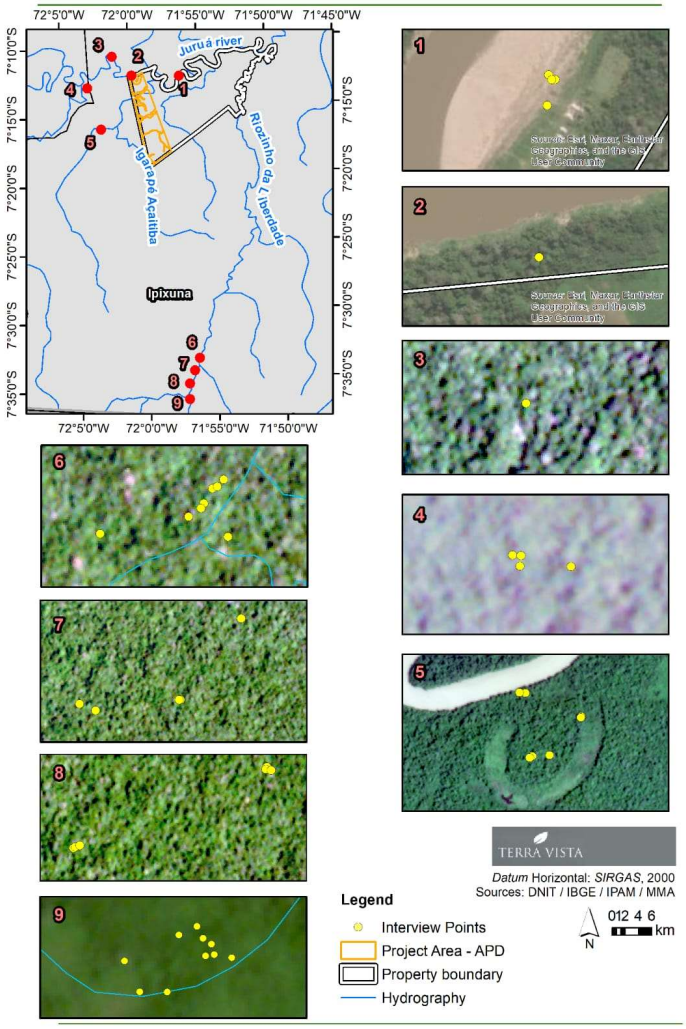


Figure 38. Distribution of the places where the questionnaires were applied.

As the profile of the survey respondents, we can say that they are mostly, as shown in Figure 9, women, 52% of the respondents against 48% of men, and mostly adults (Figure 39). Within the adult field, people over 41 years old accounted for approximately 54% of the respondents.

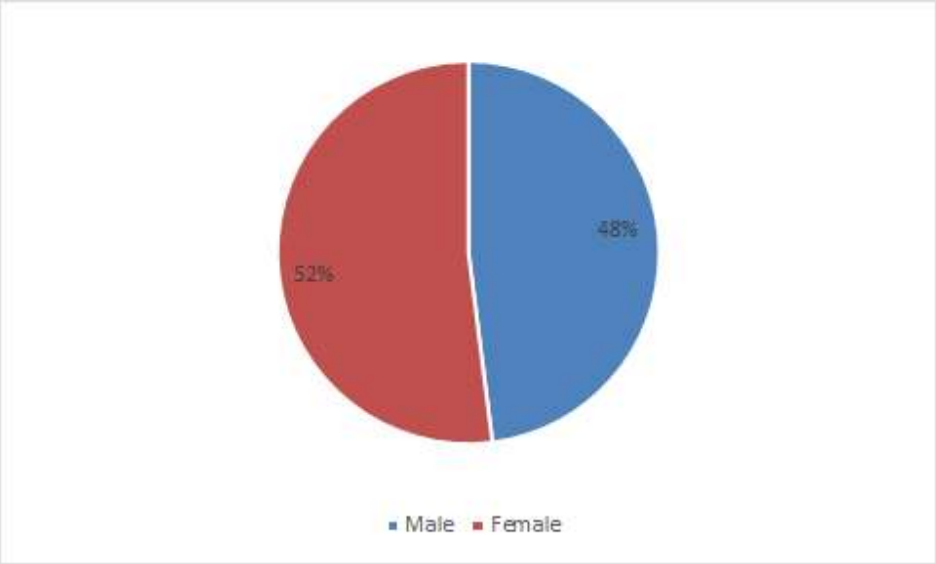


Figure 39. Distribution of respondents' gender frequencies.

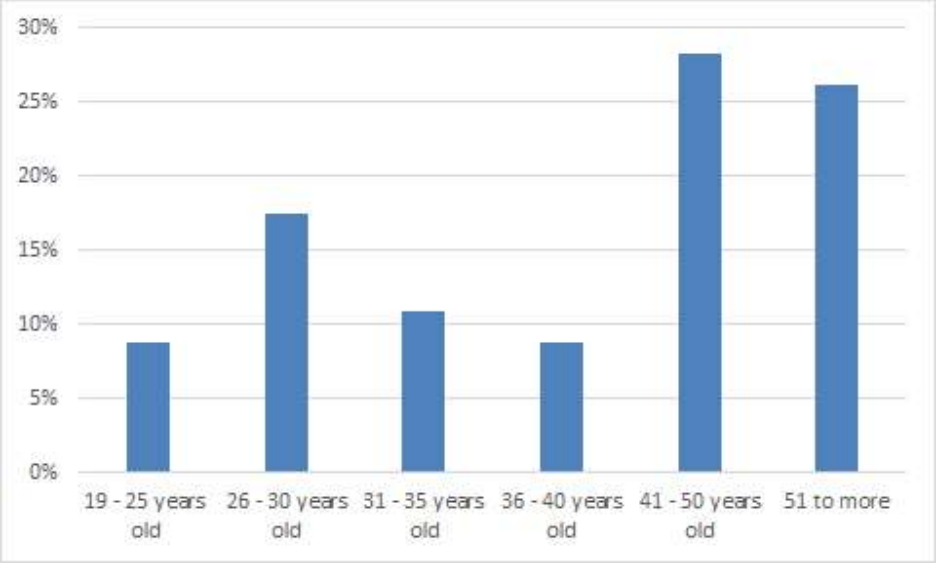


Figure 40. Age of survey respondents.

Of this sample, the two largest groups of respondents are residents of the São Luiz community (39%), followed by São José (24%) and Tigre (15%).

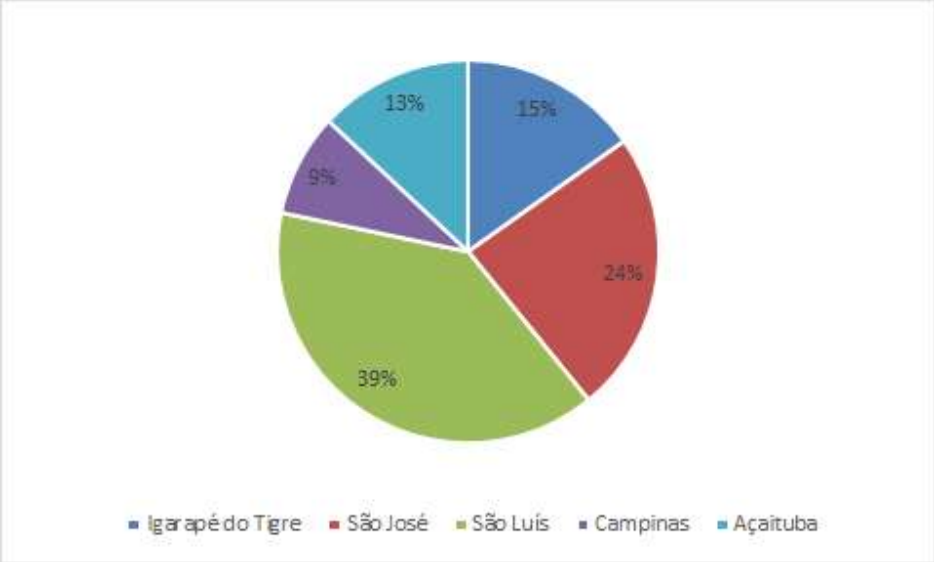


Figure 41. Percent distribution of respondents per community.

Figure 42 shows how long the survey respondents have lived in the locality. It shows that the "more than thirty one to fifty years" and "more than fifty years" ranges correspond to about 54% of the respondents. This indicates that respondents do not move often and tend to stay in their respective localities for long periods.

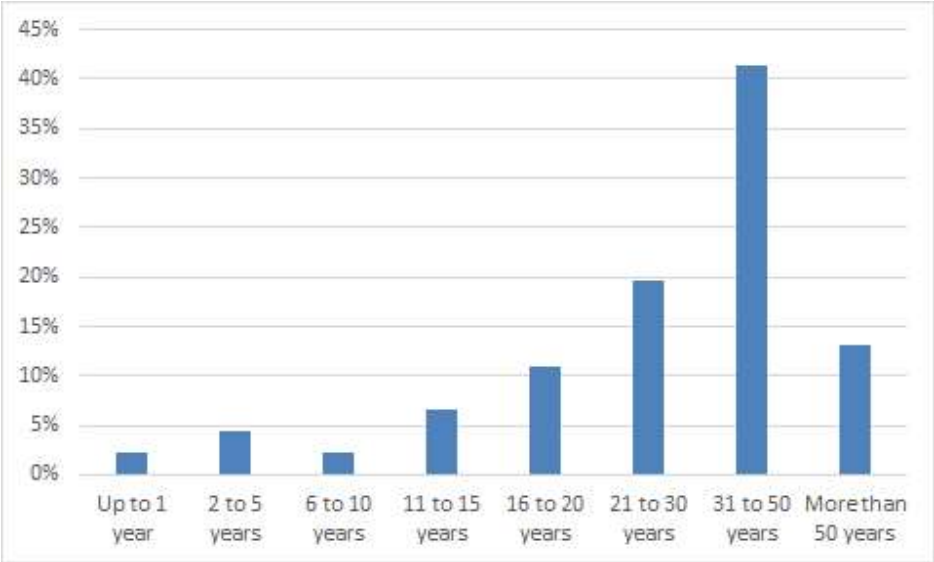


Figure 42. Length of time living in the current location.

Finally, in terms of education, the survey respondents showed a significant deficit in their schooling. About 26% of the interviewees did not study, 32% did up to the 4th grade and only 15% completed elementary school (Figure 43).

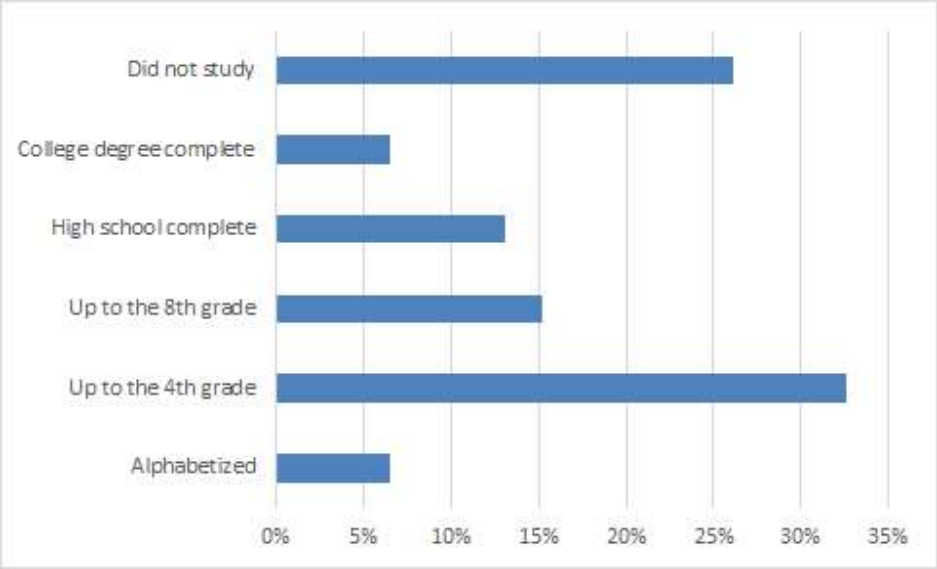


Figure 43. Education level.

This data reflects the difficulty found by the interlocutors in continuing their studies. Currently, in the communities consulted, the schools offer only elementary education for the early years, with the exception of the São José community, where secondary education is offered by the municipality of Cruzeiro do Sul, in the state of Acre. However, the interviewees complained about the precarious conditions. In São José, for example, the wooden school building is in danger of falling down.

In the communities located on the banks of the Juruá river, the following schools were found: Escola Municipal Solon de Melo, in the Campinas community; and Escola Municipal Francisco Marques, in the Açaituba community. In the communities situated on the banks of the Liberdade river were found: the Magia do Saber State School Annex Room, in the São José community; and the São Luiz Municipal School, in the São Luiz community[148]. To complete their education, the children must move to other rural locations or even to the municipal centers of the towns of Cruzeiro do Sul (AC), Ipixuna (AM) or Guajará (AM).

The unstable conditions of access to electricity and consequently to the internet further weaken the community's access to education. About 26% of respondents said they have a cell phone and some access to the internet, and only 5% say they have access to the computer network when they want it, while most do not have it or need to go far away from their home and workplace. With a vast supply of education, training, and other learning opportunities available over the internet, this aspect of poor

[148] Schools. Search. Available at: <https://www.escol.as>. Accessed on: 10/10/2022.

infrastructure further restricts the schooling and professionalization of these riverbank dwellers. The interviewees declare that the craft of farmer and fisherman was learned from their families and that neighbors and friends are sources of some kind of information that lead to some improvement of their techniques.

Regarding income and work in the communities, the riverside women and men interviewed declared themselves mostly as farmers and some as fishermen. Some families receive cash transfer assistance from the federal government program, and only 9% of the interviewees say they know about government projects and programs, suggesting that many are deprived of basic information about the policies that are aimed to possibly bring them benefits.

The average monthly income of the interviewees was calculated at R$464.00 for the total of 42 respondents, with only two declaring an income of R$1,000.00, i.e., one minimum wage, and only one resident responded that he reached a monthly income of two thousand BRL.

About the historical aspects, the municipalities of Ipixuna (AM) and Cruzeiro do Sul (AC) were cities that flourished from the presence of extensive rubber plantations in their hinterlands from the beginning of the rubber economy in the late nineteenth century until the mid-twentieth century. Along the Juruá river, the communities Campinas, Tigre, Deus é Por Nós, and Porto Mappes developed from the descendants of the extractivist families present in these rubber plantations.

- **Rio Juruá: Campinas, Tigre, Deus é Por Nós and Porto Mappes communities**

The interviews conducted by the technical team with the interlocutors of these communities informed the specific context of the occupation of this territory. The information gathered here on the history of the region connects with the territorial and economic dynamics of the region.

The current residents are immigrants from other regions of the Legal Amazon or the Northeast of Brazil, or children of these migrants who came to work in the rubber plantations. In the Campinas community, the oldest resident of the region is the son of a migrant from Maranhão, who arrived at the Açaítuba[149] rubber plantation at the age of 5 in the mid-1940s. The Açaítuba rubber plantation belonged to Mr. Antônio Sólon Andrade de Melo, name also given to the school in the Campinas community, and there are no clear records of its extension and limits, since they were the result of agreements between the patrons of the rubber plantations. To this end, natural landmarks were used as reference for these properties, and it was in this way that the extension of the Açaítuba rubber plantation was described to the technical team. The Açaítuba rubber plantation extended along the bank of the Juruá river, from the mouth of the Campinas stream to thirteen beaches downstream, ending where the community of Açaítuba (or as it is also known Estirão) is today. Its landward extension covered a large portion of forest, including Foguedo creek in its inner region. To cover it all one had to walk a distance of 3 hours from the Juruá riverbank to the cobra lake (about 12 km); from the cobra lake one could access the Foguedo

[149] In some written records it is possible to find the spelling of this rubber plantation as "Seringal Assaítuba". In the IBGE municipal map of Ipixuna it is also spelled as Açaituba.

creek, where it took 2 hours by motorboat during the winter, when the best navigation conditions are available, to reach the last place. Within this territory, it was reported by the community the existence of 36 placements that started from the bank of the Juruá river and at least 4 on the Foguedo creek, and each placement had at least 2 roads. Taking as an average reference that each rubber road has 150 hectares, the Açaítuba rubber plantation would have approximately 12 thousand hectares. Figure 44 shows a collective map prepared together with the community members, in which we try to locate the communities and the main landmarks of the territory corresponding to Seringal Açaítuba.

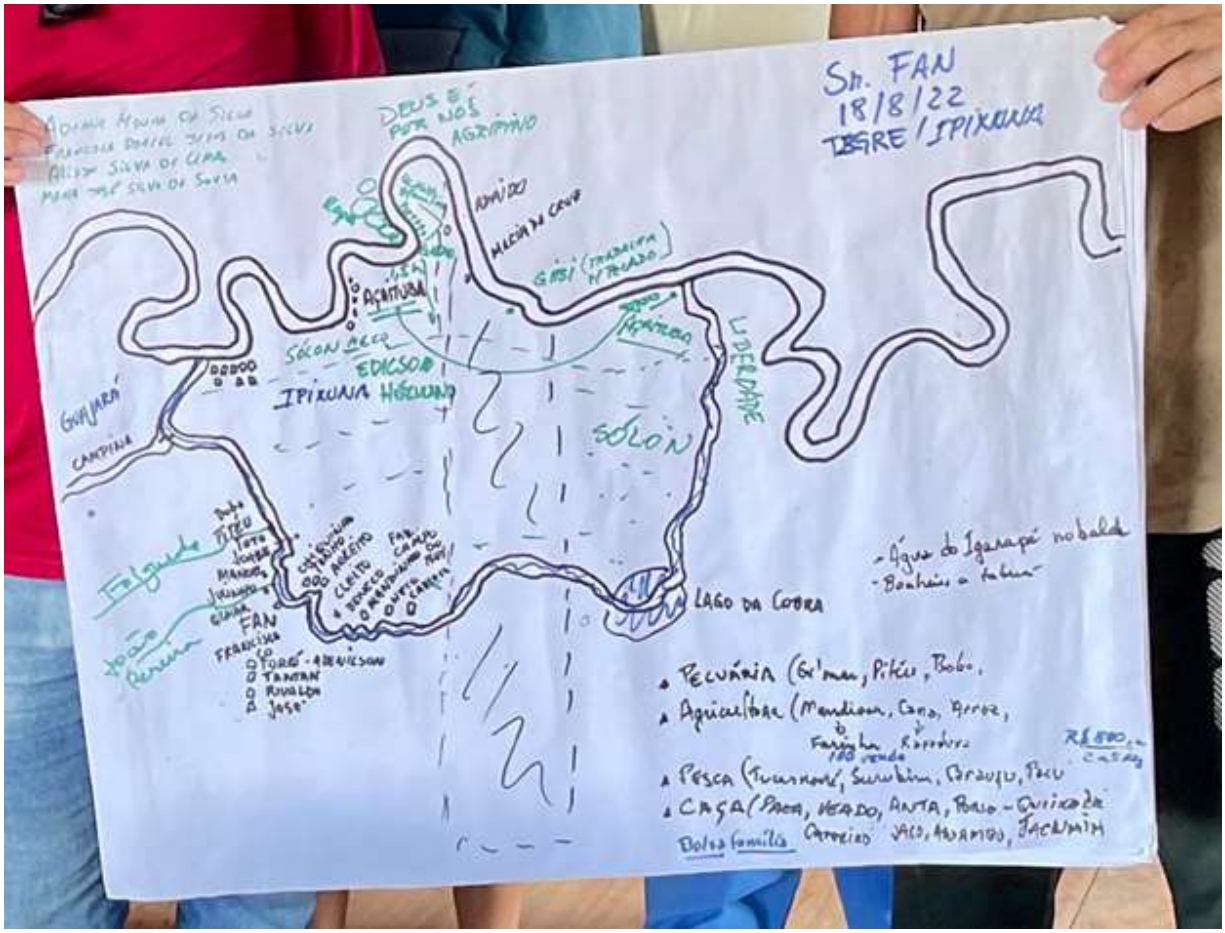


Figure 44. Collective map of the Açaítuba rubber plantation.

