JURUENA RIVER REDD+ PROJECT

Document Prepared by Ecológica Assessoria Ltda.

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1 PROJECT DETAILS

1.1 Summary Description of the Project

In Brazil, 58.39% of its entire 851,029,591.4 ha territory[1] is covered by forests, representing almost 497 million hectares of forest area[2] 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 2020[3]. 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 beef[4]. Simultaneously, Mato Grosso also registers high deforestation rates, reaching in 2018 the highest in 10 years [5]; 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 Amazon[6].

The primary objective of the Juruena River REDD+ Project is to avoid the unplanned deforestation (AUD) of the 45,675.15 ha project area, consisting of 100% Amazon rainforest. The project area is located within 18 private properties, which are located in Cotriguaçu, in the State of Mato Grosso, Southern Amazon. A Sustainable Forest Management Plan is also carried out in some of the properties.

In addition to the pressure of cattle raising and other important activities in the region, the properties are located between a settlement project and a mining area, in addition to having, to the south, an indigenous land. Therefore, the area is a vulnerable target of invasions and illegal actions, such as fires and theft of wood. Thus, monitoring and vigilance actions are fundamental to guarantee the standing forest.

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[1] IBGE – Instituto Brasileiro de Geografia e Estatística. Brazil. 2019. 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.ghtml

[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.ghtml

[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 3,800 ha of deforestation, equating to 1,384,740 tCO2e in emissions reductions over the 30-year project lifetime (12-November-2021 to 11-November-2050), with an annual average of 46,150 tCO2e

1.2 Sectoral Scope and Project Type

Sectoral Scope: 14 - Agriculture, Forestry, Land Use

Project Category: Avoided Unplanned Deforestation (AUD project activity)

This is not grouped project.

1.3 Project Eligibility

According to the VCS Methodology Requirements v4.0[7], 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 VC 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;
- Non-performance risk will be analyzed in accordance with the VCS Program document AFOLU Non-Permanence Risk Tool.

1.4 Project Design

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

This project has been designed as an Avoided Unplanned Deforestation applying VM0015 methodology, Version 1.1.3 from December 2012.

Eligibility Criteria

Not applicable. This is not a grouped project.

1.5 Project Proponent

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Email	

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Organization name	Beatris Tormena Fabris Gradela
Contact person	Beatris Tormena Fabris Gradela

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1.6 Other Entities Involved in the Project

Organization name	Sustainable Carbon Projetos Ambientais Ltda.

Role in the project	Carbon credits trader and Registry Manager
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Organization name	Uezu Planejamento Ambiental S/S LTDA
Role in the project	Geographic Information System – GIS

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1.7 Ownership

The project area is located at Cotriguaçu, in the State of Mato Grosso, and is composed by the following areas:

- Fazenda Tucano Amarelo
- Fazenda Tico Tico
- Fazenda Sanga My
- Fazenda Pardal
- Fazenda Nhuma
- Fazenda May Tay
- Fazenda Mutum
- Fazenda Melro
- Fazenda Jaó
- Fazenda Jacutinga
- Fazenda Flor do Ipe
- Fazenda Fênix
- Fazenda Curió
- Fazenda Cardeal
- Fazenda Canário
- Fazenda Beija Flor
- Fazenda Arara Azul
- Fazenda Águia Branca

These properties are owned by the Project Proponents. The legal documents proving the land title and ownership of the property will be made available to the auditors during the validation process, in the Appendix.

1.8 Project Start Date

During 2020, two events marked a change in the conduct of activities in the properties of the Project Area. Initially, in August, a formal complaint to the State's Police was filled due to an encroachment

attempt, probably by miners, in Fazenda Fenix. Five days later, a new complaint was filled, as a result of a criminal fire in the same place, possibly as a retaliation for actions previously taken.

From this, the owners decided to find new ways to keep the forest standing on the property, in addition to being able to generate income to expand the monitoring and inspection of the area, constantly threatened by the mining located at East of the properties, and the settlement to the West. Thus, they learned about the carbon market and got in touch with Ecológica Assessoria, considering the area to a REDD project. As the analysis were made, as an initial way of guaranteeing the forest preserved for the project, avoiding new invasions, they chose to hire a team responsible monitoring and forest surveillance. Therefore, the chosen Project Start Date is the contract signature with the monitoring team, November 12th, 2020, as it marks the first action to effectively conserve the properties.

1.9 Project Crediting Period

The project has a crediting period of 30 years, from 12-November-2020 to 11-November-2050.

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_2e)
2021	41,768
2022	42,691
2023	43,613
2024	44,535
2025	45,458
2026	46,379
2027	47,302

2028	48,223
2029	49,146
2030	50,067
2031	43,746
2032	45,030
2033	45,953
2034	46,874
2035	47,797
2036	48,718
2037	49,641
2038	50,562
2039	51,485
2040	52,406
2041	39,565
2042	41,175
2043	42,098
2044	43,019
2045	43,942
2046	44,865
2047	45,786

2048	46,709
2049	47,630
2050	48,553
Total estimated ERs	1,384,736
Total number of crediting years	30
Average annual ERs	46,158

1.11 Description of the Project Activity

The principal objective of the present REDD project is the conservation of 45,675.15 ha of Amazon rainforest area within the property described in section 1.12 of the present VCS PD. This will be achieved through avoidance of unplanned deforestation. It is important to note that this project is not located within a jurisdiction covered by a jurisdictional REDD+ program.

The present REDD project is expected to avoid a predicted 3,800 ha of deforestation, equating to 1,384,736 tCO_2e in emissions reductions over the 30-year project lifetime (12-November-2020 to 11-November-2050), including buffer (RF), leakage (DLF) and project efficiency (EI) reductions.

The main deforestation agents within the Juruena River REDD+ project region are: cattle ranching, mainly producing beef, and timber harvesters, acting both legally and illegally. The area is also vulnerable to illegal mining, and inspection actions and equipment destruction took place even within protected areas in the region[8],[9]. Some of the properties have frontier with the Garimpo Juruena, a mining area, as presented in figure below:

[8] Illegal mining is deactivated in state park and equipment is destroyed in MT < https://g1.globo.com/mt/mato-grosso/noticia/2021/04/26/garimpo-ilegal-e-desativado-em-parque-estadual-e-equipamentos-sao-destruido-em-mt.ghtml > Last visited on October 28th, 2021.

[9] Inspection destroys illegal mine set up in conservation park in MT <https://g1.globo.com/mt/mato-grosso/noticia/2020/06/11/fiscalizacao-destroi-garimpo-ilegal-montado-em-parque-de-conservacao-em-mt.ghtml> Last visited on October 28th, 2021.

Figure 1. Location of the Garimpo Juruena

In recent years, the project region has been deforested for the expansion of agricultural and livestock activities, mainly due to the advancement of the so-called arc of deforestation from the south of the Amazon biome. This pressure is expected to continue, given the globalization of markets in the Amazon region and international development policies planned for the region[10].

According to NASA, deforestation in the Amazon Rainforest is occurring most rapidly along a curve that hugs the southeastern edge of the forest that scientists and resource managers have come to call the "Arc of Deforestation." The land is cleared for cattle ranching, small-scale subsistence farming, logging, and, increasingly, soybean production for world markets[11].

Image below shows that deforestation occurred, in the period of 1997 to 2009, in a concentrated pattern mainly along roads and in colonization projects, covering mainly the states of Pará, Maranhão, Mato Grosso, Rondônia and the south of Amazonas.

[10] Nepstad, D. C.; C. M. Stickler e O. T. Almeida. 2006. Globalization of the Amazon Soy and Beef Industries: Opportunities for Conservation. Conservation Biology 20(6):1595-1603.

[11] Deforestation patterns in the Amazon – Available at < https://www.earthobservatory.nasa.gov/images/4385/deforestation-patterns-in-the-amazon> Last visited on 22/07/2021.

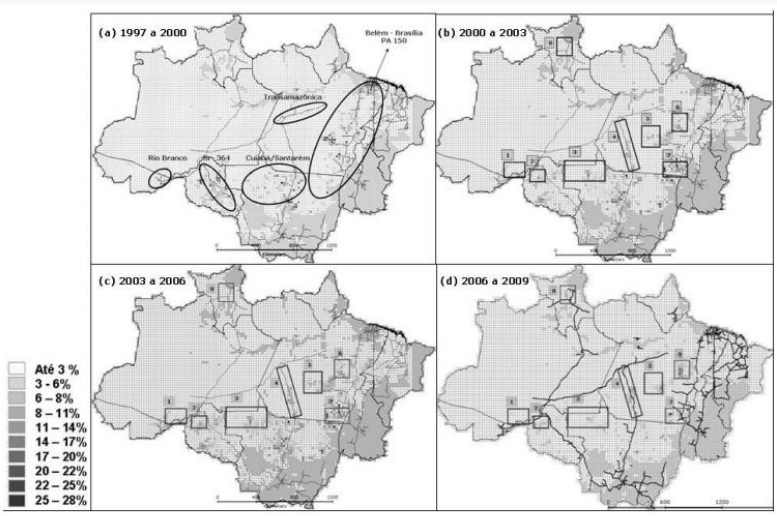


Figure 2. Arc of Deforestation in the Amazon Rainforest[12]

This tendence is still observed nowadays, the region being the main route for cattle raising in the Amazon region. Map below presents the location of the project area in the to the arc of deforestation, estimated from the pattern of deforestation observed in the Amazon.

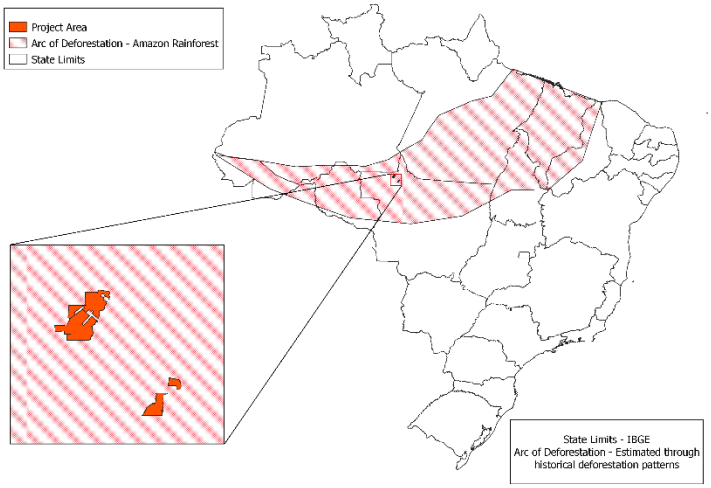


Figure 3. Project area and the Arc of Deforestation

Thus, conservation actions are essential in the region, establishing a barrier against the advancement of deforestation, making an important contribution to the conservation of Southern Amazon biodiversity and also to climate regulation in Brazil and South America.

