Programme of activities design document form (afforestation or reforestation)

(Version 06.0)

Complete this form in accordance with the instructions at the end of this form.

BASIC INFORMATION	
Title of the PoA	PoA for reforestation of land for multiple uses
Version number of the PoA-DD	03
Completion date of the PoA-DD	06/04/2022
Coordinating/managing entity	Lacan Investimentos e Participações Ltda
Host Parties	Brazil
Applied methodologies and standardized baselines	*AR-ACM0003 – Afforestation and reforestation of lands except wetlands, Version 02.0*

PART I. Programme of activities (PoA)

SECTION A. Description of PoA

A.1. Purpose and general description of PoA

>> The "*PoA for the reforestation of land for multiple uses*" Program of Activities is a voluntary action to promote sustainable tree planting in the central-western region of Brazil, specifically in the states of Mato Grosso (MT), Mato Grosso do Sul (MS) and Goiás (GO), on non-forested lands. Its objective is to generate net removal of greenhouse gases through converting traditional land use in the PoA region – non-forested/agricultural areas – into reforestation actions, based on the engagement of investors and independent rural producers. Each property involved will be considered a component project activity (CPA).

Almost half of the entire areas of the states that form the PoA boundaries are used for cultivating agricultural crops and/or cattle grazing, while only 1% of the areas are being used for reforestation, making agriculture the predominant land use (see Section C below). Thus, the PoA proposes a change in the traditional use of land in this region, known as the main agricultural frontier in the country, rendering reforestation practices as a sustainable alternative.

In addition to the generation of additional carbon stocks, resulting in net GHG removals, the program will contribute to the production of timber for various supply chains, e.g. for energy purposes, sawmills, pulp and paper etc. However, in this PoA, any climatic benefits associated with the reduction of emissions from the use of sustainable wood instead of fossil or non-renewable energy products or sources are not claimed.

a) <u>The policy/measure or stated goal that the PoA seeks to achieve</u>

The PoA will apply the reforestation methodology already approved under the CDM *AR-ACM0003 – Afforestation and reforestation of lands except wetlands*, version 02.0. The stated goal of the PoA is to generate net removals of greenhouse gases through the conversion of traditional land use in the PoA region (notably, agriculture) to reforestation activities, based on the engagement of investors and independent rural producers.

Figure 01: Map of land use – Brazil, 2018

Source: IBGE [Brazilian Institute of Geography and Statistics], 2020

b) A framework for the implementation of the PoA

Lacan Investimentos e Participações Ltda, hereinafter referred to as LACAN, is the PoA **coordinating/managing entity (CME)** and also the implementer of the CPAs. LACAN will be the sole responsible for coordinating the implementation and maintenance of the reforestation activities. The forestry activities will be conducted by outsourced staff or LACAN's own staff, whereas LACAN will be responsible for the administration of the reforestation practices that will generate additional carbon stocks in the partners' rural properties, i.e. in each CPA. The CPAs will be implemented in areas from partners/ investors/ leasers (hereinafter, Partners).

CPA implementers could be either the **partners** or **LACAN**. This definition will be negotiated in a case-by-case basis and agreed upon formal partnership agreements between the CME and partners, ensuring that the CME will have control of all records and information related to the implementation of individual CPAs. These agreements will be formalized in appropriate clauses in the partnership contract. All partners will be offered a share in the carbon credits[1], depending on the partnership/lease modality agreed (see framework and management system).
All CPAs will be large-scale CPAs, and the methodology applied is *AR-ACM0003 – Afforestation and reforestation of lands except wetlands, Version 02.0.*

[1] The CME shall inform partners of the restrictions currently applicable to tCERs or lCERs, as defined by COP26, i.e. such units may not be used for the purposes of fulfillment of NDCs (Nationally Determined Contributions under the Paris Agreement). The CME shall also inform that the CDM is undergoing a transition process towards the mechanism under Article 6.4 of the Paris Agreement, which implies uncertainties regarding the potential approval of the PoA under the CDM or, later on, depending on the transition provisions under Article 6.4.

The list below presents some of the main responsibilities of LACAN acting as the CME:

- Development of the PoA Design Document (CDM A/R-PoA-DD) and CDM Component Project Activity (CPA) Design Documents (CDM A/R-CPA-DD) for CPAs that are developed under the PoA;
- Obtaining a Letter of Approval from the DNA for the implementation of the PoA;
- Checking whether the CPAs to be included in the PoA meet all the eligibility criteria as per Section L;
- Development and coordination of monitoring activities and data management during the lifetime of the PoA;
- Archiving monitoring records from all CPAs;
- Contracting a DOE for validation and verification purposes. Prepare and submit monitoring reports and supervise any audits;
- Be a focal point for the communication with the CDM Executive Board for matters related to the PoA;
- Maintaining all monitoring reports and data of all CPAs during the lifetime of the PoA;
- Training staff in PoA matters, planting and monitoring techniques, whenever needed.

As the CPA implementer, LACAN/partners will:

- Implement the CPAs as per general description herein and specific details in the CDM A/R-CPA-DD forms;
- Operate and maintain the CPAs for the duration of the project activity;
- Voluntarily accept and comply with the eligibility criteria and all required conditions as per Section L;
- Perform and/ or arrange for monitoring procedures, data collection, and inventory of plantations;
- Record data on a regular basis as per the monitoring plan;
- Make available staff for validation and verification. Provide the DOE with required documents and access to sites, as needed.

c) A confirmation that the PoA is a voluntary action by the coordinating/managing entity;

The PoA is a voluntary action, since there are no laws, regulations or requirements of any kind stipulating the mandatory implementation of renewable forest stocks in Brazil (the host country).

d) How the PoA contributes to the sustainable development of the host Party

The reforestation for multiple purposes developed within the scope of the PoA aim to develop quality forests. In addition to generating net GHG removals from the atmosphere, the program provides various social and environmental benefits, contributing to the sustainable development of the region. It is expected that the initiative can serve as a model for the country:

- proactive engagement with neighbouring communities;
- development of local commerce and service providers in the region;
- generation of income and direct and indirect jobs in rural areas;
- training and technical guidance;
- valorisation of local culture and avoiding rural-urban migration;
- increase in forest stocks, indirectly helping to relieve pressure on native forests;
- protection and conservation of carbon stocks in remnant native forests;
- encouraging the restoration of conservation areas;
- increasing awareness of environmental preservation and conservation;

- shelter for wildlife.

The PoA will also encourage forest certification practices for the areas of the component project activities (CPAs), which have even more stringent criteria than Brazilian legislation (refer to section L).

No technologies/measures and know-how for their use are transferred to the host Party as part of this PoA.

A.2. Physical/geographical boundary of PoA

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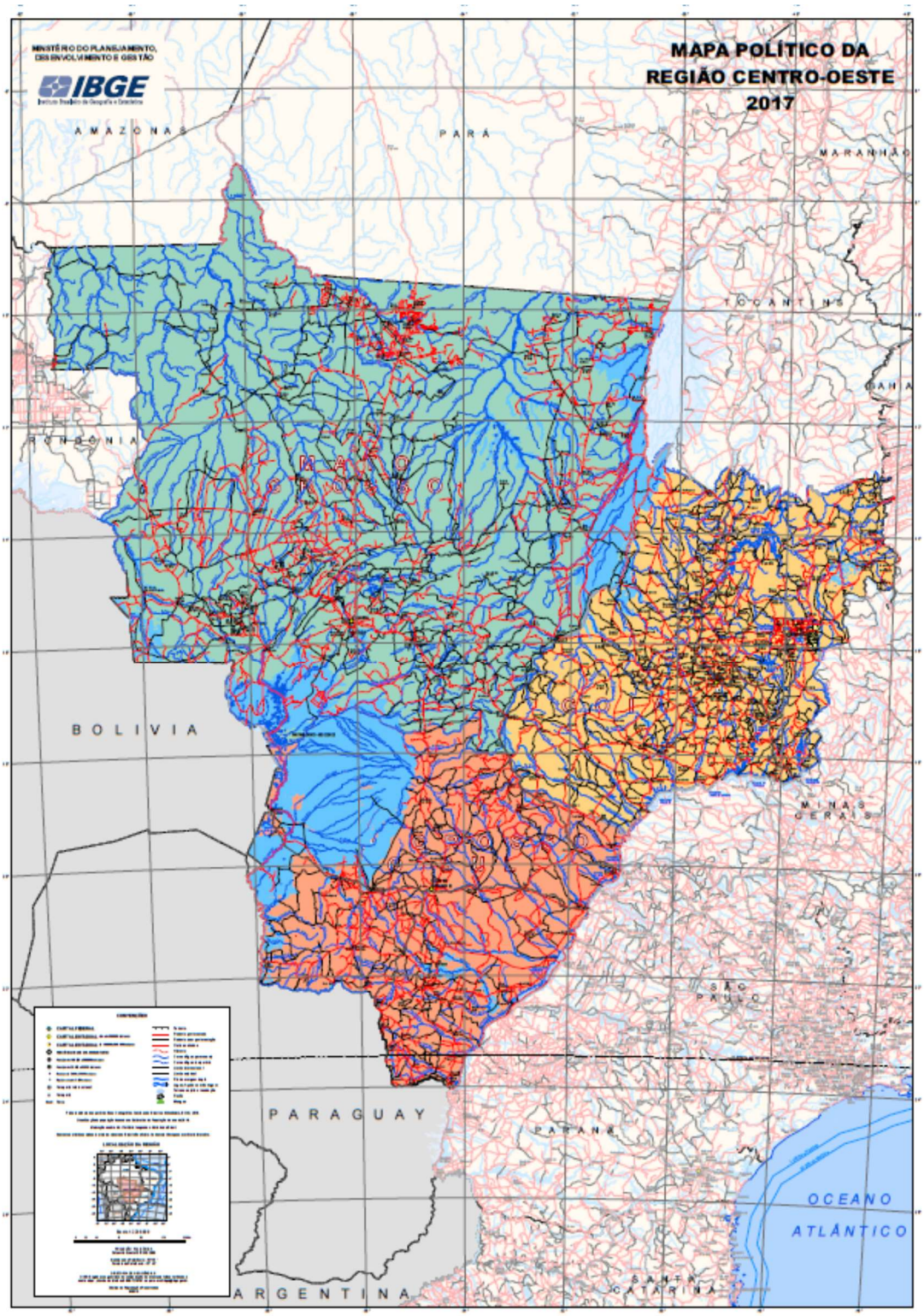
The geographical area within which CPAs will be implemented is defined as the borders of the states of Mato Grosso (MT), Mato Grosso do Sul (MS) and Goiás (GO), in the Central-West region of Brazil.

The boundaries and geographical coordinates of the states are shown in Table 01 below and in Figure 02.

Table 1: Geographic information of the PoA boundaries.

BRAZILIAN STATE	LATITUDE	LONGITUDE
Mato Grosso	12° 40' 45.142" S	56° 56' 22.816" W
Mato Grosso do Sul	20° 46' 20.028" S	54° 47' 06.551" W
Goiás	15° 49' 37.333" S	49° 50' 10.406" W

Figure 2: Map of the geographical boundaries of the states of Mato Grosso (MT), Mato Grosso do Sul (MS) and Goiás (GO) of PoA.



Source: IBGE, 2017[2]

[2] See ftp://geoftp.ibge.gov.br/cartas_e_mapas/mapas_regionais/politico/2017/centro_oeste_politico2200k_2017.pdf

A.3. Measures

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The measures adopted by the PoA refer to reforestation activities, with a view to produce timber through commercial species (for example, eucalyptus) through partnerships with landowners in the region. To this end, we seek to implement a production system that considers the local reality, generating social value in rural Brazilian regions, far from large centres. The program will also contribute to conserving native plant remnants, enabling the recovery of soils depleted by pasture or agriculture, and stimulating the local economy.