The Açaítuba rubber plantation was bordering the Maurício Mappes rubber plantation to the east when the former was approaching the mouth of the Liberdade river. This place is referred to on the IBGE municipal map of Ipixuna as Seringal and Japura Community[150]. According to the interviewees, the rubber plantation of Maurício Mappes extended along both banks of the Liberdade river up to its mouth and had

[150] IBGE - Instituto Brasileiro de Geografia e Estatística. Geociências. Mapas Municipais. Available at: <https://geoftp.ibge.gov.br/cartas_e_mapas/mapas_municipais/colecao_de_mapas_municipais/2020/AM/ipixuna/1301803_MM.pdf>. Accessed on: 14/10/22.

as its limit reference point the first beach after the Paraná river, a tributary of the Liberdade river. According to the interviewees, the communities Campinas, Açaítuba, Tigre and Deus é Por Nós are all within the former rubber plantation of Açaítuba. Only the interlocutors in the Porto Mappes community, which is located on the right bank of the mouth of the Liberdade river, recognized that they were in the area of the former Maurício Mappes rubber plantation, on the IBGE municipal map, called Fazenda do Riozinho da Liberdade (Figure 45).

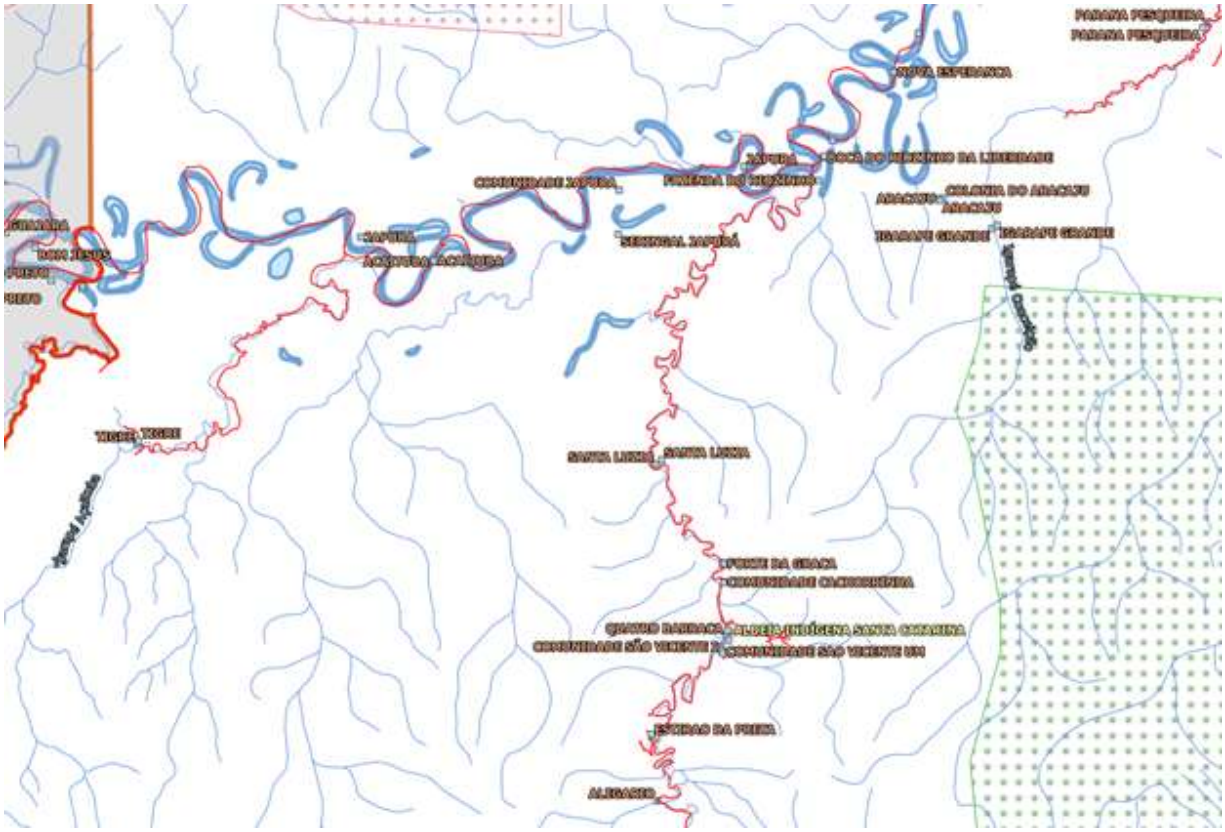


Figure 45. Detail of the rivers Juruá and Liberdade. Map of the municipality of Ipixuna. Source: IBGE[151].

The economy of these communities is based on agriculture (where the production of flour stands out), fishing for commercialization, the breeding of cattle and pigs, the last one focused mainly on subsistence, and the extraction of the murumuru coconut. The crops of the communities that are on the banks of the Juruá river, Campinas, Açaítuba and Deus é Por Nós, are maintained on the left bank of the Juruá river, where the nearest dry land is located. Fishing, extractivism and cattle, chicken and pig raising (on a small scale) are maintained on the right bank. The collection of murumuru coconuts is also done on the left bank of the river, in the forest. In the Tigre community the fields are closer to the houses and some can be reached by walking during the summer. In this community the production of flour, fishing, the sale

[151] IBGE - Brazilian Institute of Geography and Statistics. Geosciences. Municipal Maps. Available at: <https://geoftp.ibge.gov.br/cartas_e_mapas/mapas_municipais/colecao_de_mapas_municipais/2020/AM/ipixuna/1301803_MM.pdf>. Accessed on: 10/14/22

of the murumuru coconut to the cooperative COOPERCINTRA and the raising of cattle were reported. The people interviewed estimated that they have 5 families that raise cattle in the region and that each one has about 34 head of cattle and 30 hectares of pasture on dry land. Recently a new source of income has presented itself through fishing tourism. Up to twice a year they receive visits from sport fishermen from southeastern Brazil, who stay for a week and fish for sport. The income comes from meals, camping, and daily rates as a guide on the lakes and rivers.

- **Liberdade river: São José and São Luiz communities**

The communities that live on the banks of the Liberdade river are also products of the same economic structure of rubber extraction in the Amazon. Their current residents are immigrants, or their children, who came to work on the rubber plantations and settled in the area after the rubber economy collapsed. Their last recognized rubber baron boss is Maurício Mappes, who worked in the region until the mid-1950s. After his death, in the absence of a new boss, the rubber tappers who were settled there continued to use the territory and took over the site. A portion of Mauricio Mappes's former rubber plantation in the state of Acre, from the mouth of the Extrema creek to the mouth of the São João creek, was even parceled out by the Acre Land Institute (ITERACRE). Several mitigation actions were taken by the state of Acre after the paving of BR-364, including the creation of three State Forests (FLOTA): FLOTA Gregório, FLOTA Liberdade and FLOTA Mogno. As the communities of São José and São Luiz are already within the state of Amazonas, they did not benefit from land regularization.

The economy of these communities is based on a combination of subsistence and income-generating activities. Other crops grown in the communities are corn, banana, rice, potatoes, pumpkins, and beans. In the region there is also fishing and the extraction of açaí and coconuts (Attalea tessmannii), which are sold to the Cooperative of Family Producers and the Supportive Economy of the Mahogany Forest (COOPERMOGNO) whose main office is on the BR-364 road[152]. Some residents of the São Luiz and Santa Rita communities raise cattle that are sold during the winter period. Both the pastures and the farms are located on the left bank of the Liberdade river, as they are on dry land closer to the communities.

As explained in item **2.1.11**, the methodology used to describe the baseline and its subsequent monitoring was Sustainable Livelihoods. For the purposes of carbon credit generation projects, 21 indicators were stipulated that are grouped into 5 dimensions: Human, Social, Environmental, Physical and Financial. Table 44 presents the indicators and the averages of each one of them obtained from the application of the questionnaires.

[152] Coopermogno. Portfolio. Tarauacá: n/d. Available at: <http://semapi.acre.gov.br/wp-content/uploads/sites/20/2020/04/Portfólio_Coopermogno.pdf>. Accessed on: 14/10/2022.

Table 44. 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 - Household food security	0.49
	H2 - Use and recognition of traditional/local ecological knowledge	0.8
	H3 - Access to new knowledge	0.15
	H4 - Satisfaction and motivation with work and life in the territory	0.74
	H5 - Labor safety	
Social Dimension	S1 and S2 - Relations with communities, partnerships and institutions	0.28 e 0.65
	S3 - Visibility and opportunity for young adults	0.52
	S4 - Participation and valorization of women in productive activities	0.19
	S5 - Access to public policies aimed at strengthening their livelihoods	0.31
Environmental Dimension	A1 - Access to water for human and animal consumption	0.87
	A2 - Access to land suitable for various traditional uses and their aspirations	0.34
	A3 - Conservation and use of forest and wildlife	0.86
Physical Dimension	P1 - Individual production infrastructure	0.23
	P2 - Collective production infrastructure	0,23
	P3 and P4 - Individual/family infrastructure for housing, transportation and welfare	0.49 e 0.22
Financial Dimension	F1 - Income	0.30
	F2 - Product price and working capital, when applicable	0.46
	F3 - Commercialization	0.47
	F4 - Access to credit lines and other financial support policies	0.03

In the context of the Seringueira II project, a secure sampling was achieved, when representatives of 46 families distributed in the region directly related to the project were interviewed. This fieldwork ensured the application of the MVS in a formal manner, which made it possible to obtain a significant and robust baseline for measuring the impact and future monitoring plan of this project. Below are graphs with the results obtained for the Dimensions and the Sustainable Livelihoods Indicators (Figures 46 and 47).

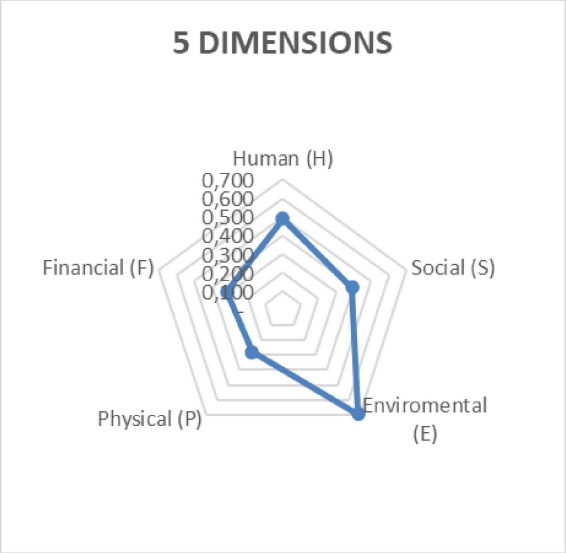


Figure 46. Average scores by dimension.

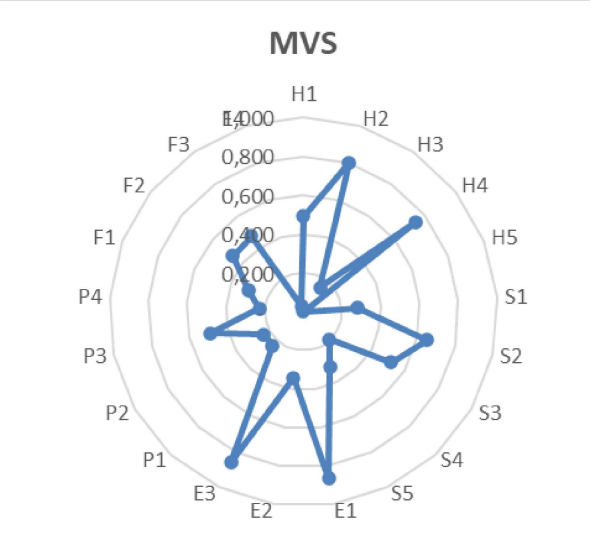


Figure 47. Average scores by indicators.

Only the environmental dimension, corresponding to what was inspected in the field, presented, in the mathematical conversion of the answers to the mentioned questionnaire, an average score close to 0.7 (within the margin from zero to one), considering that the community attributes itself with access to a relevant offer of ecosystem services and a collection of fauna and flora that guarantees them a basis for sustaining their livelihoods, that is, this dimension in the MVS demarcated by the benefits obtained in nature that seems to be sustaining the permanence of these people living in these localities (Figure 48). This was also evident by matching the enthusiasm that many showed in participating in a future natural resource conservation project through the carbon credit project, indicating that nature is still the main source and strategy of their livelihoods. Hunting, fishing, wood for building their shelters and simple boats, planting areas, and water (untreated) were presented as the best evaluated resources in the subsistence axis of the riverine peoples.

Following the environmental dimension were the Human and Social dimensions that had their indicators evaluated with scores of 0.5 and 0.4 respectively, indicating that there is an availability of human factors such as health, motivation, local knowledge, and social agglutination that, even with reasonable averages, still maintain a certain balance in the web of the Sustainable Livelihoods graph

(Figures 49 and 50). Through these aggregated indicators it is highlighted that these communities are relatively fragile in these dimensions, since there are ups and downs especially in the motivation as extractivist-farmer and in the security of the execution of their work, within the human dimension, and that the social relations in defense of their interests and collective rights are relatively frayed in the social dimension, with the exception of the São José community that claimed to be organized and united, both through the questionnaire applied and the survey with DRP methods carried out in August 2022.

The physical and financial dimensions with the lowest scores in the aggregation of their respective indicators scored only 0.3 (from zero to one) indicating the community members' own perception of insufficient monetary circulation due to low income and access to credit channels, which is also reflected in the material and physical conditions of the housing and work infrastructure, well below what was expected by the questionnaire respondents (Figures 51 and 52, respectively). Again, the São José community was the exception among all those surveyed, as it was notable for the better quality of its houses and boats anchored along the river banks.

Access to electricity and internet are also key infrastructure factors considered by the questionnaire respondents as determinant for the low scores in the Material dimension, and not having more capable cargo boats for their own and direct transport of the harvests greatly reduces the economic negotiation capacity of their production, directly affecting the income obtained by the riverside people.

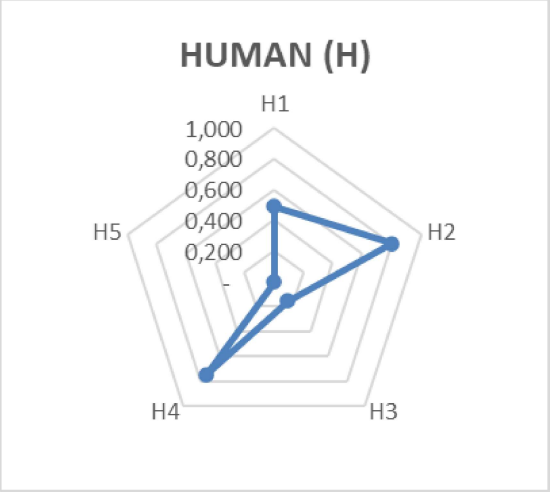


Figure 48. Polar graph with the MVS human dimension indicators.

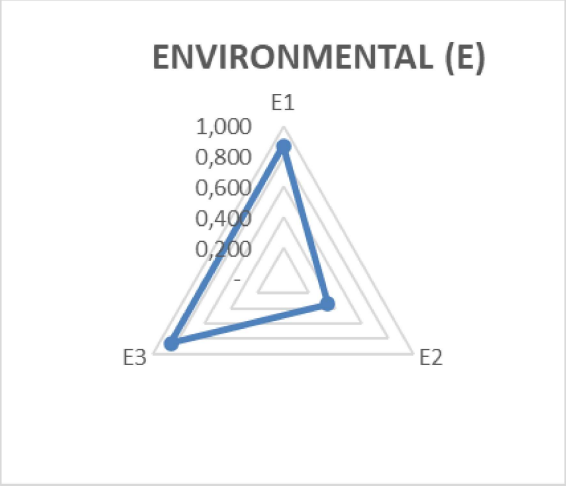


Figure 49. Polar graph with the indicators of the MVS environmental dimension.

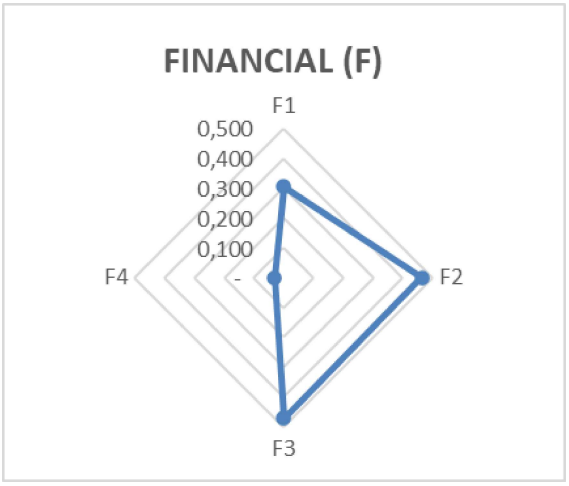


Figure 50. Polar graph with the indicators of the MVS Financial dimension.

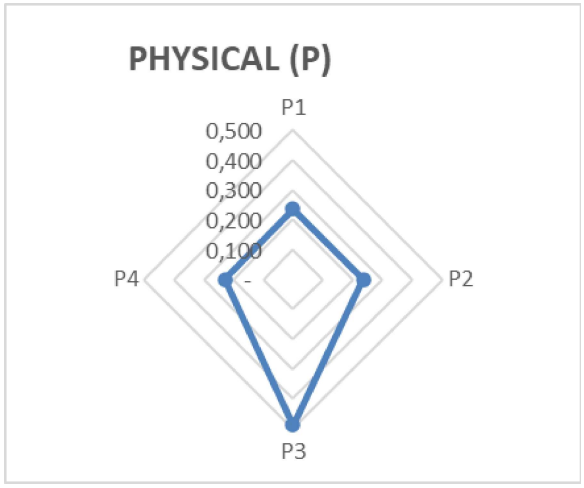


Figure 51. Polar graph with the indicators of the MVS Physical dimension.

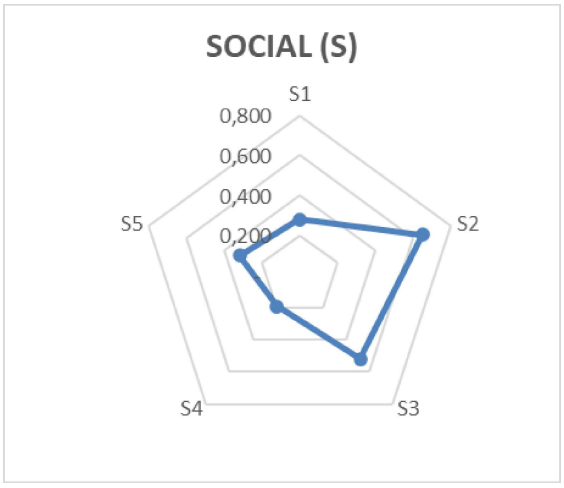


Figure 52. Polar graph with the MVS Social dimension indicators.

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

Community interactions are of great importance in the project region on many levels, these being commercial, religious, cultural, and family levels. Through field visits and local social surveys, the peculiarities of interactions could be exposed in order to define which interactions occur at each level mentioned above. The project will monitor the changes in interactions that may occur between communities due to positive impacts, since the dependence of each community on certain factors will decrease, which, however, may imply the expansion of interactions at other levels.

Commercial Level:

- The residents of the communities of the Juruá river (Tigre, Açaituba, Porto Mappes, Campinas and Deus é por Nós) work independently in fishing, individuals sell the fish to boats that transit the river, an example is the boat that buys primary products (called "regatão") for resale, This scenario is a little different when a large fish is caught (like the pirarucu) or they manage to catch a large amount of fish, dividing the fish among the community, this applies to large or large quantity hunts.

- The residents of the communities of the Liberdade river (São José and São Luiz) work in a collective way in the production of flour, selling it to the regatões that pass by the river and take it to the Liberdade bridge, where buyers of this flour are based to purchase and resell in Cruzeiro do Sul. The flow of production of the communities can constantly reach the urban center, making the production of flour one of their main means of income.

Religious Level:

- The Campina community is a religious meeting place for the Juruá river communities, being the Evangelical religion, with two congregations that move to the community to use the church, the congregation of the Tigre community and the congregation of the Deus é por nós community (where this congregation built another church together with the Campina residents in the community).

Cultural Level:

- The Liberdade river communities interact culturally with sports, where soccer games occur between communities, being a moment of meeting and social leisure shared between residents, the two communities have a soccer field and the games occur in a rotating way in one of the two fields.