[12] VALERIANO et al., Dimensões do desmatamento na Amazônia Brasileira. In. George Martine, População e Sustentabilidade na era das mudanças ambientais globais: contribuições para uma agenda brasileira. p. 223-238, Inprint, Junho, 2012. Available at < http://www.dpi.inpe.br/geocxnets/wiki/lib/exe/fetch.php?media=urbis:visita-tecnica:inpe_desmatamento_abep_rio_20_mar_2012_revisado.pdf>

The project will combine conservation with forest management, through a Sustainable Forest Management Plan in some areas. The increased complexity and costs associated with the sustainable operation of the forest as well as other factors such as bureaucratic constraints and price fluctuations of certified timber prices make sustainable forest management less competitive than illegal logging. Thus, revenue from the sales of the Verified Carbon Units (VCUs) is essential for the project activity to compete with profitable alternative land use scenarios. In addition, the carbon credit revenue is important to mitigate encroachment and illegal actions within and around the Project Area. This surveillance allows the management of the environmental situation of the property during the development of the forest exploration work, in addition to ensuring compliance with the requirements set out in the current legislation.

Environmental education and other social activities that benefit the local community will be supported, as well as improving the control of deforestation. The SOCIALCARBON® Standard is being applied to assess and monitor the project's contribution to sustainability using six key indicators: Biodiversity; Nature; Financial; Human; Social and Carbon Resources, thus improving the social and environmental conditions in the project region.

1.12 Project Location

The project area is situated in the municipality of Cotriguaçu, in the State of Mato Grosso, a region known as Southern Amazon. This municipality is located around 1,000 km from Cuiabá, capital of the State of Mato Grosso. The project area is covered 100% by native vegetation, totaling 45,675.15 ha.

The closest access road is BR 174, called Manaus-Boa Vista, highway connecting the Brazilian states of Mato Grosso, Rondônia, Amazonas and Roraima to Venezuela. The properties also make frontier to the Juruena River.

In accordance with VCS requirements, stipulated in Approved VCS Methodology VM0015, version 1.1, the project area may only include areas composed of "forest"[13] for a minimum of ten years prior to the project start date. Therefore, satellite images between 2010 and 2020, were analyzed and classified. The areas within the property that were defined as forest in 2010 and in 2020 were separated and utilized to compose the project area. In addition, some non-forest areas were also excluded, such as rivers, rocks, and non-forest vegetation.

1.13 Conditions Prior to Project Initiation

General characteristics of the project area and reference region

The Juruena River REDD+ Project makes an important contribution to the conservation of Southern Amazonia's biodiversity as well as to climate regulation in Brazil and South America. The region is important agriculture and cattle ranching center, where native forest is vulnerable to the advancement of soy plantation, for example.

The general characteristics of the project area and reference region are described below.

[13] 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." Available at: <http://www.florestal.gov.br/snif/recursos-florestais/index.php?option=com_k2&view=item&layout=item&catid=14&id=158>. Last visit on: 08 October 2020.

Aspect	Characteristics
Territory	
Climate	The municipalities of Colniza[14] and Cotriguaçu are located in the Humid Continental Equatorial climate unit, with a defined dry season of the "South Amazonian Depression", subunit IA1, which corresponds to the northwestern corner of the State of Mato Grosso. The low latitude (8º to 9º South Latitude), with altitudes from 100 to 300 meters, defines a megathermic condition, where the average annual temperatures oscillate between 25.7ºC and 24.7ºC, and the maximum between approximately 32.0ºC and 33.0ºC, and the minimum from 19.5ºC to 21.0ºC. In reality, the biggest thermal differences (amplitude) are associated with the day and night cycle and not with the seasonal cycle, that is, the daily thermal amplitude of this unit varies between 10º and 12º, while the annual amplitude is between 1ºC and 2ºC. The average total rainfall ranges from 2,000 to 2,500 mm. The dry season occurs from June to September (4 months) with an intensity of 200 to 250 mm of water deficiency. The water surplus is high, ranging from 100 to 1,200 mm, with a duration of 8 months (September/October to April).
Biodiversity	In addition to have a great value as carbon sinks and flora species, the local forests shelter a remarkable fauna diversity. According to the "Management Plan - Juruena National Park" (2011), located near the Project Area, there are at least two bird species identified as endangered according to IUCN (2007) criteria: the harpy eagle or harpy (*Harpia harpyja*), classified in the "almost threatened" category, and the black-throated brood (*Clytoctantes atrogularis*), in the "critically endangered" category. 

[14] http://pmsb106.ic.ufmt.br/wp-content/uploads/2018/04/PMSB_Colniza.pdf (accessed in 17/05/2021)

Figure 4. Harpy eagle or harpy (*Harpia harpyja*) (by Rafael Becker @rafabecker.nature)[15]

Figure 5. Black-throated brood (*Clytoctantes atrogularis*) (by Edson Guilherme)[16]

Among the species of mammals threatened with extinction, the inventory of the Juruena National Park identified the Giant Anteater (*Myrmecophaga tridactyla*), the Giant armadillo (*Priodontes 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 6. Giant Anteater (*Myrmecophaga tridactyla*)[17]

[15] https://www.ufrgs.br/faunadigitalrs/harpia-harpia-harpyja/ (accessed in 06/05/2021)

[16] https://www.researchgate.net/publication/290304061_A_range_extension_for_varzea_thrush_turdus_sanchezorum_in_South-West_Amazonia/figures?lo=1 (accessed in 06/05/2021)

[17] https://ala-bie.sibbr.gov.br/ala-bie/species/127145 (accessed in 06/05/2021)

Figure 7. Giant armadillo (*Priodontes maximus*)[18]

Figure 8. Giant otter (*Pteronura brasiliensis*)[19]

[18] https://www.icmbio.gov.br/portal/component/content/article/7093-priodontes-maximus (accessed in 06/05/2021)

[19] http://www.zoo.df.gov.br/ariranha/ (accessed in 06/05/2021)

Figure 9. Zogue-zogue (*Callicebus cinerascens*) (by Ricardo Sampaio)[20]

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) as an endangered species, according to the IUCN (2007) list.

Figure 10. Black Caiman (*Melanosuchus niger*)[21]

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 *Macrodontia cervicornis* was mentioned, which is subject to illegal collection for the international clandestine market[22].

Figure 11. *Morpho menelaus*, *Marpesia furcula*, and *Eunica yburnean* (Management Plan - Juruena National Park)

[20] https://www.researchgate.net/publication/256496436_Novos_registros_com_uma_extensao_da_distribuicao_geografica_de_Callicebus_cinerascens_SPIX_1823/figures?lo=1 (accessed in 06/05/2021)

[21] https://www.museu-goeldi.br/assuntos/colecoes/parque-zoobotanico/rpteisjacar.png/view (accessed in 06/05/2021)

[22] http://g1.globo.com/Amazonia/0,,MUL1099738-16052,00-SITES+ESTRANGEIROS+VENDEM+INSETOS+BRASILEIROS+NA+INTERNET.html (accessed in 07/05/2021)

Figure 12. Titan beetle (*Titanus giganteus*)[23]

Figure 13. Endangered beetle *Macrodontia cervicornis*, which is illegally commercialized[24]

Native 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 biome, corresponding to 480,215 km² (54%). In the center of the state, the Cerrado biome covers 354,823 km² (39%), and a smaller area is occupied by the Pantanal biome, at the south, corresponding to 60,885 km² (7%). Both Project Area and Reference Region are 100% covered by Amazon Rainforest, and are composed by 16 different phytophysiognomies. Due to the drivers indicated above, the State of Mato Grosso has several "hot spots" of deforestation, as stated by ICV. The greatest part of these spots is located in Colniza, as demonstrated in Figure 1414, which includes the Project Area, located in Cotriguaçu. According to the authors, in 2018, 55% of all deforested area in the state was concentrated in 10 municipalities. In this context, Colniza and Aripuanã, located in the Northwest, stand out, which were responsible for a quarter of the total mapped deforestation. Most of the deforestation occurred in private rural properties (i.e., similar to the Project Area), which represents 83% of the total deforested in 2018.

[23] https://netnature.wordpress.com/2013/10/08/besouro-gigante/ (accessed in 07/05/2021)

[24] http://g1.globo.com/Amazonia/0,,MUL1099738-16052,00-SITES+ESTRANGEIROS+VENDEM+INSETOS+BRASILEIROS+NA+INTERNET.html (accessed in 07/05/2021)

Another important feature is that more than 50% of deforestation occurs in areas above 100 hectares. SEMA-MT (Secretaria de Estado do Meio Ambiente - Mato Grosso; State Secretariat for the Environment) released alarming figures on the legality of deforestation in the state in 2018[25]: 98.4% of all deforestation is carried out without any authorization from the environmental agency.

Data from PRODES (2021)[26] points Colniza as the 8th municipality with the highest deforestation rate in the Amazon, with 2,063.72 km² deforested in 2020 (2.29%), as shown in Figure 15. Cotriguaçu, in turn, is ranked 39th in deforestation rate in the Amazon, with 551.75 km² (0.61%) deforested in 2020. The historic deforestation rates in Colniza and Cotriguaçu are presented in Figures below, respectively.