In order to encourage rural landowners to convert their non-forested areas (figure 03) into forested areas, the CME – which will also be the entity responsible for carrying out planting together with partners and service providers - favours the use of local services.

The CME will apply a forest management plan and will be responsible for the formation stages of the forest, from the preparation of the land to the management of plantations, until the end of the cycle of approximately 6 years.

The silvicultural steps under the scope of this PoA are listed below and will be detailed in Section I.4 of the generic CPA.

1. Clearing the area: removal of barriers in the area to ensure good quality in subsequent operations.

2. Soil preparation: leaving the area ready for planting seedlings.

3. Planting and regrowth management: planting seedlings/sprout selection.

4. Maintenance: reducing plant mortality and ensuring productivity.

Figure 3: example of PoA implementation area, MT

Source: LACAN

A.4. Coordinating/managing entity

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LACAN is the PoA coordinating/managing entity (CME). Its contact details are listed in Appendix 1. The company acts as an investment manager and, given the various barriers, the context of the region and the global need to increase activities capable of removing carbon from the atmosphere, it seeks to implement the proposed PoA as a tool to promote further reforestation activities, connecting independent rural producers, who are traditionally engaged in agricultural activities, to independent investors.

A.5. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Brazil (host)	Lacan Investimentos e Participações Ltda	No

A.6. Public funding of PoA

>>
No public funding from Annex 1 countries of the United Nations Framework Convention on Climate Change (UNFCCC) will be used for this PoA or any CPAs under this PoA.

SECTION B. Management system

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LACAN is the PoA coordinating/managing entity (CME), responsible for all technical and bureaucratic matters related to the CDM, as well as communication with DOEs, DNA and UNFCCC. It will also be responsible for the process of analysing the eligibility and inclusion criteria of new CPAs and their subsequent implementation and monitoring, in an effective and verifiable manner.

The management system described below outlines the operational and management arrangements to be established by the CME for the implementation of the PoA and inclusion of the CPAs. It includes:

a) Definition of roles and responsibilities of personnel involved in the process of inclusion of CPAs, and their competencies;
b) Records of arrangements for training and capacity development for personnel;
c) A procedure for technical review of inclusion of CPAs;
d) A procedure to avoid double counting;
e) Records and documentation control process for each CPA under the PoA;
f) Measures for continuous improvements of the PoA management system.

e) Definition of roles and responsibilities of personnel involved in the process of inclusion of CPAs, and their competencies

Operational role	Responsibilities	Team responsible
Analyst	- Technical evaluation of information;	PoA team

	- Maintenance of the CPA database; - Control of physical and digital documents; - Control of audit and inspection records.	
Coordinator	- Verification of documents, spreadsheets and reports. - Control of personnel training.	PoA team
CPA activities executors	- Implementation and execution of field activities.	Field team
Manager	- Approval of results, documents and reports; - Official communication.	Management

The CME personnel will be the responsible analysing any CPA candidate and check it against the criteria for inclusion under the PoA. The CME will be responsible for recording and archiving of data.

f) Records of arrangements for training and capacity development for personnel

Personnel involved in the PoA management system must receive appropriate training to deal with the requirements of the program in order to ensure complete monitoring of the generated data. The team must know the eligibility criteria for CPA inclusion and the monitoring items for implementing the PoA and CPAs. The CME will provide trainings whenever necessary to enhance skills and knowledge on the PoA/CPA matters, and register participation.

g) A procedure for technical review of inclusion of CPAs

For each new proposed CPA, the CME will check the information for the candidate areas against the requirements of the Eligibility Criteria (see Section L of the generic CPA), to verify that they are in compliance with all requirements (e.g. eligibility of area, applicability, others). If so, then all necessary documentation for submitting the CPA to the DOE will be provided, in accordance with the latest CDM rules, forms and guidelines. The CME will create and maintain a database that will contain all the information regarding each CPA.

h) A procedure to avoid double counting

To avoid double counting, the CME will confirm that the proposed CPA is not included in another Program of Activities or that it has been registered as a project activity by the CDM or by a substitute mechanism under the Paris Agreement, by checking the UNFCCC/CDM website that the CPA is not part of another PoA nor that it is registered as an individual project activity. Up until the completion date of this PoA-DD, no PoA, or even project activity - small or large-scale - was registered in the proposed PoA region under the CDM either. Should any other CDM project of the same sector scope, registered in the PoA region, arise in the future, the geographical coordinates will be cross-checked to ensure that they are not the same activities.

i) Records and documentation control process for each CPA under the PoA

The CME will develop and maintain an electronic database, which will contain all relevant data and information about each CPA, including (and not limited to):

- Name and contact details of the land owner;
- Agreement between Lacan and land owner;
- CPA name;

- Start date of the CPA and documental evidence of this starting date;
- Geographical location of the CPA (GPS coordinates);
- Area of planting in hectares and map of the area;
- Crediting period;
- Start and end date of crediting period;
- Verification status (historical number of verifications and monitoring periods);
- Historical removals monitored and issued in each monitoring period;
- Supporting evidence for each eligibility criterion to demonstrate that the CPA meets all the eligibility criteria for inclusion into the PoA.
- All data and information collected during monitoring periods regarding the removals achieved by the CPA.

j) Measures for continuous improvements of the PoA management system

The PoA management system will be regularly reviewed by the CME to identify and resolve potential problems. The CME will continuously seek improvement of its processes such as internal monitoring, trainings and capacity building of PoA personnel, as well as keeping up to date on recommended changes or updates by UNFCCC of related PoA procedures

SECTION C. Demonstration of additionality of PoA

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In general, this PoA seeks to show that reforestation activities are additional in relation to the predominant land use in the baseline applicable to the case (non-forested areas, especially agriculture). CPAs would not be implemented in the absence of this PoA, especially due to the barriers mentioned below, above all the prevailing practices and the aversion to long-term risk inherent to reforestation activities.

The *AR-ACM0003* version 02.0 methodology requires the use of the "Combined tool to identify the baseline scenario and demonstrate the additionality of the CDM A/R project activities", version 01, in order to establish a baseline and demonstrate additionality. The tool is applied under the following conditions:

- Forestation of the land within the proposed project boundary performed with or without being registered as the A/R CDM project activity shall not lead to violation of any applicable law even if the law is not enforced.

This Program of Activities complies with all laws and regulations of the Host Country, as well as those of the entire area within the boundaries of the PoA.

- This tool is not applicable to small-scale afforestation and reforestation project activities.

According to the definition of small-scale forestry projects[3], it can be said that this program will not develop projects that fall into that category, considering the current criteria in the CDM's scope and the complementary regulations determined by the Designated National Authority in Brazil.

[3] See the definition of "SSC A/R CDM project activity" at https://cdm.unfccc.int/Reference/Guidclarif/glos_CDM.pdf

STEP 0. Preliminary screening based on the starting date of the A/R project activity

- The start date of the PoA is 05/12/2019, which is the date of the official notification of the CME's intention to seek registration through the CDM to the CDM secretariat and the DNA.

- The CDM's incentive was seriously considered, as evidenced by:
  - Meetings/training with external consultants for the development of the project;
  - Signing the contract with external consultants;
  - Sending the CDM prior consideration to the CDM Secretariat and the DNA.

STEP 1. Identification of alternative land use scenarios to the proposed A/R CDM project activity

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

Realistic and credible land use scenarios have been identified that could occur in areas within the proposed PoA boundaries, in the absence of reforestation project activities under the CDM. The following alternative land use scenarios have been identified:

- *Scenario 1*: Continuation of pre-existing land use for PoA.

  Justification: as outlined below, the traditional land use within the boundaries of the PoA is agricultural activities. In the absence of this PoA, it is most likely that the pre-existing land use will remain, i.e. non-forested areas.

- *Scenario 2*: Reforestation of the land within the PoA boundaries without registering with the CDM.

  Justification: Although plausible, it is very unlikely that the area within the limits of the PoA will be reforested, considering not only the historical use, but also the various barriers listed in the next steps of this tool.

- *Scenario 3*: A continuation of the pre-existing land use before the project, considering the reforestation of at least part of the land at a rate resulting from i) legal requirements; and ii) the expansion of reforestation actions observed in the geographic area with socioeconomic and ecological contexts similar to those of the PoA.

  Justification: Although not very representative, it is a plausible scenario.

Outcome of Sub-step 1a: the plausible alternative scenarios for land use within the PoA boundaries therefore are:

- *Scenario 1*: Continuation of current land use.
- *Scenario 2*: Project activity undertaken without CDM incentive.
- *Scenario 3*: Planting in at least some of the land within the PoA boundaries.

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

The plausible scenarios mentioned above are in compliance with the applicable laws and regulations, in Brazil and in the areas that make up the limits of the PoA.

There are no applicable mandatory laws and regulations that prohibit any of the identified alternative scenarios. According to the Brazilian Forestry Code, "*the extraction of firewood and other products from planted forests in areas not considered Permanent Preservation and Legal Reserve Areas is free"* (Forestry Code, Chapter VIII paragraph 2).

Outcome of Sub-step 1b: the scenarios listed below are plausible land use scenarios that are in accordance with Brazilian legislation and the states that are part of the PoA limits.

- *Scenario 1*: continuation of current land use.
- *Scenario 2*: project activity undertaken without CDM incentive.
- *Scenario 3*: planting in at least part of the land within the limits of the PoA.

STEP 2. Barrier Analysis

As determined by the applicable methodology, this PoA has adopted the following steps for analysing barriers:

Sub-step 2a. Identification of barriers that would prevent the implementation of at least one alternative land use scenarios.

This PoA faces the following barriers that could prevent its implementation. Scenario 1 is free of any of the barriers identified.

a) Barrier due to traditional local land use: the historical tradition of land use for agriculture and livestock grazing;

b) Barriers related to markets, transport and storage: market and operational difficulties inherent to forestry activities;

c) Investment barrier: liquidity, long term, the country's investment and financing culture and context.

Outcome of Sub-step 2a: the barriers that would prevent one or more land uses identified in Sub-step 1b are listed above.

Sub-step 2b. Elimination of land use scenarios that are prevented by the identified barriers.

a) Barrier due to traditional local land use

The predominant land use practices in the PoA region will then be analysed, i.e., the situation in the states of the Central-West region of Brazil: Mato Grosso, Mato Grosso do Sul and Goiás.

Brazil has the largest commercial cattle herd in the world, alongside around 180 million hectares of natural and cultivated pastures (LAPIG, 2020)[4], as well as approximately 65.3 million hectares (IBGE, 2020)[5] dedicated to grain production (250 million tons in 2020). These two areas combined (245 million hectares) represent about 30% of the country's territory (875.2 million hectares).

In 2018, 8.6 million hectares (IBGE, 2020) were reforested for economic purposes ("planted forests"), representing less than 0.9% of the country's territory. Thus, even at the national level, the area designated for agriculture is considerably larger than that for reforestation. Therefore, the prevailing productive practices of land use in Brazil are clearly focused on pastures and grain cultivation. This situation in the Central-West of the country is even clearer.

The states in the Central-West region of Brazil total 160 million hectares (IBGE, 2020). Agriculture is a common practice in the region, being an intrinsic part of the regional culture, as outlined in Table 2 and Figure 4 below.

