



ARCA REDD+ PROJECT



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1 PROJECT DETAILS

1.1 Summary Description of the Project

In Brazil, 58.39% of its entire 851,034,553.8 ha territory¹ is covered by forests, representing almost 497 million hectares of forest area² and putting it in second place for nations with most forest area worldwide. Brazil has also been at times the country with the highest levels of deforestation in the world, having lost almost 15 million hectares of its forest area from 2010 to 2020³. The expansion of the agriculture frontier due to cattle ranching, soy farming, timber collection, infrastructure and colonization by subsistence agriculturalists has contributed to this historically high deforestation rate, which is concentrated in the northern portion of the country, where the Amazon Rainforest lies.

The State of Mato Grosso is one of the main grain and meat producers in Brazil. Currently, the State is the 5th largest exporter, mainly with soy, cotton and beef⁴. Simultaneously, Mato Grosso also registers high deforestation rates, reaching in 2018 the highest in 10 years⁵; in 2019 in addition to the states of Pará, Amazonas and Rondônia, it accounted for 84.56% of all deforestation observed in the Brazilian Legal Amazon⁶.

The primary objective of the Arca REDD+ Project is to avoid the unplanned deforestation (AUD) of 11,954.69 ha of project area, consisting of 100% Amazon rainforest. The project area is located within 7 private properties, which are located in Nova Bandeirantes, in the State of Mato Grosso, Southern Amazon. A Sustainable Forest Management Plan is also carried out in the properties.

In addition to the pressure of cattle raising and other important activities in the region, the properties boundaries border a settlement. Therefore, the area is a vulnerable target to encroachments and illegal activities, such as fires and theft of wood. Thus, monitoring and vigilance actions are fundamental to ensure the forest will stand.

¹ IBGE – Instituto Brasileiro de Geografia e Estatística. Brazil. 2021. Available at: <<https://www.ibge.gov.br/cidades-e-estados>>.

² FAO and UNEP. 2020. The State of the World's Forests 2020. Forests, biodiversity and people. Rome. Available at: <<https://doi.org/10.4060/ca8642en>>.

³ FAO. 2020. Global Forest Resources Assessment 2020: Main report. Rome. Available at: <<https://doi.org/10.4060/ca9825en>>.

⁴ <https://g1.globo.com/mt/mato-grosso/noticia/2021/07/21/valor-de-exportacoes-neste-ano-em-mt-aumenta-26percent-em-comparacao-com-2020.ghml>

⁵ <https://g1.globo.com/mt/mato-grosso/noticia/2018/12/10/mt-registra-o-maior-indice-de-desmatamento-da-amazonia-nos-ultimos-10-anos.ghml>

⁶ http://www.inpe.br/noticias/noticia.php?Cod_Noticia=5465

Beyond the project's ecological and carbon benefits, a proportion of the carbon credits generated will be dedicated to improving the social and environmental conditions in the project region, specifically contributing to improving deforestation control, and developing environmental education and other social activities. The contribution to sustainability is being monitored through the application of the SOCIALCARBON® Standard, which is based on six main indicators: Biodiversity; Natural; Financial; Human; Social and Carbon Resources.

The present REDD project is expected to avoid a predicted 4,475 ha of deforestation, equating to 1,533,078 tCO₂e in emissions reductions over the 30-year project lifetime (01-August-2018 to 30-July-2048), with an annual average of 51,103 tCO₂e.

1.2 Sectoral Scope and Project Type

Sectoral Scope: 14. Agriculture, Forestry, Land Use

Project Category: Reduced Emissions from Deforestation and Degradation (REDD) through Avoided Unplanned Deforestation (AUD project activity).

This is not a grouped project.

1.3 Project Eligibility

According to the VCS Methodology Requirements v4.0⁷, for Reduced Emissions from Deforestation and Degradation (REDD) projects, eligible activities are those that reduce net GHG emissions by reducing deforestation. Thus, the project is eligible under the scopes of the VCS Program Version 4.1:

- The project meets all applicable rules and requirements set out under the VCS Program;
- The project applies a methodology eligible under the VCS Program;
- The implementation of this project activity does not lead to the violation of any applicable law;
- This is an eligible AFOLU project category under the VCS Program: reduced emissions from deforestation and degradation (REDD);
- This project is not located within a jurisdiction covered by a jurisdictional REDD+ program;
- Implementation partners are identified in the project activity;
- This project does not convert native ecosystems to generate GHG. The project area only contains native forested land for a minimum of 10 years before the project start date;
- This project does not occur on wetlands and does not drain native ecosystems or degrade hydrological functions;

⁷ https://verra.org/wp-content/uploads/2019/09/VCS_Methodology_Requirements_v4.0.pdf

- Non-performance risk will be analysed in accordance with the VCS Program document AFOLU Non-Permanence Risk Tool.

1.4 Project Design

This project has been designed as a single installation of an activity.

Eligibility Criteria

Not applicable. This is not a grouped project.

1.5 Project Proponent

Organization name	Arca S/A Agropecuaria
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Title	Property Owner
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Organization name	Ecológica Assessoria Ltda.
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1.6 Other Entities Involved in the Project

Organization name	Sustainable Carbon Projetos Ambientais Ltda.
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Role in the project	Carbon credits trader and Registry Manager
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1.7 Ownership

The project area is located in the municipality of Nova Bandeirantes, State of Mato Grosso, and is composed by the following areas:

- Fazenda Vale Verde I;
- Fazenda Vale Verde II;
- Fazenda Vale Verde III;
- Fazenda Vale Verde IV;
- Fazenda Vale Verde V;
- Fazenda Vale Verde VI;
- Fazenda Vale Verde VII.

The properties composing the project area are owned by Arca S/A Agropecuaria (hereafter “the company” or “Arca S/A”). The legal documents proving the land title and ownership of the properties will be made available to the auditors during the validation process, in the Appendix.

1.8 Project Start Date

The properties were acquired by Arca S/A in 2005 and have always experienced a high risk of encroachment and illegal deforestation, as they border a settlement area. This risk has been increasingly intensified over the past 6 years, with many attempts by outside actors to deforest the area illegally.

Despite all efforts to curb illegal deforestation, the properties' owner constantly receives many offers from outsiders to carry out illegal logging within the area, which he promptly declines, but it is not enough to stop the attempts of these illegal actors to extract wood from the Arca project area. That is why the opportunity of adopting a Sustainable Forest Management Plan (SFMP) was considered, in 2017, while they started fencing the properties.

However, in 2018, a great fire caused by illegal agents led to a severe deforestation in the properties. This was the company's final motivation, among the many aforementioned, that led the SFMP to be put into effect. Their first sustainable logging happened on July 5th, 2018, and, therefore, this date is considered as the project start date. With the SFMP in place, a set of activities was also implemented, providing a bigger presence of the managing team in the project area, as well as giving the company a better control over people's entries and exits within its boundaries. Furthermore, following the implementation of the SFMP, Arca S/A also put other conservation measures into action, such as building a guardhouse within the properties' limits, hiring a security team to protect the properties, and filing a formal complaint to report these illegal activities to the police.

1.9 Project Crediting Period

The project has a crediting period of 30 years, from 01-August-2018 until 30-July-2048.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	X
Large project	

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
2018 (Starting on August 1 st)	10,180
2019	24,103

2020	25,111
2021	26,121
2022	58,014
2023	58,199
2024	58,385
2025	58,571
2026	58,757
2027	58,945
2028	55,606
2029	55,817
2030	55,995
2031	56,173
2032	56,351
2033	56,529
2034	56,709
2035	56,889
2036	57,070
2037	57,252
2038	51,422
2039	51,645
2040	51,807
2041	51,970
2042	52,134
2043	52,298
2044	52,463
2045	52,628
2046	52,794
2047	52,960

2048 (Ending on July 30 th)	10,180
Total estimated ERs	1,533,078
Total number of crediting years	30
Average annual ERs	51,103

1.11 Description of the Project Activity

The project activity for the Arca REDD+ Project (hereafter “the project”) combines conservation measures with the Sustainable Forest Management Plan (SFMP) in the project area’s properties.

Among the conservation measures adopted by Arca S/A, there is maintenance of the fences that surround the properties, security and managing teams present at the project area’s location in order to carry out the management plan and to monitor suspicious and/or illegal activities, as well as the construction of a guardhouse to control the entrance and exit within the area’s boundaries. Keeping environmental and police entities updated on the suspicious and illegal activities around the project area is also a way to ensure that the project is secure, these reports are made by filing formal complaints.

Sustainable Forest Management Plan within the properties of the Arca REDD+ Project

The Sustainable Forest Management Plan (PMFS) is a set of plans and techniques for forest extraction, adapted to the conditions of the forest. This concept will guide the exploitation of forest resources (wood, residual woody material from exploration and non-wood products), guaranteeing the supply of wood processing and processing units.

The management of the forest must occur in a sustainable manner, which ensures the use of available resources based on techniques such as the Reduced Impact Exploration (EIR) system, the conservation of the forest, preventing soil wear and erosion, in addition to protecting watersheds, reduce the risk of fire and allow the maintenance of natural regeneration and protection of biological diversity.

Therefore, there is a guarantee that the wood product comes from sustainable management, which makes its commercialization feasible. And the main products are roundwood and sawn wood, to serve the foreign and domestic markets. Arca S/A is committed to the norms and principles of sustainability of the forestry activity.

The SFMP aims to produce and extract forest resources in a sustainable way, planning, harvesting, and using forestry systems that maximize economic efficiency, with socio-environmental responsibility and compliance with forest regulation mechanisms, which are mentioned at Section 1.14, in addition to enabling the supply of raw material of safe and continuous origin to the consumer market.

In the area designated for forest harvest management, permanent preservation and the absolute reserve areas were excluded. According to the Brazilian Forest Code, permanent preservation areas (PPA) at the borders of waterways shall be comprehensively preserved. The Permanent Preservation Area of the property is 1,075.44 ha. The sustainable logging is only carried out in approximately 60% of the area granted by the Autex (Exploration Authorization), which means an extraction around 7,000 m³/year.

The cutting cycle in this plan is 30 years. This cycle is based on an attempt to introduce new paradigms for forest management, in order to reduce the period for recovery of forest stocks. Forest monitoring will provide the growth data from the permanent plots installed in the Forest Management Unity, aiming to adjust the period initially foreseen.

The silvicultural system to be adopted is the polycyclic one, widely recommended for yields upland forests in the Brazilian Amazon. EMBRAPA named the referred system of the Brazilian System of Selective Management. In each cycle, mature trees are harvested in intermediate cuts. In the case of this management plan, a cycle will be initially adopted of 30 years.

The application of this system is due to the results of research carried out, which indicate this system as the most appropriate for the management of tropical forests. The sequence of operations of the system to be developed in the SFMP of Fazenda Vale Verde is presented below:

Table 1. Main forestry measures and operations to be conducted by Arca S/A in the SFMP

Year	Operations
Y-1	<ul style="list-style-type: none"> • Demarcation of UPAs, UTs and trails or guidance trails; • 100% inventory (forest census) and cutting of vines on trees to be harvested; • Preparation of exploration maps; • Establishment and measurement of permanent plots; • Harvest; • Planning and construction of permanent infrastructure (roads and storage yards);
Y	<ul style="list-style-type: none"> • Exploration of trees, observing the established guidelines for exploration with reduced impact; • Exploitation of residues for charcoaling;
Y+1	<ul style="list-style-type: none"> • Remeasurement of permanent parcels; • Maintenance of permanent infrastructure; • Survey of damage caused by exploration and waste; • Data collection for volume equation;

	<ul style="list-style-type: none"> • Silvicultural treatments;
Y+3	<ul style="list-style-type: none"> • Remeasurement of permanent parcels;
Y+4	<ul style="list-style-type: none"> • Inventory of forest residues;
Y+5	<ul style="list-style-type: none"> • Remeasurement of permanent parcels; • Data collection for the volume equation; • Adjustment of the volume equation;
Y+10	<ul style="list-style-type: none"> • Remeasurement of permanent parcels;
Y+20	<ul style="list-style-type: none"> • Remeasurement of permanent parcels;
Y+30	<ul style="list-style-type: none"> • Beginning of the new cycle.

Furthermore, the applied forestry management system has the following objectives:

- Employ Reduced Impact Exploration (EIR) techniques, in order to mitigate damage to remaining forest, regulating production in order to ensure a minimum 30-year cutting cycle;
- Implement a monitoring and control program for forest management activities, aiming to optimize productivity, reduce impacts and costs of operations, in order to guide the possible changes that may be necessary to the original management plan;
- Develop partnerships with research institutions for the development of studies that enhance the improvement of forest management techniques;
- Support forest certification in the management area, through compliance with the principles and criteria of onshore forest management;
- Value local products, whether timber or non-timber;
- Maximize the resources of the management area through the multiple use of the forest;
- Develop markets and secure existing markets with wood and non-wood products (resins, oils, seeds, etc.) of sustainable origin.

All actions that cause direct and indirect impacts on the environment must be monitored and the appropriate mitigating measures implemented. Likewise, it should be noted that both

management and field teams must be properly trained to employ natural resource management methodologies in order to minimize impacts and costs, in addition to the use of reduced impact exploration techniques to minimize the damage caused to remaining species, to the soil, hydrography, air and fauna. In this aspect, the activities with the greatest impact will be identified and monitored, offering conditions for assessment and measurement directly in the field by the company's team.