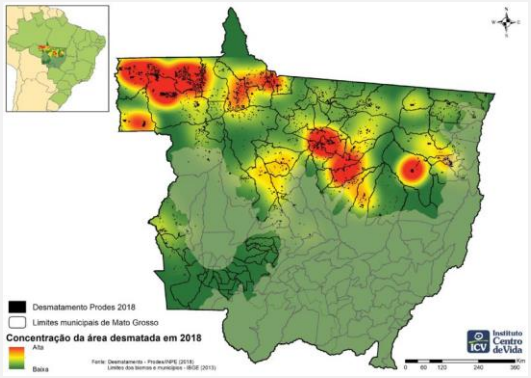


Figure 14. Deforestation concentration regions detected between August 2017 and July 2018 in the Mato Grosso forest area (Prodes/Inpe, 2018)[27]

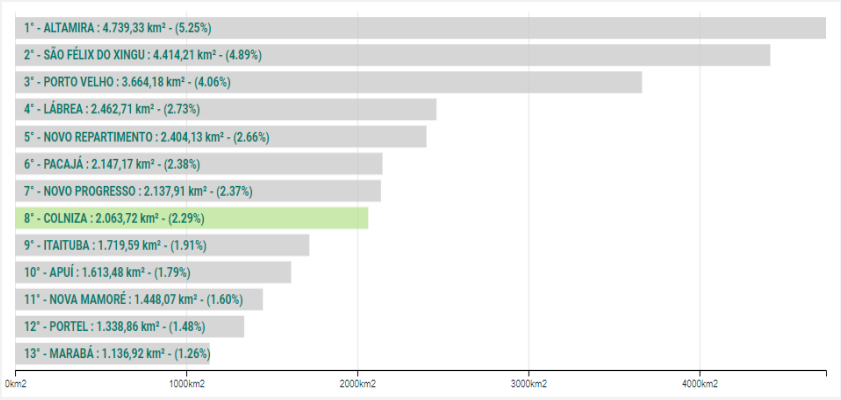
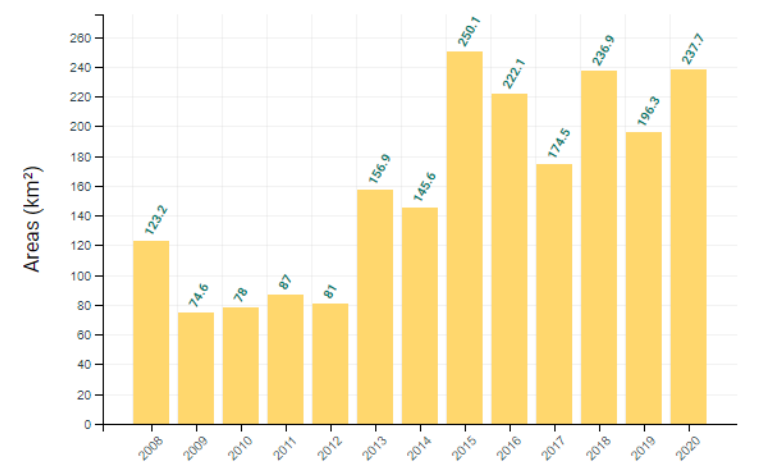


Figure 15. Colniza placement among the highest deforester municipalities (Prodes/Inpe, 2021)

[25] http://transparencia.sema.mt.gov.br/conteudo/monitoramento/desmatamento/layout_infografo_desmate_2017_2.pdf (accessed in 05/05/2021)

[26] http://terrabrasilis.dpi.inpe.br/app/dashboard/deforestation/biomes/amazon/increments (accessed in 05/05/2021)

[27] https://www.icv.org.br/drop/wp-content/uploads/2018/12/2019-AnaliseDesmatamentoProdesMatoGrosso-v2.pdf (accessed in 04/05/2021)

	 **Figure 16. Historic deforestation rates in Colniza (Prodes/Inpe, 2021)**
Protected Areas	There are 111 protected areas in Mato Grosso State, 23 of them are federal, 43 are managed by the State and 45 by the municipalities[28]. As for the classification of the federal units, we have: - 16 Sustainable Use Areas (US), 15 of them are Private Natural Heritage Reserves (RPPN) and 01 is an Environmental Protection Area (APA); - 07 Full Protection Areas (PI), 04 of them are National Parks (PARNA) and 03 are Ecological Stations (ESEC).[29]
Water resources	The State of Mato Grosso is one of the main reserves of fresh water in the world. The main sub-basins in the state are Guaporé, Aripuanã, Juruena-Arinos, Teles Pires and Xingu. Rivers from the Amazon Basin drain 2/3 of the state's territory[30]. Colniza belongs to the regional hydrographic Basin of Aripuanã, which presents an annual flow between 20,000 - 40,000 hm^3. The Juruena and Aripuanã rivers are the main water courses in Cotriguaçu and Colniza, draining them in the south-north direction. The city of Colniza is located at the headwaters of the Perseverança stream, a tributary of the right bank of the Aripuanã river. Figure below shows the hydrography that covers the municipalities of Colniza and Cotriguaçu.

[28] Available at <http://www5.sefaz.mt.gov.br/-/unidades-de-conservacao-uma-proposta-para-conter-a-destruicao-dos-ecossistemas#:~:text=UNIDADE%20DE%20CONSERVA%C3%87%C3%83O%20Atualmente%2C%20existem,s%C3%A3o%20estaduais%20e%2045%20municipais.>

[29] Available at <http://www.sema.mt.gov.br/site/index.php/component/content/article/244-unidades-administrativas/unidades-de-conserva%C3%A7%C3%A3o/unidades-de-conserva%C3%A7%C3%A3o-federais/137-unidades-de-conserva%C3%A7%C3%A3o-federais?Itemid=474>

[30] Information available at < http://www.mt.gov.br/geografia>

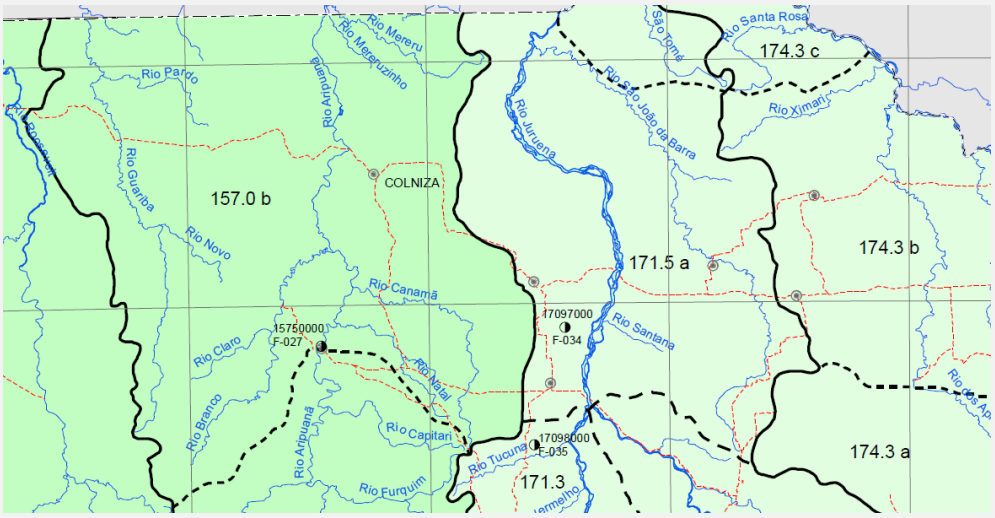
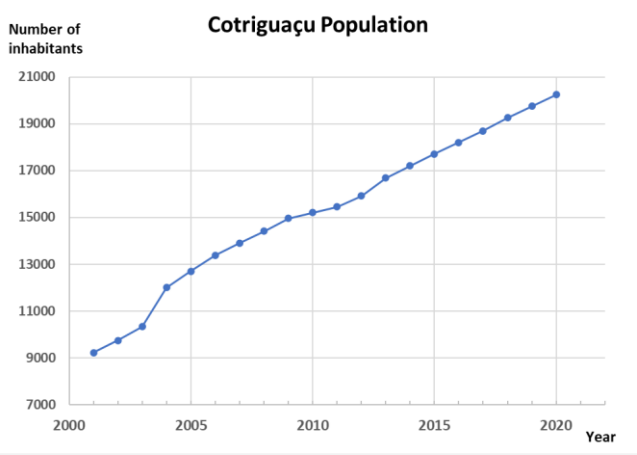


Figure 17. Water bodies in Cotriguaçu and Colniza[31]

Socio-economic conditions

Nowadays, Colniza is in second place in rural agrarian settlements in the State of Mato Grosso. From then on, the municipality did not stop growing[32]. In the last Census, in 2010, the estimated population of the municipality was 26,381. In Cotriguaçu, 14,983. The historical series of population growth is shown in Figures below

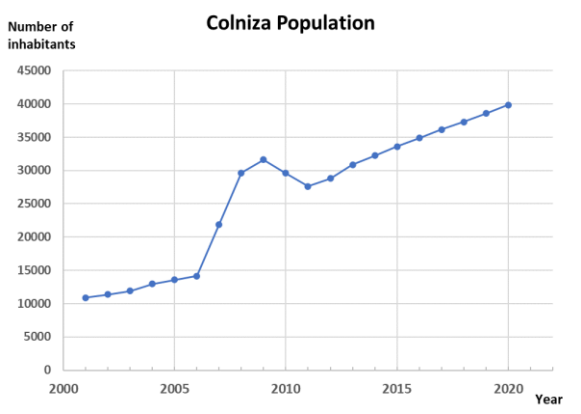
Figure 18. Timeseries of population of the municipality of Cotriguaçu and Colniza (IBGE, 2021)[33]



[31] http://www.seplan.mt.gov.br/documents/363424/11018205/PROJETO+ATLAS.rar/dacf2572-a60a-f0e9-7080-83d06bd81051 (accessed in 29/06/2021)

[32] https://cidades.ibge.gov.br/brasil/mt/colniza/historico (accessed in 02/05/2021)

[33] https://ftp.ibge.gov.br/Estimativas_de_Populacao/ (accessed in 02/05/2021)



In Cotriguaçu, according to 2019's data, the population's average income was of 2.1 minimum wage (R$998,00), and 6.3% of the total population was formally hired. The municipality's GDP is the 138th in the state of Mato Grosso.

In Colniza, the average income was 1.9 minimum wage in 2019, and 8.5% of the population was formally hired. The municipality's GDP is the 132nd in the State.