Table 2: area of states – by region, within the PoA limits – in hectares, in 2018

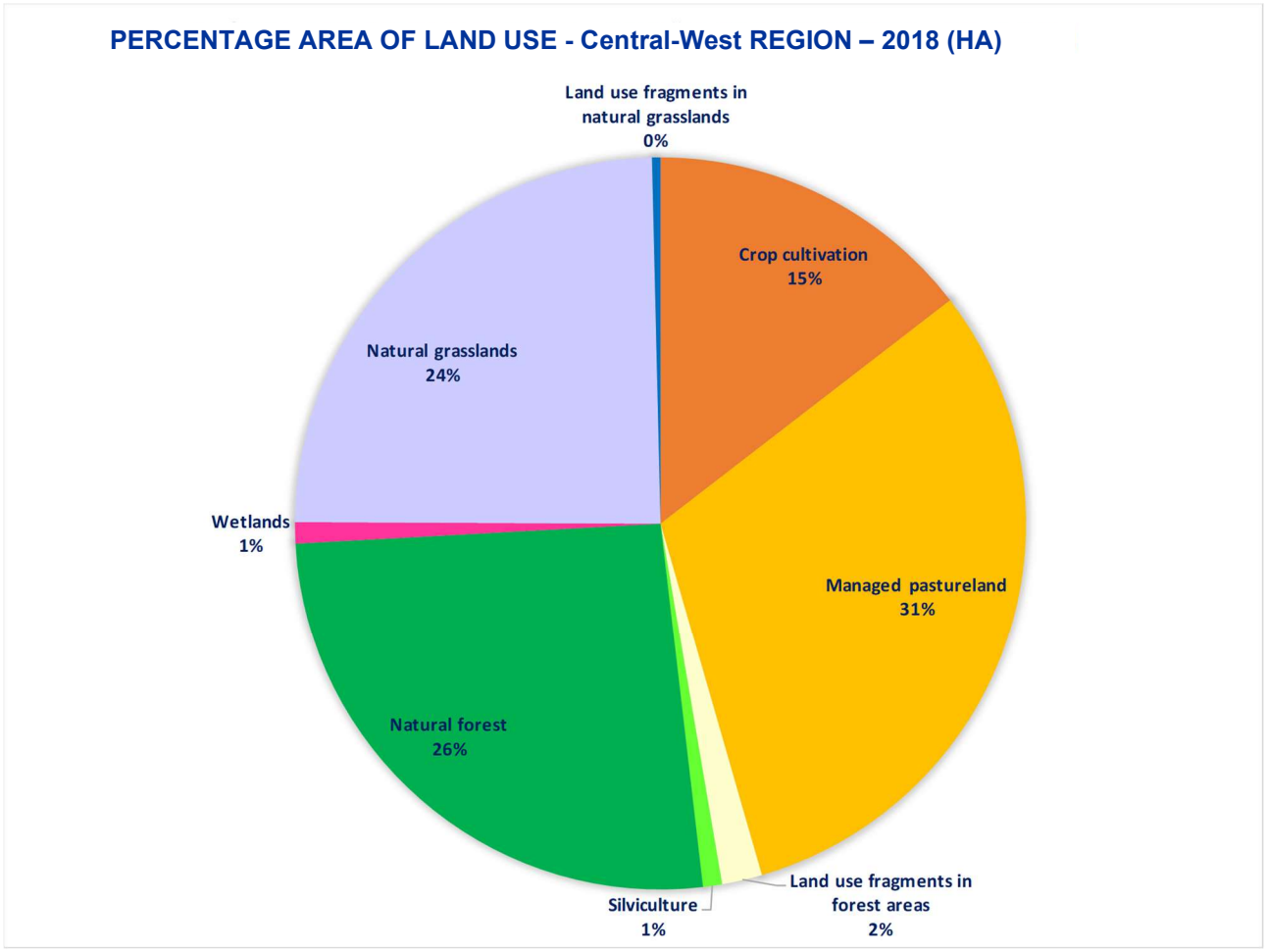
PoA BOUNDARIES (STATES)	AREA (ha)	AREA AGRO+PASTURE (ha)	TOTAL AREA %	FORESTRY AREA (ha)	TOTAL AREA %
Mato Grosso	90,320,244	30,875,000	34%	132,500	0.15%
Mato Grosso do Sul	35,714,553	19,537,100	55%	1,071,400	3%
Goiás	34,010,649	21,887,000	64%	131,500	0.39%
Total	**160,045,446**	**72,299,100**	**45%**	**1,335,400**	**0.8%**

Source: IBGE, 2020

Figure 4: Total area of the states of Mato Grosso, Mato Grosso do Sul and Goiás for the main land uses in 2018.

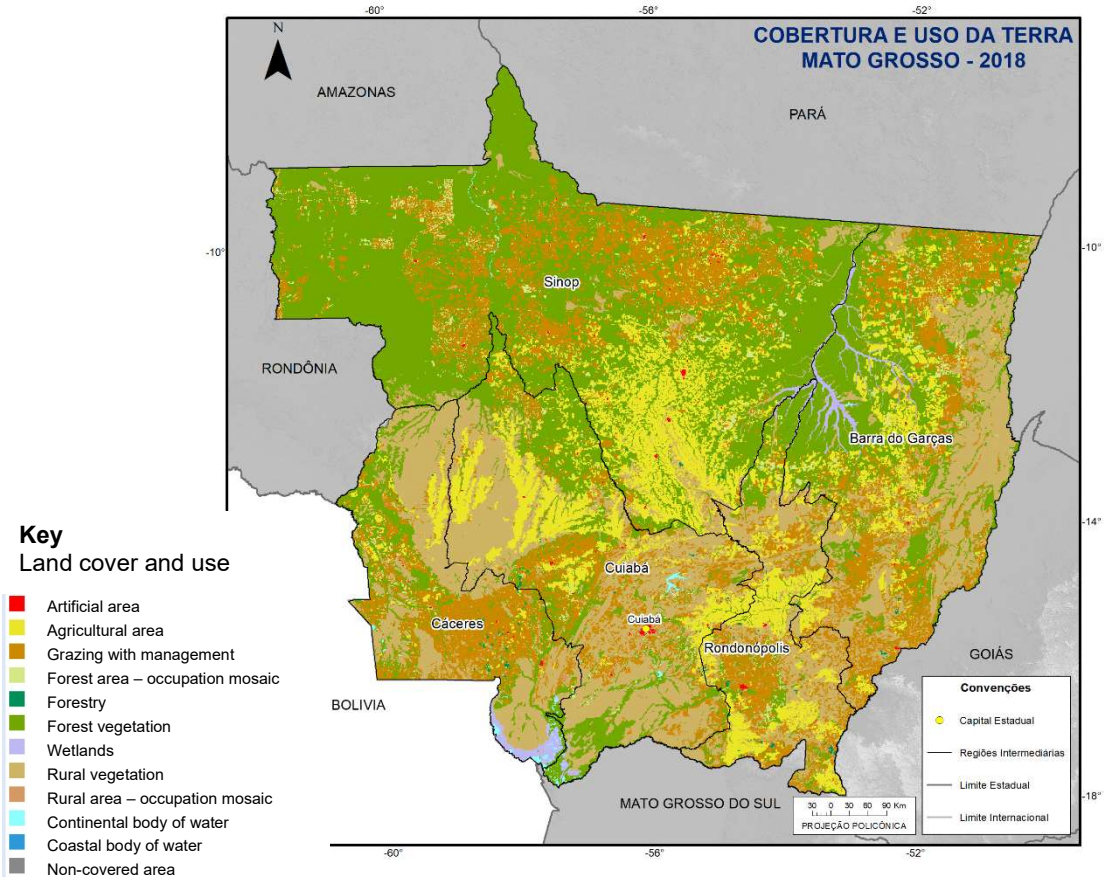
[4] PASTAGEM.org, 2020. Atlas Digital das Pastagens Brasileiras. See https://www.lapig.iesa.ufg.br/lapig/index.php/produtos/atlas-digital-das-pastagens-brasileiras

[5] IBGE, 2020. Levantamento Sistemático da Produção Agrícola. See https://sidra.ibge.gov.br/tabela/1618



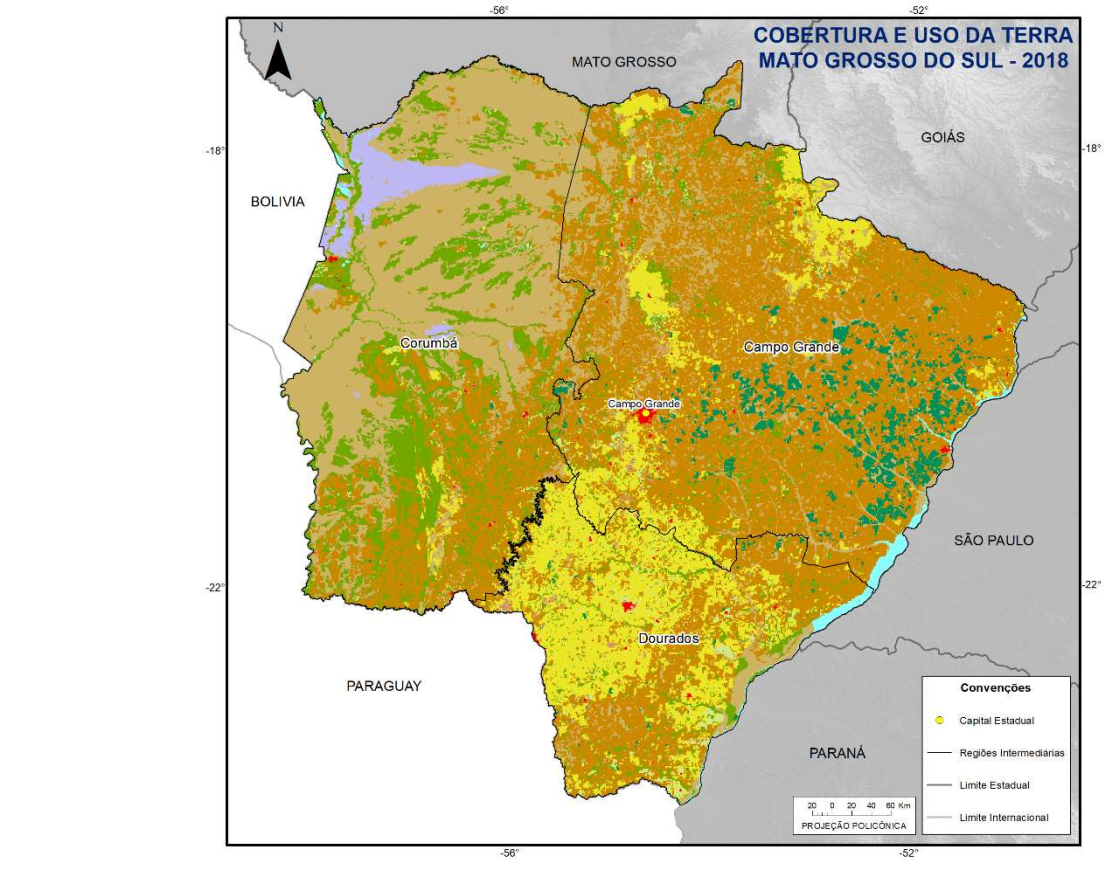
Source: Produced originally based on IBGE, 2020