With the management and exploration system employed, the environmental impacts are reduced. The selection method provides a stable habitat for plants and animals. Managed stands support more weeds, secondary vegetation and natural regeneration than unmanaged primitive stands. It increases the diversity and frequency of birds and nests with rapid recovery after exploration and has a reduced impact on the mammal community because of the maintenance of natural conditions important to their development.

The chain of custody is extremely important, as it ensures the tracking of the raw material, from production to the consumer. Tree identification starts at the forest inventory, through the plates that are placed on the tree stump after the cut. The log must also carry identification (UPA number, UT number, tree, section number, species code and log length) after unloading. Marking must be done on each section of the logs when tracing is needed.

For the tracking of wood in the various stages of management, some activities will be developed to ensure control of the entire wood chain, from the tree that will be harvested to the exit from the industrial processing unit.

Despite the importance of sustainable forest management for climate change adaptation and mitigation, its implementation is not considered common practice, primarily due to the shortage of human resources and funding required to implement the necessary measures.

Therefore, besides forest conservation, the present project aims to improve and quantify its social and environmental activities that benefit the local communities, through application of the SOCIALCARBON® Methodology. This methodology measures the contribution of carbon projects towards sustainable development. The SOCIALCARBON® Methodology is based on six main indicators: Biodiversity; Natural; Financial; Human; Social and Carbon Resources and aims to deliver high-integrity benefits in each in order to improve social and environmental conditions in the project region.

The implementation of REDD + SOCIALCARBON mechanisms with SFMP promotes sustainable forest use, as it carries on forest conservation and storage of carbon stocks in forests while reducing pressure for timber from other conserved areas. In this way, biodiversity conservation and development of the local economy can be achieved simultaneously.

All the aforementioned measures aid in achieving the net GHG emission reductions by preventing legal deforestation agents to advance with their activities, as well as by retrieving their practices and, therefore, protecting and even restoring the carbon pools.

The project is not located within a jurisdiction covered by a jurisdictional REDD+ program.

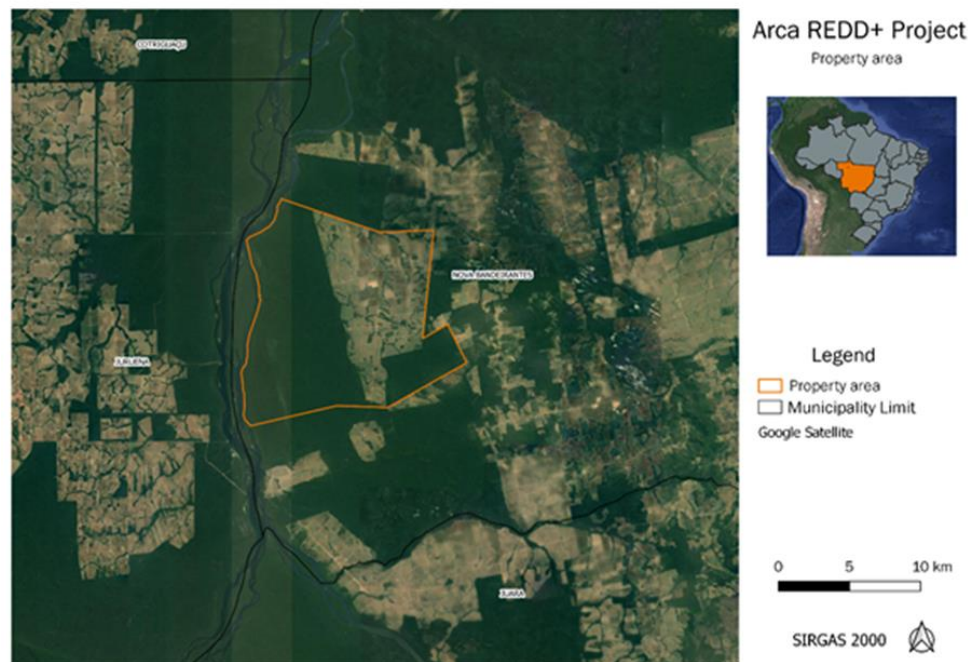
1.12 Project Location

The Arca REDD+ Project is located in the municipality of Nova Bandeirantes, in the State of Mato Grosso, a region known as Southern Amazon. The municipality is located around 900 km from Cuiabá, capital city of the State of Mato Grosso. The Fazenda Vale Verde properties border the Juruena River, and their total area is of 17,450.87 ha.

The closest access road is through MT-208, leading to highway BR-174 called Manaus-Boa Vista, which connects Brazilian states of Mato Grosso, Rondônia, Amazonas and Roraima to the country of Venezuela.

Geodetic coordinates of the project location have been submitted separately as a KML file.

Figure 1. Project Location



1.13 Conditions Prior to Project Initiation

Conditions prior to the project initiation as well as general characteristics of the project area and reference region are described below.

Climate and Hydrography

The project region is classified as Tropical, dry winter climate type – Aw category – according to the Köppen climate classification⁸. This means that it has a rainy season in summer, from November to April, and a distinct dry season in winter, from May to October (July is the driest month). The average temperature of the coldest month is above 18°C⁹. Annual precipitation in the project area is on average 1,932.8 mm.

The project area is located within the Amazonica watershed, specifically in the Tapajós sub-basin, Baixo Juruena water management unit. The main river near the Project Area is the Juruena River; smaller rivers are Mureru, São João da Barra, and Bararati Rivers.

Geology, Topography and Soils

The Mato Grosso state has modest altitudes, with large, flattened surfaces, carved in sedimentary rocks and covers three distinct regions: in the north-central portion of the state, the sedimentary plateaus and crystalline plateaus (with altitudes between 400 and 800m), that make up the central Brazilian plateau. The sandstone-basalt plateau, located in the south, is a simple portion of the southern plateau. The part of the Pantanal Mato-Grossense, lowered from the central-western portion¹⁰.

The predominant soil types within the project area are red-yellow argisoil and haplic gleysol. Red-yellow argisoils have very low to medium natural fertility. In Coastal Tablelands, these soils need correctives and fertilizers to obtain good crop productivity, requiring the use of organic matter in the superficial horizon, especially in sandy-textured soils¹¹. Haplic Gleysol are mineral, hydromorphic soils, presenting A (mineral) or H (organic) horizons, followed by an olive-gray, greenish or bluish color horizon, called glei horizon, resulting from modifications suffered by the iron oxides existing in the soil in waterlogged conditions all or part of the year. They are poorly drained soils and may present a very variable texture along the profile¹².

Vegetation cover

Mato Grosso is the only Brazilian state with three biomes: Amazon Rainforest, Cerrado and Pantanal. This makes the state unique, with great diversity and conservation importance. Of 141 municipalities, 86 are covered by the Amazon Rainforest. The Arca REDD+ Project's boundaries are 100% covered by Amazon Rainforest and are composed by 16 different phytogeographies.

⁸ KÖPPEN, W.; GEIGER, R. *Klimate der Erde*. Gotha: Verlag Justus Perthes. 1928.

⁹ EMBRAPA. Clima. <https://www.cnpf.embrapa.br/pesquisa/efb/clima.htm>

¹⁰ GOVERNO DE MATO GROSSO. Geografia. <http://www.mt.gov.br/geografia>

¹¹ https://www.agencia.cnptia.embrapa.br/gestor/territorio_mata_sul_pernambucana/arvore/CONT000gt7eon7k02wx7ha087apz2axe8nfr.html

¹² Available in <https://www.agencia.cnptia.embrapa.br/Agencia16/AG01/arvore/AG01_95_10112005101956.html> Last visited on December 07th, 2021.

Two vegetation types were found to be present in the project area: Open Submontane Tropical Rainforest, and Dense Submontane Tropical Rainforest. Other vegetation types present within the reference region are Dense Alluvial Tropical Rainforest, Dense Tropical Rainforest, Open Tropical Rainforest, Seasonal Forested Savana, Seasonal Treed Savana, and Seasonal Deciduous Submontane Forest.

Socio-economic conditions

Nova Bandeirantes is a 955,666.10-ha municipality located in the State of Mato Grosso, in Brazil. Its accounted population in the last sense in 2010 was of 11,643 citizens, its demographic density being of 1.21 inhab/km². Of all population, in 2018 only 1,280 people had formal or informal jobs, which is less than 10% of the municipality's population¹³. The average monthly wage of formal workers in 2018 was of 1.9 minimum wages, and the minimum wage R\$ 954.00¹⁴. This means a minimum wage of US\$ 278.13 (considering the average exchange rate between January and June of 2018, of US\$ 3,43¹⁵), and an average monthly wage of formal workers equivalent to US\$ 528.45.

Almost 94% of the municipality's population studied until a 6 to 14 years old- range. Nova Bandeirante's IDHM in 2018 was of 0. 650. The IDHM - *Índice de Desenvolvimento Humano Municipal* (Municipal Human Development Index in free translation) is a measurement composed by indicators of three dimensions of human development: longevity, education, and income. The index ranges from 0 to 1. The closer to 1, the greater human development¹⁶. Per capita GDP of the municipality was R\$ 14,816.53 (equivalent to US\$ 4,319.68) in 2018, it is important to note that Mato Grosso's GDP is mainly composed of agriculture and cattle raising, as the majority of Nova Bandeirantes' population is not employed.

Biodiversity

According to the "Management Plan - Juruena National Park" (2011), a floristic inventory was carried out, having collected 1,028 specimens of vegetables of which 650 had the gender identified, 215 species were able to be identified by family, 105 were not even identified by family, with just 58 were identified by species, belonging to 23 botanical families. This result demonstrates the gap in the taxonomic knowledge of that region.

In addition to having valuable carbon sinks and flora species, the local forests shelter a remarkable fauna diversity. According to the same management plan, there are at least two endangered bird species as per IUCN (2007) criteria: the harpy eagle or harpy (*Harpia harpyja*),

¹³ <https://cidades.ibge.gov.br/brasil/mt/nova-bandeirantes/panorama>

¹⁴ http://www.planalto.gov.br/ccivil_03/_ato2015-2018/2017/decreto/d9255.htm

¹⁵ <https://www.bcb.gov.br/estabilidadefinanceira/historicocotacoes>

¹⁶ <https://www.br.undp.org/content/brazil/pt/home/idh0/conceitos/o-que-e-o-idhm.html>

classified as “almost threatened” category, and the black-throated brood (*Clytoctantes atrogularis*), classified in the “critically endangered” category.

Figure 2. *Harpia harpyja* (left) and *Clytoctantes atrogularis* (right) bird species



Among the species of mammals threatened with extinction, the inventory of the Jurueña National Park identified the Giant Anteater (*Myrmecophaga tridactyla*), the Giant armadillo (*Prionates maximus*), the Ocelot (*Leopardus pardalis*), the Jaguar (*Panthera onca*), the Maracajá-mirim (*Leopardus wiedii*), the Giant otter (*Pteronura brasiliensis*), and the Zogue-zogue (*Callicebus cinerascens*).

Figure 3. *Myrmecophaga trydactyla* (left) and *Prionates maximus* (right) species



Figure 4. *Pteronura brasiliensis* (left) and *Callicebus cinerascens* (right)



Of all the species of fish collected, 25 were recorded at only one point, which may indicate that they are endemic to those locations or that studies on their distribution and biology are lacking. Thus, studies to date are still scarce, which indicates the great importance of local conservation.

Regarding reptiles, the Juruena National Park inventory indicated the presence of *Melanosuchus niger* (Black Caiman) an endangered species according to the IUCN (2007) list.

Figure 5. *Melanosuchus niger*



In the diagnosis of the Juruena National Park, the communities of Lepidoptera, Isoptera and Hymenoptera (Formicidae) were studied. Outstanding species were found, such as the butterflies *Pyrrhogyra amphiro amphiro*, *Dryas iulia*, *Philaethria dido*, *Morpho menelaus*, *Marpesia furcula*, *Anteos menippe* and *Eunica yburnean*, and the titan beetle *Titanus giganteus*. As an endangered species, the beetle *Macrodonia cervicornis* was mentioned, which is subject to illegal collection for the international clandestine market.

Figure 6. *Morpho menelaus*, *Marpesia furcula*, and *Eunica yburnean*



Figure 7. *Titanus giganteus* (left) and *Macrodonia cervicornis* (right)



As some of the other conditions existing prior to the project initiation are the same as the baseline scenario and, as per the VCS guidelines, therefore, there is no need to repeat the description of the scenarios, the remaining conditions prior to the project initiation can be found at Section 3.4 (Baseline Scenario).

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

According to the Brazilian Forest Code (Law N° 12.651, 25/05/2012¹⁷), all rural estates located in forest zones should have:

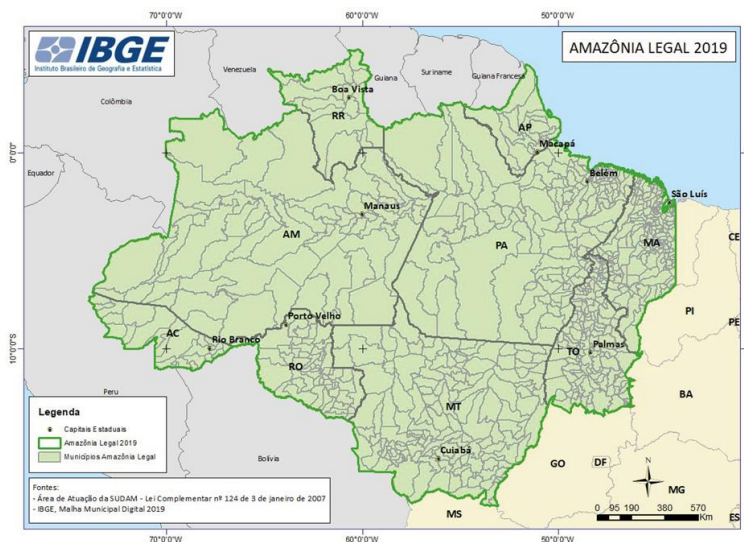
I - Permanent preservation area: protected areas covered or not by native vegetation, with the environmental function of preserving water resources, landscape, geological stability, biodiversity, gene flow of plants and animals, protecting the soil and ensuring the well-being of human populations

II - Legal Reserve (LR): an area located within a rural property or possession which is required to be segregated, as well as the permanent preservation area, for the sustainable use of natural resources, conservation and rehabilitation of ecological processes, biodiversity conservation and shelter, and protection of native flora and

¹⁷ BRASIL. Law nº. 12.651, of 25 May 2012. Forest Code. Diário Oficial [da] República Federativa do Brasil, Brasília, DF, 25 May 2012.

fauna. In the Brazilian Legal Amazon¹⁸, eighty percent (80%) of a rural property should be preserved as LR.