Family Level:

- The communities of both rivers have family ties with each other. These bonds of kinship extend across the rivers Juruá, Liberdade, and Igarapé Tigre. For example, in the Campinas community where the patriarch resides and his two married sons visit him, since they are currently living with their families in the community of Igarapé Tigre.

4.1.3 High Conservation Value (CM1.2)

The concept of High Conservation Values (HCVs) was developed by the Forest Stewardship Council (FSC)[153] for certification of timber products from responsible forest management, according to

[153] Council, Forest Stewardship. Forest Stewardship Council®. Protocol for Endorsing National Iniciatives. FSC. Doc, v. 1, n. 2,1996.

principles, criteria, and standards that reconcile environmental and ecological safeguards with benefits and economic viability[154]. According to Jennings et al. (2003)[155], an HCV area represents a natural or managed area with exceptional values or critical importance, with social and cultural relevance for the reproduction of the communities' way of life. The Seringueira II project is located entirely within an area of high conservation value for the above mentioned community members, directly related to three HCV criteria:

- HCV 4 - Ecosystem services: Basic ecosystem services in critical situations, including watershed protection and control of erosion of vulnerable soils and hillsides;
- HCV 5 - Community needs: key areas and resources to maintain the basic needs of local communities (livelihood, food, health, water, etc.);
- HCV 6 - Cultural values: areas of national and global cultural, archaeological or historical importance, and/or of cultural, ecological, economic or religious/sacred importance to local communities.

Table 45. Identification of high conservation value areas within the Seringueira II project.

High Conservation Value	• Extractive resources from nearby communities (rubber trees, murumuru, Brazil nuts, açaí) (HCV 4; HCV 5) • Archeological sites in the project area (HCV 6) • Lakes and streams that flow between communities in the region (HCV 4; HCV 5) • Area of presence of animals for subsistence hunting (HCV 5)
Qualifier Attribute	The entire project area being protected favors the extraction activities of latex (*Hevea brasiliensis*), Brazil nut (*Bertholletia excelsa*), murumuru (*Astrocaryum murumuru*) and açaí (*Euterpe oleracea*). The conservation also favors the increase of the local fauna, used as an important food resource by the communities. These factors together favor the reproduction of the way of life of the local populations, in addition to the archaeological analysis for historical cultural rescue.
Area of focus	Improved surveillance of property, remote monitoring of forest cover, monitoring and further studies of biodiversity, and activities to intensify community engagement with forest preservation and forest resources.

[154] Council, Forest Stewardship. FSC'S "Theory Of Change". Intended Impacts And Related Indicators.[Available at: ToC https://ic. fsc. org/en/our-impact/program-areas/monitoring-and-evaluation/fsc-theory-of-change, 2014.

[155] Jennings, Steve et al. The high conservation value forest toolkit. Edition I, ProForest, Oxford OX, v. 12, p. 1-62, 2003.

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

The projection of the scenario without the project indicates the continued dependence of the communities on the commercialization of wood, gradual expansion of cattle ranching with expansion of pasture and continued constant consumption of hunting.

The forest area that the project aims to preserve would be vulnerable to irregular wood exploitation, with gradual invasions occurring in the area, strongly affecting the local biome, an invasion that the stakeholders would not be able to prevent without the presence of the project, increasing the municipal deforestation rates and affecting the community livelihood, generating impacts that would drive rural exodus, leaving the forest more exposed to exacerbated wood exploitation that would culminate in the reduction of local carbon stocks.

Illegal hunting in the scenario without the project is estimated to continue on the rise, threatening the local biome and directly impacting the diet of the communities, which will have fewer and fewer animals for subsistence, increasing the possibility of periods of hunger during the seasons when hunting is the main source of food, a factor that will affect the local HDI, decreasing the quality of life by increasing food insecurity, making communities more dependent on canned food and processed products, causing a direct impact on health and well being, or even motivating the communities to make rural exodus.

For the riverside communities we highlight the implementation of strategies aimed at improving the quality of life, which would not occur in the absence of the project, such as: implementation of a community photovoltaic system, implementation of a water collection and distribution system, implementation of residential bathrooms, internet supply system to improve communication, school construction and support to improve the production of flour and meliponiculture.

There will be training for community members who are interested in developing their production of flour or starting the production of wild honey from native bees.

Mortality rates may be widely affected by dysentery, infections and verminosis from consuming contaminated water, keeping the quality of life in lower categories, with the constant risk of families suffering from infant mortality, a serious issue that requires great efforts to keep at the lowest possible margins, which would hardly occur without the presence of the project.

The communities that live within the malaria zone will continue to suffer from the disease, maintaining the endemic state of the disease around the month of May each year, victimizing individuals and future generations of these communities.

Limited access to electricity limits the ability of communities to deal with most of the problems they experience.

Without the possibility of having a refrigerator and freezer, the riverside dwellers live a more immediate routine in the search for food, making it impossible to stock food for consumption in periods of scarce fishing, hunting and agriculture. The lack of constant energy also limits the use of machinery to access drinking water, being a problem of difficult solution without adequate equipment and energy necessary for consumption. The local economy is strongly affected by the lack of electric power options

other than generators, as the need for gasoline and oil for the generators limits the economic reach of the communities for other issues.Without the actions of the project it is estimated that this problem will endure, as there is no solution in sight to occur in the near future.

Due to the high cost of maintaining the activities that ensure the monitoring and security of the forest areas, it would be unfeasible for the landowners to bear such costs and efforts in the long term and on a large scale, and it would not be possible to prevent unplanned deforestation and uncontrolled invasions. Thus, the scenario with the presence of the Seringueira II 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.

4.2 Net Positive Community Impacts

4.2.1 Expected Community Impacts (CM2.1)

The International Association for Impact Assessment (IAIA, 2003)[156] defines social impacts, for impact assessment purposes, as changes in one or more of the following:

- People's way of life - how they live, work, play, and interact on a daily basis;
- Their culture - their shared beliefs, customs, values, and language or dialect;
- Their community - its cohesion, stability, character, services, and facilities;
- It is political systems - the extent to which people participate in decisions that affect their lives, the level of democratization that is taking place, and the resources made available to them;
- Their environment - the quality of the air and water people use; the availability and quality of the food they eat; the level of hazard or risk, dust and noise they are exposed to; the adequacy of sanitation, their physical safety, and their access to and control over resources;
- Their health and well-being - health is a state of complete physical, mental, social, and spiritual well-being, and not merely the absence of disease or infirmity;
- Their personal and property rights - particularly if people are economically affected or experience personal disadvantages that may include a violation of their civil liberties;
- Their fears and aspirations - their perceptions about their safety, their fears about the future of their communities, and their aspirations for their future and the future of their children.

[156] Social and Biodiversity Impact Assessment (SBIA) Manual for REDD+ Projects Part 1 – Core Guidance for Project Proponents. 2011.

The IAIA also defines social impact assessment as "the processes of analyzing, monitoring, and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any processes of social change invoked by those interventions. Its primary purpose is to create a more sustainable and equitable biophysical and human environment."[157]

The impacts on communities presented below include benefits, costs, and risks, and are related to community, social, cultural, environmental, and psychological aspects. In addition to the observed impacts, consultations were held with community members, seeking to capture their perception of the possible positive and negative changes that the project will bring. The impact assessment activities took place in conjunction with public hearings for consultation with the community between December 8 and 9, 2022 in São José and São Luiz, and between January 11 and 14, 2023, in the communities of Açaituba, Porto Mappes, Campinas, Tigre, and Deus é Por Nós.

Regarding the positive impacts, it was emphasized that forest preservation is essential to sustain the reproduction of their way of life and the well-being of the riverside communities. The maintenance of biodiversity favors the extraction of rubber trees, murumuru, nuts, and açaí, besides making hunting and fishing more abundant. In addition, according to the community, maintaining the forest helps to preserve a mild climate, improving the quality of life.

Table 46. Description of impacts of project activities anticipated for selected community groups.

Community Group	Açaituba, Porto Mappes, Campinas, Tigre, Deus é Por Nós, São José, São Luiz.
Impact(s)	• Improved home infrastructure with the deployment of household photovoltaic system; • Increased instantaneous communication between communities in emergencies, events, negotiations, and integration of populations in cyber environments; • Improved health with access to safe drinking water promoted by the implementation of treated water collection and distribution systems and dry pit toilets • Improvement of the educational infrastructure with the construction of a school in the São José community; • Improvement in river transportation with the acquisition of a boat to monitor the project area; • New learning that adds value to the commercialized products and generates new income alternatives, providing more job opportunities and improving the families' income; • Strengthening associative and community management capacity; • Strengthening the inclusion of socially vulnerable groups in productive activities.

[157] Social and Biodiversity Impact Assessment (SBIA) Manual for REDD+ Projects Part 1 – Core Guidance for Project Proponents. 2011.

Type of Benefit/Cost/Risk	• Benefit: these impacts are directly related to the project, expected to occur in the short, medium and long term, presenting benefits for the extractivists who will learn processing techniques, management and marketing of their business, with direct support from trained professionals. These activities will also help the riverside dwellers with their family agriculture. The social organization will be favored, creating a favorable environment for the generation of new businesses and the expansion of the activities carried out. • Cost: no significant costs are expected from the community groups, only the time that the producers must invest in the development of the activities is considered a cost for the communities. • Risk: The risk identified is related to the illegal logging activity that has invaded areas surrounding the project. There is the possibility of riparian and extractivist communities suffering threats from criminals for being part of the project and thus assisting the inspection teams in the areas.
Change in Well-being	Positive, indirect impact of great magnitude.

4.2.2 Negative Community Impact Mitigation (CM2.2)

The Seringueira II project does not cause negative impacts on local communities. Communication channels have been established to clarify doubts, receive suggestions and complaints.

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

The viability of access to safe drinking water implies directly in the reduction of infant mortality rates from contaminated water consumption, also affecting the reduction of dysentery cases in all age groups. Improving the quality of life in these communities with accessible safe drinking water is an important step towards achieving more complex community goals. By decreasing the risk of infection, these communities will suffer less and spend less on gasoline, since there will be less travel to health clinics for sick riverside dwellers. In addition, access to toilets with dry toilets will improve the basic sanitation of the communities, promoting a decrease in cases of worms and solitary worms, as well as providing decent housing conditions (Figure 53).

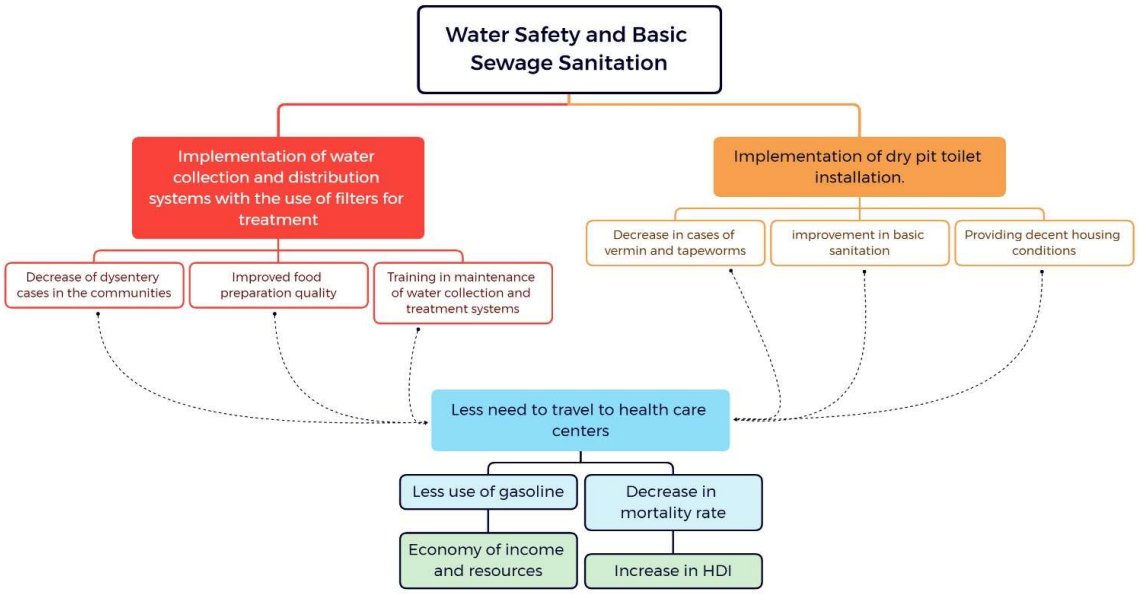


Figure 53. Infographic on water security and sanitation benefits.

The implementation of solar panels, guaranteeing electric energy without charge, will have a positive impact on the well being of the communities. This energy will bring the basis for a series of changes in the local routine and structure, giving access to the use of household appliances such as refrigerators, freezers, and fans, appliances of constant use that were unfeasible in a mode of using generators for only a few hours a day. The introduction of a refrigerator and freezer in the livelihood of these communities will guarantee an advance in food preservation, giving the communities the possibility of storing food in a hygienic and safe way, reducing the immediate need for hunting or fishing to obtain animal protein, ensuring that the communities have less need to consume perished food, increasing the quality of life and reducing cases of foodborne infections (Figure 54).

The access to the internet will ensure a better daily communication between the riverside dwellers of the communities, with the solar panels the access can be throughout the day, different from the restrictions that the generator power has in the daily routine, this will ensure that the community can be more integrated in events, access to websites of government agencies for services and schedules, digital inclusion of the communities the social networks in a solid way. It is expected that through the saving of resources such as oil and gasoline for generators, the communities will have a greater availability of these resources for mobility, making possible locomotion previously unviable due to the limited use of gasoline and oil available.

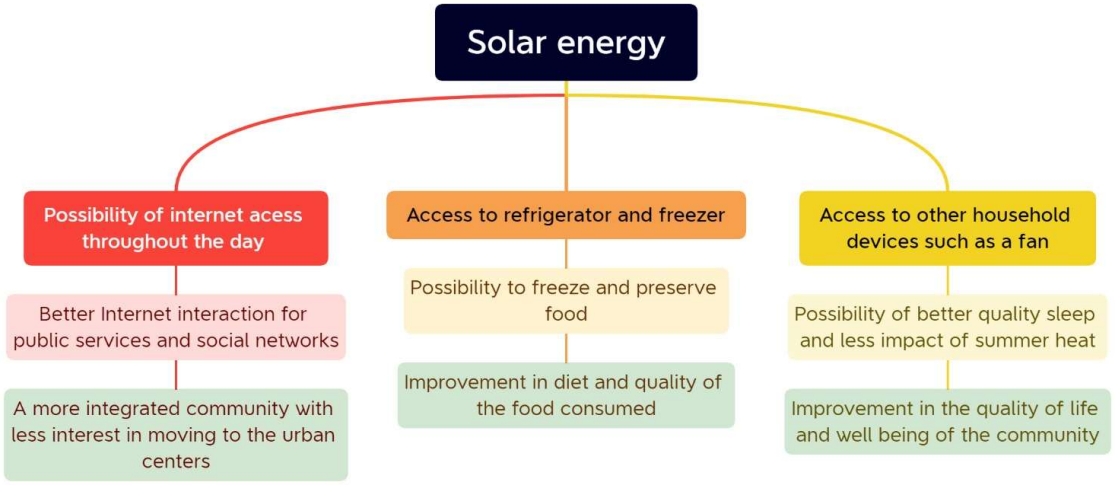


Figure 54. Infographic about the benefits of photovoltaic system implementation.

Energy autonomy, internet access in the communities and the construction of a school in the São José community will bring a considerable improvement in local education. These actions constitute the basic infrastructure needed to facilitate the education of the community, improve alphabetization, reduce school dropouts, and adjust the age/grade. Education is also fundamental to staying in the territory, improving family ties and reducing the exodus to urban areas, where living conditions tend to be of high social vulnerability (Figure 55).

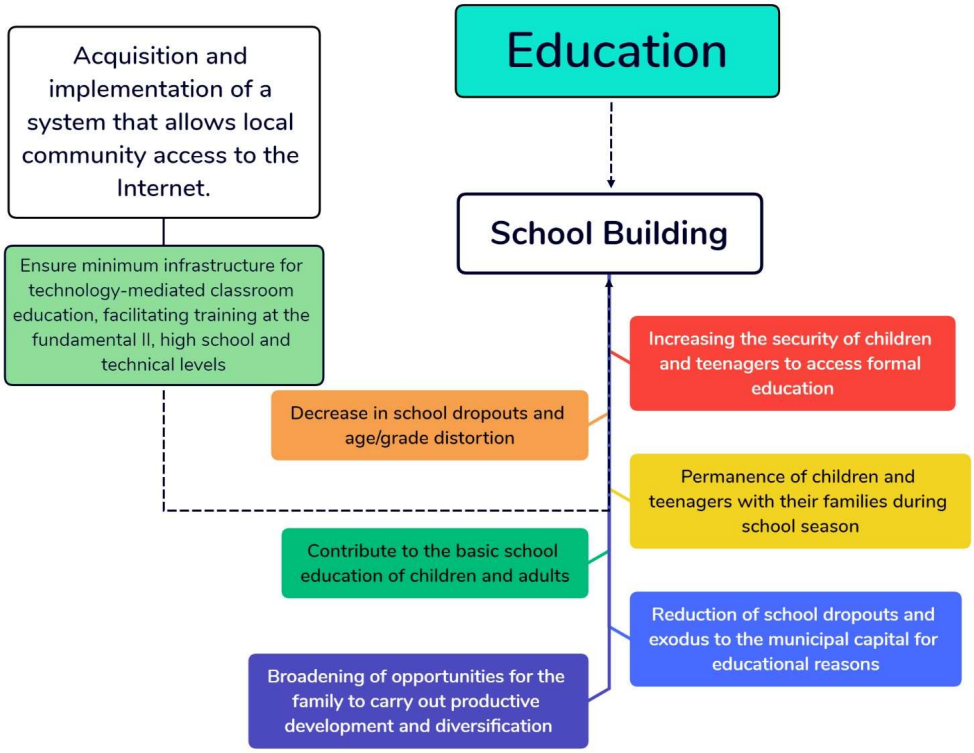


Figure 55. Education Benefits Infographic

The improvement in the production of manioc flour through training courses, in the search for new business partnerships and in the development of the brand itself, relying on marketing and building new business relationships, will cause an increase in the income of the producing families, from the appreciation of the product and the reduction of dependence on a single buyer. Besides this, the capacity building for meliponiculture, which will include training for the production of wild honey from native bees and the implementation of meliponaries, will also include courses directed to the valorization of the product. These actions together will generate increased income for riverside families, improving the quality of life and strengthening the association (Figure 56).