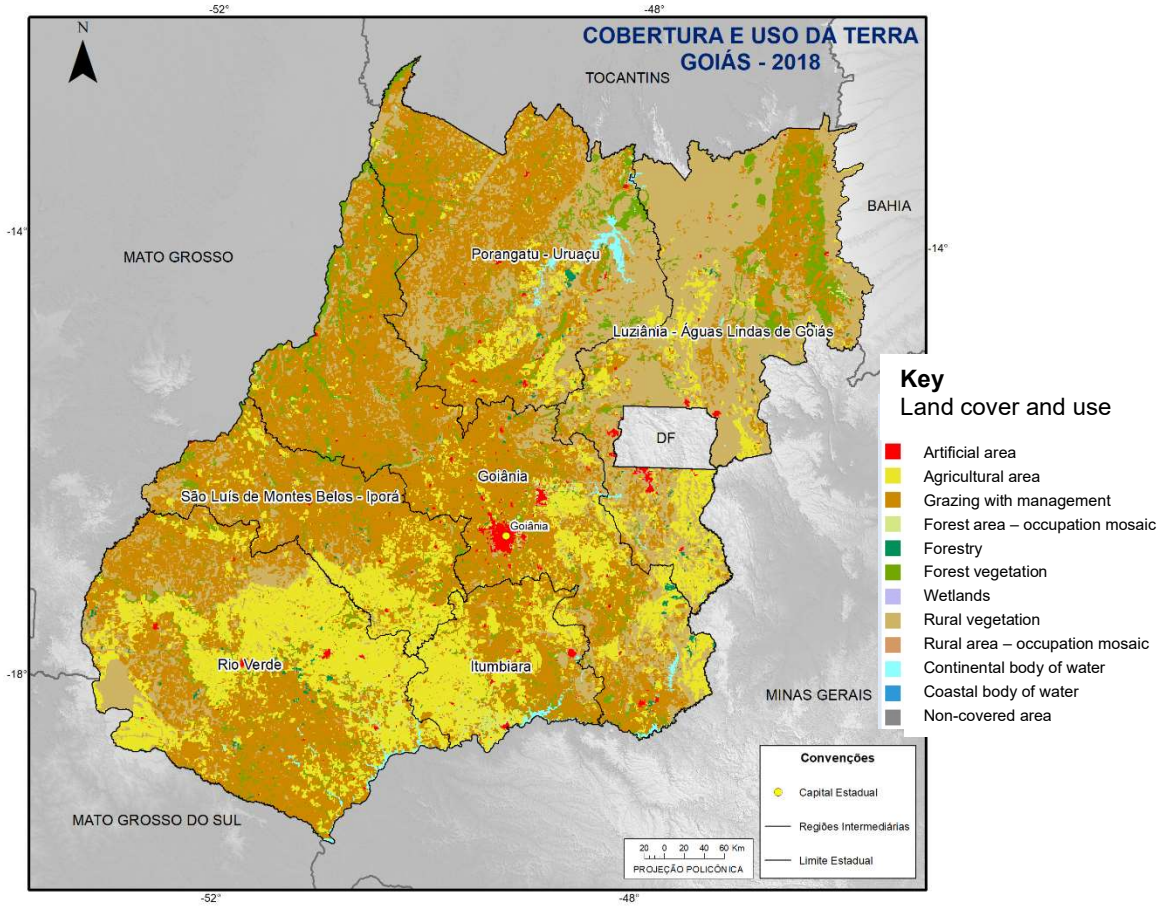
Figure 5: Land use map – states of the Central-West region: Mato Grosso, Mato Grosso do Sul and Goiás, 2018



Key
Land cover and use

- Artificial area
- Agricultural area
- Grazing with management
- Forest area – occupation mosaic
- Forestry
- Forest vegetation
- Wetlands
- Rural vegetation
- Rural area – occupation mosaic
- Continental body of water
- Coastal body of water
- Non-covered area



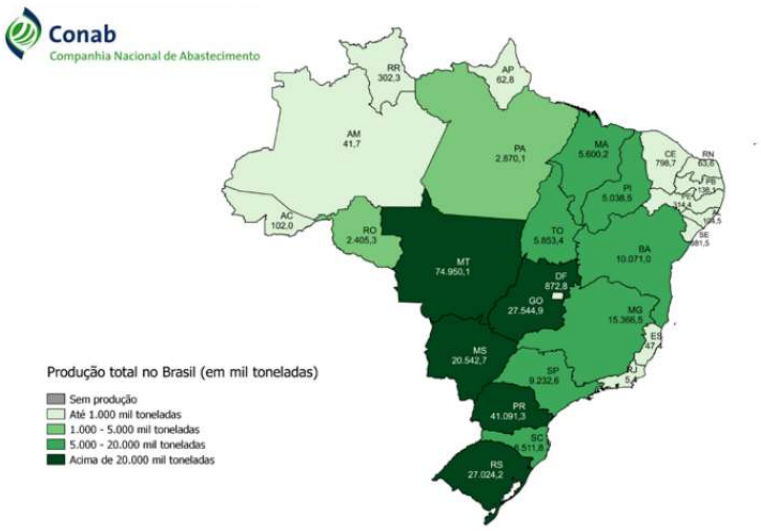


Source: IBGE, 2020[6]

In this context, the land use in the states where the PoA is to be implemented is traditionally agricultural, with them being among the largest agricultural producers in the country (see map, states MT, MS and GO), based on cultures of much shorter production cycles than forest cycles.

Figure 6: Total production in Brazil (in thousand tons)

[6] See https://www.ibge.gov.br/apps/monitoramento_cobertura_uso_terra/v1/



Source: CONAB [National Food Supply Company], 2020

The Central-West Region of Brazil currently represents the core of the expansion of the Brazilian agricultural frontier, standing out in the ranking of agriculture Gross Value of Production (GVP)[7]. In 2018, the states of Mato Grosso, Mato Grosso do Sul and Goiás were among the top four in the country in terms of livestock (ABN, 2018), with special emphasis on grain production – MT topping the national rankings in grain production and the total agriculture GVP in Brazil.

Much of the agriculture's predominance can be understood not only by the physical strength of the crops, but also by the tradition and custom of cultivating the land in short cycles. According to the National Supply Company (CONAB, 2020), "*thanks to the cultivation techniques implemented, from soil management, through to seed technology and applied with modern machines, in addition to qualified labour, the country has the distinction of being able to produce up to three crops of grain*[8] *in the same area.*" It is worth highlighting the fact that, in a single area, the grower can produce up to three harvests per year.

The investment in reforestation, in turn, requires careful assessment and prior planning, as the economic return of the enterprise occurs at greater intervals when compared to agriculture, which is even clearer in the next sections. For example, eucalyptus takes approximately 7 years from planting to first harvest, that is, from the initial disbursement to the first year of revenue obtained from the sale of the product. The long return period and its implications in relation to risks, predictability and instabilities represent a radically different characteristic from the prevailing practice of agricultural crops in the region, in addition to the specificities of implantation, harvesting and marketing strategies, which can also be a deterrent[9].

Thus, considering the fact that land use in the PoA region is clearly predominantly agriculture, and that reforestation areas represent less than 1% of the entire PoA region (IBGE, 2020), it is clear that the most likely land use scenario within the limits of the PoA, without the program, would be agriculture and livestock.

[7] The GVP of the Central-West region totalled R$231.4 billion in 2020 (MAPA, 2020)

[8] Emphasis added.

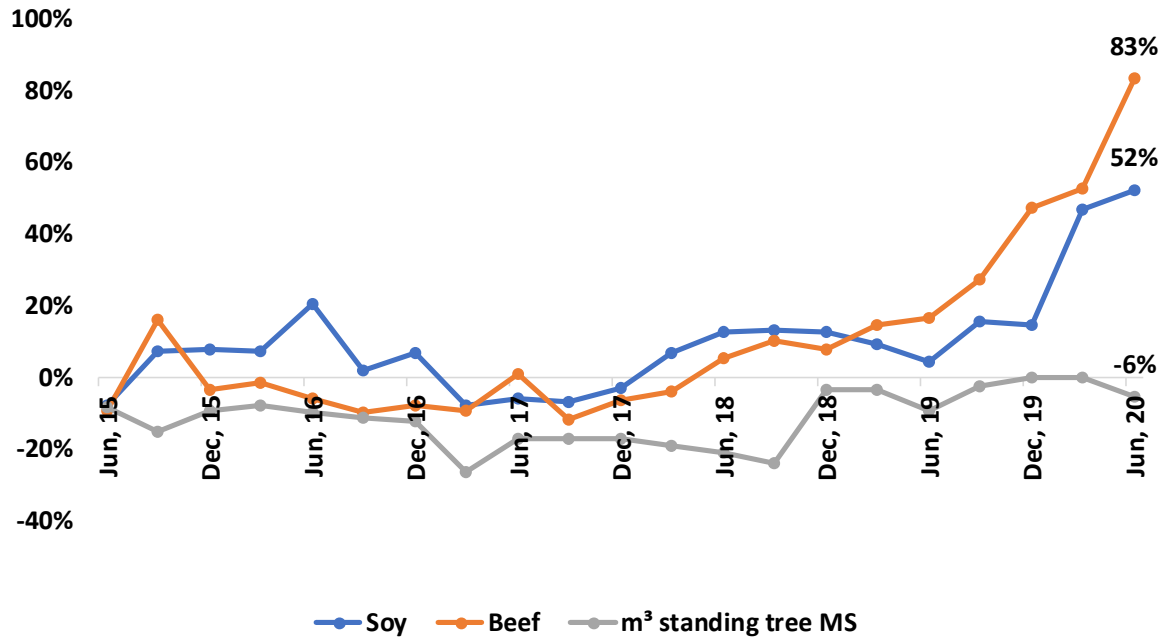
[9] See https://www.embrapa.br/florestas/transferencia-de-tecnologia/eucalipto/perguntas-e-respostas.

b) Barriers related to markets, transport and stock

The trade of forest products in Brazil faces various market difficulties, especially in relation to agriculture.

Regarding market dynamics, when compared to the values of the last years, the cubic metre of standing wood devalued by 6%, while soy and beef appreciated by 52% and 83% per tonne, respectively (see Figure 7[10]).

Figure 7: Percentage change in the trade price of soy, wood and cattle – June 2015 base



Source: Poyry[11] and Index Mundi[12]

When the main forest product markets are analysed, the data also corroborates a less favourable situation. Even in scenarios of growth in sales volume, revenues are either stable or declining, revealing a devaluation of the product unit.

According to data from the Secretariat of Foreign Trade of Brazil (SECEX), there was a unit devaluation in various forestry products. For example, since 2010, the production of laminate flooring, paper and wood panels has remained virtually constant, while prices have

[10] Data available: Mato Grosso do Sul (source).

[11] Poyry: Radar, Year 13, Issue 2, Second quarter 2020.

[12] Index Mundi, 2020. See: https://www.indexmundi.com/commodities/?commodity=wood-pulp&months=120&currency=eur

depreciated by 7%, 6% and 3%, respectively. Since 2007, the same has been seen in other sectors: sawn wood (6%), plywood (26%) and charcoal (6%)[13].

It should also be noted that unlike agriculture, reforestation activities do not constitute the generation of commodities traded in future markets. Based on production estimates, future markets allow the sale of the expected harvest at a predetermined price, which substantially expands the set of opportunities to make a project more attractive and less risky. Table 3 indicates the commodities traded on the Brazilian stock exchange. Forest products are not included. According to the B3, the contracts made available are determined according to market demand.

Table 3: Main contracts traded on the B3

Segmento	Contrato	Código de Negociação
Ações e Índice	Índice Bovespa Índice S&P500 Futuro de Ações	IND e WIN ISP e WSP B3SAO e outros
Taxa de Juros	Taxa DI Taxa Selic Cupom Cambial de DI Cupom de IPCA	DI1 DDI OC1 DAP IAP
Moedas	Dólar dos Estados Unidos Euro Libra Esterlina Iene Japonês Iuan Chinês Outras	DOL e WDO EUR GBR JAP CNY
Commodities	Boi Gordo Milho Café Soja Açúcar Etanol	BGI CCM ICF SFI ETN

Source: B3[14]

With regard to logistics, another relevant aspect in relation to the conversion of agricultural areas into reforestation activities is the greater difficulty in converting reforestation areas to other crops at the end of the forestry project, if the independent producer desires this. This is because, in addition to harvesting the trees, it would be necessary to eliminate tree stumps to make new plantings feasible. This implies more difficulty and additional costs for the producer, aggravating the perception of inflexibility associated with forestry.

Market liquidity is also a relevant aspect. While revenue flows occur at least annually in agriculture, and in some cases there is the possibility of up to three harvests in one year, in reforestation activities, liquidity occurs only from the seventh year.

Thus, the discrepancy in price developments, the absence of a structured spot market, access to future markets, the devaluation of the unit product and, especially, lower liquidity in relation to the agricultural crops prevalent in the PoA region (according to the barrier (a))

[13] Even in the pulp sector, there was a 38% growth in production between 2019 and 2010, however the unit prices of short fibre and long fibre pulp depreciated by 10% and 28% respectively (IBÁ, 2020[13])

[14] http://www.b3.com.br/pt_br/produtos-e-servicos/negociacao/renda-variavel/mercado-de-acoes/mercado-futuro.htm)

constitute important barriers, which hinder the conversion of agricultural areas into independent reforestation projects.