Figure 8. The Brazilian Legal Amazon States - Acre (AC), Amapá (AP), Amazonas (AM), Maranhão (MA), Mato Grosso (MT), Pará (PA), Rondônia (RO), Roraima (RR) and Tocantins (TO)



However, there is a clear disregard for legal conservation requirements in the region. Much of the deforestation occurs in areas that should be preserved.

One of the main ways to combat deforestation in Brazil is command and control mechanisms, such as effective monitoring, requiring compliance with environmental legislation along with a greater State presence. However, this does not seem to be implemented in most regions of the country, because of the government's tendency to disregard these responsibilities in comparison with other social goals and economic interests, which has put Brazil among the world's largest deforesters¹⁹. Given the approval of the new Forest Code (2012) and its general pardoning of those who deforested, a significant increase in annual deforestation rates has been observed²⁰.

In spite of the legal provisions intended to preserve at least 80% of the Amazon Forest coverage, lack of law enforcement by local authorities along with public policies seeking to increase commodity production and encourage land use for agricultural, bio energy and cattle breeding purposes have created a scenario of complete disregard for the mandatory provisions of the

¹⁸ The concept of Legal Amazonia was originated in 1953 and its boundaries arise from the necessity of planning the economic development of the region. For this reason, Legal Amazonia's boundaries do not correspond to those of the Amazon biome. The former has an area of approximately 5 million km², distributed through the entirety or a proportion of 9 Brazilian states.

¹⁹ FAO. Global Forest Resource Assessment 2015: Desk reference. Rome, 2015. 253 p.

²⁰ NOBRE, Antonio Donato. O Futuro Climático da Amazônia. São José dos Campos: Articulação Regional Amazônica (ARA), 2014. 42 p.

Forest Code. In addition, covering vast areas with low demographic density makes tracking of illegal activities and land surveillance very difficult for the authorities^{21,22}.

Moreover, according to PRODES, around 788,893 km² have been deforested until 2016, which is equivalent to 18.9% of the total Amazon biome area. Given the increasing deforestation trend observed in recent years, this data shows the non-compliance with the Legal Reserve requirement established by the Brazilian Forest Code.

Therefore, all calculations were made assuming that the reference region has a general non-compliance with the Brazilian Forest Code. Thus, the baseline scenario considers the potential of unplanned deforestation in the project area to surpass the limits stipulated by the Law.

As the project activity involves planned logging, it is important to describe compliance with applicable law.

Sustainable Forest Management is defined in Article 3, VII, of Law 12.651/2012 (National Forest Code), as the administration of natural vegetation to obtain economic, social and environmental benefits, respecting the support mechanisms of the ecosystem object of management and considering, cumulatively or alternatively, the use of multiple wood species or not, of multiple products and by-products of the flora, as well as the use of other goods and services.

The National Forest Code and Decree 5,975²³ also specifies the technical and scientific foundations of the PMFS (Article 31, 1st paragraph):

- I. Characterization of physical and biological environment;
- II. Determination of existent stock;
- III. Exploitation intensity compatible with the forest's environmental support capacity;
- IV. Cutting cycle compatible with the restoration time of the volume of product extracted from the forest;
- V. Promotion of the natural regeneration of the forest;
- VI. Adoption of adequate silvicultural system;
- VII. Adoption adequate operating system;
- VIII. Monitoring of the development of remaining forest;

²¹ MOUTINHO, P. et al. REDD no Brasil: um enfoque amazônico: fundamentos, critérios e estruturas institucionais para um regime nacional de Redução de Emissões por Desmatamento e Degradação Florestal – REDD. Brasília, DF: Instituto de Pesquisa Ambiental da Amazônia, 2011.

²² INSTITUTO DE CONSERVAÇÃO E DESENVOLVIMENTO SUSTENTÁVEL DO AMAZONAS (IDESAM). Reduções de Emissões do Desmatamento e Degradação Florestal (REDD+): Estudo de Oportunidades para a Região Sul do Amazonas. Manaus: Idesam, 2011. 45 p. (Relatórios Técnicos nº1).

²³ Available at < http://www.planalto.gov.br/ccivil_03/_ato2004-2006/2006/decreto/d5975.htm>

IX. Adoption of mitigation measures for the social and environmental impacts.

In addition, the law also demands the fulfillment of obligations related to control and monitoring of the sustainable management. The company must submit an annual report to the environmental agency with information on the entire Sustainable Management Area and the description of the applicable activities and must be submitted to technical inspections to approve the operations and activities carried out in the management area.

The technical procedures for the preparation, presentation, execution and technical evaluation of sustainable forest management plans are regulated by IBAMA's Normative Instructions: 1, of 24/04/2007²⁴; 5, of 11/12/2006²⁵; and 2 of 27/06/2007²⁶; in addition to CONAMA's Resolution 406, of 02/02/2009²⁷.

The approval of the SFMP and expedition of environmental licenses is responsibility of the State Government. After the SFMP approval, the company proceeds to the applicable Forest Management Licenses (AUTEX, in national level, and AEF, in Mato Grosso).

In this sense the preparation for REDD+ activities, programs and projects become essential for the Project Region, not only as a means to promote forest conservation, but also as a way to implement a new productive forest-based economy. This scenario needs to be reinforced because the areas in question hold incomparable biological and cultural diversity, with their traditional inhabitants marginalized from the process of economic development through capitalized livestock production.

Regarding other regulatory frameworks that exist in Brazil, on November 28th, 2019 occurred the approval of the Federal Decree 10,144/2019, which establishes the National Commission for Reducing Emissions of Greenhouse Gases from Deforestation and Forest Degradation, Conservation of Forest Carbon Stocks, Sustainable Management of Forests and Increase of Forest Carbon Stocks - REDD+²⁸.

The development of this Project is not in conflict with such Decree. It is important to clarify the difference between Law and Decree in Brazil. The Brazilian Federal Constitution establishes the principle of legality for all the national territory, according to the text of article 5, item II "no one shall be obliged to do or not to do anything other than by virtue of law".

Law is an infra-constitutional (sub-constitutional) norm, it is a mandatory rule by the coercive force of the legislative power or of legitimate authority, which constitutes the rights and duties in a society. Law is different from Decree.

²⁴ <https://www.ibama.gov.br/component/legislacao/?view=legislacao&legislacao=113233>

²⁵ <https://www.ibama.gov.br/component/legislacao/?view=legislacao&legislacao=112909>

²⁶ <https://www.ibama.gov.br/component/legislacao/?view=legislacao&force=1&legislacao=113306>

²⁷ <https://www.ibama.gov.br/component/legislacao/?view=legislacao&legislacao=114762>

²⁸ http://www.planalto.gov.br/ccivil_03/_Ato2019-2022/2019/Decreto/D10144.htm#art12

Decrees, on the other hand, are administrative acts, issued by the Chief Executive (president, governor or mayor), with the main objective of regulating and detailing a law, in order to grant it the necessary means for its faithful execution, without, however, being able to contradict any of its provisions or to innovate the Law.

Thus, in terms of the object, jurisdictionally and scope of the Decree 10,144/2019, it is understood that its application is merely administrative, that is, it merely organizes the functioning of the Federal Government about the REDD+ agenda. Its application is restricted to the federal entities of the Public Administration, and, because it is a decree, a normative type that only grants regulation to the matter of law, does not establish duties or obligations to the society.

Thus, Decree 10,144/2019²⁹ only limits the Federal Government's understanding of what shall be accounted for in order to comply with mitigation commitments of other countries to the United Nations Framework Convention on Climate Change. It does not impose a barrier or obstacles to the implementation of REDD projects and the commercialization of carbon assets generated from these projects. This consideration in the Decree does not affect or interfere with the voluntary or regulated carbon market, domestic or international.

There is no law in Brazil that does not allow or restrict the execution of REDD projects or that does not allow or restrict any commercial transaction of assets resulting from REDD projects. On the contrary, such transactions are valid and legally permitted. Thus, there is no contradiction or irregularity between the Arca REDD+ Project and such Decree.

1.15 Participation under Other GHG Programs

1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

This project has not been registered and is not seeking registration under any other GHG Programs.

1.15.2 Projects Rejected by Other GHG Programs

Not applicable. This project has not requested registration under any other GHG Programs, therefore, the project has not been rejected by any other GHG programs.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

²⁹ Available at <http://www.planalto.gov.br/ccivil_03/_ato2019-2022/2019/decreto/D10144.htm>

The project activity is not included in an emission trading program or any other mechanism that includes GHG allowance trading.

1.16.2 Other Forms of Environmental Credit

The project area has not sought or received any other form of GHG-related environmental credit, including renewable energy certificates.

1.17 Additional Information Relevant to the Project

Leakage Management

Where applicable, describe the leakage management plan and implementation of leakage and risk mitigation measures.

Commercially Sensitive Information

Indicate whether any commercially sensitive information has been excluded from the public version of the project description and briefly describe the items to which such information pertains.

Note - Information related to the determination of the baseline scenario, demonstration of additionality, and estimation and monitoring of GHG emission reductions and removals (including operational and capital expenditures) cannot be considered to be commercially sensitive and must be provided in the public versions of the project documents.

Sustainable Development

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

Further Information

Include any additional relevant legislative, technical, economic, sectoral, social, environmental, geographic, site-specific and/or temporal information that may have a bearing on the eligibility of the project, the net GHG emission reductions or removals, or the quantification of the project's net GHG emission reductions or removals.

2 SAFEGUARDS

2.1 No Net Harm

Summarize any potential negative environmental and socio-economic impacts and the steps taken to mitigate them.

2.2 Local Stakeholder Consultation

Describe the process for, and the outcomes from, the local stakeholder consultation conducted prior to validation. Include details on the following:

- *The procedures or methods used for engaging local stakeholders (e.g., dates of announcements or meetings, periods during which input was sought).*
- *The procedures or methods used for documenting the outcomes of the local stakeholder consultation.*
- *The mechanism for on-going communication with local stakeholders.*
- *How due account of all and any input received during the consultation has been taken. Include details on any updates to the project design or justify why updates are not appropriate.*

For AFOLU projects, also demonstrate how the project has or will communicate the following:

- *The project design and implementation, including the results of monitoring.*
- *The risks, costs and benefits the project may bring to local stakeholders.*
- *All relevant laws and regulations covering workers' rights in the host country.*
- *The process of VCS Program validation and verification and the validation/verification body's site visit.*

2.3 Environmental Impact

Summarize any environmental impact assessments carried out with respect to the project, where applicable.

2.4 Public Comments

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

2.5 AFOLU-Specific Safeguards

For AFOLU projects, provide details on the following:

- *Local stakeholder identification process and a description of results.*
- *Risks to local stakeholders due to project implementation and how the project will mitigate such risks.*

- *Risks to local stakeholder resources due to project implementation and how the project will mitigate such risks, including the plans to ensure the project will not impact local stakeholder's property rights without the free, prior and informed consent.*
- *Processes to ensure ongoing communication and consultation with local stakeholders, including a grievance redress procedure to resolve any conflicts which may arise between the project proponent and local stakeholders.*

For AFOLU projects with no impacts on local stakeholders, provide evidence of such.

For non-AFOLU projects, this section is not required.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

This project utilizes the approved VCS Methodology VM0015: Methodology for Avoided Unplanned Deforestation, version 1.1, published on 03-December-2012³⁰.

Furthermore, the following tools were used:

- VT0001 - Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities, v3.0, published on 01-February-2012³¹;
- AFOLU Non-Permanence Risk Tool v4.0, published on 19-September-2019³².