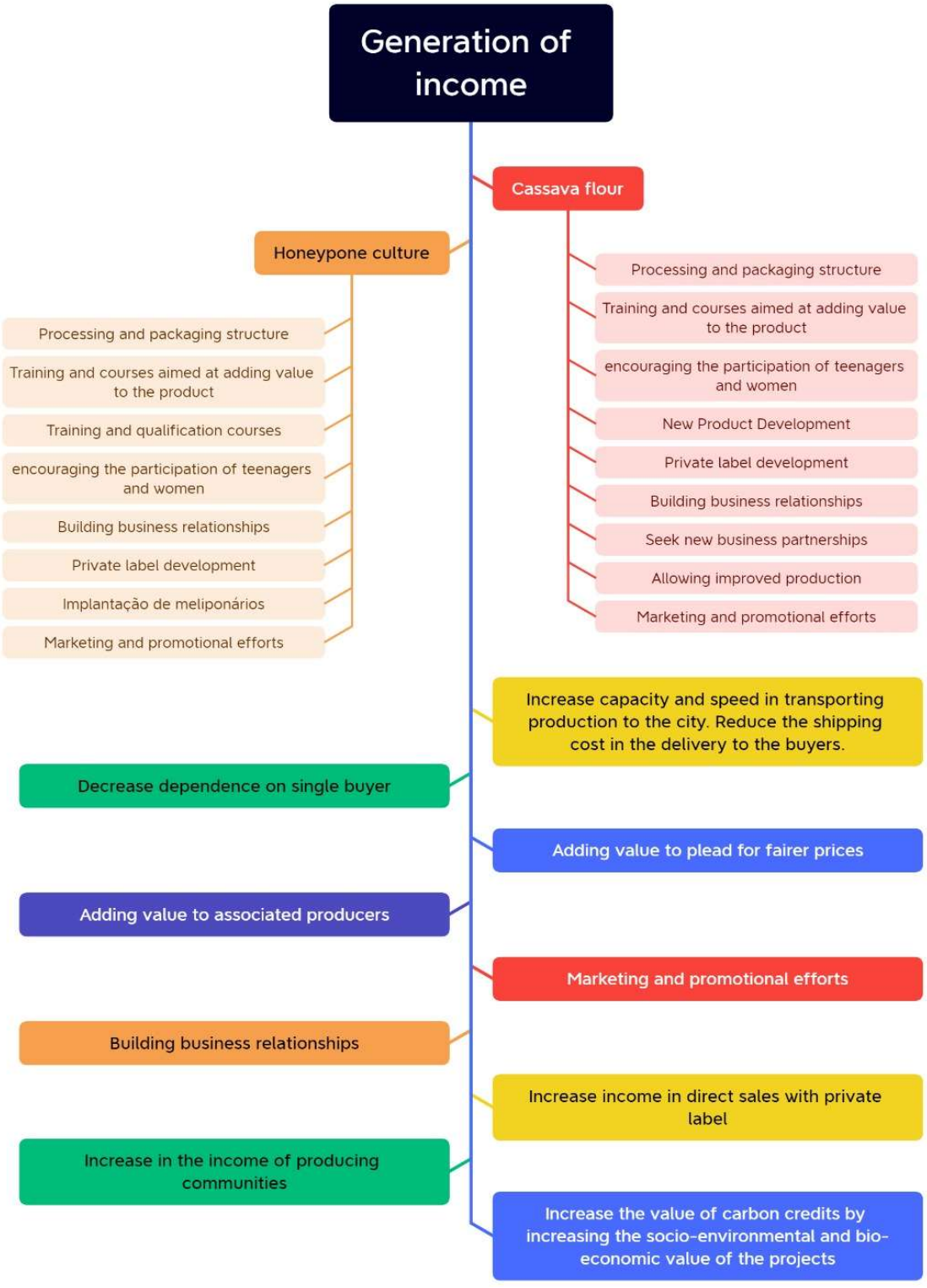


Figure 56. Infographic benefits of income-generating courses and training.

4.2.4 High Conservation Values Protected (CM2.4)

The project's activities consist in the conversation of the forest used as an area for extraction of products by the riverside dwellers of Açaituba, Porto Mappes, Campinas, Tigre, Deus é Por Nós, São José, São Luiz, serving to maintain the reproduction of their way of life and improve the supply of ecosystem services, such as murumuru, açaí and chestnut, hunting and fishing.

4.3 Other Stakeholder Impacts

4.3.1 Impacts on Other Stakeholders (CM3.1)

The development of the Seringueira II project is not expected to cause negative impacts on other stakeholders. However, it may cause positive impacts to other stakeholders. The positive impact on their well-being will be related to the project's benefit activities. In order to share the positive impacts with all stakeholders, the project intends to:

- Benefit all stakeholders through forest conservation in the project area;
- Increase the commercialization of local products.

Although not anticipated to occur, the negative impacts can be listed as:

- Conflict between the time dedicated to day-to-day activities and the time available for training and participation in the project;
- Lack of communication between the technical team and the community and, consequently, misunderstandings between the parties.

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

The Seringueira II 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 participatory manner allowing the free exercise of the manifestations of other stakeholders, as well as an efficient and permanent communication between the project developer and all stakeholders.

4.3.3 Net Impacts on Other Stakeholders (CM3.3)

The Seringueira II project is not expected to negatively impact other stakeholders. As stated above, the project only intends to positively impact other stakeholders. By preserving the forest area used by extractivists and allowing access to local communities, the project will have positive impacts on communities and other stakeholders by encouraging traditional ways of life as well as their maintenance and strengthening. The project aims to serve all stakeholders and is intended to achieve the inclusion and well-being of the communities and other stakeholders.

4.4 Community Impact Monitoring

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

The methodology adopted for Sustainable Livelihoods (MVS) makes it possible to recognize the community's future aspirations for change in line with forest conservation and protection measures. Due to its multidimensional aspect (human, social, environmental, physical and financial), the baseline assessment allows the project to consider precisely that the fragile bases are strengthened and the expected changes come with a structured connection of these changing dimensions. This will happen based on a governance that transversally considers community participation in the decision-making process for local projects and monitoring them in the light of sustainable changes.

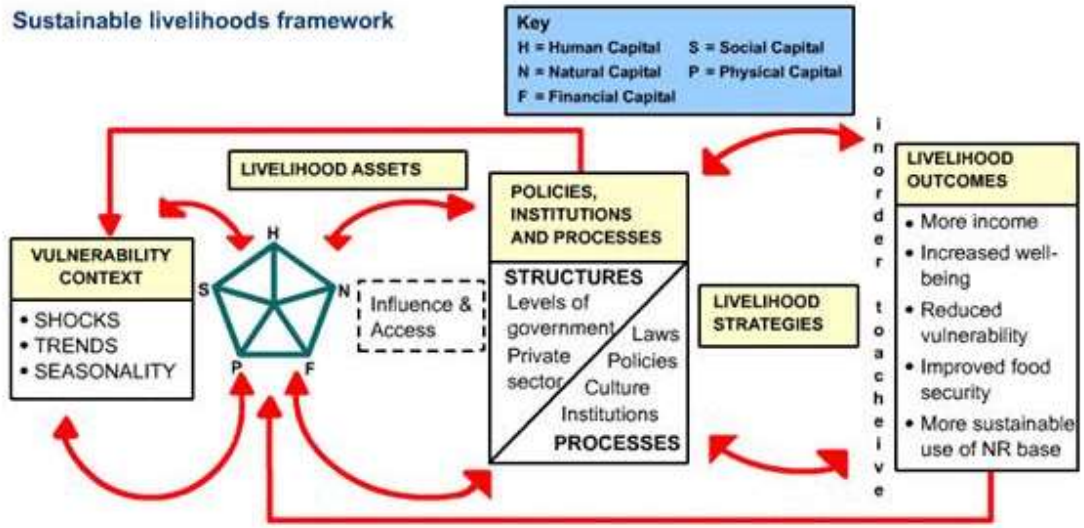


Figure 57. Structure of the Means of Sustainable Lives method.

A push or an exogenous factor can be an impact like a force majeure that strengthens, empowers or disrupts and unbalances this tenuous web of interactions between what was available in their livelihoods and what can happen to improve access and /or the strengthening of this asset base. Carbon credit projects, in order to generate maximum positive impacts, must be chosen and recognized for their viability in accordance with the way of life of the communities, either by ensuring or improving access to the assets of the five dimensions, simultaneously maintaining the balance and respecting the dreams and goals of the community.

As a large part of extractivists and riverside communities are from socioeconomically vulnerable social groups, projects to strengthen their assets in the five dimensions must drive individual, family and community forces towards rebalancing and positive impacts, so that the intervention process of the projects do not provoke an incurable erosion of available ways of life. It is therefore necessary to avoid

that riverside communities and extractivists suffer damage to their asset bases and their aspirations and strategies for the future.

Considering the role of the company that prepares and implements the carbon credit project as a means of guaranteeing elements that strengthen and encourage livelihoods and human rights associated with them, the methodology and expected results of this study and precise analysis account for the complexity of the interaction of internal and external factors with indicators that consider measuring this complex tangle of assets, aspirations, dreams, interests that are immaterial and material, so that the resident population and users of the areas of carbon credit projects know foster their rights and livelihoods in order to positively achieve the even greater strengthening of their assets for the autonomous and independent continuity of their family and community life.

As a starting option for the dialogue on indicators for measuring the process and results of community carbon credit projects, with the description of the baseline and future monitoring, the methodology must cover its effects in the defense of rights, aspirations, needs and livelihoods of people, families and communities in the territories of the projects that result from the investigation into the before and after of each project designed and executed by Terra Vista Gestora de Recursos Ltd., taking inspiration, for example, from the dimensions and aspects proposed in the table below. This can be made possible, of course, by means of a deep dialogue between the parties that are interested in the performance resulting from the projects being a differential in terms of qualified information, effective social participation and achievement of community development aspirations.

Table 47. Dimensions, indicators and corresponding averages stipulated from the application of the Sustainable Livelihoods (MVS) questionnaires.

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

Sustainable livelihoods help to reference important aspects of the integrality of ways of life and aspirations of people, families and communities resident and/or users of the territories of carbon credit projects. Subsequently, it will be possible to develop projects in partnership with the communities in a dialogic way through informed and enlightened participation, respecting the autonomy and way of seeing and living of each group in the territory. Clear and precise indicators will be adopted that can help measure the advances and results achieved each year, considering the positive impacts of the intended carbon credit project.

The evaluation will take place through the annual systematic application of the questionnaire based on the Sustainable Livelihoods (MVS), with a sample of up to 25% of the beneficiary community members, considering that the indicators measured in the baseline survey below the 0.5 average (from Zero to One) must point a positive growth impact of 20% per year for the indicators of the human, social and physical dimensions and of 15% per year for the indicators of the financial dimension.

As for the indicators that in their baseline received an average score of 0.5 above, the expected improvement is that the score increases in general for indicators of all these dimensions by 5% per year.

This metric is justified by the fact that the resource base of the five dimensions, with the exception of the natural dimension (has forest, hunting, fishing, ecosystem services that support them) were evaluated with an average score below 0.5, demonstrating that insufficient for a sustainable base of their livelihoods and indicating that a more rapid change is needed in order to guarantee stability, especially so that young people and women do not give up and are willing to emigrate.

In this case, reaching the median level of the indicators that make up the dimensions of the Sustainable Livelihoods (MVS) will create a more sustainable basis for livelihoods, considering that programming beyond this level will be slower as it will depend on a series of factors outside the project's governance and will have to greatly reduced the risk of the population of these communities giving up being extractivists and guardians of the forest along with the project.

4.4.2 Monitoring Plan Dissemination (CM4.3)

The indicator monitoring plan will be disclosed by email and in meetings with 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 (GL2.1)

As described in section **2.1.8** Stakeholder Identification (G1.5) and **2.1.19** Permanence of Benefits (G1.11), seven riverside communities living in the Liberdade and Juruá rivers in the municipality of Ipixuna were identified as project beneficiaries. 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 improvement of the production chain, association and improvement of the quality of life.

As described in section **2.1.6** Social Parameters (G1.3), the residents of the riverside communities, especially those of Porto Mappes and Açaituba, live in a region of social vulnerability, in which there are people below the poverty line, defined as individuals living on less than R$457.00 per month.

The FIRJAN Municipal Development Index (IFDM) Employment and Income of Ipixuna for the year 2016 was 0.254 points, being considered a low performance, occupying the 5,339th place in the national ranking of 5,570 municipalities, which, added to the IFDM Health and Education, represents one of the worst performances at the national level. According to the Central Registry of Companies, consulted through IBGE's Cities portal, in the year 2020, the average monthly salary of formalized workers in Ipixuna was 1.7 minimum wages[158]. However, only 1.1% of the population was formally employed in the period, and considering the monthly incomes of up to half a minimum wage per person, Ipixuna had 50.6% of its population in this condition[159]. This indicates a situation of wide salary inequality and a labor market characterized by high informality. Thus, when comparing the average salary situation with the average of the state of Amazonas, Ipixuna occupies an average position, 31st out of 62, and when compared with other municipalities in Brazil, it occupies the 3,792nd position out of 5,570 places.

To the data presented above can be added the proportion of people employed in the labor market of the municipality compared to the average found in Amazonas and Brazil. Ipixuna occupied the second to last place, the 61st position in relation to the state in which it is inserted. Compared to the country, it

[158] IBGE - Brazilian Institute of Geography and Statistics. Average monthly salary of formal workers. IBGE, Central Register of Companies 2020. Rio de Janeiro: IBGE, 2022. Available at < https://cidades.ibge.gov.br/brasil/am/apui/panorama> Accessed on: 30/08/2022

[159] IBGE - Brazilian Institute of Geography and Statistics. Average monthly salary of formal workers. IBGE, Central Register of Companies 2020. Rio de Janeiro: IBGE, 2022. Available at < https://cidades.ibge.gov.br/brasil/am/apui/panorama> Accessed on: 30/08/2022

ranked 5,559th, out of 5570 Brazilian municipalities. These data indicate that the average salary is restricted and an alarming concentration of income, since the rule for the municipality is unemployment and informality, appearing as one of the worst municipalities in Brazil when it comes to occupation in the labor market. Thus, it can be said that the population of Ipixuna, especially the riverside dwellers on the margins not only of the rivers, but also of capitalism, are in a condition of extreme social vulnerability.

4.5.2 Short-term and Long-term Community Benefits (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 infrastructure. These actions together generate benefits that extend 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 their own brand, and product promotion activities; (xiv) Resilience to crises through productive diversification.

In the long term, the project tends to provide the following impacts: (i) Decrease in the rate of water-borne diseases, such as diarrhea, cholera, and verminosis; (ii) Decrease in female workload in water collection and domestic activities; (iii) Dissemination of social technologies; (iv) Increase in permanence in the territory; (v) Access to rights and citizenship; (vi) Strengthening of family autonomy; (vii) Improvement in educational indices; (viii) Strengthening of associativism; (ix) Adding value to the productive chain; (x) Increasing the value of carbon credits by increasing the socio-environmental value and bio-economy of the projects; (xi) Strengthening the ways of life of traditional local communities and their economic and cultural reproduction; (xii) Reducing the rural exodus and urban marginalization; (xiii) Mitigating the risks of extreme climate events; (xiv) Improving the quality of life.

4.5.3 Community Participation Risks (GL2.3)

With regard to the risks associated with the participation of community members in the Seringueira II project, the possible threats posed by land invaders, who are located close to the project area and

engaged in timber extraction, were pointed out. The Ipixuna region has suffered pressure from the invasion of loggers, who have wrongfully taken over extensive areas occupied by preserved forests. As pointed out in section **4.2.2** Mitigation of Negative Impacts on Communities (CM2.2), as a way 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.

With regard 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 main objective of the Seringueira II project is to conserve about 2,773.79 hectares of native Amazon Rainforest in a region that has a high history of deforestation. Due to the high cost of maintaining the activities that guarantee the monitoring and security of the forest areas, it would be unfeasible for the landowners to prevent unplanned deforestation and invasions for wood extraction. 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 the region's biodiversity. 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.

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

The residents of the river slopes have greater difficulty in accessing public policies and less influence on decision-making, because transportation to the municipal headquarters is difficult and the community infrastructure is precarious. The lack of housing structure, the low offer of jobs and income generation activities, followed by the constant advance of deforestation, are factors that cause a constant migration movement of the riverside communities to the cities. The Seringueira II project will have its efforts directed to this sector, seeking to cause a positive initial impact on the advancement of this community through improved housing for riverside families and rural technical assistance. In the medium to long term, it will facilitate the access of this vulnerable group to public policies, markets, training, and decision-making processes.

In the annual investment forecast meetings and in the semi-annual evaluation, the riverine community will have its 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 Seringueira II 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 (GL2.5)

The process of socio-economic assessment, public consultation, and communication with the communities of Açaituba, Porto Mappe, Campinas, Tigre, Deus é Por Nós, São José, São Luiz, occurred in an open and participatory manner, without distinction of sex or gender. In this sense, there was a concern on the part of the technical team to enable female participation in the entire project development process. Thus, 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.

Through the socio-cultural diagnosis, it was found that there is a certain local balance in the division of labor, in which women are more focused on the tasks of farming, cleaning, planting, producing flour, and household chores, with domestic work being practically exclusive to women. In view of this web of social relations, the meetings and activities between the technical team and the communities took place within the domestic environment, in the houses of the community members, so that there could be inclusive participation of women who work more in the domestic environment.

To enable an equal participation of men and women in the project activities and benefits, knowing that women's activities are more associated with housework and child rearing, while men dedicate themselves more to activities outside the domestic environment, there should be an equal distribution of places for the training courses. Places for capacity building in social technologies will be designated and secured for women by establishing participatory quotas of 45% of the total number of vacancies. To ensure women's participation in the trainings, the presence of their children and other children will be welcomed.

As a way of ensuring gender equality and improving the quality of life of the riverine and extractivist women in the project, a support network for women who are victims of domestic violence and attempted feminicide 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 place, accessible and free of charge for these women.

The project will seek, through training, to expand the possibility of creating an association of riverine women 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. The organization of activities and net impacts towards women are presented in Table 48.

Table 48. Activities and Impacts directed towards women.

Activities	Impacts
Training courses with exclusive openings for women.	Increased scope of professional opportunities for riverine and extractivist women in the project.
Reporting channel on Whatsapp for denunciations of aggressions and feminicide attempts.	Improved safety and decreased gender vulnerability suffered by riverine and extractivist women in the project.
Immersion in associative structures to enable the creation of a women's association for women.	Expansion of safe spaces for riverine and extractivist women in the project, ensuring greater representation and debate towards their problems and challenges that are out of the question in traditional circles today.

4.5.6 Benefit Sharing Mechanisms (GL2.6)

The focus of the Seringueira II project is to train local multipliers, through the dissemination of knowledge and information about the project in all its phases, building efficient and assertive communication with the communities, ensuring the maturity of the communities in the appropriation of the actions that involve their territory. Stakeholders want and need to be involved in the design, implementation, monitoring, and evaluation throughout the life of the project. As detailed in section **2.5.3** Free, Prior, and Informed Consent (G5.2), all stages of the project are carried out with participatory and propositional consultations, including: pre-mobilization, mobilization, execution, and publicizing.

The public meetings of the project design had moments of clarification of the benefits, costs and risks provided by the project, as presented in section **2.3.7** Stakeholder Consultations (G3.4). In addition, the periodic meetings to be held in the communities will also seek to reassess the benefits, costs, and risks.

The public meeting and its ritual is the legal and normative tool developed for the collective participation of the communities, in which they deliberate on their willingness to be involved, at what level this will take place, and what the expectations are in terms of benefits. For the definition and approval of the project's actions, public consultations were held in the communities of Açaituba, Porto Mappes, Campinas, Tigre, Deus é Por Nós, São José, and São Luiz, in which, after explaining the project and clarifying all the doubts of the communities, their consent, support, and participation were received. The results of the public hearings can be seen in detail in section **2.3.7** Stakeholder Consultations (G3.4).

As detailed in section **2.3.8** Ongoing Consultation and Adaptive Management (G3.4), the project has developed a permanent channel of communication and consultation between the project proponents and the communities and other stakeholders. Communication takes place instantaneously by email

and/or messaging application. Prior to each verification, communities and other stakeholders will be contacted and consulted to receive updates about project activities and results. Added to this transparency and communication factor is the presentation of the project monitoring results in periodic meetings with the communities, in addition to the availability of summarized information in appropriate language and in public on the websites of Verra and of the proponent Terra Vista Gestora de Recursos Ltd.

Thus, based on the socio-economic diagnosis, the result of interviews and meetings held with the participating communities, in order to get to know the local reality and the expectations of the target audience, the main social demands and mitigating actions capable of promoting improvements in local infrastructure and quality of community life were raised.

As pointed out in section **2.1.11** Project Activities and Theory of Change regarding community infrastructure, the project will facilitate the transfer of social technologies, through: a) acquisition and implementation of a family photovoltaic system; b) implementation of water collection and distribution systems with the use of filters for treatment; c) construction of toilets with dry septic tanks; d) implementation of internet access systems; e) construction of a school (São José community) and f) acquisition of a boat for monitoring the project area.

The communities involved will also benefit from training and courses directed towards: a) Strengthening the cassava flour productive chain, adding value to the product and potentializing the community's management capacity; b) Implementing a meliponiculture project, promoting the emergence of new income alternatives; c) Increasing the income of extractivist families, strengthening associativism; d) Encouraging the training and engagement of young people and women in economic activities, increasing inclusion and strengthening vulnerable social groups. As a result, the project activity will have a positive impact by strengthening the autonomy of families, providing decent conditions for community infrastructure, ensuring better conditions for permanence in the territory, and developing new knowledge that provides the improvement of productive capacities.

The residents of the communities included in the project are protagonists in the process of defining the actions developed. All the actions presented above were agreed upon with the communities: Açaituba, Porto Mappes, Campinas, Tigre, Deus é Por Nós, São José, and São Luiz, as a form of benefit sharing of the project.