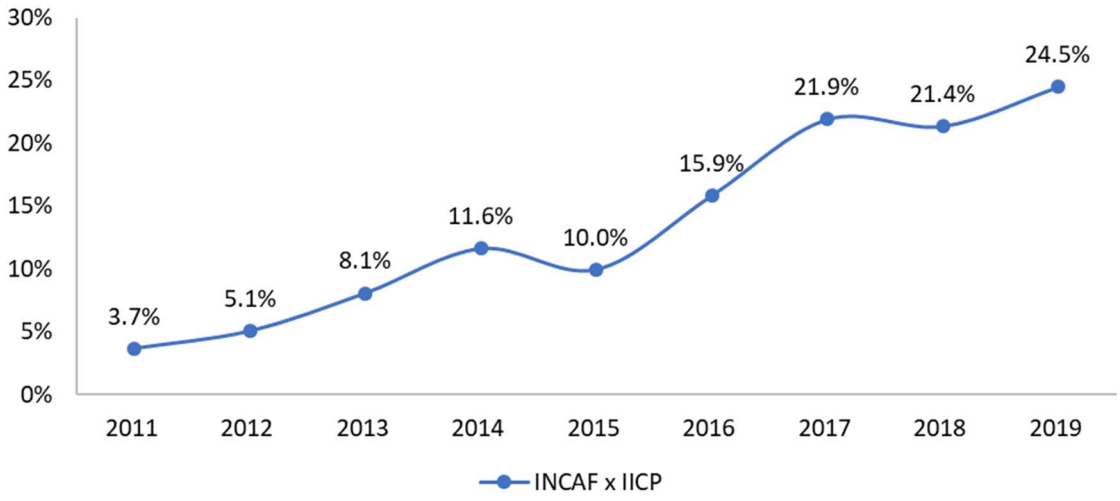
c) Investment barriers: liquidity, long term, investment culture and financing in the country

As mentioned above, unlike the main agricultural crops, forest production requires long periods of investment maturity, depending on the eucalyptus cycle in Brazil, whose first harvest occurs only around the seventh year after planting, in a total investment cycle that usually ranges from 14 to 28 years. In other words, the producer has a high disbursement at the beginning of the period but must wait approximately 7 years for the first source of revenue to occur, assuming various risks related to the development of the forest and the dynamics of the market during the long periods between planting and harvest.

For most agricultural collections, especially in the PoA region (including soy and cattle, which prevail in the Central-West), the cycles are at least annual and, therefore, the level of uncertainty over reforestation is substantially higher, and so are the perceptions of risks on the part of investors accustomed to other cultures, as demonstrated in the barriers above.

In addition to the risks linked to the long-term nature of this type of investment, the dynamics of increased activity costs have also not been favourable. In contrast to the history of falling or stabilizing prices of forest products mentioned in the point above (market barriers), the costs of forest production in Brazil, with regard to the general market situation, have grown above inflation over the years (see Figure 8 for the last 10 years). In the same context, it can be seen that the costs of forestry activity represented by the INCAF (Forest Activity Costs Index) have historically grown above the cost of agricultural production, represented by the IICP (Production Cost Inflation Index). The accumulated variation between INCAF and IICP corresponds to 24%, i.e. the cost of forestry activity rose 24% above inflation presented by agricultural activity in the period between 2011 and 2019.

Figure 8: Accumulated variation between the Forest Activity Cost Index (INCAF) and the Production Cost Inflation Index (IICP)



Source: Pöyry e Farsul (2020)

Besides the difficulty inherent in long-term reforestation, financing conditions also represent a significant challenge in relation to traditional agricultural practices. Historically, agribusiness in Brazil relies on rural insurance, credit insurance, and the future harvest is the collateral (IPEA, 2015)[15]. But since the middle of the last decade, the system has been moving towards agricultural insurance contracted alongside credit, giving financial guarantees against unsuccessful harvests. This does not apply to the activity proposed in this PoA and the use of the forest itself as a guarantee for financing is not yet an option. Even when considering the main instrument for low carbon financing in the land use and forests sector in Brazil (Low Carbon Agriculture Program – ABC), 98% of the funds[16] in the last 10 years were destined for predominantly agricultural activities. Forests are also not accepted as a guarantee – only tangible items such as mortgages, future harvests, fiduciary property, surety, bonds or reserve of means of payment are accepted.

Other capital market instruments are also less accessible to independent producers. For example, issuing Agribusiness Receivables Certificates (CRAs) generally requires well-defined amortization and payment terms, which is easily manageable with annual agricultural crops. On the other hand, in the case of independent reforestation actions, it is difficult to accurately predict when the harvest will take place (revenue generation) according to the market conditions at the time.

Furthermore, the availability of resources in the capital market from large institutional investors for alternative investments, such as forest-based investments, is still very small, given the diverse peculiarities of the business. In Brazil, even among the main pension funds, which are generally more open to investments in long-term assets, participation is much lower. According to ABRAPP (Brazilian Association of Closed Supplementary Pension Entities), over the past 7 years investments by the main pension funds in Brazil in FIPs (Investment Funds in Participations, which include forestry along with several other sectors), fell from 2.6% of the total amount available to only 1.1%, corroborating the difficulty in accessing this type of capital (ABRAPP, 2020). All of this has occurred even in recent periods in which there has been a large availability of capital in the world, which also highlights the difficulty of attracting this type of long-term resource to Brazil (see also the next barrier).

Also, in terms of the long-term investment context, Brazil has lost its investment grade (poor credit rating)[17] for several reasons, especially due to its unstable economic and fiscal context. Over the past few years, Brazil has suffered from political and economic instability (even before the COVID-19 pandemic), which has made investments in forest production proportionately more risky and less attractive compared to the baseline, given the intrinsic relationship with long-term exposure and connection with the various barriers above. This political instability is strongly associated with expectations of economic volatility, directly interfering with investment decisions in Brazil and the ability to attract long-term resources. To cite a more recent period, in the past 7 years, various political events have played a crucial role in investment decisions and expectations. Included in this period are events such as the 2013 protests[18], the beginning of a presidential impeachment process in 2015[19], allegations of corruption against the president who succeeded the previous presidency, removed through impeachment, a decrease in the country's investment grade among others.

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[15] http://repositorio.ipea.gov.br/bitstream/11058/3407/1/td_2028.pdf

[16] Agroicone, 2020.

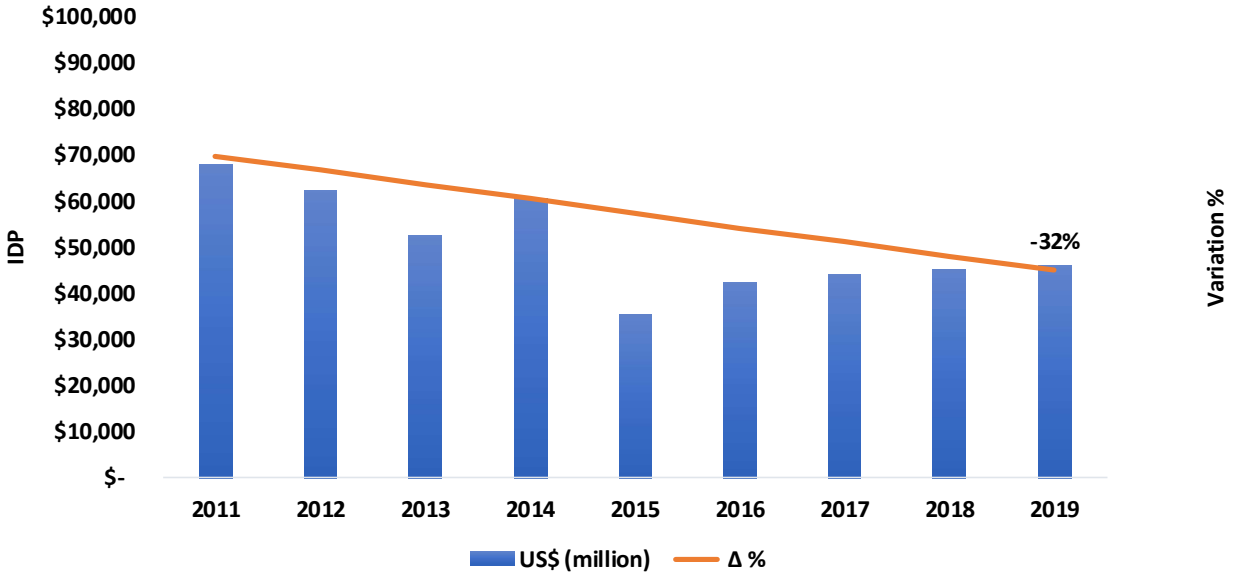
[17] http://g1.globo.com/economia/noticia/2015/09/standard-and-poors-tira-grau-de-investimento-do-brasil.html

[18] See: https://www.bbc.com/portuguese/brasil-44310600

[19] See: https://www2.camara.leg.br/atividade-legislativa/plenario/discursos/escrevendohistoria/destaque-de-materias/impeachment-da-presidente-dilma

The variations in the net foreign direct investment flows portray this point well. FDI values in 2019 fell 32% compared to the 2011 flow, even before the pandemic[20].

Figure 10: Historical series of Net Direct Investments in Brazil



Source: Central Bank of Brazil

Based on the CDM, the measures proposed under this PoA – reforestation practices in partnership with local owners – are more attractive as they generate additional economic incentive, including in the time period that may precede the first harvest of the wood (before 7 years) since carbon stocks made possible by PoA can be established and verified after 2, 3 or 4 years of forest maturation.

Outcome of Sub-step 2b:

The land use scenario that is not impeded by the analysed barriers is *Scenario 1: continuation of current land use*.

Sub-step 2c. Determination of the baseline scenario (if permitted by the Barriers Analysis)

The decision tree proposed by the methodological tool is applied to determine the baseline scenario:

a) Is the reforestation not registered as an A/R CDM project included in the list of land uses that are not impeded by barriers?

No. At the end of Sub-step 2b, only one scenario remains that is not subject to any of the impediments presented by the list of barriers analysed, and this is *Scenario 1: continuation of current land use*.

[20] In 2020 specifically, the decline was even more dramatic. With regard to direct investments, Brazil fell by 41% compared to the same period in 2019 (the lowest value in 11 years) according to the Central Bank of Brazil.

Table 4: summary of the conclusions of the analysis of the identified barriers.

Alternative scenarios			Summary of analysis
Scenario 1 continuation of current land use	*Scenario 2 Project activity undertaken without CDM incentive*	*Scenario 3 planting in at least part of the land within the limits of the PoA*	
a) Barrier due to local land use tradition *Historical tradition of land use with agriculture and livestock activities*			
No	Yes	Yes	Farming is widely disseminated in the region within the limits of the PoA, inherent to the culture and tradition of land use in the region. Without any perspective of incentive (Scenario 2), it is very unlikely that producers will migrate from their traditional crops to a totally new and specialised activity, such as reforestation. In the same way, the specificities of reforestation, without specialised technical support, would discourage producers from taking risks in the long run, even if partially, in this enterprise (Scenario 3). The current situation of land use in the PoA region corroborates the context: reforestation represents only 0.8% of the area. Scenario 1 is, therefore, the scenario that faces no barriers to its continuity.
a) Barriers related to markets, transport and stock *Market and operational difficulties inherent to forestry activity*			
No	Yes	Yes	The absence of a structured spot market and of access to future markets, especially the lower liquidity in relation to agricultural crops prevalent in the PoA region, constitute relevant barriers that hinder the conversion of agricultural areas into independent reforestation actions (Scenarios 2 and 3) . Scenario 1 is, therefore, the most likely scenario.
b) Investment barrier *Less liquidity, increased production costs and competition with agribusiness for financing sources*			
No	Yes	Yes	Forestry production requires long periods of investment maturity (a minimum of approximately 7 years), unlike the main agricultural crops (harvests at least annually), characterised by being an investment with less liquidity and greater risk. In addition to the risks linked to the long-term nature of this type of investment, the limited resources available for forest production (whether via debt, capital markets, etc.), among other aspects, corroborate the difficulty in mobilizing resources and interest in forestry investment in relation to the tradition of land use in the region (Scenario 3). Scenario 1 is, therefore, the most likely scenario. Also, in periods of

			economic instability, investors tend to focus their investments on projects that have greater liquidity and greater profitability to minimize their risks (Scenario 3). Due to the characteristics inherent to reforestation projects, these tend to be neglected when there is the possibility of agriculture (Scenario 1).

b) Does the list contain only one land use scenario?