3.2 Applicability of Methodology

VM0015	
Applicability Conditions	Justification of Applicability
a) Baseline activities may include planned or unplanned logging for timber, fuelwood collection, charcoal production, agricultural and grazing activities as long as the category	None of the baseline land-use conversion activities are legally designated or sanctioned for forestry or deforestation, and hence the project activity qualifies as avoided unplanned

³⁰ <https://verra.org/methodology/vm0015-methodology-for-avoided-unplanned-deforestation-v1-1/>

³¹ <https://verra.org/methodology/vt0001-tool-for-the-demonstration-and-assessment-of-additionality-in-vcs-agriculture-forestry-and-other-land-use-afolu-project-activities-v3-0/>

³² https://verra.org/wp-content/uploads/2019/09/AFOLU_Non-Permanence_Risk-Tool_v4.0.pdf

<p>is unplanned deforestation according to the most recent VCS AFOLU requirements.</p>	<p>deforestation. This is in accordance with the definition of unplanned deforestation under the VCS Standard v4.1.</p> <p>The primary land uses in the baseline scenario are: cattle ranching, mainly for producing beef cattle; and timber harvesters, acting both legally and illegally. These unplanned deforestation and degradation agents have been attracted due to infrastructure expansion, such as waterways and roads.</p> <p>Therefore, in the baseline scenario, the project area would continue to be illegally deforested by the deforestation agents described above. With that said, the present criteria are fulfilled.</p>
<p>b) Project activities may include one or a combination of the eligible categories defined in the description of the scope of the methodology (table 1 and figure 2).</p>	<p>Within the categories of Table 1 and Figure 2 of the methodology, the present project activity falls within category B, “Avoided Deforestation with Logging in the Project Case”. The reason is that the project area contains 100% native vegetation, and a sustainable forest management plan is implemented in the project area. In addition, it is important to note that degradation is not included neither in the baseline nor in the project scenario.</p>
<p>c) The project area can include different types of forest, such as, but not limited to, old growth forest, degraded forest, secondary forests, planted forests and agroforestry systems meeting the definition of “forest”.</p>	<p>These forest classes composing the project area are named as per the Technical Manual for Brazilian Vegetation³³. The area is considered forest as per the definition of forest adopted by FAO³⁴: Land spanning more</p>

³³ Available at <<https://www.terrabrasilis.org.br/ecotecadigital/pdf/manual-tecnico-da-vegetacao-brasileira.pdf>>

³⁴ Available at <[https://www.fao.org/3/y4171e/y4171e10.htm#:~:text=FAO%202000a%20\(FRA%202000%20Main,of%20other%20predominant%20land%20uses.>](https://www.fao.org/3/y4171e/y4171e10.htm#:~:text=FAO%202000a%20(FRA%202000%20Main,of%20other%20predominant%20land%20uses.>)>

	<p>than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10%, or trees able to reach these thresholds in situ.</p> <p>No deforested, degraded or areas otherwise modified by humans were included in the project area at Project Start Date.</p>
<p>d) At project commencement, the project area shall include only land qualifying as “forest” for a minimum of 10 years prior to the project start date.</p>	<p>The project area consisted of 100% tropical rainforest in 2008 – 10 years prior to the project start date – all of which according to the Brazilian definition of forest³⁵. This was ascertained using satellite images, as described in the section Baseline Scenario of the present VCS PD.</p>
<p>e) The project area can include forested wetlands (such as bottomland forests, floodplain forests, mangrove forests) as long as they do not grow on peat. Peat shall be defined as organic soils with at least 65% organic matter and a minimum thickness of 50 cm. If the project area includes forested wetlands growing on peat (e.g. peat swamp forests), this methodology is not applicable.</p>	<p>According to the Sustainable Forest Management Plan, the project area is located within a region formed by soil types red-yellow argisols and haplic gleysols. The map will be presented in section 1.13. Therefore, none of the project region grows on peat, satisfying this applicability criterion.</p>

VT001

<p>AFOLU activities the same or similar to the proposed project activity on the land within the proposed project boundary performed with or without being registered as the VCS AFOLU project shall not lead to violation of any applicable law even if the law is not enforced;</p>	<p>The activities in the proposed project boundary do not lead to violation of any applicable law even if the law is not enforced. The sustainable forest management plan is an authorized and endorsed activity in Brazil, and Arca S/A has all the environmental and</p>
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³⁵ Brazil adopts the FAO forest definition: “Land with tree crown cover (or equivalent stocking level) of more than 10 percent and area of more than 0.5 hectares (ha). The trees should be able to reach a minimum height of 5 meters (m) at maturity in situ.” Available at: <<http://www.fao.org/docrep/006/ad665e/ad665e06.htm>>.

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

3.3 Project Boundary

- **Spatial Boundaries**

Project Area

The Project Area (PA) of the present project is covered 100% by native vegetation, being composed by 7 properties that comprise Fazenda Vale Verde (Vale Verde farm), as described at section 1.7, its location and physical boundaries detailed at section 1.12. The total area of the Fazenda Vale Verde properties is 17,450.87 ha. Given that the coordinates represented by these properties are extensive, the area contour coordinates of the fazenda (farm) composing the Arca REDD+ Project were presented as a KML file.

In accordance with VCS requirements stipulated in the Approved VCS Methodology VM0015, version 1.1, the project area may only include areas composed of “forest”³⁶ for a minimum of ten years prior to the project start date. Therefore, satellite images between 2008 and 2018 were analyzed and classified. The areas within the properties that were defined as forest in 2008 and in 2018 were identified and utilized to compose the project area. In addition, some non-forest areas were also excluded, such as rivers, rocks, and non-forest vegetation.

Therefore, the estimated Project Area is 11,954.69 ha, and is displayed below:

³⁶ Brazilian Forestry Service. Brazil adopts FAO forest definition: “Land with tree crown cover (or equivalent stocking level) of more than 10 percent and area of more than 0.5 hectares (ha). The trees should be able to reach a minimum height of 5 meters (m) at maturity in situ.” http://www.florestal.gov.br/snif/recursos-florestais/index.php?option=com_k2&view=item&layout=item&catid=14&id=158.

Figure 9. Project Area of the Arca REDD+ Project



Reference Region

The reference region (RR) is an analytical domain through which information on rates, agents, drivers and underlying causes of land-use and land-cover (LU/LC) change are obtained, and subsequently used for future projection and monitoring.

According to the applied methodology, as no applicable sub-national or national baseline is available, and the country or subnational region has not been divided in spatial units for which deforestation baselines will be developed, a baseline must be developed for a Reference Region.

The Reference Region must encompass the project area, the leakage belt and any other geographic area that is relevant to determine the baseline of the Project Area.

A geographic area with agents, drivers and overall deforestation patterns observed during the 10-year period preceding the start date, i.e. November-2010 to November-2020, was determined, representing a credible proxy for possible future deforestation patterns in the project area.

The RR will be defined in accordance with two criteria:

- The methodology recommends that projects under 100,000 ha in size should have RRs 20 - 40 times bigger than the project area.
- The conditions determining the likelihood of deforestation within the project area being similar or expected to become similar to those found within the reference region, depending

on: the landscape configuration and ecological conditions (elevation, slope, vegetation, and rainfall), socio-economic and cultural conditions, and agents and drivers of deforestation (agent groups, infrastructure or other drivers). The latter condition was the most important for adjusting the RR in order for it to more accurately represent the land-use dynamics. Specifically, this was based on the waterways (watersheds) and infrastructure (roads), which are the principal means of human and product transportation in the region. As such, from the areas directly surrounding the project, the RR was expanded to meet the nearest main waterways and roads.

It is possible to assume that the deforestation in the Project Area is likely to occur in a similar way to the observed in the Reference Region. The RR is yet to be defined.

Leakage Belt

The Leakage Belt (LB) is the land area or land areas surrounding or adjacent to the Project Area in which baseline activities could be displaced due to the project activities implemented in the project area. To define the boundary of the Leakage Belt, Opportunity cost analysis (Option I) will be applied, in accordance with Approved VCS Methodology VM0015 “Methodology for Avoided Unplanned Deforestation”, Version 1.1, 3 December 2012, Sectoral Scope 14.

The boundary of the Leakage Belt will be revisited at the end of each fixed baseline period, as opportunity costs are likely to change over time. In addition, this boundary of the Leakage Belt may have to be revisited if other VCS AFOLU projects are registered nearby the Project Area.

Opportunity cost analysis (Option I) is applicable where economic profit is an important driver of deforestation. In this context, literature studies, surveys and other credible and verifiable sources of information were used to demonstrate profitability of the main products of deforestation in the region: wood and cattle.

The LB is yet to be defined.

Forest

According to the Brazilian Forests at a Glance 2019³⁷, the Brazilian Forest Service considers as forests the lands that correspond to the vegetation typologies according to the Classification System of the Brazilian Institute of Geography and Statistics (IBGE), updated by the SIVAM project³⁸. Brazil endorses the definition of forest adopted by FAO: Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10%, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural

³⁷ Available at

<<https://www.florestal.gov.br/documentos/publicacoes/4262-brazilian-forests-at-a-glance-2019/file>>. Last visited on August 3rd, 2021

³⁸ As of 1996, through a contract signed between the Implementation Commission of the Airspace Control System - Cisceia, and its Amazon's Surveillance System Project - Sivam, and IBGE, updated the information that make up the Legal Amazon, attending, at the same time, the Systematization of Information on Natural Resources project. Information available at <https://www.terrabrasilis.org.br/ecotecadigital/pdf/manual-tecnico-da-vegetacao-brasileira.pdf>; SIVAM Project: <https://www.camara.leg.br/noticias/55929-o-que-e-o-sivam/>

or urban land use. The compliance of the Project Area with these definitions is further explained in section 1.13.

In addition, as per VM0015 methodology, the Minimum Mapping Unit (MMU) size of the LULC maps created using RS imagery shall not be more than one hectare irrespective of forest definition. Thus, the 30 m resolution LANDSAT images used for mapping have the minimum mapping unit defined at 30x30 m (0.09 ha), therefore falling easily to the methodology requirement. Details on data and image processing will be available at Appendix II.

Temporal Boundaries

- **Starting date and end date of the historical reference period**

The adopted historical reference period is August 2008 to July 2018;

- **Starting date of the project crediting period the AUD project activity**

The project has a crediting period of 30 years, from 01-August-2018 until 30-July-2048.

- **Starting date and end date of the first fixed baseline period**

The first baseline period is from 01-August-2018 to 30-July-2024.

- **Monitoring period**

The next monitoring periods will comply with the criteria established in the applied methodology, which states that the minimum time-frame of the monitoring period is one year, and the maximum time-frame is one fixed baseline period.

Carbon Pools

The applied Methodology considers six carbon pools. Their inclusion or exclusion within the boundary of the proposed AUD project activity, as well as the respective justification/explanation, are described in Table below.

Table 2. Carbon pools included or excluded within the boundary of the proposed AUD project activity

Carbon pools	Included / Excluded	Justification / Explanation of choice
Above-ground	Tree: Included	Carbon stock change in this pool is always significant
	Non-Tree: Excluded	No existence of perennial crops as final class
Below-ground	Included	Stock change in this pool is significant

Dead wood	Excluded	Excluded for simplification. This exclusion is conservative.
Harvested wood products	Included	Stock change in this pool is considered significant
Litter	Excluded	Excluded as it does not lead to a significant over-estimation of the net anthropogenic GHG emission reductions of the AUD project activity. This exclusion is conservative.

In accordance with the methodology, approximately 1/10 of the carbon stock in the below-ground pool of the initial “forest” class will be released in a ten-year interval. This is further discussed at the section Baseline Emissions.

In addition, the Methodology considers the two sources of GHG emissions listed on the Table below. Their inclusion or exclusion within the boundary of the proposed AUD project activity, as well as the respective justification/explanation, are described in the Table below.

Table 3. Sources and GHG included or excluded within the boundary of the proposed AUD project activity

Source		Gas	Included?	Justification/Explanation
Baseline	Biomass burning	CO ₂	Excluded	Excluded as recommended by the applied methodology. Counted as carbon stock change.
		CH ₄	Included	Included as non-CO2 emissions from biomass burning in the baseline scenario, according to the methodology.
		N ₂ O	Included	Included as non-CO2 emissions from biomass burning in the baseline scenario, according to the methodology.
		Other	Excluded	No other GHG gases were considered in this project activity.
	Livestock emissions	CO ₂	Excluded	Not a significant source
		CH ₄	Excluded	Excluded for simplification. This is conservative.
		N ₂ O	Excluded	Excluded for simplification. This is conservative.

Source		Gas	Included?	Justification/Explanation
Project	Biomass burning	Other	Excluded	No other GHG gases were considered in this project activity.
		CO ₂	Excluded	No biomass burning increase is predicted to occur in the project scenario compared to the baseline case. Therefore, considered insignificant.
		CH ₄	Included	Included as non-CO ₂ emissions from biomass burning in the project scenario, according to the methodology.
		N ₂ O	Included	Included as non-CO ₂ emissions from biomass burning in the project scenario, according to the methodology.
	Livestock emissions	Other	Excluded	No other GHG gases were considered in this project activity.
		CO ₂	Excluded	Not a significant source
		CH ₄	Excluded	No livestock agriculture increase is predicted to occur in the project scenario compared to the baseline case. Therefore, considered insignificant.
		N ₂ O	Excluded	As above.
		Other	Excluded	No other GHG gases were considered in this project activity.

3.4 Baseline Scenario

In the baseline scenario, forest is expected to be converted to non-forest by the agents of deforestation acting in the reference region, project area and leakage belt, as described below. Therefore, the project falls into the AFOLU-REDD category, specifically: Avoided unplanned deforestation (AUD). The revenue from the present REDD project is essential to maintain this area as standing forest, as described under additionality of the Project (section 3.5), as well as to carry out the present project's leakage management activities.

Degradation was not considered in the present REDD project, in accordance with methodology requirements, which define “forest” and “non-forest” as the minimum land-use and land-cover classes.

Analysis of historical land use and land cover change, as well as definition of classes and categories of LU/LC and the analysis of historical changes will be conducted as per VM0015 methodology.

ANALYSIS OF AGENTS, DRIVERS, AND UNDERLYING CAUSES OF DEFORESTATION

- **Identification of agents of deforestation**

As will be mentioned in “1.13 Conditions Prior to Project Initiation” of this VCS-PD, pasture accounts for virtually all the deforested land occupation in the project region.