The distribution of benefits was done in a transparent way during meetings between the Terra Vista technical team and the communities. During these meetings, all benefits, costs, and risks were presented in appropriate language to the communities participating in the project. In these meetings, the communities expressed their perspectives, conditions, and needs about participating in the project, thus influencing the process of elaboration and development of Seringueira. Thus, as agreed in a meeting with the communities, the sharing of the benefits of the project serves all participating communities.

Regarding the costs and funds of Seringueira II, the process of generating carbon credits and the revenue from their sale will be made available in a transparent manner via the project's website.

Information about the process of generating carbon credits and the revenue from their sale will also be made available in meetings between the technical team and communities.

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

The project design public meetings had moments of clarification of the benefits, costs and risks provided by the project, as presented in section **2.3.7** Stakeholder Consultations (G3.4). In addition, periodic meetings to be held in the communities will also seek to reassess the benefits, costs and risks.

4.5.8 Governance and Implementation Structures (GL2.8)

As detailed in section **2.4.1** Project Governance Structures (g4.1), the project will be managed by Terra Vista Gestora de Recursos Ltd. together with Mappes Family. 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 (GL2.9)

The Seringueira II project intends to build broad technical capacity for the community members, integrating social technologies of the traditional riverside communities of the rivers Juruá, Liberdade and Igarapé Tigre, addressing the strengthening of the production chain, community associativism and the inclusion of vulnerable groups in economic activities. The communities involved will benefit from training and courses directed to: a) strengthening the productive chain of manioc flour, adding value to the product and potentiating the capacity of community management; b) implementation of a meliponiculture project, promoting the emergence of new income alternatives; c) increase in the income of extractivist families, strengthening associativism; d) incentive to the training and engagement of youth and women in economic activities, increasing the inclusion and strengthening vulnerable social groups. As a result, the project activity will have a positive impact by strengthening the autonomy of the families, ensuring better conditions for their permanence in the territory and developing new knowledge that will provide the improvement of productive capacities.

5 BIODIVERSITY

5.1 Without-Project Biodiversity Scenario

5.1.1 Existing Conditions (B1.1)

The Amazon is characterized by its great biodiversity, providing various ecosystem services that are considered fundamental to the maintenance of the climate, regulating hydrological and

biogeochemical cycles, storing carbon stocks, and conserving various species[160] [161] [162]. It is estimated that about 10% of the world's biodiversity, including threatened and endemic species, is found in the Amazon[163].

The Juruá river basin, region in which the project area is inserted, shelters a great diversity of species not yet described by science[164]. Knowledge of the composition and richness of species are relevant parameters for the understanding of biological communities and their importance in a given region. The knowledge of species composition and richness are relevant parameters for understanding the biological communities and their importance in a given region, especially those located in priority areas for conservation and near Protected Areas.

The Seringueira II project area is located near Protected Areas of great biological importance and priority areas for conservation and protection considered as "Extremely High" and "High" by the Ministry of Environment (MMA), highlighting its importance for conservation and scientific knowledge of biodiversity.

For the characterization of the potential fauna and flora occurring in the project region, secondary data presented in the Management Plan of the Extractive Reserve (RESEX) of Rio Gregório[165], data from the Integrated Biodiversity Assessment Tool - IBAT[166], and data from scientific studies conducted in the region[167] [168] were used. It is noteworthy that, due to the scarcity of available data for the project area, primary data surveys will be developed at the beginning of the project implementation, in addition to

[160] Fearnside, P. M. Environment services as a strategy for sustainable development in rural Amazonia.1997. Ecological Economics, v. 20, n. 1, p. 53-70. Available at: https://www.sciencedirect.com/science/article/abs/pii/S0921800996000663 Accessed 10/22/2022

[161] Nepstad, D. 2007. The Amazons vicious cycle: drought and fire in the greenhouse. Ecological and climatic tipping points of the worlds' largest tropical rainforest, and practical preventive measures. Gland Switzerland: WWF international, 24 p. Available at: https://wwfeu.awsassets.panda.org/downloads/amazonas_eng_04_12b_web.pdf Accessed on: 10/22/2022

[162] Santos, A.C; Kano, C; Quartarolli, C.F; Tosto, S.G. 2019. Mapping land use and land cover and soil carbon stock in forest area in the Apuí/AM watershed. 13th Inter-institutional Congress of Scientific Initiation - CIIC 2019 July 30 and 31, 2019 - Campinas, São Paulo. Available at: https://www.alice.cnptia.embrapa.br/alice/bitstream/doc/1111354/1/5075.pdf Accessed on: 10/22/2022

[163] WWF. 2012. ARPA Biodiversity. Available at: https://www.terrabrasilis.org.br/ecotecadigital/index.php/estantes/pesquisa/1694-arpa-biodiversidade Accessed on: 18/10/2022.

[164] SDS – Secretaria de Estado do Meio Ambiente e Desenvolvimento Sustentável. 2010. Plano de Gestão da Reserva Extrativista do Rio Gregório. Manaus/ Amazonas. Available at: https://documentacao.socioambiental.org/ato_normativo/UC/2121_20160315_152957.pdf Accessed on 01/10/2022

[165] SDS – Secretaria de Estado do Meio Ambiente e Desenvolvimento Sustentável. 2010. Plano de Gestão da Reserva Extrativista do Rio Gregório. Manaus/ Amazonas. Available at: https://documentacao.socioambiental.org/ato_normativo/UC/2121_20160315_152957.pdf. Accessed on: 01/10/2022.

[166] IBAT Proximity Report. Generated under license 31998-37082 from the Integrated Biodiversity Assessment Tool on 28 November 2022 (GMT). www.ibat-alliance.org

[167] Bernarde, P.S; Machado, R.A; Turci, L.C.B.2011. Herpetofauna of Igarapé Esperança area in the Reserva Extrativista Riozinho da Liberdade, Acre - Brazil. Biota Neotrop.Available at: http://www.biotaneotropica.org.br/v11n3/en/abstract?inventory+bn02111032011 Accessed on: 11/13/2022.

[168] Teixeira, Z.M. 2018. Ethnozoology, Environmental Education and Community Management of Chelonians (reptilia) in the Extractive Reserve Riozinho da Liberdade - Acre. Master's Dissertation. Federal University of Acre. Available at: https://sucupira.capes.gov.br/sucupira/public/consultas/coleta/trabalhoConclusao/viewTrabalhoConclusao.jsf?popup=true&id_trabalho=6461699 Accessed on: 11/13/2022

environmental monitoring throughout its life cycle, in order to deepen the specific knowledge in the project area.

Fauna

The project region presents a great richness and diversity of fauna. The mammalian fauna comprises about 231 species. Among the primates recorded in the region, five are found only in Brazilian Amazonian environments, such as the parauacu (*Pithecia irrorata* ssp. *vanzolini*), the uacari (*Cacajao calvus* spp. *novaesi)*, the zogue-zogue (*Cheracebus regulus*), *Leontocebus weddelli* ssp. *melanoleucus*, and the *Saguinus mystax* ssp. *pileatus* [169] [170] [171] [172] [173] [174].

Regarding herpetofauna, a total of 317 species were recorded, 153 of which were amphibians and 164 reptiles [175] [176] [177] [178]. The great diversity registered in the region is corroborated by bibliographic

[169] SDS – Secretaria de Estado do Meio Ambiente e Desenvolvimento Sustentável. 2010. Plano de Gestão da Reserva Extrativista do Rio Gregório. Manaus/ Amazonas. Available at: https://documentacao.socioambiental.org/ato_normativo/UC/2121_20160315_152957.pdf Accessed on 01/10/2022

[170] Ravetta, A.L., Rylands, A.B., Calouro, A.M., Messias, M.R. & Alves, S.L. 2021. *Leontocebus weddelli* ssp. *melanoleucus* (amended version of 2020 assessment). The IUCN Red List of Threatened Species 2022. Available at: https://dx.doi.org/10.2305/IUCN.UK.2021-1.RLTS.T43955A192315495. Accessed on: 11/13/2022

[171] Marsh, L.K., Martins, A.B. & Ravetta, A. 2018. *Pithecia vanzolinii*. The IUCN Red List of Threatened Species 2018. Available at: https://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T43946A17991869. Accessed on: 11/13/2022

[172] Ravetta, A.L. & Boubli, J.P. 2021. *Cacajao calvus ssp. novaesi* (amended version of 2020 assessment). The IUCN Red List of Threatened Species 2021: e.T3421A191695770. Available at: https://dx.doi.org/10.2305/IUCN.UK.2021-1.RLTS.T3421A191695770. Accessed on: 11/13/2022

[173] Valença-Montenegro, M.M. 2022. *Cheracebus regulus* (amended version of 2018 assessment). The IUCN Red List of Threatened Species 2022: e.T41566A217755933.Available at: https://dx.doi.org/10.2305/IUCN.UK.2022-1.RLTS.T41566A217755933.en. Accessed on: 11/29/2022.

[174] Ravetta, A. & Rohe, F. 2020. *Saguinus mystax ssp. pileatus*. The IUCN Red List of Threatened Species 2020: e.T43957A17981034. Available at: https://dx.doi.org/10.2305/IUCN.UK.2020-3.RLTS.T43957A17981034.en. Accessed on: 11/29/2022.

[175] SDS – Secretaria de Estado do Meio Ambiente e Desenvolvimento Sustentável. 2010. Plano de Gestão da Reserva Extrativista do Rio Gregório. Manaus/ Amazonas. Available at: https://documentacao.socioambiental.org/ato_normativo/UC/2121_20160315_152957.pdf Accessed on: 01/10/2022

[176] Teixeira, Z.M. 2018. Ethnozoology, Environmental Education and Community Management of Chelonians (reptilia) in the Extractive Reserve Riozinho da Liberdade - Acre. Master's Dissertation. Federal University of Acre. Available at: https://sucupira.capes.gov.br/sucupira/public/consultas/coleta/trabalhoConclusao/viewTrabalhoConclusao.jsf?popup=true&id_trabalho=6461699 Accessed on: 11/13/2022

[177] Bernarde, P.S; Machado, R.A; Turci, L.C.B.2011. Herpetofauna of Igarapé Esperança area in the Reserva Extrativista Riozinho da Liberdade, Acre - Brazil. Biota Neotrop.Available at: http://www.biotaneotropica.org.br/v11n3/en/abstract?inventory+bn02111032011 Accessed 11/13/2022

[178] IBAT Proximity Report. Generated under license 31998-37082 from the Integrated Biodiversity Assessment Tool on 28 November 2022 (GMT). www.ibat-alliance.org

records, which characterize the Alto Juruá region and the RESEX of Rio Gregório, priority regions for surveys and conservation of the herpetofauna[179] [180] [181].

The region's avifauna comprises about 649 species. According to bibliographic data[182], the region is known to be a strategic place for the knowledge and distribution of birds in the southwest Amazon. Endemic species to the region have been recorded, such as *Psarocolius bifasciatus, Cantorchilus griseus* and *Amazona kawalli*. [183] [184] [185]

In the region, a total of 35 species are considered threatened (Table 49). For the group of Mastofauna, 24 species were recorded, 13 of which were classified as "Vulnerable" and 6 as "Endangered" by the IUCN. Nationally, 12 species are in the "Vulnerable" category of threat and two "Endangered". For herpetofauna, three reptile species are classified as "Vulnerable" by the IUCN. Regarding avifauna, 8 species are threatened, 5 internationally and 4 nationally.

Table 49. List of fauna species threatened with extinction (VU = Vulnerable; EN = Endangered; CR = Critically Endangered).

Scientific Name	Popular Name	Threat Category
Mastofauna		
Myrmecophaga tridactyla	Giant anteater	VU (IUCN, 2014; MMA, 2022);
Priodontes maximus	Giant armadillo	VU (IUCN, 2014; MMA, 2022)
Panthera onca	Jaguar	VU (MMA, 2022)
Pteronura brasiliensis	Otter	EN (IUCN, 2021) VU (MMA, 2022)

[179] Azevedo-Ramos, C. & Galatti, U. 2001. Patterns of amphibian diversity in Brazilian Amazonia: conservation implications. Biol. Conserv. 103:103-111. Available at: http://dx.doi.org/10.1016/S0006-3207(01)00129-X. Accessed on: 11/13/2022

[180] Vogt, R.C; Moreira, G. Duarte, A.C.O.C. 2001. Biodiversity of reptiles of the Amazon Rainforest biome and Priority Actions for their conservation. In: Biodiversity in the Brazilian Amazon, Assessment and priority actions for conservation, sustainable use and benefit sharing (J.P.R. Capobianco, ed.). Estação Liberdade: Instituto Socioambiental, São Paulo, p.89-96.

[181] SDS – Secretaria de Estado do Meio Ambiente e Desenvolvimento Sustentável. 2010. Plano de Gestão da Reserva Extrativista do Rio Gregório. Manaus/ Amazonas. Available at: https://documentacao.socioambiental.org/ato_normativo/UC/2121_20160315_152957.pdf Accessed on 01/10/2022

[182] SDS – Secretaria de Estado do Meio Ambiente e Desenvolvimento Sustentável. 2010. Plano de Gestão da Reserva Extrativista do Rio Gregório. Manaus/ Amazonas. Available at: https://documentacao.socioambiental.org/ato_normativo/UC/2121_20160315_152957.pdf Accessed on 01/10/2022.

[183] BirdLife International. 2022. Species factsheet:*Psarocolius bifasciatus*. Available at: http://www.birdlife.org Accessed on: 08/15/2022.

[184] BirdLife International. 2022. Species factsheet:*Cantorchilus griseus*. Available at: http://www.birdlife.org Accessed on: 08/15/2022. 15/08/2022.

[185] BirdLife International. 2022. Species factsheet: *Amazona kawalli*. Available at: http://www.birdlife.org Accessed on: 08/15/2022.

Inia geoffrensis	Red button	EN (IUCN, 2018; MMA, 2022)
Tayassu pecari	White-lipped peccary	VU (IUCN, 2013; MMA, 2022)
Tapirus terrestris	Anta	VU (IUCN, 2019; MMA, 2022)
Ateles chamek	Spider monkey	EN (IUCN, 2015) VU (MMA, 2022)
Cacajao calvus spp. *novaesi*	Bald uakari	VU (IUCN, 2020)
Sotalia fluviatilis	Tucuxi	EN (IUCN, 2020)
Aotus nancymaae	Night monkey	VU (IUCN, 2018)
Atelocynus microtis	Short-eared Bushdog	VU (MMA, 2022)
Cacajao calvus	Bald-headed uakari	VU (IUCN, 2020)
Callimico goeldii	Callimico goeldii	VU (IUCN, 2020)
Cebuella niveiventris	Eastern pygmy marmoset	VU (IUCN, 2015)
Cebus unicolor	Spix's white-fronted capuchin	VU (IUCN, 2020)
Furipterus horrens	Bat	VU (MMA, 2022)
Lagothrix lagothricha	Silvery woolly monkey	VU (IUCN, 2020)
Lagothrix lagothricha ssp. *cane*	Silvery woolly monkey	EN (IUCN, 2020)
Lagothrix lagothricha ssp. *poeppigii*	Silvery woolly monkey	EN (IUCN, 2020)
Leopardus tigrinus	Oncilla	VU (IUCN, 2016) EN (MMA, 2022)
Leopardus wiedii	Margay	VU (MMA, 2022)
Speothos venaticus	Bush dog	VU (MMA, 2022)
Trichechus inunguis	Amazon manatee	VU (IUCN, 2016; MMA, 2022)
Herpetofauna		
Podocnemis unifilis	Yellow-spotted river turtle	VU (IUCN, 1996)

Podocnemis sextuberculata	Six-tubercled river turtle	VU (IUCN, 1996)
Chelonoidis denticulata	Yellow-footed tortoise	VU (IUCN, 1996)
Avifauna		
Harpia harpyja	Harpy eagle	VU (IUCN, 2021; MMA, 2022)
Primolius couloni	Blue-headed macaw	VU (IUCN, 2021)
Pionites leucogaster	Green-thighed parrot	VU (IUCN, 2021)
Chaetura pelagica	Chimney swift	VU (IUCN, 2018)
Agamia agami	Agami heron	VU (IUCN, 2016)
Calidris subruficollis	Buff-breasted sandpiper	VU (MMA, 2022)
Morphnus guianensis	Crested eagle	VU (MMA, 2022)
Nyctibius leucopterus	White-winged potoo	CR (MMA, 2022)

Regarding risks to the region's biodiversity, it is considered that some mammal species are under hunting pressure from local communities. The main species hunted in the region, according to Queiroz et al., [186], in the period 2003 to 2009 in the municipalities of Cruzeiro do Sul, Guajará and Ipixuna were the white-lipped peccary (*Tayassu pecari*) and the tapir (*Tapirus terrestres*), species that are on the official lists of threatened species.

For herpetofauna, there are records of hunting and consumption of chelonians and their eggs, especially threatened species such as the jabuti (*Chelonoidis denticulata*) and the tracajá (*Podocnemis unifili*), considered as an important food source for riverside dwellers, and used for illegal marketing of chelonians in the markets of small Amazonian towns[187] [188]. The risks for the avifauna refer also to hunting

[186] Queiroz, A.M., Ortega, G. P., Valente, R. A. S.; Junio, F. P. Z. 2013. Crimes against fauna registered in the city of Cruzeiro do Sul - Acre, Guajará and Ipixuna - Amazonas in the period from 2003 to 2009. Enciclopédia Biosfera. Centro Científico Conhecer - Goiânia, v.9, N.16; p. 2013.C. Available at: https://conhecer.org.br/ojs/index.php/biosfera/article/view/3520 Accessed on: 01/10/2022

[187] Balestra, R. A. M. et al. 2016. Conservation management and population monitoring of Amazon chelonians. Brasília: Ibama. Available at: https://www.icmbio.gov.br/ran/images/stories/Downloads/Manual_Tecnico_Manejo_Monitoramento_Quelonios_Amazonicos_2016.pdf Accessed on: 11/13/2022

[188] Teixeira, Z.M. 2018. Ethnozoology, Environmental Education and Community Management of Chelonians (reptilia) in the Extractive Reserve Riozinho da Liberdade - Acre. Master's Dissertation. Federal University of Acre. Available at: https://sucupira.capes.gov.br/sucupira/public/consultas/coleta/trabalhoConclusao/viewTrabalhoConclusao.jsf?popup=true&id_trabalho=6461699 Accessed on: 11/13/2022

activities, especially those of commercial importance, besides the deforestation that occurs in the region, interfering with the connectivity of the natural environments[189].

Flora

The forest formation in the Seringueira II project area is predominantly Open and Dense Ombrophylous Forest, varying between four phytophysiognomies: (i) Open Alluvial Ombrophylous Forest with palm trees; (ii) Dense Alluvial Ombrophylous Forest with emerging canopy; (iii) Lowland Open Ombrophylous Forest with palm trees; (iv) Lowland Dense Ombrophylous Forest with emerging canopy, as presented in section **2.1.5**.

The secondary data on flora used in this initial survey was taken from the IBAT database - Integrated Biodiversity Assessment Tool[190], and the RESEX of Rio Gregório Management Plan[191]. About 520 (morph) tree species were recorded[192], distributed in 242 genera and 80 botanical families. The ten most representative families in terms of number of species were: Fabaceae (66 species), Annonaceae (31 species), Moraceae (26 species), Melastomataceae (25 species), Rubiaceae (24 species), Euphorbiaceae (23 species), Lauraceae (22 species), Myristicaceae (19 species), Arecaceae and Lecythidaceae (16 species each).

Among the species surveyed, 322 species are classified as endemic to the Amazon and 44 as endemic to the Brazilian territory (Table 50). Among the species endemic to Brazil, 36 occur only in the Amazon phytogeographic domain.

Table 50. List of tree species endemic to the Brazilian territory and their respective endemism in the Amazon.