Scenario 1, continuation of current land use, is not impeded by any of the barriers analysed.

Thus, the conclusion is that the most plausible baseline scenario for the PoA region is the continuation of current land use. Therefore, the baseline scenario for this CPA is Scenario 1.

STEP 3. Investment analysis

This step is used only if the Barriers Analysis is not conclusive and is therefore not applicable to this PoA-DD.

STEP 4. Analysis of common practice

According to the A/R combined tool, the previous steps shall be complemented with an analysis of the extent to which forestation activity has already diffused in the geographical area of the proposed A/R CDM project activity.

The geographic region considered for the comparison between the proposed reforestation activity by this PoA and other similar activities was the Central-West region of Brazil. Currently, there are no CDM A/R projects registered in this region of Brazil.

As already presented in Step 2, Analysis of Barriers, the states of the Central-West region are notable for their remarkable performance in the agricultural sector, being even mentioned as “the country's breadbasket”. There are forest plantations in the states, but the proportion of area covered by reforestation compared to agricultural areas for the total number of states is almost insignificant. Even in Mato Grosso do Sul, which has a greater amount of reforested area, this area represents only 3% of the state’s total. Mato Grosso and Goiás do not reach 1% each (IBGE, 2020/IBA, 2019). Clearly, reforestation as proposed by this PoA is not the baseline and is therefore additional.

Although, the previous assessment demonstrates that project activity is not the common practice in the region, an additional common practice check has been performed as per the combined tool. There are other companies in the PoA region that have also established reforestation activities. However, as presented below, such activities are mostly related to verticalized operations from large multinational companies from the agribusinesses industry, to use biomass as sources of heat for drying grains, energy for cold storage of food and steam generation in production processes, i.e. an input for their agricultural production processes. These companies are listed below and all of them are located in the PoA area, i.e. the Center-West region of Brazil (States of Mato Grosso/MT, Goias/GO and Mato Grosso do Sul/MS):

Cargil[21]: founded 155 years ago, Cargill is a private, multinational company headquartered in the state of Minnesota, USA, whose activity is food production and processing. It is currently the second largest privately held company in the world and employs more than 160,000 people in 67 countries.

BRF[22]: BRF is a Brazilian multinational food company, the result of the merger between Sadia and Perdigão, two of the main food companies in Brazil. It is the world's largest producer and exporter of processed meats, mostly based on poultry, and the second largest food industry in the country. It has more than 85 years of history and a team of 95,000 employees in 130 countries.

Bunge[23]: founded a trading company in Amsterdam in 1818, Bunge is an agribusiness and food multinational grain trading company that produces food, operates in port and logistics services and produces sugar and bioenergy. According to a survey by Brand Finance, in 2012 Bunge was among the 20 most valuable brands in Latin America: the only agribusiness and bioenergy company to be included in this ranking, and the second-ranked company in the food sector.

ADM[24]: is a conglomerate founded in the USA in 1818, operating more than 270 factories worldwide, with 40,000 employees, where cereal grains and oilseed plants are transformed into numerous products used in food, beverages, industries and animal fodder.

Amaggi[25]: Amaggi is a Brazilian company in the areas of agriculture (production of soybeans, corn and cotton), logistics and operations (port, road and river operations), commodities and energy (generation and commercialization of electric energy). Operates in 7 countries with 6,000 employees. It was ranked the fifth largest exporter of soybean and soy products in Brazil in 2020.

The forestation activities carried out by these companies are not similar to the one proposed by the PoA, and did not face barriers likewise, especially because of the staggering difference between the companies' scale and purposes. The target of the reforestation activities carried out by these large companies is not the forestry activity itself, but rather the provision of an input to their production of grains and animal protein under their agribusinesses. The difference in the scale of the companies, when compared to the CME, and the purpose of their plantations substantially affects the approach, conditions and resources that can be made available and accessed for the establishment of the forest areas and constitute essential distinctions between the proposed forestation activity and the ones found in the region. So, forestation activities in the region cannot be considered similar due to essential distinctions between them and the proposed A/R PoA: the proposed A/R PoA is not the baseline scenario and, hence, is additional.

SECTION D. Start date and duration of PoA

D.1. Start date of PoA

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The start date of the PoA is 05/12/2019, which is the date of the official notification of the CME's intention to seek registration through the CDM to the CDM secretariat and the DNA.

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[21] See https://www.cargill.com.br/en/cargill-at-a-glance

[22] See https://www.brf-global.com/en/about/brf/about-us/

[23] See https://www.bunge.com/who-we-are/our-history

[24] See https://www.adm.com/our-company/adm-facts

[25] See https://www.amaggi.com.br/en/about-the-company/our-performance/

D.2. Duration of PoA

>>
60 years and 0 months.

SECTION E. Environmental impacts

E.1. Level at which environmental impacts analysis is undertaken

>>
The analysis of environmental impacts is conducted at the PoA level. The implementation of PoA does not result in significant negative environmental impacts; on the contrary, when considering the baseline scenario (non-forested areas), the benefits are evident, since there is an increase in forest stocks in previously non-forested areas. All CPAs will be implemented in areas already impacted by humans, including a historic intensive agricultural/ grazing land use. Hence, the CME concluded that, despite local specificities, the overall positive impacts will be of a same nature.

The technology used and the methods followed will be identical, or very similar, in all CPAs, so impacts will likewise be similar for all of them.

E.2. Analysis and environmental impacts

>>
Environmental impacts are consequences or changes in the environment caused by humans, which can be negative when the previous situation worsens, or positive when they promote the recovery of the affected areas. The environmental impacts resulting from silviculture practices in non-forested areas, when properly managed, are positive, especially when converting agricultural land into forest plantations.

According to OLIVEIRA, 2017,

> *"In agricultural crops, biodiversity is extremely restricted compared to areas with forest plantations. In agricultural cultivation, the survival of other plant species is inhibited by factors such as the use of herbicides, annual soil preparation (ploughing and harrowing) and the competition promoted by the cultivated plant. In forestry crops, these factors, when used, are restricted to the forest implantation phase, leaving various years without being applied."*

Reforestation enables maintaining soil fertility through litter and the permanence of harvest residues in the soil between the crop rotations incorporated as organic matter.

In areas whose original vegetation cover has already been removed, in the case of areas under this PoA, reforestation begins to contribute environmentally in various aspects, such as reducing erosion and maintaining soil structure. There is the monitoring of the occurrence of accidental or intentional fires in the planted and conservation areas within the boundaries of the PoA, a benefit that results from the PoA and extends to neighbouring areas. In addition, the correct establishment and conservation of legal reserve areas and permanent preservation on properties safeguards biodiversity[26].

[26] See https://www.embrapa.br/codigo-florestal/area-de-reserva-legal-arl

The CME seeks to manage PoA activities through an operational and environmental management plan, aiming to prevent impacts and optimise operating costs. The verification of compliance with legal requirements is carried out periodically by the CME. Compliance and updating of laws, treaties, agreements, conventions, etc., among other pertinent requirements, are verified.

Within the scope of this PoA, the CME also seeks to voluntarily encourage forest certification practices for the areas included in the CPAs, despite not being a mandatory or legal requirement. Even though Brazilian environmental legislation already contemplates several criteria to ensure good environmental practices, Lacan, under the proposed PoA, also commits to the principles and criteria (P&C) of the FSC®[27] for Forest Management Certification and Chain of Custody, with socio-environmental responsibility towards communities and neighbours in all forestry management operations, as summarized below:

1. Compliance with FSC Laws and Principles®;
2. Responsibilities and rights of land ownership and use;
3. Rights of Indigenous Peoples;
4. Community Relations and Workers' Rights;
5. Benefits of Forests;
6. Environmental impact;
7. Management plan;
8. Monitoring and evaluation;
9. Maintenance of Forests of High Conservation Value;
10. Plantations[28].

It is important to note that one of the principles (Principle 6) specifically covers environmental impacts. The operational procedures that are part of Lacan's Management System, which will also be adopted under the PoA, and other documents related to forest management activities support the management plan to be contemplated for the CPAs' areas. These documents undergo periodic reviews considering changes in the technical&scientific, socio-environmental, and economic scenarios. Thus, it is hoped that certification will maximize the potential of the program's contribution to the sustainable development of the regions.

Moreover, in response to the public consultation held on 01 April 2022 (see Section G below), Lacan lists below the main measures to be carried out in the CPAs areas for monitoring and preserving water resources:

- Licensing for water collection to its forestry activities, according to legislation;
- Collect water only where permitted by environmental authorization issued by the environmental agency and/or as established by the relevant legislation.
- Record the amount of water captured in all forest management daily.
- The equipment used for water collection must be protected (containment basin) to avoid contamination of soil and water resources.
- Isolation of the water collection point and proper distribution of the different land uses.
- Monitoring of the Natural Regeneration of Native Species.

The sustainable management of water resources comprises actions aimed at ensuring water quality standards in the watershed. The actions to be developed in the CPAs' areas are listed below:

- Fencing the area adjacent to the water source (Preservation Area) to prevent animals, people, and vehicles from entering; taking all measures to favor its isolation to avoid the contamination of the land or even the water, e.g. fishing/hunting ban;

[27] Or equivalent certification system, if there is any relevant change in the future.

[28] See https://br.fsc.org/pt-br/polticas-e-padres/princpios-e-critrios/os-10-princpios.

- Redistribution of roads, aiming at protecting the springs, since most of rural roads were not properly planned;
- Conservation of the entire basin and vegetable cover surrounding the springs;
- Construction of protective structures for the springs
- Control of erosion;
- Laboratory Analyses: analysis will be carried out sorted by areas with more ecological and social representativeness; conduct qualitative analysis preferably in areas that have some type of activity e.g. planting, maintenance and /or harvesting;

It is worth noting that both Brazilian legislation and FSC principles and criteria allow the implementation of reforestation projects based on planted forests, diverse or homogeneous, since several practices and references already indicate that possible impacts on water resources, when applicable, can be managed in accordance with the principles of sustainable development regarding environmental, social and economic aspects (OLIVEIRA, 2017).

Thus, in the context explained above, the sustainable reforestation activities proposed by the PoA constitute a nature-based solution. Since reforestation practices will be implemented on non-forested lands, including areas previously occupied by agriculture, environmental conditions are expected to improve. In any case, the CME will encourage the use of state-of-the-art operational techniques, always targeting the conservation and maintenance of natural resources, considered to be its greatest assets, as per the following key activities:[29]

- contribution with the recovery and maintenance of soil integrity;
- control of invasive species;
- maintaining ecological corridors;
- monitoring of fire occurrences, benefiting not only its areas, but also neighbouring areas;
- guaranteeing that all activities that require licensing will have their applications approved by the competent bodies;
- implementing FSC certification.

E.3. Environmental impact assessment

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State law in the states that make up the PoA limits do not require an Environmental Impact Study – EIA for reforestation, since this is considered to have low environmental impact, as per Mato Grosso state Decree n.262/2019[30] and SEMADE (State Secretariat for the Environment and Economic Development) Mato Grosso do Sul Resolution n. 9/2015[31] and Goias State Secretariat Decree n.9710/2020[32].