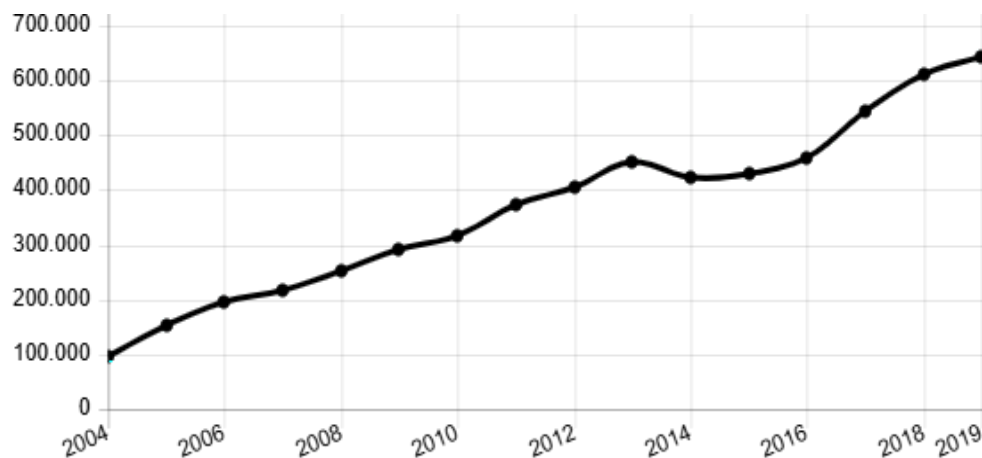
The following information is provided for the identified agent of deforestation:

a) Cattle Ranchers

Description of the main features of the main agent of deforestation: Cattle ranching (pasture) is usually financed by means of initial capital obtained in wood logging. Deforestation is considered to occur through clear-cutting of forests for logging followed by pasture installation. This deforestation pattern may be caused by private landowners themselves and also by professional land-grabbers, by means of invasions in unguarded areas. The final use of virtually all occupied lands would be cattle ranching (pasture). Thus, it can be affirmed that the deforestation agent group is composed by large and small-scale cattle ranchers supported by land-grabbers and loggers in the initial stage of deforestation. This group is composed by private owners and itinerant land-grabbers. It can also be affirmed that this group of deforestation agents is culturally and economically adapted to this “business cycle” of deforestation, whose results are clearly demonstrated in the Reference Region during the reference period.

Assessment of the most likely development of the population size of the deforestation agent group in the Reference Region, Project Area and Leakage Belt: As the main deforestation agent in the region, cattle ranching (pasture) is expected to increase in the project region. This increase is inferred from official IBGE data on cattle livestock in the municipality of Nova Bandeirantes.

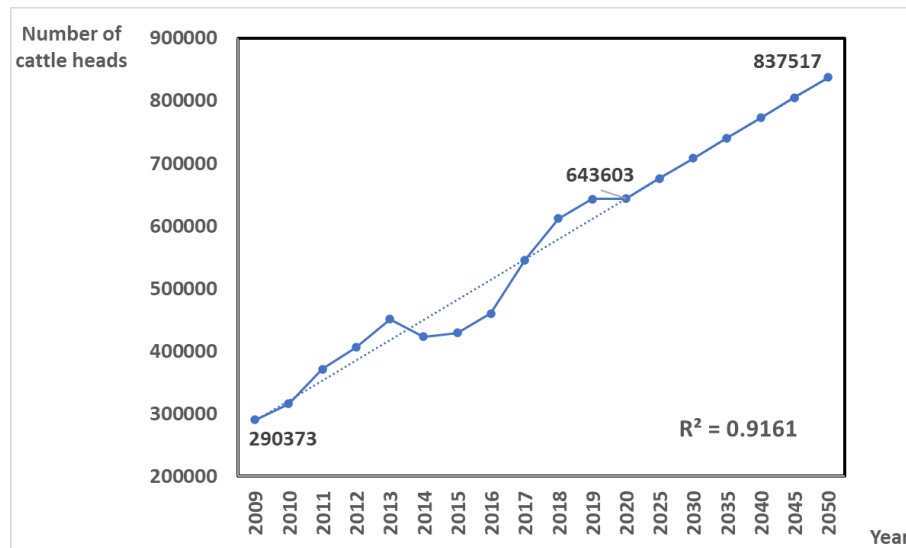
Figure 10. Historical growth of livestock numbers in the municipality of Nova Bandeirantes, State of Mato Grosso: number of cattle heads per year (IBGE, 2021)³⁹



³⁹ <https://cidades.ibge.gov.br/brasil/mt/nova-bandeirantes/pesquisa/18/0?tipo=grafico&indicador=16533> (accessed in 28/05/2021)

Given these dynamics, the herd size in Nova Bandeirantes is expected to increase by up to 30% (837,517 heads) during the project lifetime (up to 2050), according to statistical projections conducted with official IBGE data from the 10 years prior to the project start date. This significant pace of growth in cattle-related land uses will certainly impose considerable deforestation pressures in the future.

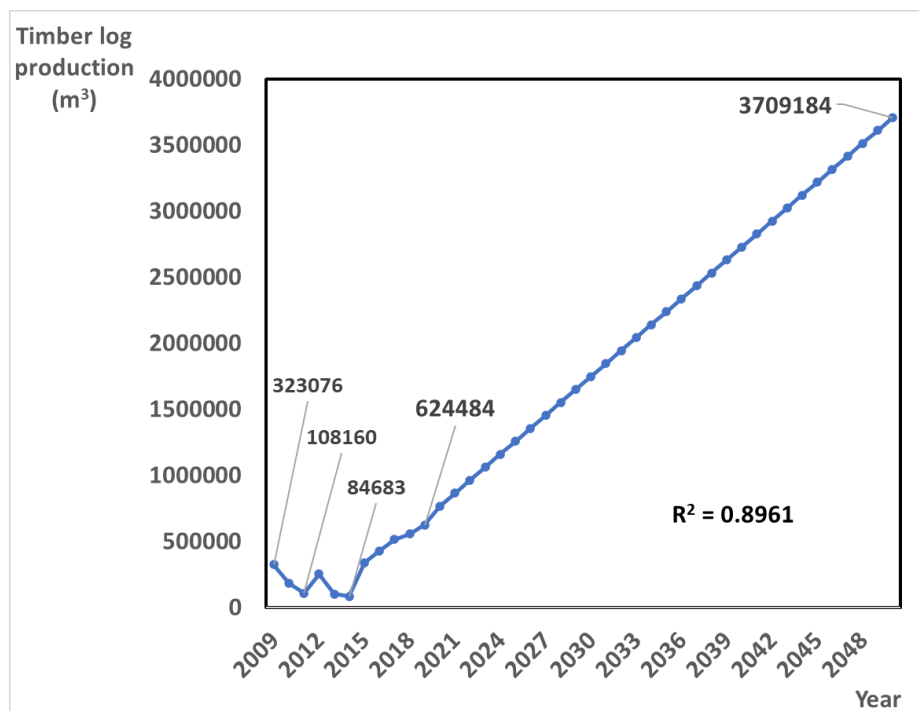
Figure 11. Projected growth of livestock numbers in the municipality of Nova Bandeirantes, State of Mato Grosso, within project lifetime (adapted from IBGE, 2021)



b) Timber harvesting

Timber harvesting can be regarded as the initial approach in a series of activities by deforestation agents, as it is the precursor of cattle ranching implementation. Official registration of formally documented logging for sale to sawmills has been volatile over the last 10 years, according to official IBGE data. Production of legal timber in Nova Bandeirantes presented a significant decrease in years 2011 (108,160 m³) and 2014 (84,683 m³). From that year afterwards, the supply of legal wood only continued to increase, reaching in 2019 624,484 m³. Based on official data from the last 6 years, it is projected that the production tends to increase during the project lifetime, reaching 3,709,184 m³ in 2050, which also points to a significant increase in timber demand for the following years of project.

Figure 12. Historical production and future projection of legally registered logs in the municipality of Nova Bandeirantes, State of Mato Grosso (adapted from IBGE, 2021)



Statistics on historical deforestation attributable to the agent group: in Nova Bandeirantes, the highest deforestation rates for the last ten years occurred in 2015 (250.1 km²), 2018 (236.9 km²) and 2020 (237.7 km²). During the historical reference period (2010 – 2020), the lowest deforestation occurred in 2010 (78 km²). Therefore, it is possible to identify a consistently increasing trend in deforestation from 2010 (1.34% yearly deforestation) to 2020 (2.31% yearly deforestation) in Nova Bandeirantes.

- **Identification of drivers of deforestation**

In this step, the factors that drive the land-use decisions of the agent group are analyzed to identify the immediate causes of deforestation. For this analysis, two sets of driver variables are distinguished:

For this analysis, two sets of driver variables are distinguished:

- a) **Driver variables explaining the quantity (hectares) of deforestation:**

Cattle prices:

According to CEPEA (2021)⁴⁰, the price of cattle increased 245% over the 2010 (R\$ 88.51 per arroba) to 2021 (R\$ 305.46 per arroba) period. This economic phenomenon can be observed

⁴⁰ <https://www.cepea.esalq.usp.br/br/consultas-ao-banco-de-dados-do-site.aspx> (accessed in 31/05/2021)

throughout the country. Young (1998) as cited in Rivero et al. (2009)⁴¹, evaluating the mechanisms that cause deforestation in the Legal Amazon, found a positive relation between the expansion of agricultural areas and the variation of prices of agricultural products. For Margulis (2001) as cited in Rivero et al. (2009), the higher the agricultural prices, the higher is the migration to rural lands, which results in deforestation;

This key driver variable is likely to have a major impact on cattle ranchers' decision to deforest. Considering that the higher is the cattle price, the higher are the profits obtained with pasture for cattle ranching, instead of maintaining standing forests. This driver also plays an important role on the definition of economic radius for cattle activities, which also influences the distances of deforestation from consumption poles;

China's demand for beef is still a reflection of swine flu, which has decimated between 40% and 60% of the country's pig stock (about one third of the world's pork production). In addition to this conjuncture factor, China also contributed to the growth of imports, since it was the only major economy in the world to record economic growth in 2020, even amid the coronavirus pandemic, and a more long-term factor, which is the gradual increase in income of the Chinese population, which results in higher consumption of more expensive proteins, such as beef. Analysts estimate that the price of beef should remain under pressure for the next few years, due to the livestock cycle: the low supply of ox is not something that can be solved immediately, because cattle is a multi-year production, as it begins to produce today to deliver animals in two, three, or four years⁴². In 2020, Brazil broke its beef export record, with more than 2 million tons sold (8% more than in 2019). For 2021, the projection indicates an increase of 5% over the value of 2020⁴³, indicating a strong trend of increased in exports for the coming years. Beef exports have continued increased, growing by almost 7% in 2020 and close to 8% in 2021, increasing by more than 15% in the biennium 2020/2021⁴⁴. Chinese importers have increased the purchases of Brazilian beef by more than 150% in 2020⁴⁵;

The dynamics of cattle prices are regulated by micro and macroeconomic scenario throughout the country and abroad, and there are no applicable project measures that can be implemented to address this driver.

⁴¹ <https://www.scielo.br/j/neco/a/iZHjd9B8ZghY7tG9G7qchTk/?format=pdf&lang=pt> (accessed in 31/05/2021)

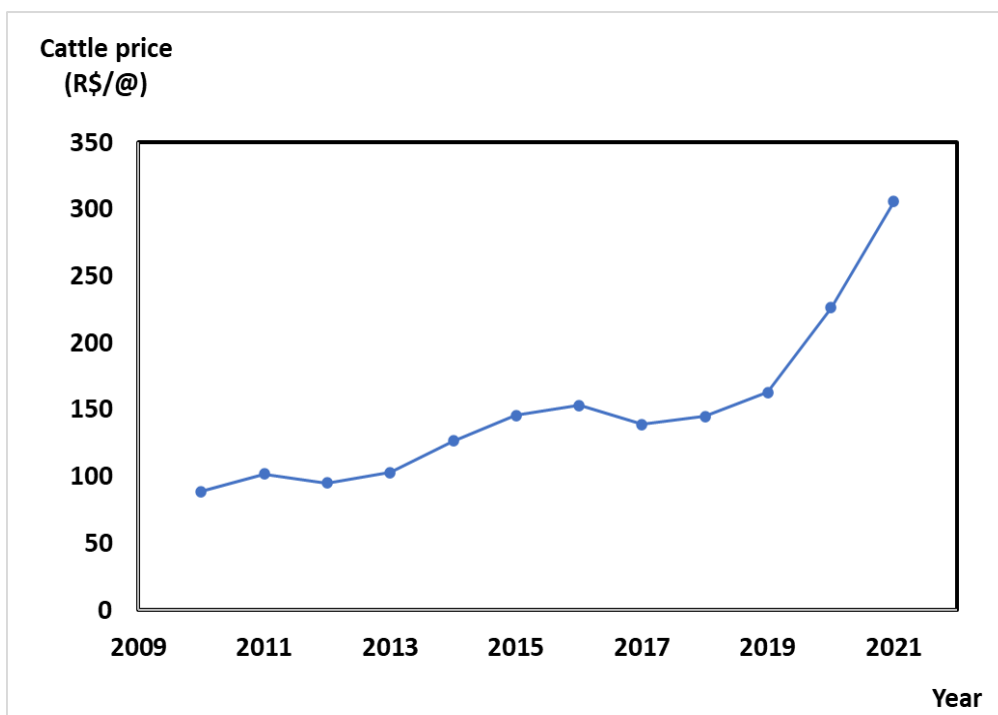
⁴² <https://www.bbc.com/portuguese/brasil-55664305> (accessed in 31/05/2021)