Family	Scientific Name	Popular Name	Amazon Endemism
Annonaceae	*Unonopsis duckei*	Black Envira	Endemic
Annonaceae	*Xylopia nitida*	-	Not endemic
Apocynaceae	*Tabernaemontana muricata*	-	Endemic

[189] SDS – Secretaria de Estado do Meio Ambiente e Desenvolvimento Sustentável. 2010. Plano de Gestão da Reserva Extrativista do Rio Gregório. Manaus/ Amazonas. Available at: https://documentacao.socioambiental.org/ato_normativo/UC/2121_20160315_152957.pdf Accessed on 01/10/2022

[190] IBAT Rubber Tree Report, 2022. http://www.ibat-alliance.orgGenerated under license number 31998-37082 from the Integrated Biodiversity Assessment Tool on 25th November 2022.http://www.ibat-alliance.org"

[191] SDS – Secretaria de Estado do Meio Ambiente e Desenvolvimento Sustentável. 2010. Plano de Gestão da Reserva Extrativista do Rio Gregório. Manaus/ Amazonas. Available at: https://documentacao.socioambiental.org/ato_normativo/UC/2121_20160315_152957.pdf Accessed on 01/10/2022

[192] Subspecies and variations were considered in the count of total records

Chrysobalanaceae	*Printed Licania*	-	Endemic
Cordiaceae	*Cordia sellowiana*	-	Not endemic
Euphorbiaceae	*Croton cuneatus*	-	Not endemic
Euphorbiaceae	*Hevea spruceana*	Syringe-itauba	Endemic
Euphorbiaceae	*Manihot leptophylla*	-	Endemic
Fabaceae	*Andira parviflora*	Sucupira-preta	Endemic
Fabaceae	*Andira unifoliolata*	Sucupira-chorona	Endemic
Fabaceae	*Hymenolobium sericeum*	Angelim-da-mata	Endemic
Fabaceae	*Inga obtusata*	Ingá-peluda	Endemic
Fabaceae	*Inga stipularis*	Ingá-branca	Endemic
Fabaceae	*Schizolobium parahyba* var. *amazonicum*	Angico	Endemic
Fabaceae	*Swartzia ingifolia*	Ingá-ferro	Endemic
Fabaceae	*Swartzia lamellata*	Ingá-ferro	Endemic
Fabaceae	*Swartzia longistipitata*	-	Endemic
Fabaceae	*Swartzia macrocarpa*	Muira-jiboia-amarela	Endemic
Fabaceae	*Swartzia recurva*	Muira-jiboia-vermelha	Endemic
Fabaceae	*Tachigali vulgaris*	Tachi-white	Not endemic
Fabaceae	*Vataireopsis iglesiasii*	Faveira-amarela	Endemic
Fabaceae	*Vouacapoua pallidior*	Acapú	Endemic
Humiriaceae	*Vantanea macrocarpa*	Uchi-breaking	Endemic
Hypericaceae	*Vismia cauliflora*	Lacre	Endemic
Lauraceae	*Dicypellium manausense*	Louro-preto	Endemic
Lauraceae	*Mezilaurus duckei*	-	Endemic

Lauraceae	*Ocotea minor*	-	Endemic
Lauraceae	*Ocotea tabacifolia*	Louro-abacate	Not endemic
Lecythidaceae	*Allantoma integrifolia*	Corrimboque	Endemic
Lecythidaceae	*Corythophora alta*	-	Endemic
Lecythidaceae	*Eschweilera amazonica*	Ripeiro-vermelho	Endemic
Lecythidaceae	*Eschweilera amazoniciformis*	Ripeiro-preto	Endemic
Lecythidaceae	*Eschweilera atropetiolata*	Castanha	Endemic
Lecythidaceae	*Eschweilera truncata*	-	Endemic
Lecythidaceae	*Lecythis pisonis*	Castanha-sapucai	Not endemic
Lecythidaceae	*Lecythis prancei*	Castanharana	Endemic
Moraceae	*Castilla ulei*	Caucho	Endemic
Moraceae	*Sorocea guilleminiana*	-	Not endemic
Rutaceae	*Hortia superba*	Hostia	Endemic
Sapindaceae	*Paullinia stipularis*	Cajuzinho	Not endemic
Sapotaceae	*Pouteria petiolata*	Abiurana-branca	Endemic
Urticaceae	*Cecropia purpurascens*	Imbaúba-roxa	Endemic
Urticaceae	*Pourouma cuspidata*	Embaubarana	Endemic
Urticaceae	*Pourouma ovata*	Imbaúba-toré	Endemic

In the secondary survey a total of 19 threatened tree species were recorded according to the official lists[193] [194] (Table 51), eight of which are exclusive to the IUCN list, five to the national list of the Ministry of Environment (MMA), and six species present on both lists. Among the threatened species,

[193] National Center for Flora Conservation (CNCFlora). Red List. Available at:<http://cncflora.jbrj.gov.br/portal/pt-br/listavermelha>. Accessed on: 10/01/2023.

[194] IUCN Red List. Available at: < https://www.iucnredlist.org/> . Accessed on: 10/01/2023.

seven are endemic to Brazil and restricted to the Amazonian environment[195], namely: *Dicypellium manausense* (louro-preto), *Hortia superba* (hostia), *Lecythis prancei* (castanharana), *Mezilaurus duckei*, *Pouteria petiolata* (abiurana-branca), *Swartzia lamellata* (ingá-ferro) and *Tabernaemontana muricata*.

Table 51. List of threatened tree species (VU= Vulnerable, EN = Endangered, CR = Critically Endangered).

Family	Scientific Name	Popular Name	Threat Category	Amazon Endemism
Lauraceae	*Aniba ferrea*	Iron laurel	EN (IUCN, 2020) EN (MMA, 2022)	Endemic
Lauraceae	*Aniba permollis*	Louro-rosa	EN (IUCN, 2019)	Endemic
Meliaceae	*Cedrela odorata*	Cedro-verdadeiro	VU (IUCN, 2017) VU (MMA, 2022)	Not endemic
Rubiaceae	*Coussarea ampla*	Café-bravo	VU (MMA,2022)	Endemic
Lauraceae	*Dicypellium manausense*	Louro-preto	CR (IUCN, 2018) CR (MMA, 2022)	Endemic
Bignoniaceae	*Handroanthus capitatus*	-	VU (IUCN, 2020)	Endemic
Bignoniaceae	*Handroanthus incanus*	Pau-de-arco	VU (IUCN, 2020)	Endemic
Rutaceae	*Hortia superba*	Hostia	VU (IUCN, 2019) VU (MMA, 2022)	Endemic
Fabaceae	*Hymenaea parvifolia*	Jatoba	VU (MMA, 2022)	Endemic
Lecythidaceae	*Lecythis prancei*	Castanharana	EN (IUCN, 1998)	Endemic
Lauraceae	*Mezilaurus duckei*	Itaúba-abacate, Ubá	EN (IUCN, 2018) EN (MMA, 2022)	Endemic
Sapotaceae	*Micropholis splendens*	-	EN (MMA, 2022)	Endemic
Lauraceae	*Ocotea tabacifolia*	Louro-abacate	EN (MMA, 2022)	Not endemic

[195] Flora and Funga from Brazil. Botanical Garden of Rio de Janeiro. Available at: < http://floradobrasil.jbrj.gov.br/ >. Accessed on: 10/01/2023.

Sapotaceae	*Pouteria peruviensis*	Abiurana-roxa	VU (IUCN, 1998)	Endemic
Sapotaceae	*Pouteria petiolata*	Abiurana-branca	VU (IUCN, 1998)	Endemic
Moraceae	*Sorocea guilleminiana*	Bainha-de-espada	VU (IUCN, 1998)	Not endemic
Fabaceae	*Swartzia lamellata*	Ingá-ferro	VU (MMA, 2022)	Endemic
Apocynaceae	*Tabernaemontana muricata*	-	EN (IUCN, 1998)	Endemic
Myristicaceae	*Virola surinamensis*	Ucuuba	EN (IUCN, 1998) VU (MMA, 2022)	Endemic

Of the species classified as "Endangered", it is important to highlight the *Aniba ferrea,* which is considered a rare species used in the perfume industry[196], and the *Virola surinamensis* whose populations have reduced considerably in recent years due to its intense and unplanned exploitation for the production of laminates and plywood[197]. The species *Dicypellium manausense,* classified as "Critically Endangered" and endemic to the Amazon, presents its population in decline, according to data from the IUCN.

Several species have economic and food potential and are therefore used by local communities, such as *Cedrela odorata*, *Simarouba amara*, *Copaifera officinalis*, and *Euterpe precatoria*. Also, as an extractive activity practiced by the community, the collection of latex from the rubber tree stands out[198]. According to information provided by the local communities in the project area, the most commonly carried out extractive activities are the management of wood or oil from the copaíba and andiroba species.

5.1.2 High Conservation Values (B1.2)

According to the secondary data survey in the region, the High Conservation Values - HCV were defined, as per the HCV Resource Network guide[199]. The table below presents information about the high conservation values related to biodiversity in the project region.

[196] CNCFlora. *Aniba ferrea* in Lista Vermelha da flora brasileira versão 2012.2 Centro Nacional de Conservação da Flora. Available at<http://cncflora.jbrj.gov.br/portal/pt-br/profile/Aniba ferrea>. Accessed August 17, 2022

[197] CNCFlora. 2012. *Virola surinamensis* in Red List of Brazilian flora version 2012.2 National Center for Flora Conservation. Available at <http://cncflora.jbrj.gov.br/portal/pt-br/profile/Virola surinamensis>. Accessed on: 11/13/2022

[198] SDS – Secretaria de Estado do Meio Ambiente e Desenvolvimento Sustentável. 2010. Plano de Gestão da Reserva Extrativista do Rio Gregório. Manaus/ Amazonas. Available at: https://documentacao.socioambiental.org/ato_normativo/UC/2121_20160315_152957.pdf Accessed on 01/10/2022

[199] Available at: https://www.hcvnetwork.org/ Accessed on:10/13/2022

Table 52. High Conservation Value (HCV) related biodiversity in the Seringueira II project.

High Conservation Value	HCV 1 - Endemic and threatened Flora species
Qualification Attribute	In the project region, flora species endemic to Brazil and the Amazon have been recorded, as well as species threatened with extinction at the international level by the International Union for Conservation (IUCN) and at the national level by the Ministry of Environment (MMA). According to the secondary survey, 322 flora species endemic to the Amazon phytogeographic domain, 44 species endemic to the Brazilian territory, and a total of 19 threatened species were recorded. The species *Dicypellium manausense*, *Hortia superba, Lecythis prancei*, *Mezilaurus duckei*, *Pouteria petiolata*, *Swartzia lamellata,* and *Tabernaemontana muricata* are restricted to the Brazilian territory and the Amazon environment and are threatened with extinction.
Focus area	In project areas where potentially threatened species populations occur

High Conservation Value	HCV 1- Endemic and threatened species of fauna
Qualification Attribute	Several threatened and endemic fauna species have been recorded in the region. A total of 35 species are considered threatened in the region, 24 for the mammal fauna group, three for the herpetofauna group, and eight for birds, highlighting *Pteronura brasiliensis*, *Ateles chamek*, *Inia geoffrensis*, *Sotalia fluviatilis*, *Lagothrix lagothricha* ssp. *cana* and *Lagothrix lag*othricha ssp. *poeppigii*, which are classified as endangered by the IUCN. In terms of endemism, the region stands out for the presence of endemic primates and birds.
Focus area	In all project areas

High Conservation Value	HCV 1 - Protected and Priority Areas for Conservation
Qualification Attribute	The project area is located near Protected Areas and zones nationally (MMA) considered as "Extremely High" and "High" priority for conservation and protection.

	The implementation of the Seringueira II project will contribute to the conservation of an area inserted in an important environmental context for biodiversity, enabling the maintenance of the biological connectivity of species in the region.
Focus area	In all project areas

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

The Northern region of Brazil is characterized by high rates of deforestation and the state of Amazonas ranks second with the highest rates[200]. Deforestation in the Amazon is caused by several activities, such as agriculture, livestock, and urbanization, and is currently represented by 194,485 ha of deforested area[201], presenting severe impacts varying from local to global scale.

The data on land use in the Amazon show that livestock is the main actor responsible for deforestation in the region. Its expansion, since the early 1970s, has been a continuous process. In addition, forest degradation by illegal logging and deforestation leads to the conversion of the original forest, mainly for the formation of extensive pastures and agricultural plantations, forming the greatest threats to the forests[202].

According to data from INPE, the municipality of Ipixuna has been suffering an increase in deforestation levels from 2008 to 2022, representing an accumulated deforestation of 91.32 km^2, as presented in Figure 1 in section **2.1.1**.

According to the history of land use and occupation in the region, the scenario without the Seringueira II project, which is located in a private area, tends to be the replacement of native vegetation areas by pasture areas, meeting the provisions of Law nº 12.651/12, where the owner has the right to clear about 20% of his property, as presented in section **2.5**.

With the deforestation and degradation of the areas in the absence of the project, the biodiversity may suffer several impacts such as fragmentation and loss of habitats, leading to the scaring away and loss of species, especially those with less mobility and more specialized characteristics.

It is noteworthy that the project is located in regions that have Conservation Units nearby, in addition to areas considered Priority Conservation Areas. This is especially important for the conservation of biodiversity, with a great diversity of species, including threatened and endemic species.

In this context, the implementation of the REDD+ project guarantees forest conservation, due to the implementation of surveillance measures and activities within the area, in a region with a history of

[200] Available at:<https://mapbiomas.org/desmatamento-em-2021-aumentou-20-com-crescimento-em-todos-os-biomas-1> Accessed on: 01/10/2023.

[201] Available at: https://s3.amazonaws.com/alerta.mapbiomas.org/rad2021/RAD2021_Completo_FINAL_Rev1.pdf Accessed on: 11/13/2022.

[202] Margulis, S. 2003 Causas do Desmatamento na Amazônia Brasileira. 1a Edição. Brasília-DF. Available at:https://www.terrabrasilis.org.br/ecotecadigital/pdf/causas-do-desmatamento-da-amazonia-brasileira.pdf Accessed on: 10/13/2022.

increased deforestation and recognized biological importance. Also, the protection of the area favors the maintenance of continuous forest environments, guaranteeing the maintenance of the gene flow of the species, in addition to ensuring the maintenance of ecosystem services in the region, favoring the local communities.

5.2 Net Positive Biodiversity Impacts

5.2.1 Expected Biodiversity Changes (B2.1)

Table 53. Expected changes in biodiversity resulting from Seringueira II project activities.

Biodiversity Element	Vegetation
Estimated Change	Reducing deforestation and conserving habitats
Change Justification	The Seringueira II 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 (B2.3)

The objective of the Seringueira II project aims to maintain the forest cover in the project area, conserving the region's biodiversity. Thus, to maintain or improve the HCV attributes (Table 54), the

project will monitor the groups of fauna and flora in the region, in order to deepen the knowledge of the structure and composition of the communities, especially the threatened and endemic species recorded in the region.

In addition, measures such as the improvement of surveillance in the area in order to avoid invasions, deforestation, and illegal practices for the fauna and flora, and frequent monitoring of the forest cover by satellite images, in order to monitor any change in the area's land use, will be adopted to ensure the conservation of biodiversity.

With the progress of the project, knowledge of the structure and evaluation of the faunal and floristic communities will be deepened and other activities can be proposed to ensure the conservation of biodiversity.

Table 54. Measures for the maintenance and improvement of the HCV attributes identified in the Seringueira II project area.

HCVs	Maintenance and Improvement Measures
HCV 1 - Protected Areas	- Improvement of heritage surveillance in the area; - Remote monitoring of the area; - Periodic monitoring of fauna and flora; - Engagement and awareness of local communities; - Activities focused on priority and commercially valuable species; - 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 (B2.2, GL1.4)

The implementation of the Seringueira II project foresees the conservation of a 16.483,02 ha area of Amazon Rainforest of great biological importance, resulting in positive impacts on 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 (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 16.483,02 ha, not negatively affecting any of the identified HCVs.

5.2.5 Species Used (B2.5)

Not applicable. No new species, other than those native to the area, will be used within the scope of the Seringueira II project.

5.2.6 Invasive Species (B2.5)

Not applicable. The Seringueira II project will not introduce or increase the population of invasive species in the area affected by the project.

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

Not applicable. No invasive species will be introduced within the scope of the Seringueira II project.

5.2.8 GMO Exclusion (B2.7)

Not applicable. The Seringueira II 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.

5.2.9 Inputs Justification (B2.8)

Not applicable. No fertilizers, chemical pesticides, biological control agents, or other inputs will be used in the Seringueira II project.

5.2.10 Waste Products (B2.9)

The Seringueira II 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 health established in the National Policy for Solid Waste (PNRS) - Nº. 12.305/2010 and NBR 10004.

5.3 Offsite Biodiversity Impacts

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

No negative impacts outside the Seringueira II project area will be considered. The biodiversity conservation activity under the project does not foresee any actions that will cause a negative impact on the ecosystem, either within the project area or outside the project zone.

5.3.2 Net Offsite Biodiversity Benefits (B3.3)

As presented in the section above, the Seringueira II project does not foresee negative impacts on biodiversity outside the project zone, and an analysis comparing the negative and positive impacts of the project is not necessary.

5.4 Biodiversity Impact Monitoring

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

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 0.25 ha (20 x 125 m). 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.

With regard to fauna, the Herpetofauna, Mammalian fauna and Avifauna groups will be monitored considering an initial campaign during the implementation of the project (data survey), and annual campaigns.

Non-interventional methods will be used for the fauna survey and monitoring. To obtain species records, linear transects will be carried out in the project area, in two periods of the day (morning and afternoon), where data will be collected through direct and indirect records.

For herpetofauna (amphibians and reptiles), the Visual Active Search method will be used throughout the transects, which consists of walking slowly through visually accessible microhabitats with a greater chance of finding organisms, in addition to the Active Search method in reproductive sites, and recording of organisms in opportunistic encounters.

For the mammalian fauna, the methodology of Active Search will be used along the transect in order to record animals in motion and traces (footprints, feces, burrows, vocalizations, hair, carcasses, and nail marks). In addition to the use of trap cameras (photographic traps) fixed at sampling points defined in the field, for recording medium and large animals.

As for the Avifauna, the Mackinnon Lists methodology[203] will be used, which consists of recording all the species seen and/or heard along pre-existing trails traveled in a randomized manner. To complement the information on species richness of the area, data from occasional records of avifauna during the campaign will be included in the survey.

To provide a preliminary knowledge of the area with primary data, an initial biodiversity survey campaign is planned prior to project implementation, where the sampling designs will be defined and will represent the "ground zero" of the biodiversity parameters. Monitoring of the area's flora and fauna, in turn, is planned to occur throughout the project's lifetime. The overview of the monitoring plan is detailed in Table 55.

Table 55. Summary of the biodiversity monitoring plan for the Seringueira II project area.

Biodiversity parameter to be monitored	Variables to be monitored	Methodology	Frequency
Flora	- Species diversity - Vegetation conservation status - Number of threatened and endemic species	- Forest Inventory	- An initial survey campaign during the project implementation - Annual monitoring campaign

[203] Bibby, C.J.; Burgess N.D.; HILL, D.A.1992. Birds census techniques. London, Academic Press Inc. 257p. Available at: https://www.elsevier.com/books/bird-census-techniques/bibby/978-0-12-095831-3 Accessed on 20/10/2022

Flora	- Vegetation conservation status - Area (ha) preserved	- Remote monitoring by satellite images	- Annual
Avifauna	- Species richness - Number of threatened and endemic species - Species accumulation curve	- Mackinnon's Lists - Indirect Records	- Campaign prior to project implementation - Annual monitoring campaign
Mammalian fauna	- Species richness - Number of threatened and endemic species - Species accumulation curve	- Active Search - Trap Cameras	- Campaign prior to project implementation - Annual monitoring campaign
Herpetofauna	- Species richness - Number of threatened and endemic species - Species accumulation curve	- Visual Active Search - Active Search - Indirect Records	- Campaign prior to project implementation - Annual monitoring campaign

5.4.2 Biodiversity Monitoring Plan Dissemination (B4.3)

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

5.5 Optional Criterion: Exceptional Biodiversity Benefits

5.5.1 High Biodiversity Conservation Priority Status (GL3.1)

In the Seringueira II project region, the presence of threatened flora and fauna species that meet the Gold Level criteria, such as Critically Endangered (CR) and Endangered (EN), was verified according to the IUCN list.

- Critically Endangered (CR)

  Flora: *Dicypellium manausense*

- Endangered (EN)

  Flora: *Aniba ferrea, Aniba permollis, Lecythis prancei, Mezilaurus duckei, Tabernaemontana muricata* and *Virola surinamensis.*

  Fauna: *Ateles chamek, Inia geoffrensis, Lagothrix lagothricha* ssp. *cana, Lagothrix lagothricha* ssp. *poeppigii, Pteronura brasiliensis* and *Sotalia fluviatilis.*

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

The trigger species identified for the Seringueira II project region and their respective population trends are described in the tables below. After the primary data surveys have been conducted in the project area, the species identified as trigger species may change according to the data collected.