It is important to note, however, that all CPAs under this PoA will seek forest certification (example, FSC), which requires even more rigorous socio-environmental management criteria than the legislation.

[29] Based on https://07505549-16a6-42cf-8953-76bced28b1d0.filesusr.com/ugd/3c8577_6c0df0ce5fda482f819bac24d853d83a.pdf

[30] See https://www.iomat.mt.gov.br/portal/visualizacoes/pdf/15698/#/p:1/e:15698

[31] See https://www.imasul.ms.gov.br/wp-content/uploads/2019/11/Res-Semade-09-2015-compilada.pdf

[32] See https://legisla.casacivil.go.gov.br/api/v2/pesquisa/legislacoes/103356/pdf

SECTION F. Socio-economic impacts

F.1. Level at which socio-economic impact analysis is undertaken

>>

The analysis of socioeconomic impacts is conducted at the PoA level. The technology used and the methods followed will be identical or very similar in all CPAs, so the impacts will also be similar in all CPAs.

F.2. Analysis of socio-economic impacts

>>

National and state laws do not require a socio-economic impact analysis for forestry. Interventions that address socioeconomic issues will be similar across all CPAs. It is expected that the implementation of the PoA will enable generation and maintenance of jobs and an injection into local economies.

In fact, the implementation of sustainable reforestation, as prescribed in this PoA, generates a series of socioenvironmental benefits, such as the generation of quality jobs in rural areas, securing field labour, and supplying renewable biomass for various production chains, among others.

In addition, all work safety standards are followed. The CME has implemented a system for legal monitoring from which it is possible to verify the legislation applicable to the enterprise and to monitor the legal changes in labour, health and safety legislation, as well as others applicable to the enterprise.

The PoA will be implemented in areas already impacted by humans that have a historical land use for other purposes, especially agriculture. Some areas of the PoA are characterised by being remote, far from urban centres and with almost no neighbours and communities in the surroundings that interdepend on resources and socio-environmental services in the management areas. When this is the case, the treatment given to these resources and services will be those required by environmental legislation, especially with regard to the conservation of legal reserves and preservation of APPs.

Thus, in line with the presented above, the CME will act:

- providing good and safe working conditions for its employees and demanding the same from its suppliers;
- hiring all employees, without exception, under the Brazilian Labor Legislation (informally known in Brazil as “CLT”);
- creating job opportunities, contributing to a better distribution of income in the region. This will consequently increase the quality of life of several local families;
- prioritizing suppliers from cities and rural areas close to the project's operations;
- increasing the availability of wood from sustainable sources. This is an important point for the contribution of regional integration and articulation with other sectors.

The implementation of new reforestation areas, with different silvicultural treatments, where previously was non-forested areas, contributes to strengthening the local social economic context.

F.3. Socio-economic impact assessment

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See sections F.1. and F.2.

SECTION G. Local stakeholder consultation

G.1. Level at which local stakeholder consultation is undertaken

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The stakeholder consultation process will be conducted at the PoA level, in accordance with the instructions of the Brazilian DNA, Interministerial Commission on Global Climate Change (CIMGC), Resolution No. 9, of 20 March 2009[33], which provides for the Program of Activities under the Clean Development Mechanism.

G.2. Modalities for local stakeholder consultation

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Stakeholders' consultation, December 2020

The solicitation of comments from local actors on the proposed Program of Activities requires registered letters to be sent to the official addresses of the indicated institutions, containing the invitation for comments. Sealed envelopes are also sent for the return of comments, with no postage costs for the recipient. The "Manual for Submitting Project Activities under the CDM to the Interministerial Commission on Global Climate Change for the purpose of obtaining the Letter of Approval from the Brazilian Government", version 2, of 1 July 2008, was also followed.

List of stakeholders who was invited to comment:

Organization / Individual
Executive Secretariat of the National CDM Designated Authority
FBOMS – Brazilian Forum of NGOs and Social Movements for Environment and Development
Ibá – Brazilian Tree Industry
Federal Public Ministry

The invitation letters were sent on 11 and 12/12/2020 and the project documents (PoA-DD and "Annex 3") were made available in Lacan website, www.lacanflorestal.com.br/sustentabilidade.

Stakeholders' consultation, April 2022

As per request from the Brazilian DNA through its "*Ofício Nº 2640/2022/MCTI*"[34], the CME conducted a complementary consultation, according to instructions provided therein. Due to constraints caused by the COVID-19 pandemic, a virtual consultation was held on 01/04/2022. Invitation letters were sent to all stakeholders on 17/03/2022. The stakeholders invited are listed below.

Organization / Individual
Executive Secretariat of the National CDM Designated Authority
FBOMS – Brazilian Forum of NGOs and Social Movements for Environment and Development
IBÁ – Brazilian Tree Industry
Federal Public Ministry

[33] See http://www.mctic.gov.br/mctic/export/sites/institucional/ciencia/SEPED/clima/arquivos/legislacao_cimgc/Resolucao-n-9-de-20-de-marco-de-2009.pdf.

[34] This document was presented to the DOE for validation.

IBAMA - Federal Institute for the Environment
Mato Grosso State Secretariat for the Environment
SEMAGRO - State Secretariat for the Environment, Economic Development, Production and Family Farming - MS
IMASUL - Mato Grosso do Sul Institute for the Environment
Goiás State Secretariat for the Environment and Sustainable Development
State Government of Mato Grosso
Legislative Assembly of the State of Mato Grosso
State Government of Mato Grosso do Sul
Legislative Assembly of the State of Mato Grosso do Sul
State Government of Goiás
Legislative Assembly of the State of Goiás
Public Ministry of Mato Grosso
Public Ministry of Mato Grosso do Sul
Public Ministry of Goiás
Reflore MS - Association of Producers and Consumers of Planted Forests from MS
AREFLORESTA - Mato Grosso Reforestation Association
GOFLOR - Association of Producers and Consumers of Planted Forests of the State of Goiás
Mato Grosso State University
Mato Grosso Federal University
Mato Grosso do Sul State University
Mato Grosso do Sul Federal University
Goiás State University
Goiás Federal University

The online public consultation was held on 01/04/2022 via Microsoft Teams platform from 08h30 to 09h35, Brasilia time (BRT). The attendees were:

Marco Neves	Superintendent of Water Resources and Sanitation of the Goiás State Secretariat for the Environment and Sustainable Development
Albano Araújo	Management Instruments of the Goiás State Secretariat for the Environment and Sustainable Development
Luiz Calvo Ramires Junior	*Reflore MS* - Association of Producers and Consumers of Planted Forests from MS
Fausto Takizawa	*AREFLORESTA* - Mato Grosso Reforestation Association
Cibele Kotsubo Cunha Castro	*AREFLORESTA* - Mato Grosso Reforestation Association
Haroldo Klein	*AREFLORESTA* - Mato Grosso Reforestation Association
Allan Mota	Forestry Engineering Coordination*, UEMS*-Mato Grosso do Sul State University
Sonia Regina Bittencourt	*MCTI* - Ministry of Science Technology and Innovation; representing the Brazilian DNA under the CDM
Fabio Marques	Director – Plantar Carbon
Cristiana Oliveira	Analyst – Plantar Carbon
Guilherme Ferreira	Managing Partner of Lacan Ativos Reais, Lacan
Alexandre dos Santos Bomfim	Administrative/Financial Board, Lacan Florestal
Luzia Hirata	Sustainability Manager, Lacan
Rodrigo Rocha de Oliveira	Forestry Operational Board, Lacan Florestal
Geraldo Colli Junior	Strategic Board of Forestry, Lacan

A summary of the meeting is provided below, and the meeting report was sent to the DNA.

Guilherme Ferreira, Lacan	○ Conducted a general presentation of the proposed CDM Program of Activities.
Marco Neves, *SEMA Goiás*	○ Firstly, congratulates the initiative. He states that he usually works with projects aiming at the recovery of protected areas and legal reserves, based on native vegetation. He asks in what manner the program proposal would cover this issue. ○ Lacan's response: the project aims to comply with all environmental legislation. Therefore, if any partner's properties within the program are not in compliance with environmental legislation, the program activities will have to contemplate the recovery of these specific areas; this is already a usual practice in Lacan's projects.
Albano Araújo, *SEMAD GO*	○ He starts by saying that he cannot use the term "forest" to refer to eucalyptus monoculture, although he understands the use of the term. ○ He points out that the program's proposal does not mention water resources. ○ He notes that although the document mentions jobs creation, forestry activities in fact generates few jobs, as they do not require frequent management. He also notes that the project mentions soil improvement but claims that *brachiaria* results in the same effects. He states that the project lists positive aspects without really covering all the issues involving monoculture, suggesting it steers the attention only to benefits, which, according to him, would not actually be found. ○ He states that the project is in line with the private sector, as it is a profit-focused plantation, and claims that he does not conceal the activity as generating environmental benefits, nor understands the proposals presented as benefits, citing carbon removals as a concept of climate change management, but not in the concept of water resource management, stating that they modify evapotranspiration pattern. ○ He criticized the document for calling eucalyptus a "nature-based solution", as this is an exotic species for commercial purposes. ○ He mentions that cultivating eucalyptus is nor as changeable as ordinary crops, as it demands the removal of stumps from the area to change to another crop. ○ He said trees are the greater water consumers in a hydrological basin; 70% of the water in the basin system is involved in evapotranspiration. Harvested based crops present intense evapotranspiration pattern at the growth phase and when it begins to balance, it is harvested, and the process is restarted. ○ The program proposal is aligned with any commercial processes and he does not perceive any environmental benefit. ○ He suggested that water resource is contemplated in the program's document[35]. Lacan's Response: Lacan considers and respects Mr Albano's opinion, however, would like to clarify that:

[35] Taking this comment into consideration, refer to Section E.2 for provisions regarding water resources.

	○ Regarding job creation, forest plantation demands continuous activities for planting/maintenance/harvesting, as the plantings are annually-based and comprise more than one single area. And there is the second cycle and second rotation. So, no personnel is dismissed. ○ Regarding environmental issues concerning eucalyptus plantations, those are common and fairly debated issues; especially they are under the scrutiny of FSC certification system. The areas are FSC certified exactly to guarantee no relevant negative impact is derived from the forest activities. Lacan's areas are all FSC certified and this will be pursued for all CPAs under the PoA. ○ The purpose of the program is not restauration of native vegetation, reforestation with eucalyptus species to supply the demand for wood. These activities promote jobs as they attract industries interested in wood and avoid the use of wood from native vegetation.
Albano Araújo, *SEMAD GO*	○ Appreciates the consideration and reinforce the importance of including water resource treatment in the program's document. Lacan's Response: reinforces that water collection is one of the major aspects analyzed by FSC, and it is seriously treated during the certification audits. ○ Reinforces that FSC certification will be pursued for all CPAs.
Luzia Hirata, Lacan	○ Stated that information regarding water resources will be included in the PoA document.
Sônia Bittencourt, *MCTI*	○ She stressed the relevance of the information stating that CDM assesses the project's contribution to sustainable development. ○ She thanks SEMAD-GO for all inputs and reinforces the importance of contemplating this issue in the PoA document. ○ She said that the project is approved before the FSC certification of the areas and, therefore, no guarantee can be made as to the success of the CPAs' certification. ○ Lacan's Response: reinforces that information regarding water resources will be included in the PoA document.