⁴³ <https://revistagloborural.globo.com/Noticias/Criacao/Boi/noticia/2021/01/apos-recorde-brasil-projeta-alta-de-5-nas-exportacoes-de-carne-bovina-em-2021.html#:~:text=Segundo%20Abrafrigo%2C%20pa%C3%ADs%20alcan%C3%A7ou%20marca,em%20rela%C3%A7%C3%A3o%20ao%20ano%20anterior&text=As%20exports%C3%A7%C3%B5es%20de%20carne%20bovine,by%20fortes%20shipments%20%C3%A0%20China> (accessed in 31/05/2021)

⁴⁴ <https://www.avisite.com.br/index.php?page=noticias&id=21284> (accessed in 31/05/2021)

⁴⁵ <https://www2.safras.com.br/eng/2020/09/23/meat-exports-in-brazil-will-be-an-important-differential-in-2021/> (accessed in 31/05/2021)

Figure 13. Cattle prices in Brazil (CEPEA, 2021)



- **Population density:**

This deforestation driver is associated with the dynamics of the local cattle market, as well as with the increase of potential deforestation agents working in the region. Several authors include population density as a prediction variable in deforestation models, which demonstrates that this driver has important impact on deforestation trends (Reis and Margulis, 1991; Reis, 1996; Andersen and Reis, 1997 as cited in Rivero et al. 2009);

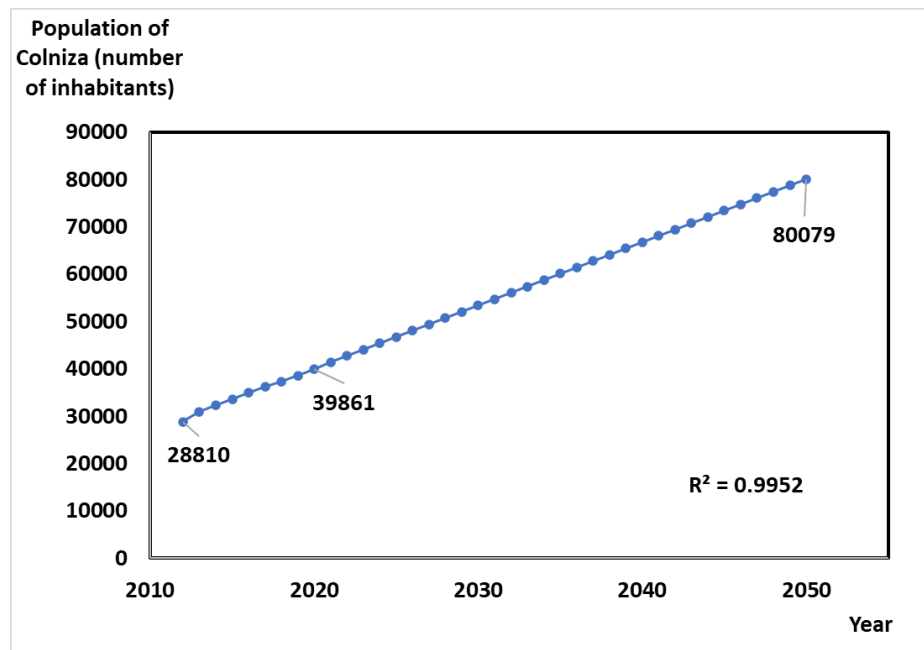
This key driver variable provides an increasing pressure of deforestation by cattle ranchers, avid for mitigating poverty by means of a profitable business;

The population of Nova Bandeirantes (municipality where the Project Area is located) is expected to virtually double (i.e., 101% approximate growth) during the project period (Figure 14). This estimate was made by means of a linear regression based on the past 10 years of official data on population, according to official IBGE data⁴⁶.

Considering that the project activity cannot regulate the population density, there will be no project measures to address this driver.

⁴⁶ https://ftp.ibge.gov.br/Estimativas_de_Populacao/ (accessed in 31/05/2021)

Figure 14. Projected population growth in the municipality of Nova Bandeirantes, Mato Grosso, Brazil



a) Driver variables explaining the location of deforestation:

These driver variables were used in deforestation projection modelling, the results of which show that such variables can predict the location of deforestation variables explaining the quantity (hectares) of deforestation:

Access to forests (existing roads and navigable rivers):

Studies on historical location of deforestation in the Reference Region can evidence that this factor has been a driver for deforestation during the historical reference period. It is broadly recognized that deforestation is accelerated in regions that have denser road networks (IMAZON, 2021⁴⁷);

The presence of roads and navigable rivers is a logical deforestation driver, since it facilitates the flow of wood and other products harvested from the forest. The capacity to transport wood logs, rapidly clear the land for pasture and place wood logs in sawmills, quickly obtaining revenues, certainly has a major impact on cattle ranchers' decision to deforest the most accessible forest areas;

The Reference Region holds a dense network of primary, secondary, and tertiary roads. The lands located near these roads are more likely to undergo deforestation, generating a progressive

⁴⁷ <https://imazongeo.org.br/> (accessed in 31/05/2021)

fishbone effect. This deforestation pattern may even increase exponentially in some cases, given that a single road may originate several other offshoot roads in the future, and so on. In a brief analysis of deforestation location, the existence of the fishbone deforestation patterns can be noted, which indicates the creation of secondary and tertiary roads in the Reference Region. Barber et al. (2014), in their study on deforestation drivers in the Amazon, conclude that proximity to transportation networks, particularly the rapidly growing unofficial road network, is a major driver of deforestation in the Amazon. Thus, it can be expected that the growth of the unofficial road network will increasingly affect the dynamics of deforestation over the project lifetime.

A similar line of reasoning is applicable to the navigable rivers surrounding the Project Area: the Juruena River is a navigable river that has been used to access the western portion of the Project Area, and is a valuable way for land-grabbers to easily invade the property and clear forests for logging and pasture. In the case of navigable rivers, the number of paths will be invariable across the project lifetime, as the creation of new navigable rivers is highly unlikely. However, the Legislative Decree Bill - PDC no. 119/2015, was prepared to authorize the use of water resources, upon prior completion of the Technical, Economic and Environmental Feasibility Studies, engineering projects and other Environmental Studies, on the Tapajos River Waterway, located in the stretch from its mouth, on the Amazon River, in the State of Pará, to the confluence of the Juruena and Teles Pires Rivers, on the border of the States of Pará, Amazonas and Mato Grosso, on the Teles Pires River waterway, located between the confluence with the Juruena River, in the State of Pará, to the mouth of the Verde River, in the municipality of Sinop, in the State of Mato Grosso, and on the Juruena River waterway, located between the confluence with the Teles Pires River, in the State of Pará, to the municipality of Juína (passing, therefore, through the municipality of Nova Bandeirantes), in the State of Mato Grosso. The Legislative Decree Bill, which foresees the dredging of stretches of the rivers to improve navigability, is currently shelved for a vote in the House of Representatives since 2019⁴⁸.

The project activity will result in the increase of the intensity of surveillance activities during the crediting period, in such a way that the main means of access to the Project Area will be continuously monitored and controlled.

Proximity to forest edges:

Studies on historical location of deforestation in the Reference Region provide evidence that this has also been a driver for deforestation over the historical reference period. Similarly to the proximity to roads and navigable rivers, the effect of this driver on deforestation decisions is related to easier logistics when clearing areas and easier and quicker revenue from logging. The proximity to forest edges has been used in similar ways by other REDD projects, including the “Fortaleza Ituxi REDD Project”, “The Suruí Forest Carbon Project”, the “RMDLT Portel-Pará REDD Project”, the “Florestal Santa Maria REDD Project”, and others. Furthermore, this deforestation driver has been used to explain the dynamics of deforestation in similar analyses (LAURANCE et

⁴⁸ <https://www.camara.leg.br/proposicoesWeb/fichadetramitacao?idProposicao=1307295> (accessed in 31/05/2021)

al. 2009⁴⁹; ROSA et al. 2013⁵⁰). According to ROSA et al. (2013), deforestation is contagious, such that local deforestation rates increase over time if adjacent locations are deforested;

The impact of this driver on cattle ranchers' decision to deforest is similar to that explained for roads and navigable rivers: this proximity facilitates the logistics of wood and other products extracted from the forest;

This key driver variable will have increased impact during next years, owing to the advance of deforestation in the region, which will bring deforestation pressures gradually closer to the boundaries of the Project Area. As stated in several parts of this PD, deforestation for logging and cattle ranching is a common practice in the project region, and this behavior tends to continue in the future. Thus, it is expected that deforested areas will attract deforestation agents continuously, in a growing deforestation trend, provoked by a "contagious" process, as stated by ROSA et al. (2013);

The project measures that will be implemented to address this driver are the same measures that are being adopted to manage leakage in this project. These measures are described in detail in "1.17 Additional Information Relevant to the Project", subtopic "Leakage Management", of this PD, and involve Sustainable Forest Management practices, increased surveillance, replication of project concepts to other areas (divulcation), engagement of local communities in inhibiting illegal occupation, and others

- **Identification of underlying causes of deforestation**

According to literature surveys and local interviews, it is concluded that the underlying causes of deforestation are as follows:

Land-use policies and their enforcement:

As previously mentioned in this PD, in spite of the legal provisions intended to preserve at least 80% of the Amazon Forest cover, the lack of law enforcement by local authorities along with the increase in production and prices of cattle has created a scenario of almost complete disregard of the mandatory provisions of the Forest Code. High rates of criminality associated with land disputes usually jeopardize efforts concerning law enforcement improvement. In addition to that, to cover vast distances of areas with low demographic density makes tracking of illegal activities and land surveillance very difficult for the authorities. Accordingly, policies implemented to address illegal deforestation only by means of command-and-control approaches have proven to be ineffective so far.

This key underlying cause has a strong effect on the decisions of the main deforestation agents, as they are at liberty to continue their illegal business activities with very low probability of being

⁴⁹ <https://doi.org/10.1016/j.tree.2009.06.009> (accessed in 01/06/2021)

⁵⁰ <https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0077231&type=printable> (accessed in 01/06/2021)

detained by authorities. There are several indications of loosening of environmental legislation in recent years, with emphasis on the following subfactors:

Greater conveniences for obtaining “forest clearing authorization”: An example of this fact can be observed in the state of Goiás, which reported a 1,100% increase in the number of permits for deforestation in 2020⁵¹. The new environmental licensing in Goiás, plus technologies that facilitate the inspection work of the Secretariat of Environment and Sustainable Development (Semad), in addition to effort in the analysis of applications, are responsible for increasing the number of deforestation permits in the State. According to data from Semad's Environmental Licensing Superintendence, there was an increase of area suppressed by 673%: 6.5 km² in 2019, to 43.8 km² in 2020. Thus, as occurred in the State of Goiás, the facilitation of the issuance of authorization for the suppression of native vegetation can occur at any time in the Amazon Biome. In fact, attempts at facilitation have been sought recently (in 2020), as indicated in the next topic.

Granting of tacit (or automatic) environmental licensing, in case of delay of the environmental agency: The controversial automatic release of environmental permits and permits by maturity of term, that is, after a period stipulated for the government agency to manifest (120 days), was voted on 29/04/2020, by a virtual plenary. Provisional Measure 915 originally referred to the so-called "Economic Freedom Law" edited by the government, but ended up bringing, within the texts, changes that directly affect the rite of environmental licensing throughout the country. The change could lead to the automatic authorization of forest suppression in the Amazon and Atlantic Forest enforced by delay, and without analysis of the environmental agency. This means that, once the 120-day period is expired, the request would be automatically granted with a tacit license⁵². Fortunately, environmentalists have reedited the Provisional Measure 915, to prevent deforestation licensing for term expiration⁵³.

Loosening legislation for timber exports: As reported by Reuters, during 2019 Brazil exported "thousands of cargoes of wood from an Amazonian port without authorization from the federal environmental agency, increasing the risk that they have been extracted from illegally deforested land". The rule change scrapping IBAMA's authorizations for most timber exports came after five cargoes of wood arrived in US and European ports without these mandatory documents. Foreign authorities contacted Brazil to ask about the missing authorizations, with the head of Ibama in Pará then retroactively granting the authorizations. The problem, however, is much more widespread than just the five shipments. In Pará state, more than half of the roughly 3,000 officially registered shipments in the past year, containing an estimated 54,000 m³ of wood that

⁵¹ <https://www.meioambiente.go.gov.br/noticias/2089-emiss%C3%A3o-de-licen%C3%A7as-para-supress%C3%A3o-de-vegeta%C3%A7%C3%A3o-tem-aumento-de-1-100-in-a-year-in-goi%C3%A1s.html> (accessed in 01/06/2021)

⁵² <https://www.correiobraziliense.com.br/app/noticia/brasil/2020/04/29/interna-brasil,849652/camara-pode-aprovar-hoje-licenciamento-ambiental-automatico.shtml> (accessed in 01/06/2021)

⁵³ <https://epbr.com.br/ambientalistas-alteram-mp-915-para-prevent-licensing-environmental-by-course-of-time/> (accessed in 01/06/2021)

left one port, did not have authorization. Companies had requested authorizations from Ibama for those shipments but exported them before the agency had time to respond. Beyond that, many shipments were exported without seeking approval from Ibama. Shipments went to the US, the Netherlands, France, Germany, Belgium, and possibly other countries. Before the rules changed, Ibama was required to give authorization to all wood exports before they leave port. Even though, most of the shipments needed only the proper paperwork to be given the green light, but only certain cargoes would be randomly selected for physical inspection⁵⁴. Arbitrarily, the president of Ibama ensured that all future unauthorized exports of wood, previously classified as illegal, became legal: he took advantage of the inattention of the press to the theme during Carnival, at the end of February 2020, to quietly revoke a 2011 Ibama policy that required an authorization from the agency before forest products could receive export licenses. From that date on, such permits would be required only for endangered tree species or in other special circumstances. With the repeal, the way was opened for large shipments of illegal timber from the Brazilian Amazon to go abroad⁵⁵. It was also revealed that in February 2020, loggers from Pará asked Ibama to change that rule: the companies wanted to sell wood abroad presenting only the Document of Forest Origin (DFO, “DOF – Documento de Origem Florestal” in Portuguese), made by the companies themselves and that originally only serves to allow the transport of the goods to the port. This change has been immediately accepted by the president of Ibama⁵⁶.