Table 56. Population trends of the trigger species identified in the Seringueira II project region.

Trigger Species	*Dicypellium manausense* (louro-preto)
Population Trend at the Start of the Project	According to the IUCN, subpopulations of *Dicypellium manausense* , a species endemic to Brazil, restricted to the Amazon biome, and critically endangered nationally and internationally, are in decline. This is mainly due to the loss of its natural habitat caused by urban expansion and the exploitation of its resources (selective logging) due to its aromatic properties.
Without-project Scenario	In the absence of the Seringueira II project, the population would continue to decline due to continued deforestation and exploitation of its resources (e.g., essential oils).
With-project Scenario	The Seringueira II project, by monitoring through forest inventories and conservation of the area, will prevent deforestation and forest degradation, and thus the loss of habitat for this species. The conservation and monitoring of the area will prevent the exploitation of this species driven by economic interest in its resources. With the Seringueira II project it is expected that the population of *Dicypellium manausense* will be maintained.
References	1. IUCN. Moraes, M., Fernandez, E., Martinelli, G. & Quinet, A. 2021. *Dicypellium manausense*. The IUCN Red List of Threatened Species 2021: e.T189632701A189632703. Available at:

	https://dx.doi.org/10.2305/IUCN.UK.2021-2.RLTS.T189632701A189632703.pt.> Accessed on: 01/13/2023. 2. Alcantara, J.M., Yamaguchi, K. K. de L., and Veiga-Junior, V.F. 2013. Composition of essential oils of *Dicypellium manausense, Mezilaurus duckei, Mezilaurus itauba* and *Pleurothyrium vasquezii,* four Amazonian species of the Lauraceae family. Boletín Latinoamericano y del Caribe de Plantas Medicinales y Aromáticas, 12 (5): 469-475.

Trigger Species	*Mezilaurus duckei* (itaúba-abacate)
Population Trend at the Start of the Project	The species *Mezilaurus duckei is* considered rare and with sparse subpopulations. According to the IUCN, the populations of this species, which is endemic to Brazil, restricted to the Amazon biome, and endangered nationally and internationally, have suffered a continuous decline of at least 50% over the past 30 years. This is mainly due to the loss of its natural habitat caused by urban expansion and agricultural activities, environmental impacts (e.g., burning), and selective logging due to its aromatic properties.
Without-project Scenario	In the absence of the Seringueira II project, the population would continue to decline due to continued deforestation and exploitation of its resources (e.g., essential oils).
With-project Scenario	The Seringueira II project, by monitoring through forest inventories and conservation of the area, will prevent deforestation and forest degradation, and thus the loss of habitat for this species. The conservation and monitoring of the area will prevent the exploitation of this species driven by economic interest in its resources. With the Seringueira II project it is expected that the *Mezilaurus duckei* population will be maintained.
References	1. IUCN. Fernandez, E., Verdi, M., Martinelli, G. & Quinet, A. 2021. Mezilaurus duckei. The IUCN Red List of Threatened Species 2021: e.T189632791A189632799. Available at: <https://dx.doi.org/10.2305/IUCN.UK.2021-2.RLTS.T189632791A189632799.pt.> Accessed on: 01/13/2023. 2. Alcantara, J.M., Yamaguchi, K. K. de L., and Veiga-Junior, V.F. 2013. Composition of essential oils of *Dicypellium manausense, Mezilaurus duckei, Mezilaurus itauba* and *Pleurothyrium vasquezii*, four Amazonian species of the Lauraceae family. Boletín Latinoamericano y del Caribe de Plantas Medicinales y Aromáticas, 12 (5): 469-475.

Trigger Species	*Aniba Ferrea* (iron-laurel)
Population Trend at the Start of the Project	According to CNCFlora, the species *Aniba Ferrea,* endemic to the Amazon and threatened with extinction nationally and internationally, is considered rare in the areas where it occurs, with sparse subpopulations and restricted geographical distribution and habitats. Its population is in decline according to the IUCN, but no population rate figures are available. This decline is mainly due to the fact that it is a species highly exploited in the perfumery industry for obtaining essential oils.
Without-project Scenario	In the absence of the Seringueira II project, the population would continue to decline due to habitat loss through deforestation and the exploitation of its resources used in the perfume industry. To obtain its essential oils, it is necessary to cut down the tree, which leads to a decrease in its population.
With-project Scenario	The Seringueira II project, by monitoring through forest inventories and conservation of the area, will prevent deforestation and forest degradation, and thus the loss of habitat for this species. In addition, the conservation and monitoring of the area will prevent the exploitation of this species driven by the high economic value of its resources. With the project it is expected that the *Aniba Ferrea* population will be maintained.
References	1. CNCFlora. 2012. *Aniba ferrea.* Available at: http://cncflora.jbrj.gov.br/portal/pt-br/profile/Aniba ferrea (). Accessed on: 03/10/2022 2. IUCN. Fernandez, E., Martinelli, G. & Quinet, A. 2020. *Aniba ferrea*. The IUCN Red List of Threatened Species 2020: e.T35215A176128993. Available at:<https://dx.doi.org/10.2305/IUCN.UK.2020-3.RLTS.T35215A176128993.pt.> Accessed on: 03/10/2022.

Trigger Species	*Virola surinamensis* (ucuuba)
Population Trend at the Start of the Project	According to CNCFlora, the subpopulations of *Virola surinamensis* , an Amazonian endemic species, predominant in flooded forests, and threatened with national and international extinction, are in decline. They have been reduced by more than 30% in the last 90 years, and have been reduced by 90% and reported extinct in some places. This decline is mainly due to two factors: first, the overexploitation due to its high economic value for the timber and pharmaceutical industries as

	well as for the riverside and indigenous populations that trade its resources to make up their income - which can reach 50%. This species is considered the second most economically important wood in the Amazon basin region.
Without-project Scenario	In the absence of the Seringueira II project, the population would continue to decline due to the loss of habitat through deforestation and the exaggerated exploitation of its resources used in interior construction, carpentry, joinery, manufacture of boxes, toothpicks, plywood, pulp and paper; in addition to its economic potential in the production of cosmetics and pharmaceutical products.
With-project Scenario	The Seringueira II project, by monitoring through forest inventories and conservation of the area, will prevent deforestation and forest degradation, and thus the loss of habitat for this species. In addition, the conservation and monitoring of the area will prevent the exploitation of this species driven by the high economic value of its resources. With the project is expected, besides the maintenance of the population of *Virola surinamensis*, its increase, because the forest will tend to develop structurally (e.g.,, larger trees and denser canopy), becoming a favorable habitat for this species, since its seedlings develop better initially in shaded environments, and the presence of its seed dispersers, mainly birds and monkeys.
References	1. CNCFlora. *Virola surinamensis* in Red List of Brazilian flora version 2012.2 National Center for Flora Conservation. Available at <http://cncflora.jbrj.gov.br/portal/pt-br/profile/Virola surinamensis>. Accessed on 09/14/2022. 2. IUCN. Americas Regional Workshop (Conservation & Sustainable Management of Trees, Costa Rica, November 1996). 1998. *Virola surinamensis*. The IUCN Red List of Threatened Species 1998: e.T33959A9816820. Available at: <https://dx.doi.org/10.2305/IUCN.UK.1998.RLTS.T33959A9816820.en>. Accessed on: 09/14/2022.

Trigger Species	*Pteronura brasiliensis* (ariranha)
Population Trend at the Start of the Project	According to IUCN data, there is no estimate of the current population size of this species, however, its population is in decline. This decline is mainly due to habitat loss and environmental degradation, representing the main threats to the species. Another aggravating factor for the species is predatory hunting.

	In the last 25 years, the population decline of this species has been more than 50% and a future reduction of more than 50% in population size is suspected in the next 25 years (IUCN). It should be noted that this species is listed in Appendix I of the CITES - Convention on International Trade in Endangered Species of Wild Fauna and Flora.
Without-project Scenario	In the absence of the Seringueira II project, the population of *Pteronura brasiliensis* 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	1. IUCN. Groenendijk, J., Marmontel, M., Van Damme, P., Schenck, C. & Wallace, R. 2021. *Pteronura brasiliensis*. The IUCN Red List of Threatened Species 2021: e.T18711A164580466. Available at: https://dx.doi.org/10.2305/IUCN.UK.2021-3.RLTS.T18711A164580466.en. Accessed on: 09/18/2022. 2. CITES (2022). Available at: https://cites.org/eng/app/appendices.php. Accessed on: 09/18/2022.

Trigger Species	*Ateles chamek* (black-faced black spider monkey)
Population Trend at the Start of the Project	The *Ateles chamek* population has declined by at least 50% in the last 45 years, according to IUCN data. This decline is related to habitat loss through deforestation, environmental degradation, and poaching activities. *Ateles chamek* is a species restricted to primary forest environments. The populations found in altered and fragmented environments, according to Peres (1990; 1997) cannot persist for longer periods, which makes the maintenance of their habitat essential for their survival.
Without-project Scenario	In the absence of the Seringueira II 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 Seringueira II 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	1. IUCN. Alves, S.L., Ravetta, A.L., Paim, F.P., Mittermeier, R.A., Rabelo, R.M., Wallace, R.B., Messias, M.R., Calouro, A.M., Rylands, A.B., de Melo, F.R. & Boubli, J.P. 2021. *Ateles chamek* (amended version of 2020 assessment). The IUCN Red List of Threatened Species 2021: e.T41547A191685783. Available at:<https://dx.doi.org/10.2305/IUCN.UK.2021-1.RLTS.T41547A191685783.en.>Accessed on: 09/18/2022. 2. Peres, C. A. 1990. Effects of hunting on western Amazonian primate communities. *Biological Conservation* 54: 47-49. 3. Peres, C. A. 1997. Primate community structure at twenty western Amazonian flooded and unflooded forests. *Journal of Tropical Ecology* 13: 381-405.

- **APPENDICES**

  - **Appendix 1: Stakeholder Identification Table**

Stakeholder Group Involved in the Project	Project Rights	Interests in your Participation in the Project	Participation Relevance
Relevance of participation	Owner of the farm where the Seringueira II project will be developed and co-owner of the credits and responsible for meeting the legal conditions for the development and permanence of the project.	Ensure support to the technical team to develop the studies for crediting the carbon area, ensure access to community members that depend on the project area, and support through projects their aspects of life determined as priorities, such as education, health, income generation, human rights, environment, and culture.	High - As a project proponent, your engagement is an essential condition for the development of actions related to the CCB seal.
Public Sector - Instituto Chico Mendes de Conservação da Biodiversidade (IBAMA); Instituto Nacional de Colonização e Reforma Agrária (INCRA); Prefeitura Municipal de Ipixuna; Secretaria Municipal de Meio Ambiente (SEMA) de Ipixuna; Secretaria Municipal de Educação (SEDUC) de Ipixuna; Municipal Health Secretariat (SMS) of Ipixuna; Municipal Secretariat	Partners for the implementation or improvement of public policies with local stakeholders.	To strengthen the relationship of the communities benefited by the project's activities with the public power, making them aware of its benefits, especially in the scope of the communities, climate, and biodiversity.	High - Organizations are responsible for developing and enforcing social and environmental policies, as well as monitoring them.

Stakeholder Group Involved in the Project	Project Rights	Interests in your Participation in the Project	Participation Relevance
of Production and Supply of Ipixuna; Municipal Secretariat of Social Assistance of Ipixuna; Municipal Civil Defense - Ipixuna; State Secretariat of Environment (Sema - AM); Institute of Agricultural and Sustainable Forestry Development of the State of Amazonas (IDAM) Institute of Environmental Protection of Amazonas (IPAAM)			
Extractive communities: Juruá river: Açaítuba (15 families), Porto Mappes (8 families), Campinas (14 families), Tigre (21 families) and Deus é Por Nós (5 families); Liberdade river: São José (12 families) and São Luiz (34 families).	Beneficiaries of CCB-labeled projects and users of the property authorized by the owner. Legitimate and lawful users and occupants of the project area.	Continue to use areas in which they can extract non-timber products and access projects for improving the production chain, associativism, and improving the quality of life.	High - Essential agents for surveillance of the territory, control of deforestation and propagation of management practices, sustainability and strengthening of productive chains of non-timber forest products.

Stakeholder Group Involved in the Project	Project Rights	Interests in your Participation in the Project	Participation Relevance
Third Sector: Colônia de Pescadores Z-1 de Cruzeiro do Sul (AC); Fundação Amazônia Sustentável (FAS); Associação de Apoio ao Agroextrativismo de Ipixuna; Cooperativa Agrícola Mista dos Produtores Rurais do Vale do Juruá; Sindicato Rural de Cruzeiro do Sul; Associação dos Agropecuaristas de Ipixuna - Am; Associação Municipal Comunitária e da Cultura Evangélica de Ipixuna; Cooperativa dos Produtores de Agricultura Familiar e Economia Solidária de Nova Cintra (COOPERCINTRA); Cooperative of Family Farmers and Solidarity Economy of the Mahogany Forest (COOPERMOGNO)	Stakeholders are partners in the defense of social rights and in facilitating the integration into higher value production chains.	Raise awareness among the project's beneficiary stakeholders about their rights, strengthen associative relationships, and provide access to the production chain of higher-value non-timber forest products.	Medium - They are not executors of public policies, but they can help in the improvement of productive chains, offer training to add value to the products, and in the strengthening of associations in the communities benefited by the project. Eventually they can act as community representative bodies.

Stakeholder Group Involved in the Project	Project Rights	Interests in your Participation in the Project	Participation Relevance
Universities/Research centers - Universidade do Estado do Amazonas - UEA Ipixuna; Universidade Federal do Acre (UFAC) - Campus Cruzeiro do Sul; Agência de Assistência Técnica e Extensão Rural (ATER)/IDAM.	Stakeholders partnering in the improvement of techniques and management of agricultural production and non-timber forest resources with a view to adding value to the product.	Support and dissemination of good extraction and post-harvest processing practices. More productive and conservationist extraction techniques for the target species. Logistics and packaging of production	Average - They are not executors of public policies, but can help in the improvement of productive chains, offer training for adding value to products, and in the strengthening of associations of communities benefited by the project. Eventually they can act as an instance representative of the community.

- **Appendix 2: Project Activities and Theory of Change Table**

Activity Description	Expected climate, community and/or biodiversity			Relevance to the Project Goals
	Short-term results/outputs (Outputs)	Medium-term results/outcomes (Outcome)	Long-term results/outcomes (Impacts)	
Conservation and monitoring of forest cover	Signing long-term conservation agreements with landowners in the Amazon biome. Periodic monitoring of changes in forest cover in the project area. Adaptive management of leakage and project risks. Continuous monitoring and identification of agents and drivers of deforestation and periodic updating of the baseline. Biomass inventory. Preparation of monitoring reports.	Periodic monitoring of forest cover using remote sensing data. Monitoring of emissions from unplanned deforestation (comparison with baseline). Opportunity for intervention if deforestation is increasing. Support to the field team to understand the context of local deforestation. Carbon stocks in different reservoirs to be verified and reported.	Maintenance of 16,483.02 ha of forest cover and carbon stock. Understanding of the local context of advancing deforestation. Improved intervention processes. Possibility of understanding the impacts generated by unplanned deforestation.	Reduction of GHG emissions from unplanned deforestation. Maintenance of forest cover and provision of ecosystem services. Increased family income for the communities. The Seringueira II project, by providing forest cover maintenance in the project area, contributes to the improved well-being of the communities associated with the project through the management of ecosystems and their associated services, encouraging harmonious integration between biodiversity conservation and human development.
Sanitation and water security	Implementation of water collection and distribution systems with the use of	Provide water to homes with improvements in home potability and	Decrease in the rate of waterborne diseases, such	Improve the quality of life, strengthening the five

	filters for treatment. Implementation of toilets with dry septic tanks Training in maintenance of water catchment and treatment systems	sanitation systems with social technologies; Provide greater security in the use of water resources and less effort to access water; Increase in family income. Strengthen the autonomy of the families. Guarantee minimum autonomy in the maintenance of the system in regions of difficult access.	as diarrhea, cholera, and verminosis. Decrease of women's workload in water collection and domestic activities. Dissemination of social technologies. Provide decent housing conditions and ensure better conditions for their permanence in the territory.	dimensions of sustainable livelihoods. Provide decent housing conditions, ensure better conditions to stay in the territory, and expand access to rights and citizenship
Energy Infrastructure	Acquisition and deployment of photovoltaic systems. Reduce the cost of power generation by fossil fuel generator systems (fuel transport and related atmospheric emissions). Training for maintenance of the photovoltaic system.	Enable autonomous generation of sustainable electricity, ensure basic infrastructure for internet, communication, household appliances and basic power tools that help reduce the strain on household chores and income generation. Ensure minimum autonomy in system maintenance in hard-to-reach areas.	Provide decent housing conditions. Ensure communicative inclusion and access to rights and citizenship. Strengthen the autonomy of families.	

		Enable the learning and use of new technologies and tools.		
Communication	Acquisition and implementation of a system that allows local community access to the internet. Training for maintenance of the communication system. Facilitate emergency communications, access to information, education, trade relations, and establish basic communication infrastructure with the Seringueira II project.	Ensure minimum infrastructure for technology-mediated classroom instruction, facilitating training at the fundamental II, secondary and technical levels. Improve the infrastructure for learning new management techniques and quality of agroforestry products.	Consolidate a communication channel with the Seringueira II project. Contribute to the completion of the basic and productive training cycle, reducing the need to migrate to the city. Strengthen the autonomy of the families, provide decent housing conditions. Ensure basic communicative and digital inclusion to expand access to rights and citizenship.	
Education	Construction of a school in the São José community. Increased security for children and adolescents to access formal education	Decrease in school dropouts and age/grade distortion.	Contribute to the basic schooling of children and adults. Reduction of school dropout and exodus to the	

		Permanence of children and adolescents with their families during school time.	municipal seat for educational reasons. Expansion of opportunities for family development and productive diversification.	
Income Generation	Manioc flour - Enable improvement in the production of manioc flour through support for training in production processing. Search for new commercial partnerships, (development of new products); Development of own brand. Marketing and promotion; Construction of commercial relationships. Meliponiculture - Training and courses for capacity building in the production of wild honey with native bees. Implantation of meliponaries. Training and courses directed to valorize the product; Working capital.	Increase capacity and speed in transporting production to the city. Reduce freight cost in the delivery to buyers. Decrease dependence on a single buyer; Add value to puba flour to claim fairer prices; Value associated producers; Marketing and promotion; Building business relationships. Increase income in direct sales with your own brand. Establishing business partnerships, diversification of production and processing of the nut; New products and technologies; Building business relationships. Diversification of products with their own brand.	Increase in the income of extractivist families; Strengthening of associativism; Valorization of the productive chain of non-timber agro-forestry products Increase in the value of carbon credits by increasing the socio-environmental value and bio-economy of the projects	

	Encourage the participation of young people and women. Provide structure for processing and packaging	Search for new products already known by the extractivists, but which are not processed for lack of equipment and quality control training		
Acquisition and donation of a boat to support the monitoring of the project area.	Facilitate river travel for monitoring the project area. Facilitate communication between communities through scheduled visits.	Effectuate the monitoring and supervision of the Seringueira II area	Control of illegal logging activities.	
Associativism	Establishing rules of use and responsibility in the maintenance of the equipment received by the projects.	Ensure community autonomy in the management of the implemented infrastructure systems and projects. Ensure the durability of the infrastructure acquired by other activities.	Strengthen the autonomy of families, provide decent conditions for community infrastructure and ensure better conditions for permanence in the territory. Ensure basic communicative and digital inclusion to expand access to rights and citizenship.	
Improved security in the project area	Improve existing surveillance actions in the area.	Improvement of the processes and procedures carried out.	Improved tactical surveillance actions.	Ensure the protection of the project area.