With a diversified agriculture, Colniza is the main producer of coffee and cocoa, second in cassava production, fourth in Brazil nut production, sixth in orange and watermelon production, and tenth in banana production in the State[34]. Soy production is also slowly expanding in the municipality. Cotriguaçu also has an important agricultural production, which is the sector with the largest participation in the municipality's GDP, second only to services and administration.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

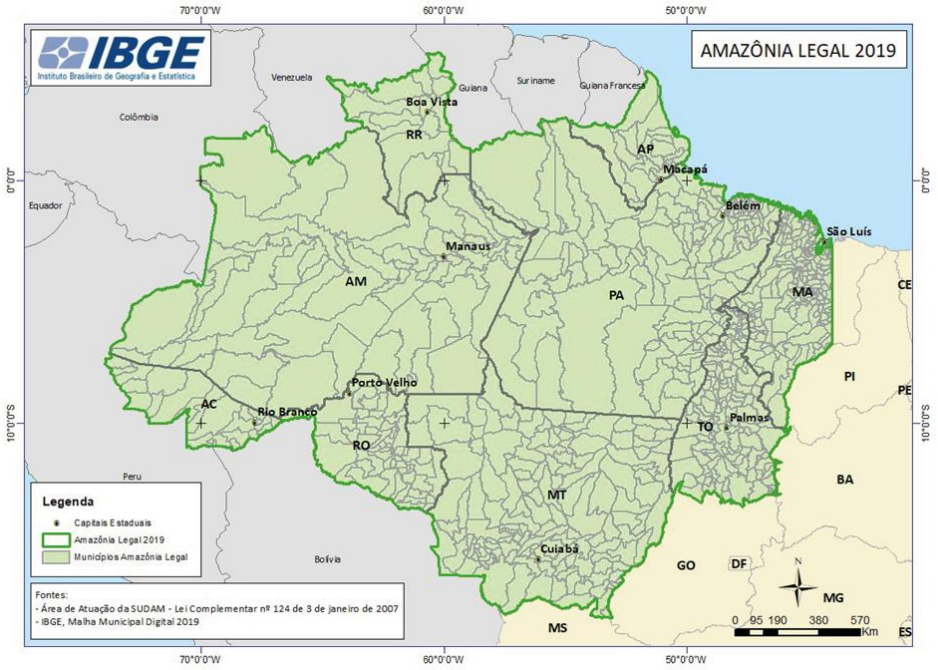
In the federal legislation level, the following definitions of the Brazilian Forest Code (Law nº 12,651, of May 25, 2012) stand out as being relevant:

"*III – Legal* Reserve *(LR): area located inside a rural estate, excluding the Area of Permanent Preservation, necessary for sustainable use of natural resources, conservation and recovering of ecological processes to conservation of biodiversity and to shelter and protection of native fauna and flora.*

VI – Legal Amazon: the States of Acre, Pará, Amazonas, Roraima, Rondônia, Amapá and Mato Grosso, and the regions located to the North of parallel 13ºS, in States of Tocantins and Goiás, and to the West of meridian 44ºW, of the State of Maranhão."

[34] Available at <http://www.mt.gov.br/rss/-/asset_publisher/Hf4xlehM0Iwr/content/id/15929921>

Figure 19. The Brazilian Legal Amazon States Acre (AC), Amapá (AP), Amazonas (AM), Maranhão (MA), Mato Grosso (MT), Pará (PA), Rondônia (RO), Roraima (RR), Tocantins (TO) (ancient North of Goiás). Source: IBGE (2019)



The Legal Reserve (LR) must be registered in property deed in the Real Estate Registry Office: its location must be publicly known, and future landowners must know where it is located, its boundaries and frontiers. The LR can be located anywhere inside a rural estate. Brazilian Forest Code determines that, once allocated, LR may not be changed even in cases of real estate transfer, land dismembering or area rectification.

The LR allocation is a prerequisite to obtaining permission to exploit the native vegetation existing inside the rural estate. In order to obtain this Permit for Forestry Stewardship, the landowner must previously register the location of the LR in land property documents through the Real Estate Registry Office, before suppressing any kind of native vegetation.

According to Provisory Measure nº 2166-67 (Medida Provisória nº 2.166-67) of August 24, 2001:

"Article 16. The forests and other types of native vegetation, excepting those located in Areas of Permanent Preservation, as well as those not subject to the politics of restricted use or subject to specific legislation, are susceptible to suppression, as long as a portion of vegetation is preserved, as Legal Reserve, at a minimum:

I – eighty percent (80%), in rural estates located in forest zones located in the Legal Amazon."

Thus, in compliance with Brazilian Forest Code, the farms have officially allocated 80% of their total area as LR.

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 commodities production and encourage land use for agricultural, bio energy and cattle breeding purposes 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 (IPAM, 2011).

Given the permanent attempts against the Project Area, the project proponents use their best efforts to prevent property invasion and to remain in compliance with Brazilian Forest Code. Some of the farms hold sustainable logging activities. These activities are carried out according to Sustainable Forest Management Plans previously approved by the Mato Grosso State Government. These management plans were conceived in accordance with Brazilian Forest Code and local regulation.

In the state of Mato Grosso[35], the Secretariat for the Environment (Sema/MT) is the body responsible for environmental licensing. At the collegiate decision level, there is the State Environment Council (Consema/MT) and the State Water Resources Council (Cehidro). Among the Licensing Instruments and authorizations for environmental intervention in the state of Mato Grosso, the "Exploration Authorization" (Autex) applies to sustainable forest management activities, which is the document issued by the competent agency that authorizes the exploration of the "Annual Production Unit" (UPA) and specifies the maximum volume per species allowed for exploration, valid for 12 months, and may be extended for another 12 months, as long as duly justified in a technical exploration report. Each "Annual Production Unit" (UPA) corresponds to a subdivision of the "Forest Management Area" (AMF), destined to be explored each year. The "Forest Management Area" (AMF), in turn, is the area of the rural property to be used through forest management. The context for obtaining "Autex" is explained as follows (Decree nº 2152 of 12/02/2014)[36]:

"Section II

Forest License

Art. 3 The Forest License will be issued with the approval of the Sustainable Forest Management Plan (PMFS), valid according to the cutting cycle.

Art. 4 The technical procedures for the elaboration, presentation, execution, analysis and technical evaluation of the Forest License in the native forests of the State of Mato Grosso and their forms of succession, shall observe the provisions of this decree and the following requirements:

I - The documentary and technical pieces listed in the Normative Instruction;

[35] http://www.acr.org.br/download/biblioteca/Procedimentos-do-Lincenciamento-Ambiental.pdf (accessed in 18/05/2021)

[36] http://extwprlegs1.fao.org/docs/html/bra135748.htm (accessed in 18/05/2021)

II - Rural Environmental Registry - CAR;

III - The georeferenced location of the area covered by the license.

Single paragraph. A Forest License will be issued by the Rural Environmental Registry, with only one PMFS being allowed, regardless of the number of annual production units."

For this project activity, the Sustainable Forest Management Plan on a Business Scale (PMFS-EE) is considered, according to the classification of the Government of the State of Mato Grosso. All the documents in their entirety are available for consultation by the audit team.

1.15 Participation under Other GHG Programs

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

Not applicable: the project is not engaged in any other emissions trading program and the host country has no binding limits on GHG emissions as yet. The project has not been registered or is seeking registration under any other GHG programs.

1.15.2 Projects Rejected by Other GHG Programs

Not applicable. This project is not requesting registration in any other GHG Programs nor has the project been rejected by any other GHG programs.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

The project neither has nor intends to generate any other form of GHG-related environmental credit for GHG emission reductions or removals claimed under the VCS Program. The VCS Program has a central project database, which lists each approved project. The VCS Project Database is the central storehouse of information on all projects validated to VCS criteria and all Verified Carbon Units issued under the program. Every VCU can be tracked from issuance to retirement in the database, allowing buyers to ensure every credit is real, additional, permanent, independently verified, uniquely numbered and fully traceable online. This project has not been registered under any other credited activity, and no VCUs have been assigned to the project area so far. Thus, any possibility of double counting of credits is eliminated.

1.16.2 Other Forms of Environmental Credit

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

1.17 Additional Information Relevant to the Project

Leakage Management

Although there is a risk of leakage, the proponents believe that the project activity will have positive impacts on surrounding areas. This project activity might be a successful benchmark of the following technical and economic aspects:

I. Sustainable management of forest resources generating success and profit;

II. Additional return to forest management, thanks to REDD incentives, which can compensate avoiding deforestation for other activities;

III. Positive example of sustainable real estate maintenance, in addition to profits with sustainable management plus REDD revenues.

In this context, the project may well stimulate other landowners to adhere to this project concept.

Leakage Management Plan

By means of Project monitoring activities, satellite imaging, and social and governmental cooperation for monitoring the project and its surroundings, the project proponent believes that the success of this business plan will generate an increased number of sustainably managed areas with REDD+.

The main leakage management activities are outlined below:

- Surveillance activities designed to mitigate illegal logging and land occupation in the area will be achieved through the project activity. By continuing to promote an increase in the number of REDD+ Projects in the region, whenever feasible, as well as sustainable forest management plans, the project aims to impact deforestation and degradation significantly. This process will be further consolidated through combined efforts with private and governmental entities, and NGOs. The main condition for execution of this activity is the approval and validation of this project activity, which will be a further important benchmark for engagement of all potential private landowners in Cotriguaçu and Colniza.
- Replication of project concept to other areas: further areas with potential for REDD+ projects have already been identified around the project site, which will favour and encourage forest conservation by means of financial incentives obtained from credit sales and provide social and environmental benefits to local communities.
- Combatting illegal land occupation: the local community will be strategic in monitoring illegal land occupation and potential illegal logging. Those who are interested in being trained and carrying out local monitoring will be included in the project, an activity which may also become a new source of income for local communities.

Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the project description.

Sustainable Development

This project activity complies with the logic of the environmental priorities defined by the Brazilian Federal Administration, which, in the course of COP 14 Conference held in Poznan, Poland, in December 2008, declared a deforestation reduction goal of 70% by the year 2018, and following that, further goals of achieving zero illegal deforestation by 2030, and offsetting of greenhouse gas emissions originating from legal removal of vegetation. The latter are elements of the Brazilian Nationally Determined Contribution (NDC), which the country aims to adopt within the framework of the Paris Climate Agreement (COP-21)[37]. In order to attain this goal, it will be necessary to join government initiatives with independent actions (such as that proposed under the present project).

The map below shows the strategic zone for "Containment of the expansion fronts with protected areas and alternative uses", which was established by the Macro ZEE/AL (Macrozoneamento Ecológico-Econômico da Amazônia Legal; Ecological and Economic Macro-zoning of Amazon) from the Brazilian Ministry of Environment[38], which encompasses the Project Area. The Macro ZEE/AL aims to establish strategic indications of occupation and use of land on a sustainable basis to guide, at the regional scale, the development and spatial distribution of public development policies, territorial and environmental planning, as well as the decisions of private agents. Due to its shield function for the heart forest protection, this territorial unit deserves strengthening policies. In this context, this project activity aligns with the strategies set up by the Macro ZEE/AL of the Brazilian Ministry of Environment.

[37] http://redd.mma.gov.br/pt/redd-e-a-indc-brasileira (accessed in 18/05/21)

[38] http://www.mma.gov.br/component/k2/item/8200-figuras (accessed in 18/05/21)

Figure 20. Containment of the expansion fronts with protected areas and alternative uses (Source: Brazilian Ministry of the Environment – MMA)[39]

Due to the increase in deforestation in the Legal Amazon, the Action Plan for the Prevention and Control of Deforestation in the Legal Amazon (PPCDAm; Plano de Ação para a Prevenção e Controle do Desmatamento na Amazônia Legal) came into effect, starting mitigation and ongoing actions to reduce deforestation. This project activity is in line with main PPCDAm premises[40].

This project therefore represents an enormous potential to continue the work started by other REDD+ neighbouring projects in Cotriguaçu and Colniza: assisting the Federal Administration and state agencies to attain these goals and leverage further pilot REDD projects in the municipalities, which are facing critical deforestation levels.