Legislation favoring landgrabbers. An analysis conducted by IPAM (Environmental Research Institute of the Amazon) showed that 35% of deforestation occurred in the Amazon between August 2018 and July 2019 was recorded in non-designated areas without information. About land regularization, environmental NGOs warn about two ongoing projects. While, in the Senate is presented Bill 510/21, in the House of Representatives it is considered to vote the Bill 2633/20⁵⁷. Commonly, both derive from the original text of Provisional Measure 910, known as “MP da Grilagem” (Landgrabbers’ Provisional Measure), for changing the law to favor large occupants of recently invaded public lands. Bill 510/21 once again changes the deadline for public land invasions to be legalized (from 2011 to 2014) and allows large areas (up to 2500 hectares) to be titrated without the need for inspection. Indeed, given that the land grabbing of undesignated public lands is responsible for more than 1/3 of the deforestation in the country, it is to be expected that amnesty for landgrabbers and illegal deforesters will be an incentive to intensify this practice in the coming years. Bill 2633/20 has a loophole that would allow to legalize, via bidding, public areas invaded after the deadline for occupation provided for by law (i.e., 2014). Of the 49.8 million hectares of forests under state and federal responsibility, but not

⁵⁴ <https://www.businesslive.co.za/bd/world/americas/2020-03-04-brazil-may-be-exporting-illegally-deforested-wood/> (accessed in 01/06/2021)

⁵⁵ <https://brasil.mongabay.com/2020/04/ao-afrouxar-leis-de-exportacao-brasil-permite-saida-de-madeira-illegal-da-amazonia/> (accessed in 01/06/2021)

⁵⁶ <https://g1.globo.com/natureza/noticia/2020/11/17/documentos-mostram-que-ibama-facilitou-exportacao-de-madeira-extraida-illegalmente.ghtml> (accessed in 01/06/2021)

⁵⁷ <https://ipam.org.br/35-do-desmatamento-na-amazonia-e-grilagem-indica-analise-do-ipam/> (accessed in 01/06/2021)

yet allocated to any category of use, 11.6 million hectares, or 23%, were irregularly declared as rural properties of particular use, in the National System of Rural Environmental Registration (CAR). If the entire area registered to date as private property was legalized, 2.2 to 5.5 million hectares could be deforested in the coming years, according to the deforestation limits defined by the Forest Code and considering that deforestation is often greater than allowed. In recent years, grabbing of non-destined public forests has increased: in 2019, it was the land category where the most forest felled in the Amazon, according to data from the deforestation alert system of INPE (National Institute of Space Research), Deter. The trend continued in 2020. Among the conditions defined by Provisional Measure 910, for appropriation of public lands by individuals, are: i) the area must be registered in the Rural Environmental Registry (CAR, “Cadastro Ambiental Rural”): as it is known, any information can be imputed in the “CAR” system until the current moment without any veracity checking, and ii) the claimant must be performing agricultural activities in the territory (i.e., should have preferably deforested the area)⁵⁸. The Provisional Measure defines that for areas that meet the requirements and have up to 15 fiscal modules (areas with up to 1,650 hectares), the title will be granted without the need for inspection. Before the Provisional Measure, the exemption from inspection was granted to areas with up to four fiscal modules (maximum 440 hectares). The exemption from the inspection may allow large illegally deforested areas to be taken over by individuals. This is because the Provisional Measure only prohibits the regularization of areas that have been subject to fines or environmental embargoes, and not all environmental violations are known and fined by the government⁵⁹. Given that the Project Area is surrounded by public lands and that cases of land-grabbing can be evidenced in the Reference Region, an abnormal increase in deforestation in that region is expected in the coming years, because Brazilian legislation increasingly gives all indications that it is very inviting to land-grabbing acts, granting amnesty to landgrabbers and agents of illegal deforestation.

The problem of lack of command-and-control measures to contain deforestation in the Amazon Biome is a widespread issue, which has been getting worse and worse every year, due to lack of personnel and infrastructure of legal authorities, in addition to schemes of corruption and violence established by illegal agents to maintain the status quo. In this context, the lack of law enforcement can be assumed to be a constant underlying cause of deforestation during the project lifetime.

Although the project activity cannot solve the problem of lack of enforcement in Brazil, it can serve as a case of success, to encourage neighbors to adopt sustainable practices as a profitable land-use alternative.

⁵⁸ <https://ipam.org.br/cientistas-mapeiam-grilagem-em-florestas-publicas-na-amazonia/#:~:text=O%20impact%20da%20grilagem%20se,main%20g%C3%A1s%20effect%20estufa> (accessed in 01/06/2021)

⁵⁹ <https://amazonia.org.br/como-a-mp-da-grilagem-pode-mudar-o-mapa-de-regioes-da-amazonia/> (accessed in 01/06/2021)

Poverty and wealth:

According to statistics on the municipality of Nova Bandeirantes/MT (IBGE, 2021)⁶⁰, in 2018, the average monthly salary was 1.9 minimum wages. The proportion of occupied people in relation to the total population was 8.8%. In comparison with other municipalities in the state, it ranked 132 out of 141, while in comparison with cities nationwide, it ranked 3834 out of 5570. Considering households with monthly incomes of up to half a minimum wage per person, it had 45.7% of the population in these conditions.

This key underlying cause has a major impact on deforestation decisions, as the main agents (cattle ranchers, operationally supported by loggers and land-grabbers) can easily recruit cheap manpower, consisting of workers seeking to sustain their families by means of this profitable activity, despite it being illegal, due to the inconsistency of law enforcement.

Over the coming years, it is not expected that the region will rapidly solve the poverty issue, as it is historically deeply rooted in the region. Given this context, poverty can be assumed to be a constant underlying cause during the project lifetime.

Although the project activity cannot solve the poverty issue, it aims to provide new jobs for local agents, who will be able to generate revenues for their families by means of a legal and sustainable initiative.

- **Analysis of chain of events leading to deforestation**

Based on the historical evidence collected, it is concluded that the implementation of the BAU activity (pasture) is usually financed by means of initial capital obtained through timber logging.

The lack of enforcement of policies and laws also affects land tenure and property rights. This aspect stimulates the action of land grabbers and squatters. Ineffective legal land registration and documentation is also a barrier to official registration of timber production from natural forests. In this scenario, a great portion of harvested wood logs can be regarded as illegal and official registration is not technically feasible.

All the above factors combine to result in uncontrolled land invasions and deforestation, followed by cattle ranching activities, a scenario which is substantiated by illegal trespassing events, and the fact that daily patrolling of the area is required by one or two employees on motorbikes, in order to combat the constant deforestation pressure.

- **Conclusion**

Available evidence about the most likely future deforestation trend within the Reference Region and Project Area is deemed to be “Conclusive”. Meaning that the hypothesized relationships between agent groups, driver variables, underlying causes, and historical levels of deforestation have been verified via literature studies and other verifiable local sources of information.

⁶⁰ <https://cidades.ibge.gov.br/brasil/mt/nova-bandeirantes/panorama> (accessed in 01/06/2021)

The weight of the available evidence conservatively suggests that the overall trend in future baseline deforestation rates will be “Increasing”. During the reference period, the deforestation rate in the Reference Region has consistently increased. In this context, the deforestation rate used in the projections was the Modelling (“c”) approach (see step 4.1.1 of the VM0015 methodology: Selection of Baseline Approach).

PROJECTION OF FUTURE DEFORESTATION

This section refers to the following steps of the VM0015 Methodology: “4.1.1: Selection of the baseline approach”; and “Step 4.1.2: Quantitative projection of future deforestation”.

3.5 Additionality

For the purpose of the present analysis, the VCS Tool for the Demonstration and Assessment of Additionality in VCS Agricultural, Forestry and Other Land Use (AFOLU) Project Activities - VT0001 version 3.0⁶¹ was applied for the project activity of the Arca REDD+ Project.

STEP 1. Identification of alternative land use scenarios to the AFOLU project activity.

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

Credible alternative land use scenarios to the present AFOLU project activity are:

- I. The continuation of the current (pre-project) land use scenario:** in this scenario, no REDD project is undertaken. The deforestation pattern identified at section 3.4 above, which describes the relationship among the agents, drivers and underlying causes present in the region during the historical period, will most likely continue to cause deforestation in the future.

This scenario involves the implementation of a sustainable forest management plan within the project boundaries of the proposed VCS REDD project, however without carrying out additional social and environmental activities, as well as activities to reduce unplanned deforestation. This scenario also complies with item iii of the methodological tool (activities similar to the proposed project activity on at least part of the land within the project boundary of the proposed VCS AFOLU project at a rate resulting from legal requirements).

Although this is a similar activity proposed by the present project, i.e. avoiding deforestation through conducting sustainable forest management activities, no other complementary activities to improve monitoring of deforestation would be carried out, such as: increased surveillance, monitoring and control by satellite images, REDD+ technical studies, social and environmental activities promoted by the SOCIALCARBON Standard, among others.

Many scientific articles conclude that sustainable forest management plans (SFMP), namely those certified, can be considered a tool for forest conservation, maintenance of forest carbon

⁶¹ Available in <<https://verra.org/wp-content/uploads/2017/11/VT0001v3.0.pdf>>

stocks, and decrease of deforestation rates in the region where they are implemented. This mainly occurs due to the use of reduced impact logging techniques, reduced social and environmental operational impacts, greater surveillance in the area, and generation of economic value for forests. On the other hand, there is a belief that forest is a non-productive natural resource and needs replacing with productive activities, such as livestock farming and agriculture, primarily in areas that require social and economic development^{62, 63, 64, 65, 66}.

However, the complexity and costs of a sustainable timber operation, added to factors such as bureaucratic constraints and fluctuation of certified timber prices, make SFMP less competitive than illegal logging. Thus, investment in additional practices to what is required by law is risky and may affect the survival of the operation. This includes activities that are complementary to the operation, specifically avoidance or reduction of unplanned deforestation/degradation and increase of monitoring of forest management areas.

Therefore, despite the contribution to forest preservation and carbon stock maintenance, SFMP areas are subject to unplanned deforestation and loss of carbon stock due to external agents, however expected to be in a lower intensity than in other areas without forest management. In addition, there are incentives for the local population to perform activities that result in unplanned deforestation, such as the expansion of low productivity agricultural activities, resulting in an ongoing necessity of cutting down the forest to maintain production.

There are many challenges to guarantee the consolidation of these areas and their effective social and environmental protection. Many conservation areas located in the Amazon still don't have an approved management plan, and a large amount does not have a management team. Furthermore, the number of Government agents assigned to these areas is greatly lacking and insufficient to carry out effective surveillance. The result is intense deforestation and pressure

⁶² BRASIL. Ministério do Meio Ambiente (MMA). Plano de ação para prevenção e controle do desmatamento na Amazônia. Brasília, 2012.

⁶³ SCHULZE, M., GROGAN, J., & VIDAL, E. 2008. O manejo florestal como estratégia de conservação e desenvolvimento socioeconômico na Amazônia: quanto separa os sistemas de exploração madeireira atuais do conceito de manejo florestal sustentável? In N. Bensusan & G. Armstrong (Eds.), *O Manejo da Paisagem e a Paisagem do Manejo* (1ª ed., pp. 161-213). Brasil: IEB

⁶⁴ VIEIRA, I. C. G.; SILVA, J. M. C.; TOLEDO, P. M. Estratégias para evitar a perda de biodiversidade na Amazônia. *Estud. av.*, São Paulo, v. 19, n. 54, Aug. 2005.

⁶⁵ HOLMES, T.P. et al. Custos e benefícios financeiros da exploração de impacto reduzido em comparação à exploração florestal convencional na Amazônia Oriental. Belém: Fundação Floresta Tropical, 2002, 66p, 2nd edition.

⁶⁶ VERWEIJ, P. *et al.* Keeping the Amazon Forests standing: a matter of values. Zeist: WWF, 2009. 72p.

on protected areas in the legal Amazon, primarily because of wood harvesting activities, agriculture, road construction and mining^{67,68}.

- II. Implementation of a sustainable forest management plan, combined with the implementation of additional activities:** In this scenario, the Project activity would be carried out on the land within the project boundary, nevertheless performed without being registered as the VCS REDD project. This scenario would include avoiding deforestation through conducting sustainable forest management activities.

Additionally, complementary activities to improve the monitoring of deforestation caused by the agents (identified in section 3.4 above) would have to be carried out, such as: increased surveillance, monitoring and control by satellite images, REDD+ technical studies, social and environmental activities promoted by the SOCIALCARBON Standard, among others. These investments are usually not made by the Brazilian Government, nor are part of sustainable forest management plans, as they are financially unattractive and not necessary to legally perform the timber harvest. Therefore, the economic feasibility of this scenario would be reduced without additional revenues from the sale of VCUs.