	Evaluate in loco deforested areas identified by remote monitoring. Define the periodicity of the patrols. Evaluate potential partnerships for surveillance activities.	Field follow-up of deforested areas detected by remote monitoring. Hiring and training of community agents. Periodic patrols. Definition and contact with possible partnerships.	Greater understanding of the local context of deforestation. Efficiency in surveillance activities by driving vehicles via the river along with remote monitoring. Support from partners in the activities.	
Periodic monitoring of the fauna and flora in the project area	Evaluate potential partnerships with local universities and local communities to participate in monitoring. Draw up a list of fauna and flora species in the project area.	Analysis of the structure and composition of the fauna and flora in the project area. Verification of the maintenance/ conservation of biodiversity in the project area. Scientific studies and research on biodiversity in the project area.	Maintenance and conservation of biodiversity. Knowledge of biodiversity in the project area, including the presence of species of high conservation value, such as endemic and endangered species. Maintenance of ecosystem functioning and provision of ecosystem services. Environmental education and awareness of local communities.	Biodiversity monitoring will allow knowledge of the fauna and flora in the project area and knowledge about the dynamics of the ecosystem.

- **Appendix 3: Project Risk Table**

Internal Risks

Project Management		
Risk Factor	**Description of the risk mitigating factor/or measure**	**Risk rate**
a)	Not applicable. The project does not involve plantations.	0
b)	Not applicable. No carbon credits have been issued previously on the carbon stock of the project.	0
c)	The management team includes individuals with significant experience in all the skills needed to successfully carry out the project activities. • *Forest Inventory*. The development of forest inventories and monitoring of the areas is based on the experience of Leandro Silva Rodrigues, forest engineer with 15 (fifteen) years of experience in consultancy in environmental and land regularization of rural properties, georeferencing, forest management, and forest inventory of native forests. • *Environmental and land analysis.*For the investigation and resolution of possible land conflicts it is possible to count on the collaboration of Karoline Pantoja do Nascimento, lawyer with 5 years of experience in triple environmental responsibility and in environmental and land regularization of rural properties. • *Climate:* The climate area counts on Alan de Brito, a professional with more than 15 (fifteen) years of experience in projects for monitoring native vegetation and deforestation, as well as accounting for Greenhouse Gas (GHG) emissions. Besides Luciane Cristina Lazzarin, forestry engineer with more than 15 (fifteen) years of experience teaching undergraduate and graduate courses.	0

	• *Community.*The implementation of social and infrastructure improvements will have the support of Vivian Fernanda Carneiro Martins, with more than 15 (fifteen) years of experience in the elaboration and coordination of socio-environmental projects in the Amazon. And also with Gustavo Fernandes Moura, social scientist with 9 (nine) years of experience in the research and development of socio-economics, culture, cultural heritage and archeological heritage projects with traditional communities. Also present is Arthur Augusto Santos, with 8 (eight) years experience in socioeconomic studies with traditional peoples and communities, elaboration and execution of socioeconomic/cultural development projects and in the planning and evaluation of reparation actions for socio environmental damage. • *Biodiversity*. The biodiversity monitoring has the collaboration of Gabriela Magalhães, biologist with more than 9 (nine) years of experience in the development and coordination of socio-environmental projects, biodiversity analysis and environmental licensing. In addition, it also counts on Nathália Vieira Hissa Safar, biologist with more than seven (7) years of experience in studies of forest dynamics, assessing the resilience of tropical forests and their role in biodiversity conservation and carbon mitigation. • *SIG.* Satellite images and drones will be coordinated by Thiago Shoegima, a professional with more than 15 (fifteen) years of experience in spatial analysis projects. • *Strategic planning.* Luíza Pagel Classen is a production engineer with eight (8) years experience. Luíza has experience in company and project management, with emphasis on structuring and optimizing processes and workflows. Besides the activities mentioned above it is possible to verify in our organization chart that all the activities necessary for the implementation of the project are coordinated by a professional with at least 5 years of experience in the area. The resumes of all project team members are available for the validation/verification bodies.	
d)	The management team is entirely based in the country. The project proponents are determined to hire four (4) employees from the project communities to contribute to management. A copy of the employment contract and proof of residence for each employee has been made available to the auditors. The support team for technical advice and financial management is located in the country (Terra Vista, head	0

	office in São Paulo). The company also has an office located in Manaus, which is a 9 hour drive from the project area. Proof of office rental is available to the auditors.	
e)	The management team includes individuals with experience in AFOLU project design and implementation, carbon accounting and reporting under the VCS Program. For example: • **Rômulo Pereira da Silva Arantes (Project Director):**Has experience in Reducing Emissions from Deforestation and Forest Degradation (REDD) projects. He worked on the first project that originated forest carbon credits in Brazil and has over 15 years of experience in baseline diagnostics to assess environmental impacts on climate, communities and biodiversity.. • **Rafaela Martins** (Climate Coordinator):Two years of experience in the design, management and development of REDD+ projects and forestry and reforestation projects to offset carbon emissions, as well as environmental projects focused on sustainability and preservation of the environment. • **Henrique Hugbert de Oliveira Reis** (Community Analyst): Four years in REDD+ projects in traditional communities, writing reports and project documents in VCS and CCB methodology, monitoring audits in REDD+ projects, production and execution of participatory rural diagnostics and socio-economic surveys. The resumes of all team members are available to the validation/verification bodies.	-2
f)	Not applicable. The project does not have a plan in place.	0
Project Management (PM) (a + b + c + d + e + f)]		**-2**

Financial Viability		
Risk Factor	**Risk factor/or mitigation measure description**	**Risk rate**
a)	Not applicable. The payback of the project is less than 10 years.	0
b)	Not applicable. The payback of the project is less than 7 years.	0

c)	Not applicable. The payback of the project is less than 4 years.	0
d)	The cash flow break-even point is less than 2 years from the current risk assessment. The financial spreadsheet has been made available to the project auditors. Evidence of financial health is available to the auditors.	0
e)	Not applicable. The project has secured more than 15% of the funding needed to cover total cash before the project reaches break-even.	0
f)	Not applicable. The project has secured more than 40% of the funding needed to cover total cash before the project reaches break-even.	0
g)	Not applicable. The project has secured more than 80% of the funding needed to cover the total cash before the project reaches the break-even point.	0
h)	The project has secured 80% or more of the funding needed to cover total cash before the project reaches the break-even point.	0
i)	The project does not have available as callable financial resources, apart from the acquired funds, at least 50% of the total cash before the project reaches the break-even point.	0
Financial Viability (FV) [((a, b, c or d) + (e, f, g or h) + i)] The total cannot be less than zero.		**0**

Opportunity cost		
Risk Factor	**Risk factor/or mitigation measure description**	**Risk rate**
a)	Not applicable. The NPV of the most profitable alternative land use activity is less than that associated with the project activities.	0

b)	Not applicable. The NPV of the most profitable alternative land use activity is less than that associated with the project activities.	0
c)	Not applicable. The NPV of the most profitable alternative land use activity is less than that associated with the project activities.	0
d)	Not applicable. The NPV of the most profitable alternative land use activity is less than that associated with the project activities.	0
e)	Not applicable. The NPV of the project activities is expected to be more than 50% greater than the most profitable alternative land use activity.	0
f)	The NPV of the project activities is expected to be at least 50% greater than the most profitable land use alternative. Justification to follow.	-4
g)	Not applicable. The project proponent is not a non-profit organization.	0
h)	Mitigation: There is a legal contract between the landowner and the project developer that provides for a project duration of 32 years.	-2
i)	Not applicable: the project is not protected by a legally binding commitment to continue management practices that protect credited carbon stocks for at least 100 years.	0
Total opportunity cost (OC) [(a, b, c, d, e or f) + (g + h or i)] The total can be less than 0.		**-6**

Justification:

The baseline scenario was pointed out in sections **2.2.1** and **2.2.2** of the DP. The most plausible scenario is using the project area to implement cattle ranching in the project area.

The spreadsheet with the NPV of the project activities and the NPV of the most profitable alternative land use activity was made available to the project validators.

Premises

- For unplanned deforestation, it is considered that the landowner does not profit because it is an invasion.
- The minimum rate of the attractiveness of the projects was considered to be equal to 15%, above the Selic rate.
- The Selic rate[204] on February 13, 2023, was 13.75%, as stated on the Central Bank website.
- The landowner does not assume the operational costs (OPEX) of the project. All operational costs of the project are borne by the project developer, as shown in the contract between the project proponents, made available to the project validator.

Carbon credit price references used

(i) CME Group[205], CBL Nature-Based Global Emissions Offset - USD 9.41 corresponding to the date 09/19/2022;

(ii) S&P Global Platts[206] - USD 11.22, as of September 27, 2022; and

(iii) Platts Nature-Based Avoidance Carbon Credits [207]- USD 13.75 dated 04/22/2022.

Recent company transaction references were also made available to the project validators.

[204] Available at: https://www.bcb.gov.br/controleinflacao/historicotaxasjuros

[205] Available on :https://www.cmegroup.com/markets/energy/emissions/cbl-nature-based-global-emissions-offset.html

[206] Available on Carbon Credit Indices - CARBEX | S&P Global Commodity Insights (spglobal.com)

[207] Available at: https://storymaps.arcgis.com/collections/1e05ebf390554cb8b7cefa80e521afda?utm_source=plattsweb&item=8.
CNC, Nature-based Avoidance carbon price spread stays wide after record high in March | S&P Global Commodity Insights (spglobal.com)

Project Longevity		
a)	Not applicable.	0
b)	The start date of the project is July 17, 2020, as shown in section **2.1.14** of the Project Description. There is a legal contractual agreement with an amendment to maintain project activities and maintain the project area as a forest for 30 years from the date of June 12, 2022. The landowner is legally able to maintain project activities for the entire life of the project. The project area management and financing plans consider the operation of the project for 30 years. **The contract with the project proponent and proof that the management and financial plans have been submitted to the project investors are available to the project auditors.**	15
Total Project Longevity(PL) Total cannot be less than zero		**15**

Internal Risks	
Total internal risks (PM + FV + OC + PL) The total cannot be less than 0.	**-2+0-6+15** **7**

External Risks

Land Tenure and Access to Resources/Impacts		
Risk Factor	**Risk Factor and/or Mitigation Description**	**Risk Rate**
a)	Ownership and access/use rights to resources are held by the same entity.	0
b)	Not applicable. Ownership and access/use rights to resources are held by the same entity.	0
c)	Not applicable. There is no dispute over land ownership or tenure in any part of the project area.	0
d)	Not applicable. There is no dispute or overlap of access/use rights. Although there are squatters on a small part of the property, the community members recognize the Mappes family as owners of the land and the project proponents have consulted with community members to obtain consent.	0
e)	Not applicable. The project is not a WRC project.	0
f)	There is a legal contract to maintain project activities and maintain the project area as a forest for 30 years from the project start date.	-2
g)	Not applicable. There is no dispute over land ownership or tenure, therefore mitigation measure is not required	0
Total Land Tenure Risk (LT) (as applicable, ((a or b) + c + d + e + f + g)) The total cannot be less than zero.		**0**

Community Engagement		
Risk Factor	**Risk Factor and/or Mitigation Description**	**Risk Rate**
a)	All communities that are within the project area were consulted.	0

b)	More than 70% of the communities that are dependent on the project area and live within a 20 km radius were consulted.	0
c)	The project generates net positive impacts on the social and economic well-being of local communities that derive livelihoods from the project area.	-5
Total Community Engagement (CE) Risk [where applicable, (a + b + c)]. The total can be less than zero.		**-5**

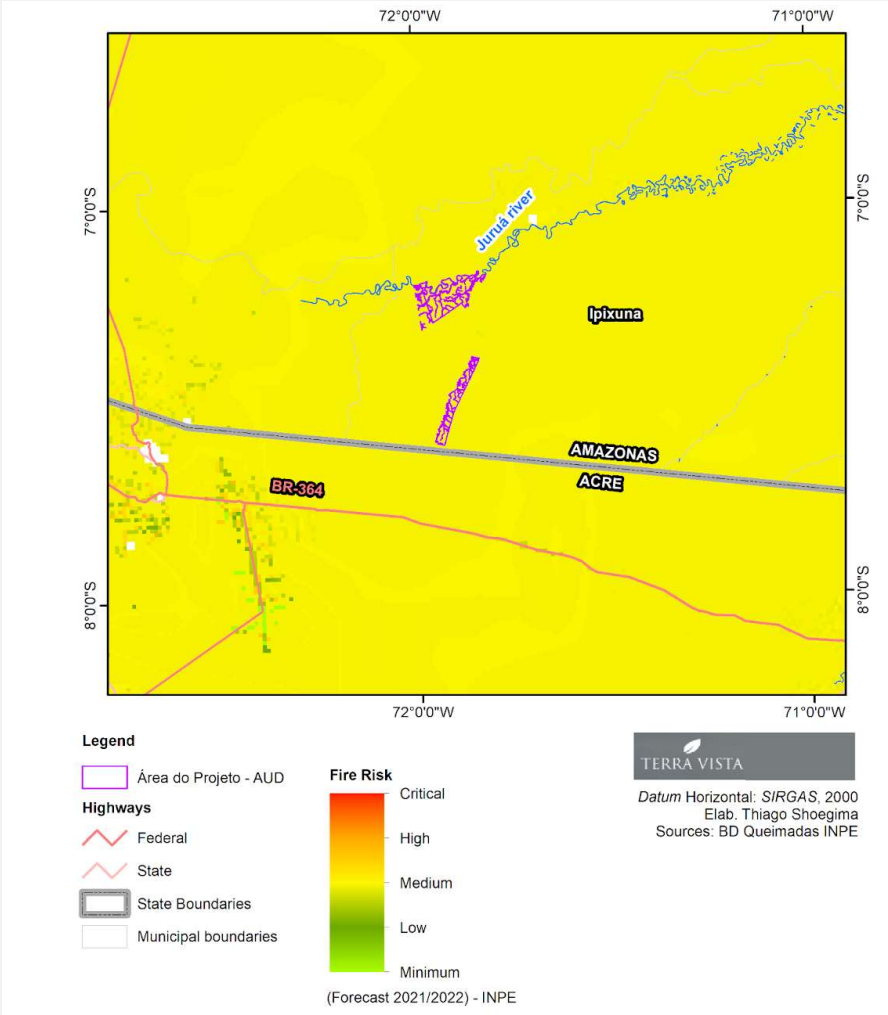
Political Risk		
Risk Factor	**Risk Factor and/or Mitigation Description**	**Risk Rate**
a)	Not applicable. The governance score is -0.203	0
b)	Not applicable. Governance score is -0.203	0
c)	Governance Score is -0.203	2
d)	Not Applicable Governance Score is -0.203	0
e)	Not Applicable Governance score is -0.203	0
f)	Brazil is implementing REDD+ readiness or other activities: (e) the country has a Designated National Authority established under the CDM and has at least one registered CDM Afforestation/Reforestation project	-2
Total Political Risk (PC) (as applicable ((a, b, c, d or e) + f)) The total cannot be less than zero.		**0**

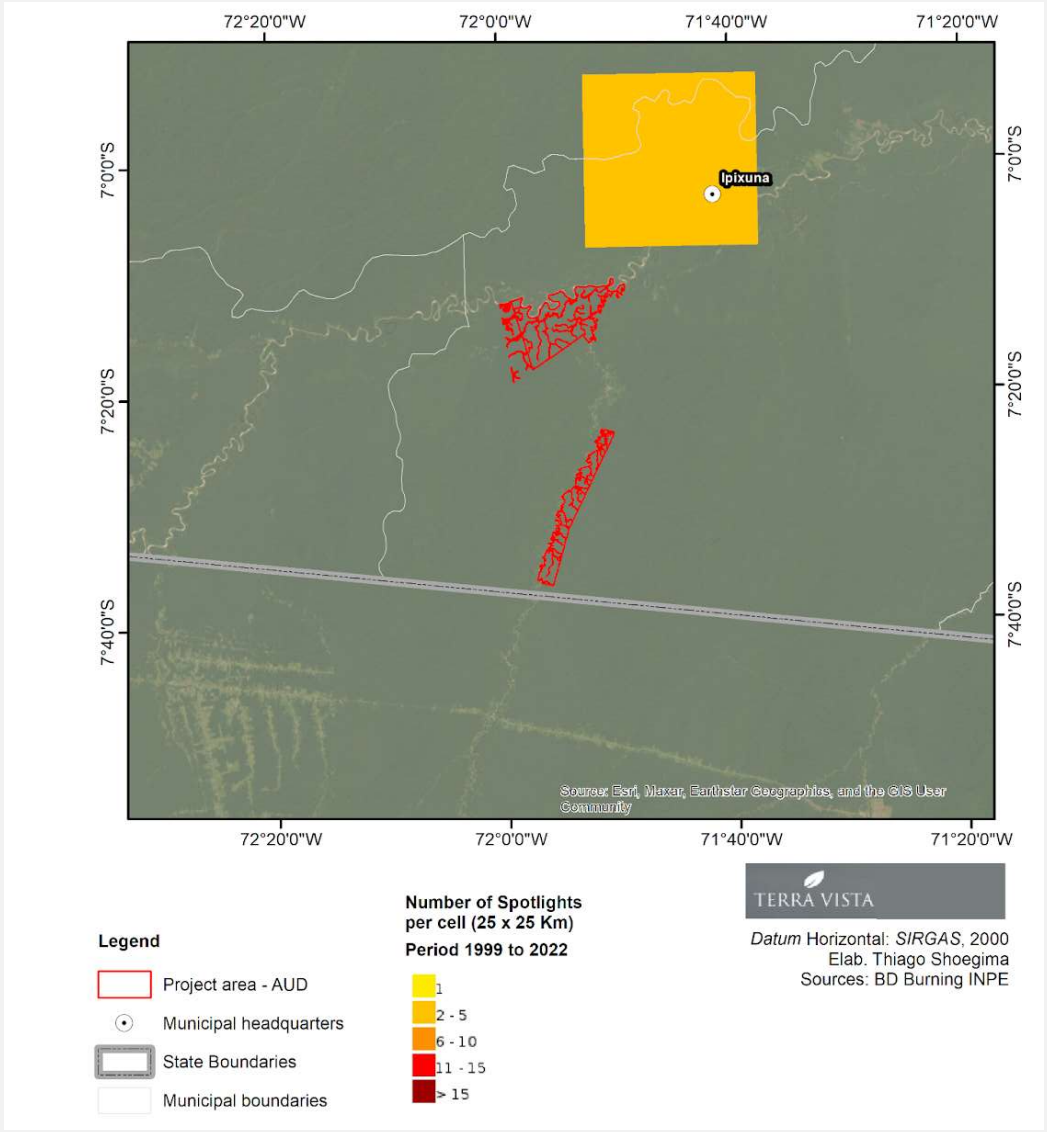
External Risk	
Total External Risk (LT + CE + PC) The total cannot be less than zero.	0

Natural Risks

Risco Natural - Fogo	
Significância	No losses. Although environmental agencies classify the project area as having a medium probability of occurrence of fires, this classification is made on a very broad scale of space, as can be seen in the following map. In an analysis made on a smaller scale, observing only the project area, it was found that no outbreaks of fire were registered in the project area for the period 1999 to 2022. Both analyses were based on data from INPE .[208]

[208] Available at: https://queimadas.dgi.inpe.br/queimadas/bdqueimadas





Probability	0
Score (LS)	0
Mitigation	0

Natural Risk - Pests and Diseases Outbreaks	
Significance	No losses. The project does not foresee an increase in pests and diseases, since no forest management or introduction and planting of new species will be carried out in the area.
Probability	0
Score (LS)	0
Mitigation	None

Natural Risk - Extreme Weather	
Significance	No losses. The climatic conditions necessary for the formation of hurricanes, cyclones, tornadoes, and floods are not present in the project region, so such events have a low possibility of occurring.
Probability	0
Score (LS)	0
Mitigation	None

Natural Risk - Geological Risk	
Significance	No losses. Neither volcanoes nor active tectonic faults are present in the project area.
Probability	0
Score (LS)	0
Mitigation	None

Score for each natural risk applicable to the project (Determined by (LS × M)	
Fire (F)	
Pest and Disease Outbreaks (PD)	0
Extreme Weather (W)	0
Geological Risk (G)	0
Other Natural Risk (ON) - Not applicable	0
Total Natural Risk (as applicable, F + PD + W + G + ON)	0

- **Appendix 4: Additional Information**

Use appendices for supporting information. Delete this appendix (title and instructions) where no appendix is required.