Further Information

No further information to disclose.

[39] https://antigo.mma.gov.br/component/k2/item/8200-figuras.html (accessed in 18/05/2021)

[40] https://www.gov.br/agricultura/pt-br/acesso-a-informacao/acoes-e-programas/ppa/plano-plurianual-ppa-2016-2019-1/relatorio_avaliacao_programa_2050-mudanca_do_clima.pdf (accessed in 18/05/2021)

2 SAFEGUARDS

2.1 No Net Harm

2.2 Local Stakeholder Consultation

2.3 Environmental Impact

2.4 Public Comments

2.5 AFOLU-Specific Safeguards

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Approved VCS Methodology VM0015 "Methodology for Avoided Unplanned Deforestation", Version 1.1, 3 December 2012. At: http://www.v-c-s.org/methodologies/VM0015 (last visited 19/05/2021).

Tool for the demonstration and assessment of additionality in VCS agriculture, forestry and other land use (AFOLU) project activities Version 3.0, 1 February 2012. At: http://www.v-cs.org/methodologies/VT0001 (last visited 19/05/2021).

AFOLU "Non-Permanence Risk Tool" VCS Version 4, Procedural Document, 19 September 2019, v4.0. At: http://www.v-c-s.org/program-documents (last visited 19/05/2021).

CDM – Executive Board "Tool for testing significance of GHG emissions in A/R CDM project activities (Version 01)" EB 31. At: https://cdm.unfccc.int/methodologies/ARmethodologies/tools/aram-tool-04-v1.pdf (last visited in 19/05/2021).

3.2 Applicability of Methodology

VM0015	
Applicability Conditions	**Justification of Applicability**
a) Baseline activities may include planned or unplanned logging for timber, fuelwood	The project activity includes planned logging for timber, in addition to avoiding unplanned

collection, charcoal production, agricultural and grazing activities as long as the category is unplanned deforestation according to the most recent VCS AFOLU requirements.	deforestation. 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 deforestation. This is in accordance with the definition of unplanned deforestation under the VCS Standard v4.0.
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).	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 project area contains 100% native vegetation, and a sustainable forest management plan is implemented. In addition, it is important to note that degradation is not included in either the baseline or project scenario.
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".	The forest classes that compose the project area are named as per Technical Manual for Brazilian Vegetation[41]. The area is considered forest as per the definition of forest adopted by FAO[42]: 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. No deforested, degraded or areas otherwise modified by humans were included in the project area at Project Start Date.
d) At project commencement, the project area shall include only land qualifying as "forest" for a minimum of 10 years prior to	The project area consisted of 100% tropical rainforest in 2010 – 10 years prior to the project start date – all of which conformed to

[41] Avaliable at <https://www.terrabrasilis.org.br/ecotecadigital/pdf/manual-tecnico-da-vegetacao-brasileira.pdf>

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

the project start date.	the Brazilian definition of forest[43]. This was ascertained using satellite images, as described in the section Project Location of the present VCS PD.
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.	Project Area is composed of Red-Yellow Argisol and Haplic Glaysol. Therefore, none of the project region grows on peat, satisfying this applicability criterion.
VT001	
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;	The activities in the proposed project boundary does not lead to violation of any applicable law even if the law is not enforced. The sustainable forest management plan is an activity authorized and endorsed in Brazil, and the landowner has all the environmental and 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.

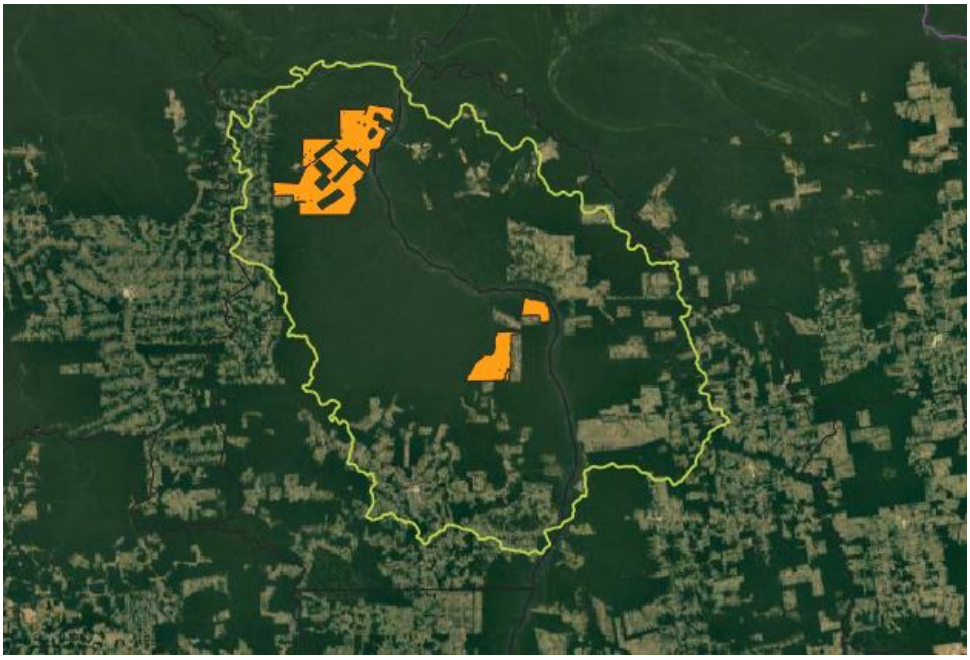
[43] Brazil adopts the FAO forest definition: "Land with tree crown cover (or equivalent stocking level) of more than 10 percent and area of more than 0.5 hectares (ha). The trees should be able to reach a minimum height of 5 meters (m) at maturity in situ." Available at: <http://www.fao.org/docrep/006/ad665e/ad665e06.htm>.

3.3 Project Boundary

Spatial Boundaries

Estimated Project Area and Reference Region are presented in figure below:

Figure 21. Project Area and Reference Region of the Juruena River REDD+ Project



- **Project Area**

According to VM00015, Project Area must comprise an area covered only by forest for at least 10 years before the Project start date: the date when activities are initiated to protect against the risk of future deforestation. Thus, some adjustments and discounts are made to comply to the methodology.

Project area is 45,675.15 ha.

- **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 was 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.

In addition, according to the methodology, three main criteria are relevant to demonstrate that the conditions determining the likelihood of deforestation within the project area are similar or expected to become similar to those found within the reference region:

- **Agents and drivers of deforestation**: Timber logging (both legal and illegal) and cattle ranching are important economic activities within the reference region. As detailed in section 1.13 and to be presented in section 3.4, the main agents of deforestation, timber harvesting and cattle ranching, are considered threats throughout the southern Amazon region. Thus, the analysis of the Reference Region definition includes these factors.

- **Socio-economic and cultural conditions:** The methodology implies that "The legal status of the land (private, forest concession, conservation concession, etc.) in the baseline case within the project area must exist elsewhere in the reference region. If the legal status of the project area is a unique case, demonstrate that legal status is not biasing the baseline of the project area." This is complied with the areas surrounding the Properties that are not public or part of any protected area, such as project area. These conditions also comply with Land Use and Land Tenure items once the conditions of the project area are found elsewhere in the reference region. The project area is governed by the same policies, legislation and regulations that apply elsewhere in the reference region. These policies are detailed in section 1.14.

- **Landscape configuration and ecological conditions:** To define the Reference Region, hydrographic basins were used within an area around the project area, from the drainage network produced by the SRTM digital elevation model. For each of these basins, the average values of elevation, slope and precipitation and the percentages of different types of vegetation were determined. Based on these values, basins that presented values close to these parameters to the values of the project area were selected. Then, an attempt was

made to select basins until reaching an extension of approximately seven times the size of the project area.

It is concluded that the deforestation in the Project Area is likely to occur in a manner similar to that observed in the Reference Region.

- Leakage Belt

The Leakage Belt 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) was tested, 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.

Based on Opportunity cost analysis (Option I) rationale, leakage can only occur in areas outside the Project Area where the total cost of establishing and raising cattle and transporting the products to market is less than the price of the products (i.e., opportunity costs are > 0). To identify this zone, the following steps were applied:

a) List the main land uses that deforestation agents are likely to implement within the Project Area in the baseline case: in the baseline case of this project, deforestation is carried out to obtain timber to finance cattle ranching.

b) Find credible and verifiable sources of information on the following variables:

$S\$x$ = Average selling price per ton of the main product (living cattle) that would be established in the project area in the baseline case:

Considering that the volume of timber from illegal deforestation is not reliably registered in any country statistics, living cattle was considered as the main and final product of deforestation in this assessment. Living cattle is usually sold and transported to slaughterhouses in the region.

The average selling price of living cattle was obtained from Instituto Matogrossense de Economia Agropecuária (IMEA)[44]: R$ 19,221 / ton. Nevertheless, there is a great variety of fees and taxes that must be discounted from the sale price, corresponding to up to

[44] https://www.imea.com.br/imea-site/indicador-boi (Colniza, accessed in 20/05/2021)

40.1% of the total sale price[45] (some taxes are levied on the gross price, while others are only on the profit), after conservatively correcting the value with a tax evasion index of 30%[46]. Thus, the resulting total of R$ 17,348 / ton return on selling price after taxes was estimated.

$SPxi$= Most important points of sale (spatial locations) for each main product Px in the reference region:

In this assessment, it was considered that the most important selling points are slaughterhouses in the region. The main slaughterhouse is located in the municipality of Juruena, as seen in Figure 22.

Figure 22. Location of the closest slaughterhouse in the project region

$PCxi$= Average in situ production costs per ton of product:

The average production costs of living cattle were obtained from Instituto Matogrossense de Economia Agropecuária (IMEA)[47]: R$ 14,774 / ton. In this context, the margin remaining for transportation costs is the difference between the net selling price (R$

[45] https://www.campograndenews.com.br/artigos/produtor-rural-pessoa-juridica-x-pis/pasep-e-cofins; https://online.sefaz.am.gov.br/silt/Normas/Legisla%C3%A7%C3%A3o%20Estadual/Resolu%C3%A7%C3%A3o%20GSEFAZ/Ano%202019/RG%20003_19.htm; https://receita.economia.gov.br/acesso-rapido/tributos/IRPJ-old; https://www.agrolink.com.br/colunistas/funrural--o-imposto-que-o-produtor-rural-nao-pode-esquecer-_448507.html; http://receita.economia.gov.br/acesso-rapido/tributos/CSLL-old (accessed in 30/07/2021)

[46] https://www.oeco.org.br/reportagens/o-drible-do-gado-a-parte-invisivel-da-cadeia-da-pecuaria/ (accessed in 30/07/2021)

[47] https://publicacoes.imea.com.br/relatorio-de-mercado/cup-bovinoculturadecorte/1 (Datum corresponding to 15/01/2021 for the State of Mato Grosso)

17,348 / ton) and the production cost (R$ 14,774 / ton), which results in R$ 2,574 / ton for transportation.