- III. Cattle ranching:** In this scenario, the landowner would change its activity from forest management to cattle ranching. This is a plausible scenario since cattle is one of Brazil's main economic activities, as previously described in section above, especially in Mato Grosso State.

According to the 2020's report⁶⁹, the State of Mato Grosso has the main cattle herd in Brazil, making Mato Grosso's livestock an important segment for the state's economy. The relevance of livestock in the Mato Grosso economic matrix is expressed in its participation of 20.9% of the State's GDP⁷⁰ (Agriculture and livestock segments). It is possible to observe that, since 2004, the cattle herd in the State is increasing:

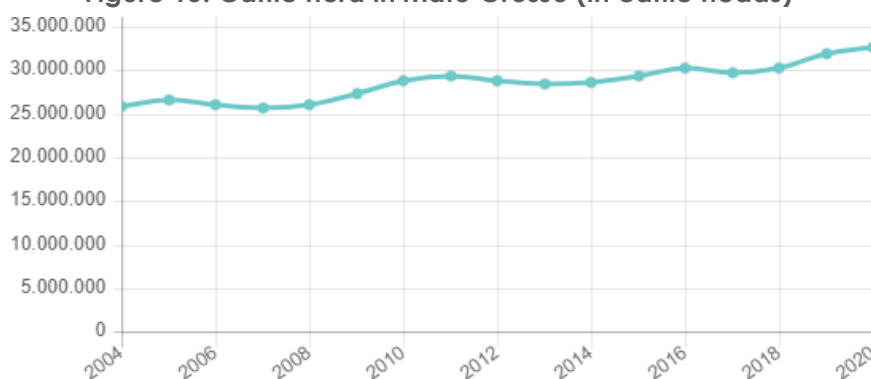
⁶⁷ VERÍSSIMO, A. *et al* (Org.). **Áreas Protegidas na Amazônia brasileira: avanços e desafios**. Belém : Imazon ; São Paulo : Instituto Socioambiental, 2011. 90 p.

⁶⁸ PORTAL AMAZONIA.COM. Unidades de Conservação do Amazonas ainda sofrem com crimes ambientais. 2013. Available at: <<http://www.portalamazonia.com.br/editoria/meio-ambiente/unidades-de-conservacao-do-amazonas-ainda-sofrem-com-crimes-ambientais/>>. Last visit on: March 12th, 2015

⁶⁹ Available at <<https://biblioteca.ibge.gov.br/index.php/biblioteca-catalogo?view=detalhes&id=784>> Last visit on: October 27th, 2021.

⁷⁰ Available at <http://www.seplag.mt.gov.br/images/files/responsive/Planejamento/INFORMACOES_SOCIOECONOMICAS/PIB/contas_regio_nais_2018.pdf> Last visit on: October 27th, 2021

Figure 15. Cattle herd in Mato Grosso (in cattle heads)



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

Scenario I and II - The application of a sustainable forest management plan is regulated in Brazil by the laws N° 12,651⁷¹, decree N° 5,975⁷², in addition to Mato Grosso's legislation, with law 233/2005⁷³. Despite the requirement to mitigate social impacts, social and environmental activities for the communities surrounding the management plan area are not required by law. According to Ribeiro⁷⁴, the main obstacles related to the approval of the sustainable forest management plan in the Amazon are: a) low investment capacity, financial and fiscal incentives, b) bureaucracy and lack of control in the SFMP approval procedure and c) lack of participation of traditional communities in the process of elaboration of the SFMP, when they are involved. Thus, it is common to see the exclusion of the surrounding community from management activities in private areas.

As it does not contain social and environmental activities to control deforestation coming from communities surrounding the property, scenario I may contain activities that are illegal or of uncertain legal status, not being enforced namely due to the lack of control⁷⁵ and government capacity. This type of illegal deforestation, apart from planned deforestation, occurs mainly due to social pressure and low HDI in the Amazon regions. Although not being in compliance with applicable mandatory laws and regulations, this scenario results from systematic lack of

⁷¹ Available at <https://www.planalto.gov.br/ccivil_03/_Ato2011-2014/2012/Lei/L12651.htm> Last visit: 02/07/2021

⁷² Available at <http://www.planalto.gov.br/ccivil_03/_ato2004-2006/2006/decreto/d5975.htm> Last visit: 02/07/2021

⁷³ Available at < <https://www.legisweb.com.br/legislacao/?id=132392>> Last visit: 27/10/2021

⁷⁴ RIBEIRO, A.C.F. et al. O PLANO DE MANEJO FLORESTAL COMO INSTRUMENTO DE DESENVOLVIMENTO SUSTENTÁVEL NA AMAZÔNIA. Direito & Desenvolvimento, ISSN 2236-0859, 2020. Available at <<https://periodicos.unipe.br/index.php/direitoedesenvolvimento/article/download/875/715/#:~:text=O%20Plano%20de%20Manejo%20Florestal%20Sustent%C3%A1vel%20D%20PMFS%20est%C3%A1%20intimamente%20relacionado,forma%20alcan%C3%A7amos%20um%20desenvolvimento%20ambiental%20>>.

⁷⁵ MOUTINHO, P. et al. **REDD no Brasil: um enfoque amazônico: fundamentos, critérios e estruturas institucionais para um regime nacional de Redução de Emissões por Desmatamento e Degradação Florestal – REDD**. Brasília, DF: Instituto de Pesquisa Ambiental da Amazônia, 2011.

enforcement of applicable laws and regulations. One of the goals of the present REDD project is to contribute to a solution to this problem by promoting the sustainable management of forest resources through increased monitoring and surveillance to avoid unplanned, illegal deforestation.

For instance, Government conservation units such as parks and sustainable use areas (APAs) are also affected by advancing deforestation and increased accessibility of the region to economic activities due to creation or improvement of infrastructure. Between 2000 and 2008, 2.25 million hectares were deforested in protected areas in Legal Amazon, and illegal exploitation of wood (degradation) has occurred in many of them.

One way to avoid increased accessibility and illegal exploitation of protected areas would be to increase the effectiveness of sanctions in cases of environmental malpractice.

The creation of protected areas is proven to be one of the most effective tools in forest conservation and the fight against deforestation. However, without management and investment, these important reserves do not attain their sustainable development goals, leaving them vulnerable to criminal activity such as land squatting, illegal wood harvesting and deforestation. This underlines the importance of REDD+ projects for forest conservation, despite being located in protected areas, because they are capable of contributing to the improvement of deforestation monitoring and control, promoting social, economic and environmental benefits in the region.

As Scenario II is the implementation of the SFMP with the addition of social environmental activities, as presented above, it is also in compliance with all applicable legal and regulatory requirements. Thus, there are no restrictions for SFMP within the areas where the Arca REDD+ Project's property is located.

Scenario III - Cattle raising in the Amazon Forest is legal as long as the owner follows the 80% Legal Reserve and Permanent Preservation Areas restriction described in the Brazilian legislation. The landowner must also provide a deforestation authorization for clearing the area for pasture. This authorization is provided by the State's government⁷⁶, in the responsible environmental agency.

Sub-step 1c. Selection of the baseline scenario

Based on the scenarios presented, Baseline Scenario will be chosen.

STEP 2. Investment Analysis

Sub-step 2a. Determine appropriate analysis method

The Arca REDD+ Project generates financial benefits other than the revenue from the sale of VCU, primarily through the commercialization of timber, as a result of the sustainable forest management plan. Thus, an investment comparison (Option II) will be carried out in order to

⁷⁶ Available at < <https://www.legisweb.com.br/legislacao/?id=132746>>

determine the project's additionality, i.e, whether the proposed project activity, without the revenue from the sale of GHG credits, is economically or financially less attractive than the other land use scenarios.

Sub-step 2b. - Option II. Apply investment comparison analysis

An investment comparison analysis will be performed to demonstrate which of the scenarios identified above is more financially attractive.

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

The following scenarios were analyzed as part of the investment analysis:

1. The implementation of a sustainable forest management plan within the project boundaries of the proposed VCS REDD project, however without carrying out additional social and environmental activities, as well as activities to reduce unplanned deforestation.
2. Implementation of a sustainable forest management plan, combined with the implementation of additional activities to reduce deforestation.
3. Land use change to cattle ranching.

Sub-step 2d. - Sensitivity analysis

The objective of this sub-step is to demonstrate that the conclusion regarding the financial attractiveness of the project is robust to reasonable variations in the critical assumptions. The investment analysis provides a valid argument in favor of additionality only if it consistently supports the conclusion that the proposed VCS AFOLU project without the financial benefits from carbon credits is unlikely to be financially attractive.

STEP 4. Common practice analysis

The previous steps shall be complemented with an analysis of the extent to which similar activities have already diffused in the geographical area of the Arca REDD+ Project activity. Similar activities to the proposed REDD project, i.e., that are of similar scale, take place in a comparable environment, inter alia, with respect to the regulatory framework and are undertaken in the relevant geographical area, shall be analyzed. Other registered VCS AFOLU Project activities shall not be included in this analysis.

3.6 Methodology Deviations

This project activity does not apply any methodology deviations.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Describe the procedure for quantification of baseline emissions and/or removals in accordance with the applied methodology. Include all relevant equations, and explain and justify all relevant methodological choices (e.g., with respect to selection of emission factors and default values).

4.2 Project Emissions

Describe the procedure for quantification of project emissions and/or removals in accordance with the applied methodology. Include all relevant equations, and explain and justify all relevant methodological choices (e.g., with respect to selection of emission factors and default values).

4.3 Leakage

Describe the procedure for quantification of leakage emissions in accordance with the applied methodology. Include all relevant equations, and explain and justify all relevant methodological choices (e.g., with respect to selection of emission factors and default values).

4.4 Net GHG Emission Reductions and Removals

Describe the procedure for quantification of net GHG emission reductions and removals. Include all relevant equations. For AFOLU projects, include equations for the quantification of net change in carbon stocks.

Provide the ex-ante calculation (estimate) of baseline emissions/removals, project emissions/removals, leakage emissions and net GHG emission reductions and removals in the table below.

For data and parameters monitored, use estimates. Document how each equation is applied, in a manner that enables the reader to reproduce the calculation. Provide example calculations for all key equations, to allow the reader to reproduce the calculation of estimated net GHG emission reductions or removals.

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
Year A				
Year B				
Year C				
Year...				
Total				

5 MONITORING

5.1 Data and Parameters Available at Validation

Complete the table below for all data and parameters that are determined or available at validation, and remain fixed throughout the project crediting period (copy the table as necessary for each data/parameter). Data and parameters monitored during the operation of the project are included in Section 5.2 (Data and Parameters Monitored) below.

Data / Parameter	
Data unit	Indicate the unit of measure
Description	Provide a brief description of the data/parameter
Source of data	Indicate the source(s) of data
Value applied	Provide the value applied
Justification of choice of data or description of measurement methods and procedures applied	Justify the choice of data source, providing references where applicable. Where values are based on measurement, include a description of the measurement methods and procedures applied (e.g., what standards or protocols have been followed), indicate the responsible person/entity that undertook the measurement, the date of the measurement and the measurement results. More detailed information may be provided in an appendix.
Purpose of Data	Indicate one of the following: <ul style="list-style-type: none"> Determination of baseline scenario (AFOLU projects only) Calculation of baseline emissions

	<ul style="list-style-type: none"> • Calculation of project emissions • Calculation of leakage
Comments	Provide any additional comments

5.2 Data and Parameters Monitored

Complete the table below for all data and parameters that will be monitored during the project crediting period (copy the table as necessary for each data/parameter). Data and parameters determined or available at validation are included in Section 5.1 (Data and Parameters Available at Validation) above.

Data / Parameter	
Data unit	Indicate the unit of measure
Description	Provide a brief description of the data/parameter
Source of data	Indicate the source(s) of data
Description of measurement methods and procedures to be applied	Specify the measurement methods and procedures, any standards or protocols to be followed, and the person/entity responsible for the measurement. Include any relevant information regarding the accuracy of the measurements (e.g., accuracy associated with meter equipment or laboratory tests).
Frequency of monitoring/recording	Specify measurement and recording frequency
Value applied	Provide an estimated value for the data/parameter
Monitoring equipment	Identify equipment used to monitor the data/parameter including type, accuracy class, and serial number of equipment, as appropriate.
QA/QC procedures to be applied	Describe the quality assurance and quality control (QA/QC) procedures to be applied, including the calibration procedures where applicable.
Purpose of data	Indicate one of the following: <ul style="list-style-type: none"> • Calculation of baseline emissions • Calculation of project emissions • Calculation of leakage
Calculation method	Where relevant, provide the calculation method, including any equations, used to establish the data/parameter.
Comments	Provide any additional comments

5.3 Monitoring Plan

Describe the process and schedule for obtaining, recording, compiling and analyzing the monitored data and parameters set out in Section 5.2 (Data and Parameters Monitored) above.

Include details on the following:

- *The methods for measuring, recording, storing, aggregating, collating and reporting data and parameters. Where relevant, include the procedures for calibrating monitoring equipment.*
- *The organizational structure, responsibilities and competencies of the personnel that will be carrying out monitoring activities.*
- *The policies for oversight and accountability of monitoring activities.*
- *The procedures for internal auditing and QA/QC.*
- *The procedures for handling non-conformances with the validated monitoring plan.*
- *Any sampling approaches used, including target precision levels, sample sizes, sample site locations, stratification, frequency of measurement and QA/QC procedures.*

Where appropriate, include line diagrams to display the GHG data collection and management system.

APPENDIX

Use appendices for supporting information. Delete this appendix (title and instructions) where no appendix is required.