TCv = Average transport cost per kilometre for one ton of product using the most typical transport technology available to the producer:

The most typical means of transportation available for cattle producers in the region is road transport by truck. Transportation costs in the region are estimated as R$ 12.82/t.km[48]. This cost indicates that cattle could be transported at a distance of approximately 200.8 km by road. This result is consistent with that presented in the work of Harfuch et. al (2018)[49], who reported an economic radius of 150 km for the transport of live cattle, as shown in

[48] http://dtri.sefaz.to.gov.br/legislacao/ntributaria/instr.normativas/2019/Inst.%20Normativa176.19.pdf (accessed in 30/07/2021); value corrected by inflation to 15/01/2021: https://www3.bcb.gov.br/CALCIDADAO/publico/corrigirPorIndice.do?method=corrigirPorIndice# (accessed in 30/07/2021)

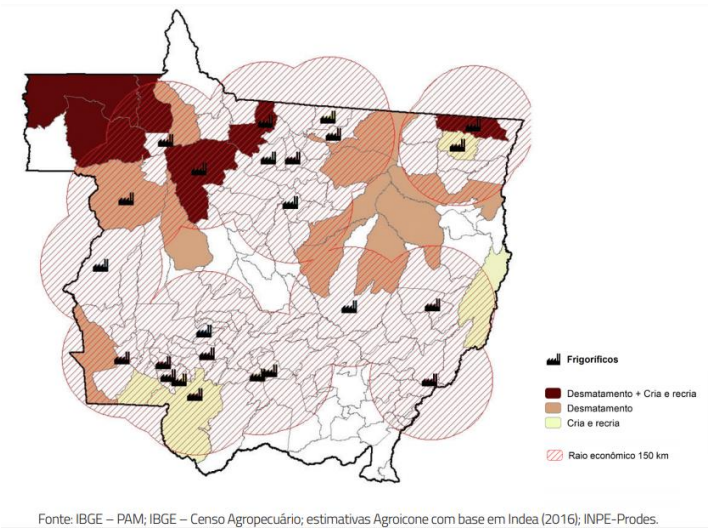
[49] http://www.agroicone.com.br/wp-content/uploads/2019/11/Policy-brief_Originacao-do-gado-de-corte-e-desmatamento-em-MT_FINAL_PT.pdf (accessed in 20/05/2021)

Figure 23.

Option I is based on the assumption that deforestation agents in the Project Area will not displace their activities beyond the Reference Region. Additionally, Option I requires to demonstrate that at least 80% of the area deforested in the Reference Region during the historical reference period has occurred at locations where deforesting was profitable.

The location of the Leakage will consider these factors and the economic radius of the region, as presented in figure below:

Figure 23. Economic radius reported by Harfuch et. al [50] for transportation of live cattle in the State of Mato Grosso.



- Leakage Management Area

The leakage management area (LMA) complies non-forest areas located outside the project boundary in which the project proponent intends to implement the activities which reduce the risk of leakage in the project scenario. These activities must include the agents of deforestation and involve seeking new sources of income which contribute to forest conservation. Leakage management could involve agricultural, agroforestry, reforestation, education, or other activities.

The definition of the Leakage Management Areas took into account the deforested areas of private lands neighbouring the city of Colniza, and the city of Cotriguaçu. The following spatial criteria were used for delimitation:

i) Non-forest classes;
ii) Logistical proximity for the Project Proponents to conduct management near the REDD project, taking into account the main access point to the Project Area, with the objective of creating a barrier to stop deforestation entering the Project Area from the Reference Region;

iii) High potential for land-use changes in these areas, considering their proximity to roads and other deforested areas.

Forest

[50] http://www.agroicone.com.br/wp-content/uploads/2019/11/Policy-brief_Originacao-do-gado-de-corte-e-desmatamento-em-MT_FINAL_PT.pdf (accessed in 20/05/2021)

According to the Brazilian Forests at a Glance 2019[51], 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 project[52]. 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 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 30x30m (0.09ha), therefore falling easily to the methodology requirement. Details on data and image processing can be verified in Appendix II.

Temporal Boundaries

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

  The adopted historical reference period is November 2010 to November 2020

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

  The project has a crediting period of 30 years, from 12-November-2020 until 11-November-2050.

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

  The first baseline period is from 12-November-2020 to 11-November-2030.

- **Monitoring period**

  The next monitoring periods will comply with the criteria established in the applied methodology, which states that the minimum duration of a monitoring period is one year and the maximum duration 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.

[51] Available at https://www.florestal.gov.br/documentos/publicacoes/4262-brazilian-forests-at-a-glance-2019/file Last visit 26/07/2021

[52] As of 1996, through a contract signed between the Implementation Commission of the Airspace Control System - Ciscea, 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/.

Table 1. 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.
Soil organic carbon	Excluded	Recommended when forests are converted to cropland. Not to be measured in conversions to pasture grasses and perennial crop according to VCS Methodology Requirements, 4.0.

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 in the section Baseline Emissions.

In addition, the Methodology considers the two sources of GHG emissions listed in 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 2. Sources and GHG included or excluded within the boundary of the proposed AUD project activity

Source		Gas	Included / Excluded	Justification / Explanation of choice
Baseline scenario	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_2O	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_2O	Excluded	Excluded for simplification. This is conservative.
		Other	Excluded	No other GHG gases were considered in this project activity.
Project scenario	Biomass burning	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-CO2 emissions from biomass burning in the project scenario, according to the methodology.
		N_2O	Included	Included as non-CO2 emissions from biomass burning in the project scenario, according to the methodology.
		Other	Excluded	No other GHG gases were considered in this project activity.
	Livestock emissions	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_2O	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 previously 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 municipalities of Colniza (

Figure 24), and Cotriguaçu (Figure 25).

Figure 24. Historical growth of livestock numbers in the municipality of Colniza, State of Mato Grosso: number of cattle heads per year (IBGE, 2021)[53]

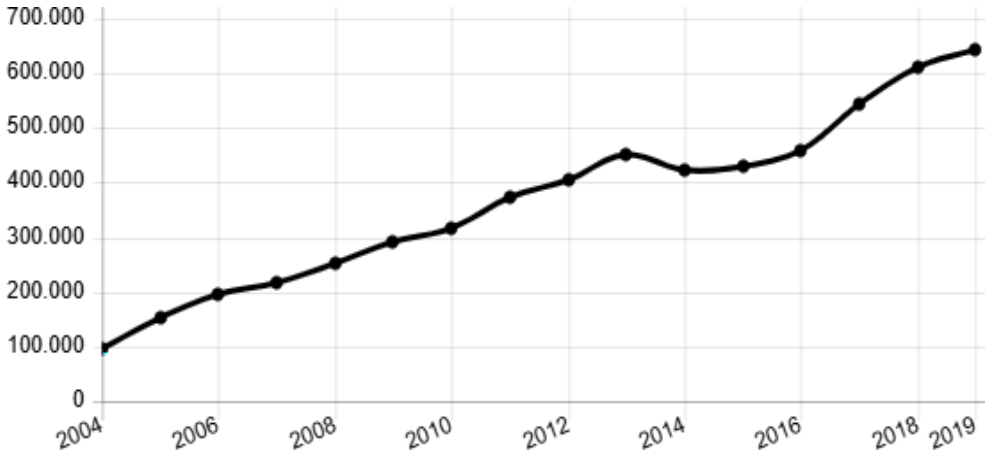
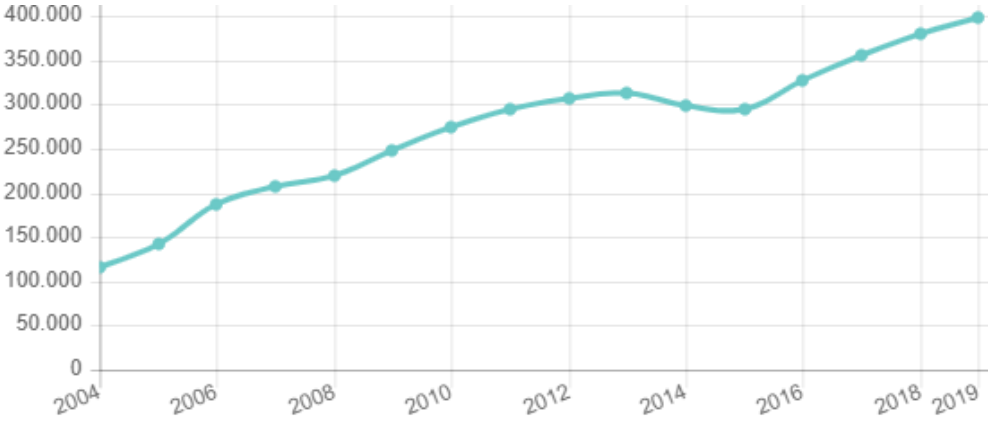


Figure 25. Historical growth of livestock numbers in the municipality of Colniza, State of Mato Grosso: number of cattle heads per year (IBGE, 2021)[54]



Given these dynamics, the herd size in Colniza is expected to increase by up to 30% (837,517 heads) during the project lifetime (up to 2050, see Figure 26), according to statistical projections conducted with official IBGE data from the 10 years prior to the project start date. For the same period, the herd size in Cotriguaçu will increase 19% (466,432 heads) during the project lifetime (Figure 27). This significant pace of growth in cattle-related land uses will certainly impose considerable deforestation pressures in the future.

[53] https://cidades.ibge.gov.br/brasil/mt/colniza/pesquisa/18/0?tipo=grafico&indicador=16533 (accessed in 28/05/2021)

[54] https://cidades.ibge.gov.br/brasil/mt/cotriguacu/pesquisa/18/0?tipo=grafico&indicador=16533 (accessed in 29/06/2021)

Figure 26. Projected growth of livestock numbers in the municipality of Colniza, State of Mato Grosso, within project lifetime (adapted from IBGE, 2021)

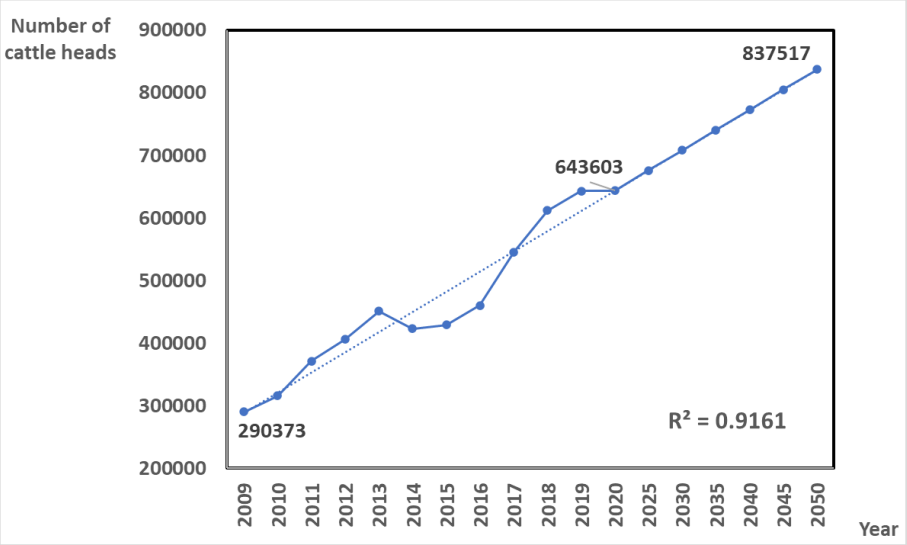
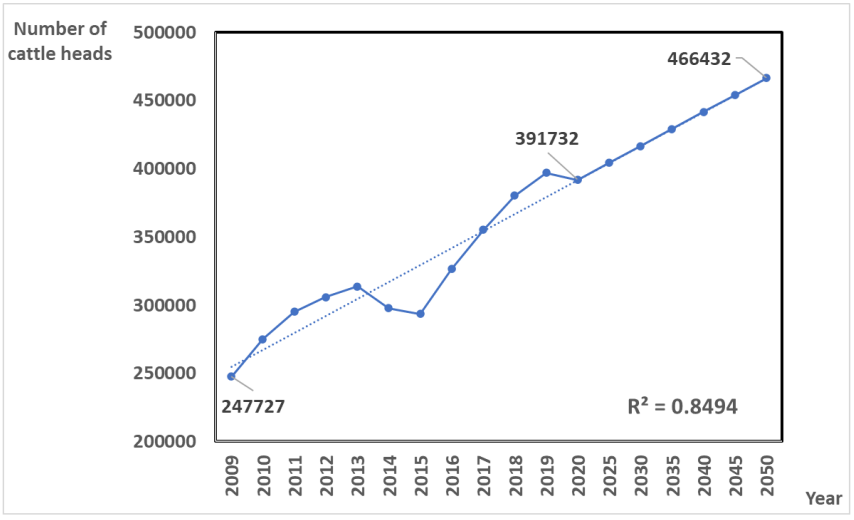


Figure 27. Projected growth of livestock numbers in the municipality of Cotriguaçu, State of Mato Grosso, within project lifetime (adapted from IBGE, 2021)



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. As shown in Figure 28, production of legal timber in Colniza presented a significant decrease in years 2011 (108,160 m^3) and 2014 (84,683 m^3). From that year afterwards, the supply of legal wood only continued to increase, reaching in 2019 624,484 m^3. 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 m^3 in 2050, which also points to a significant increase in timber demand for the following years of project. For Cotriguaçu, whose influence on the Project Area is smaller than that from Colniza, the timber production also tends to increase, but at a lower extent (R^2 = 0.339), as shown in Figure 29.

Figure 28. Historical production and future projection of legally registered logs in the municipality of Colniza, State of Mato Grosso (adapted from IBGE, 2021)

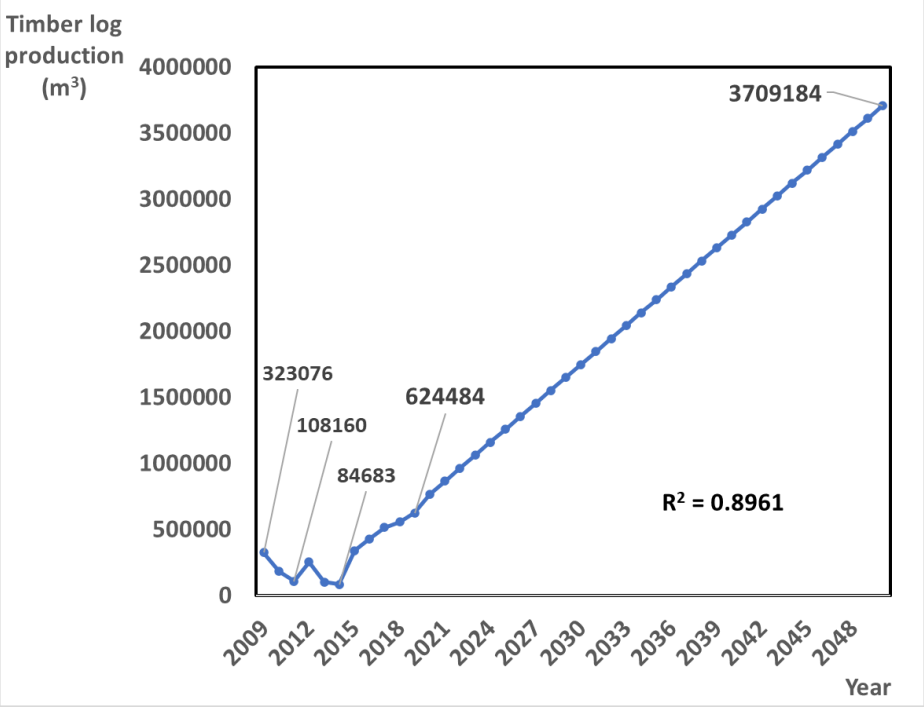
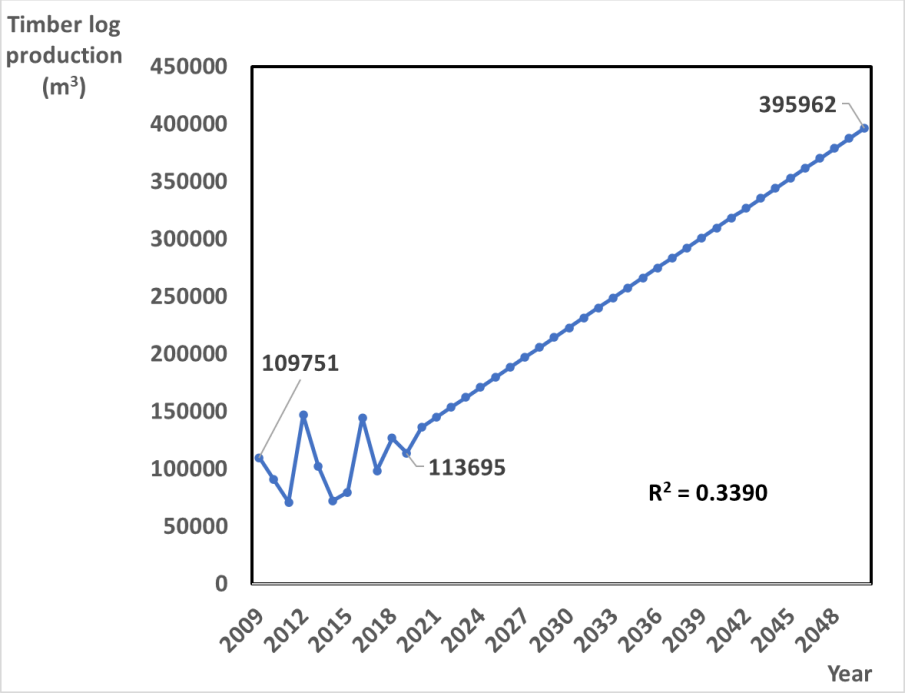


Figure 29. Historical production and future projection of legally registered logs in the municipality of Cotriguaçu, State of Mato Grosso (adapted from IBGE, 2021)



Statistics on historical deforestation attributable to the agent group: in Colniza, 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 Colniza. For Cotriguaçu, in turn, the deforestation increased from 27.67 km² in 2010, to 49.48 km² in 2020, having the lowest rate of the reference period in 2011 (21.2 km²), and the highest in 2015 (57.8%). Thus, the Cotriguaçu figures also make clear that deforestation pressures are very high within the municipality.

- 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)[55], 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 throughout the

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

country. Young (1998) as cited in Rivero et al. (2009)[56], 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;

[56] https://www.scielo.br/j/neco/a/jZHjd9B8ZghY7tG9G7qchTk/?format=pdf&lang=pt (accessed in 31/05/2021)

Figure 30 (data from CEPEA, 2021) clearly shows the increasing trend of cattle prices over the years. 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 years[57]. 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 2020[58], 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 2020/2021[59]. Chinese importers have increased the purchases of Brazilian beef by more than 150% in 2020[60];

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.

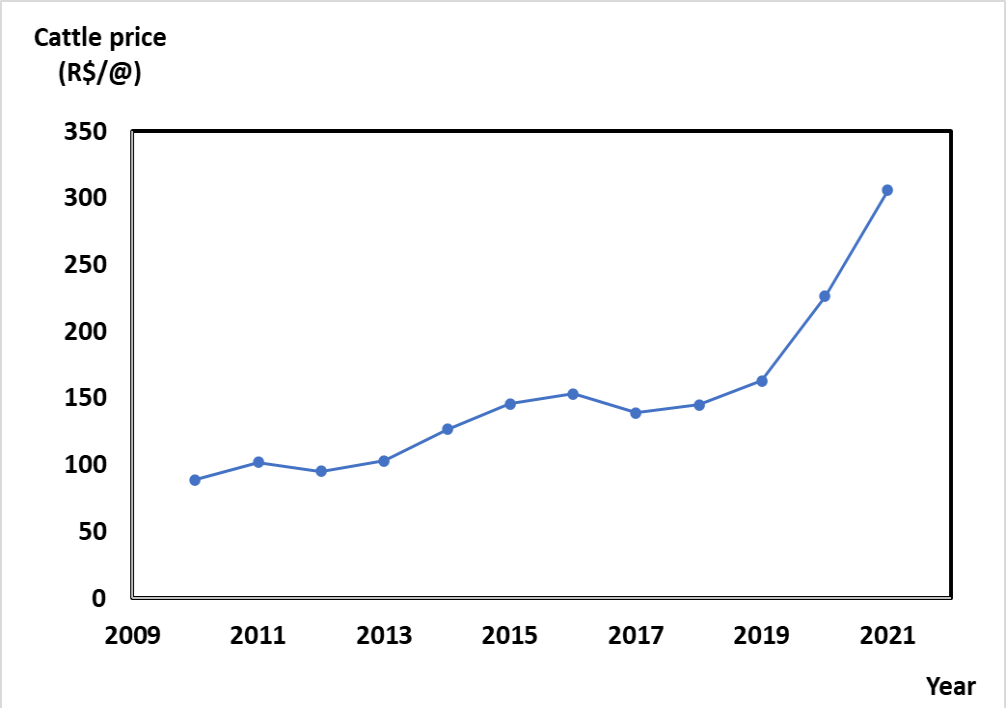
[57] https://www.bbc.com/portuguese/brasil-55664305 (accessed in 31/05/2021)

[58] 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)

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

[60] 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 30. 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 Colniza (municipality where the Project Area is located) is expected to virtually double (i.e., 101% approximate growth) during the project period (Figure 31). 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 data[61]. Similarly, the population of Cotriguaçu is estimated to more than double during the project duration (i.e., 110% increase; Figure 32). This population growth rate could represent a major driver to increase the deforestation in the region over upcoming decades;

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

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

Figure 31. Projected population growth in the municipality of Colniza, Mato Grosso, Brazil

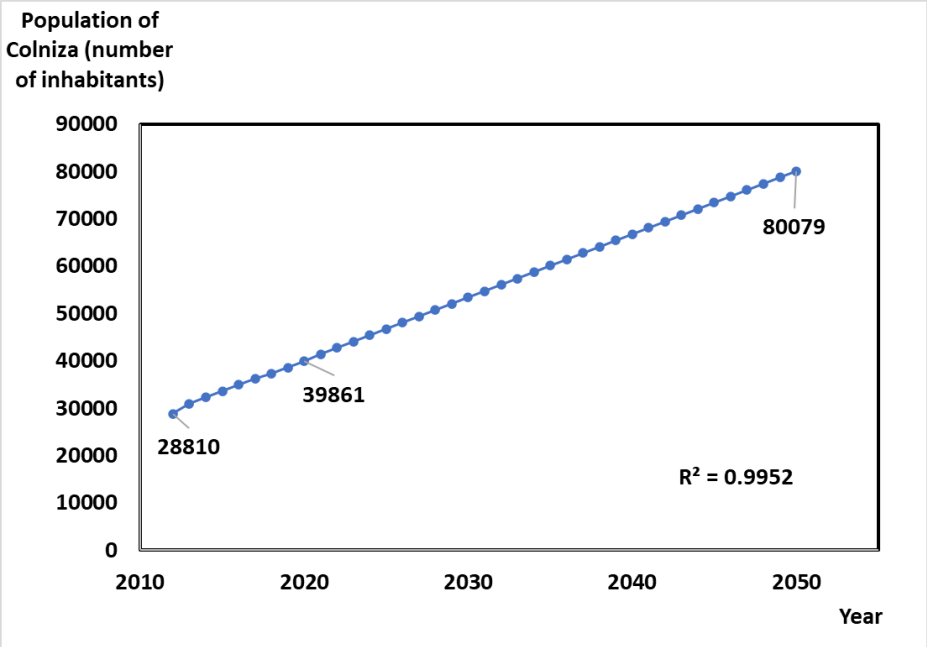
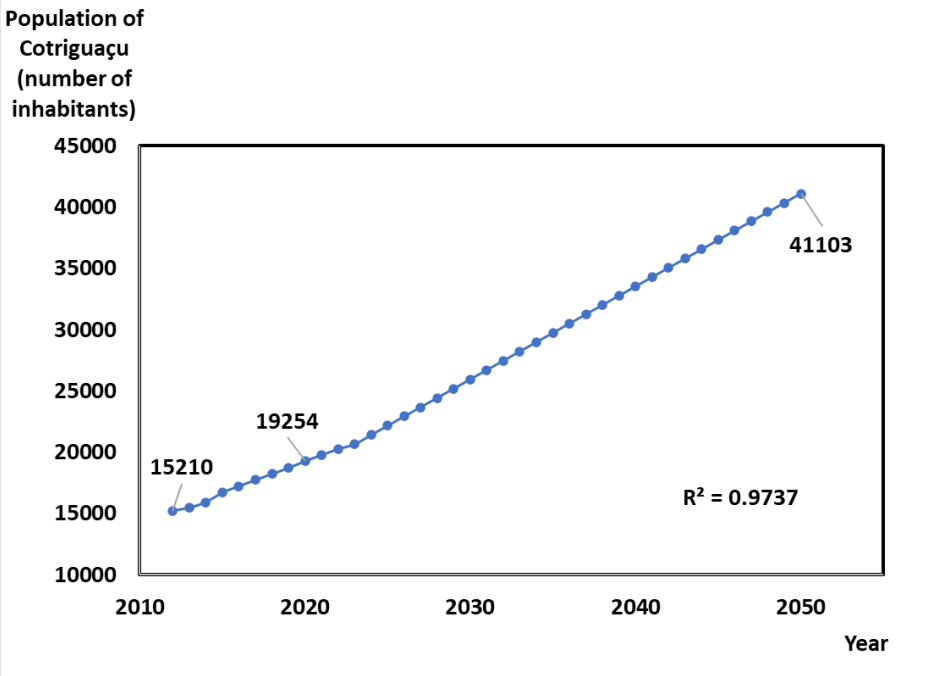


Figure 32. Projected population growth in the municipality of Cotriguaçu, Mato Grosso, Brazil



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, 2021[62]);

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 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 eastern 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 Cotriguaçu), 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 2019[63].

[62] https://imazongeo.org.br/ (accessed in 31/05/2021)

[63] https://www.camara.leg.br/proposicoesWeb/fichadetramitacao?idProposicao=1307295 (accessed in 31/05/2021)

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 al. 2009[64]; ROSA et al. 2013[65]). 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 (divulgation), 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's forest cover, the lack of law enforcement by local authorities along with the increase in

[64] https://doi.org/10.1016/j.tree.2009.06.009 (accessed in 01/06/2021)

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

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 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 2020[66]. 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 license[67]. Fortunately, environmentalists have reedited the Provisional Measure 915, to prevent deforestation licensing for term expiration[68].

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

[66] 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)

[67] 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)

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

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 m^3 of wood that 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 inspection[69]. 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 abroad[70]. 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 Ibama[71].

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 2633/20[72]. 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

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

[70] https://brasil.mongabay.com/2020/04/ao-afrouxar-leis-de-exportacao-brasil-permite-saida-de-madeira-ilegal-da-amazonia/ (accessed in 01/06/2021)

[71] https://g1.globo.com/natureza/noticia/2020/11/17/documentos-mostram-que-ibama-facilitou-exportacao-de-madeira-extraida-ilegalmente.ghtml (accessed in 01/06/2021)

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

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 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)[73]. 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 government[74]. 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.

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

[74] 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 Colniza/MT (IBGE, 2021)[75], 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. For Cotriguaçu/MT (IBGE, 2021)[76], an average monthly salary of 2.1 minimum wages was reported in 2019, and the proportion of occupied people in relation to the total population was 6.3%. Considering households with monthly incomes of up to half a minimum wage per person, it had 46.1% of the population in these conditions in 2010. These data show that the region faces poverty issues.

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

[75] https://cidades.ibge.gov.br/brasil/mt/colniza/panorama (accessed in 01/06/2021)

[76] https://cidades.ibge.gov.br/brasil/mt/cotriguacu/panorama (accessed in 30/06/2021)

groups, driver variables, underlying causes, and historical levels of deforestation have been verified via literature studies and other verifiable local sources of information.

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 3.0[77] was applied.

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 in 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+

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

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 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[78],[79],[80],[81],[82].

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

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

[79] 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

[80] 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 .

[81] HOLMES, T.P. el 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.

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

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 on protected areas in the legal Amazon, primarily because of wood harvesting activities, agriculture, road construction and mining[83],[84].

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 report[85], 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 GDP[86] (Agriculture and livestock segments). It is possible to observe that, since 2004, the cattle herd in the State is increasing:

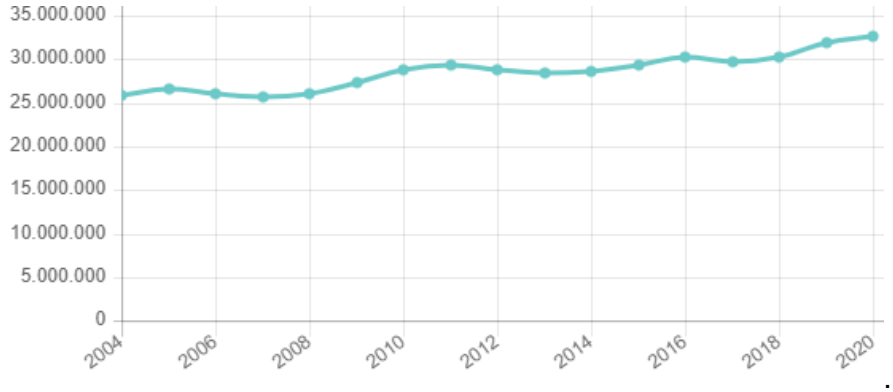
83 VERÍSSIMO, A. *et al* (Org.). **Áreas Protegidas na Amazônia brasileira:** avanços e desafios. Belém : Imazon ; São Paulo : Instituto Socioambiental, 2011. 90 p.

84 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

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

86 Available at <http://www.seplag.mt.gov.br/images/files/responsive/Planejamento/INFORMACOES_SOCIOECONOMICAS/PIB/contas_regionais_2018.pdf> Last visit on: October 27th, 2021

Figure 33. 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 Nº 12,651[87], decree Nº 5,975[88], in addition to Mato Grosso's legislation, with law 233/2005[89]. 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 Ribeiro[90], 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 control[91] 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

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

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

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

90 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%20%2D%20PMFS%20est%C3%A1%20intimamente%20relacionado,forma%20alcan%C3%A7armos%20um%20desenvolvimento%20ambiental>.

91 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.

applicable mandatory laws and regulations, this scenario results from systematic lack of 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 Juruena River 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 government[92], 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 Juruena River REDD+ Project generates financial benefits other than the revenue from the sale of VCUs, primarily through the commercialization of timber, as a result of the sustainable

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

forest management plan. Thus, an investment comparison (Option II) will be carried out in order to 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 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 Juruena River 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 ESTIMATED GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

4.2 Project Emissions

4.3 Leakage

4.4 Estimated Net GHG Emission Reductions and Removals

5 MONITORING

5.1 Data and Parameters Available at Validation

5.2 Data and Parameters Monitored

5.3 Monitoring Plan

6 ACHIEVED GHG EMISSION REDUCTIONS AND REMOVALS

6.1 Data and Parameters Monitored

6.2 Baseline Emissions
6.3 Project Emissions
6.4 Net GHG Emission Reductions and Removals

APPENDIX X: <TITLE OF APPENDIX>