Fausto Takizawa, *AREFLORESTA*	○ Starts by stressing that the reference for his inputs is the state of Mato Grosso. ○ Mato Grosso is under intense pressure for biomass and a deficit of forestry biomass, which can impact native forests. ○ He mentioned that years ago, sawmills' patios were packed with biomass residues and nowadays there are none. ○ Also, the state faces a strong pressure for land for agribusiness, and notes that this is well described in the program's document, mentioning the high prices for soy and commodities. ○ He stated that, although there is also a pressure for wood from eucalyptus and *teca* (teak), the plantings do not follow it, there is an unbalance both factors. ○ He said that producers in Mato Grosso do not perceive eucalyptus plantations as business, once it does not present a good yield such as soy, corn or cattle, and that this directly impacts the opportunity cost of land. There are studies that show the rise in opportunity cost of land for eucalyptus. ○ He states that the facts showed in the additionality section of the program's document are reasonable, since agribusiness in Mato Grosso is robust and this elevates the opportunity cost of land. ○ He said he works with *teca* (teak) plantings, which are also FSC certified and so is very familiar with the monitoring, including on water resources, but he is not aware of any monitoring of water resources in crops such as soy, corn, or pasture.
Albano Araújo, *SEMAD GO*	○ He suggested the agroforestry system as an interesting way to optimize economic gain and increase income and job creation. Lacan's response: the possibility of analyzing this modality is not ruled out, stating, however, that it depends on some characteristics for it to happen.
Luzia Hirata, Lacan	○ Acknowledged the inputs of Mr. Albano and Mrs. Sonia and states that more information on water resources will be included in the program's document.
Guilherme Ferreira, Lacan	○ Emphasized the importance of FSC certification for the program, thanked everyone for the participation, and ended session.

G.3. Summary of comments received

>>

The CME received one comment from *Ibá – Brazilian Tree Industry*, acknowledging the content of the PoA-DD and the "Annex 3", emphasizing the contribution of the program for the economic, social and environmental in local, national and global levels.

No comments were received for the public consultation of 01/04/2022, except those already described and addressed in Section G.2 above.

G.4. Consideration of comments received

>>
As the comment stated the program's relevancy and demanded no further clarification, the comment was received and archived. A thank-you note was sent to the stakeholders appreciating its participation and contribution.

No comments were received for the public consultation of 01/04/2022, except those already described and addressed in Section G.2 above.

SECTION H. Approval and authorisation

>>
According to the procedures of the Brazilian DNA, the Letter of Approval from Brazil is not available at the time of submission of this A/R PoA-DD for the Validation process.

PART II. Generic component project activity (CPA)

SECTION I. Description of generic CPA

I.1. Title of generic CPA

>>
"Reforestation for multiple uses in the Brazilian Central-West"

I.2. Reference number of generic CPA

>>
Generic CPA 01 – large scale
Version 01
Completed: xx / xx / xxxx

I.3. Purpose and general description of generic CPA

>>
The purpose of this CPA is to implement reforestation for multiple uses in [complete with the municipality/state], in the Central-West region of Brazil, where traditionally the areas are for agricultural crops or pasture. The implementation area of this CPA totals [.....] hectares in a leased property.

LACAN is the coordinating/managing entity(CME) of the Program of Activities "PoA for the reforestation of land for multiple uses" and will be responsible for developing the program in partnership with rural landowners, with the objective of converting non-forested areas into forested areas. The organisation will be responsible for managing the reforestation practices of this CPA. The species selected for this reforestation project include commercial trees [Eucalyptus spp.].

This project activity is expected to remove [....] tCO2e from the atmosphere over the 20-year period (1st crediting period) with an annual average of [.....] tCO2e.

The reforestation for multiple purposes developed within the scope of the PoA aim to develop quality forests. In addition to generating net GHG removals from the atmosphere, the program provides various social and environmental benefits, contributing to the sustainable development of the region:

- proactive engagement with neighbouring communities;
- development of local commerce and service providers in the region;
- generation of income and direct and indirect jobs in rural areas;
- training and technical guidance;
- valorisation of local culture and avoiding rural-urban migration;

- increase in forest stocks, indirectly helping to relieve pressure on native forests;
- protection and conservation of carbon stocks in remnant native forests;
- encouraging the restoration of conservation areas;
- increasing awareness of environmental preservation and conservation;
- shelter for wildlife.

This CPA involves no technologies/measures and know-how for their use transfer to the host Party.

I.4. Measures

Detailed below are the technologies and measures to be implemented in each step of a reforestation project. This CPA involves no transfer of technologies/measures and know-how to the host Party.

Planting species**:** planting will be carried out with clones of genus Eucalyptus *spp.* and the species will be defined in each CPA. In order to define the material to be used, it will be considered the adaptability of the material to the region as well as its characteristics taking into account the final use of the wood adopted for each CPA.

Clearing the area: this consists of removing barriers in the area to ensure good quality in subsequent operations. It includes the removal of undergrowth, controlling leaf-cutting ants and weeds, and the construction and maintenance of roads and firebreaks. It requires mechanisation, carried out with a bulldozer, excavator, loader and agricultural tractors. LACAN does not use fire as a clearing technique. Pre-existing vegetation is grouped as:

- Protected vegetation: these are the tree species that cannot be harvested, according to legal requirements. No action is taken regarding these trees.
- Non protected vegetation: this group includes trees and shrubs that can be legally removed.

Soil preparation: this aims to make the area ready for planting seedlings. The planting lines are demarcated through subsoiling, which may or may not include fertilisation, depending on soil conditions. Activities can be mechanised, using tractors, or semi-mechanized. In general, the CME adopts minimal cultivation, i.e. only turning the soil on the planting line, resulting in a very low impact on the level of soil cover. The CME will verify that tillage do not disturb more than 10% of the project area, e.g. evaluation of the proportion of tilled area (width x length of the tillage line x number of tilled lines or dug area x number of pits) in relation to the total area of the project.

The planting spacing will be defined *a posteriori* in order to ensure the best use of each CPA land with the planting density ranging from 900 to 1,700 plants per hectare.

Planting and regrowth:

Planting or implantation: when new seedlings are planted. During implantation, the seedling and planting is done in a semi-mechanised or mechanised way. There may be irrigation. The seedlings will be purchased in the market and will be clonal seedlings. In order to ensure a high survival rate and quality of planting, the seedlings will be acquired in reliable locations, with high phytosanitary and quality control and the species will be selected according to the final destination of the wood and its adaptability to the CPA region. The expected potential for survival will be defined in each CPA depending on the site, however, according to the plantations already carried out by the CME, a potential for survival of more than 90% is expected.

Replanting: replanting consists of the replacement of dead seedlings and will be carried out by the end of the first month after planting.

Tillage and planting activities can be carried out at any time of the year to be determined by the CME.

Regrowth: after harvesting the main sprout is selected, which appears in the stumps of the harvested trees, and the others are eliminated.

Maintenance: the phase from post-planting to the penultimate year. This involves combating leaf-cutting ants, controlling weeds and pests and diseases when planting species, in addition to nutritional monitoring until the third year of planting. It aims to reduce the mortality of plantations and ensure productivity. It also encompasses the construction and maintenance of roads and fire breaks, and the forest fire prevention and control plan.

i) Ant control: begins before planting and is planned annually. Ant control is performed in a localized and systematic way by means of ant killer. In addition, periodic monitoring of the forest is carried out to identify any infestation for early combat.

ii) Weed control: begins before planting in the clearing the area stage and is carried out annually in the planting line using of herbicides for the first 3 years, when normally the canopy closure occurs, and the operation is no longer necessary. In addition, periodic monitoring of the forest is carried out to identify any infestation for early combat.

iii) Fertilization: throughout each rotation, 4 fertilizations are planned at 0, 3, 6 and 12 months after planting to enhance production. In addition, periodic monitoring of the forest is carried out to identify some deficiency for early correction.

All operations comply with safety and quality standards required for certification.

The species selected for this reforestation project include commercial trees of Eucalyptus spp.. The clones to be used will be defined in each CPA in order to ensure the best adaptability and productivity of each project. The spacing used will be [.....] and the seedlings are expected to survive [.....]. The annual planting plan for the areas is defined in [table ... INSERT TABLE].
[Possibility of including photos; at the discretion of the CPA]

The CME conducts 2 rotations in each production cycle, where the average cutting age of plantations is 6 years and coppice is also 6 years (in both rotations the harvest occurs between 5.5 and 7.5 years of the forest, depending on the CME's need). In general, the company that buys the wood is the responsible for the harvesting, however the said company transports only the stems, leaving branches, leaves and roots in the area to protect the soil from erosive processes and compaction and allowing the cycling of nutrients. The CME does not remove the roots from the soil.

I.5. Approach to addressing non-permanence

>>
For the anthropogenic net removals of GHGs reached by this CPA, the issuance of temporary Emission Reduction Certificates (tCERs) was chosen.

SECTION J. Application of methodologies and standardised baselines

J.1. References to methodologies and standardised baselines

>>

The methodology applied by this CPA is *AR-ACM0003 - Afforestation and reforestation of lands except wetlands, version 02.0*[36].

Methodological tools applied by this methodology[37]:

1. *Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities, version 01.*
2. *Estimation of non-CO_2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity, version 04.0.0.*
3. *Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities, version 03.1* [38]
4. *Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/RCDM project activities, version 04.2*
5. *Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity, version 2.0*
6. *Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities, version 01.1.0*[39]

J.2. Applicability of methodologies and standardised baselines

>>

This methodology is applicable because the program meets the following applicability conditions.

J.2.1) Conditions of applicability of the AR-ACM003 methodology, version 02.0

The verification of the methodology's applicability conditions will be done as described below:

a) The area of the project activity does not fall into the category of wetlands:

CME will verify the type of terrain on which the proposed CPAs will be deployed using, for example, the Soil Map of Brazil – IBGE[40], in order to ensure that they are not established in wet areas, e.g. through information on the geographical location of the area and type of soil. Therefore, project activities will not fall into the category of wetlands.

b) Soil disturbances attributed to activities in the proposed project do not cover more than 10% of the project area that:

i. Contain organic soils: The CME will verify the type of land on which the proposed CPAs will be deployed using, for example, the Soil Map of Brazil - IBGE, in order to ensure that they are not established in organic soils, e.g. by information of the geographical location of the area and type of soil. Therefore, project activities will not fall into the organic soil category.

ii. At the baseline are subject to land use management conditions which receive inputs listed in Appendices 1 and 2 of the AR-ACM003 methodology, version 02.0: If the land use at baseline falls within one of the conditions listed in Appendices 1 and 2 of

[36] See https://cdm.unfccc.int/methodologies/ARmethodologies/approved

[37] See https://cdm.unfccc.int/Reference/tools/index.html

[38] Not applicable to this PoA, as per Section J.3 and J.5.1.2(a) below.

[39] Not applicable to this PoA, as per Section J.3 and J.5.1.2(a) below.

[40] See ftp://geoftp.ibge.gov.br/informacoes_ambientais/pedologia/mapas/brasil/solos.pdf

the AR-ACM003 methodology, the CME will verify that tillage do not disturb more than 10% of the project area, e.g. evaluation of the proportion of tilled area (width x length of the tillage line x number of tilled lines or dug area x number of pits) in relation to the total area of the project.

In general, the CME adopts minimal cultivation, i.e. only turning the soil on the planting line, resulting in a very low impact on the level of soil cover.

J.2.2) Conditions of applicability of the "Combined tool to identify the baseline scenario and demonstrate the additionality of the CDM F / R project activities", version 01

c) Reforestation in the area within the proposed boundaries, conducted with or without registration as CDM A/R activity, should not lead to the violation of any applicable laws, even if these laws are not being enforced.

Reforestation in the area within the proposed limits do not violate any local or national laws.

d) This tool is not applicable to small-scale A/R project activities.

All CPAs under this PoA will be large-scale, considering the current criteria of the CDM and the Designated National Authority of Brazil.

J.2.3) Conditions of applicability of the tool "*Estimation of non-CO_2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity, version 04.0.0.*"

i) The tool is applicable to all occurrence of fire within the project boundary.

This PoA-DD takes into consideration the emissions occurring due to accidental fires.

ii) Non-CO_2 GHG emissions resulting from any occurrence of fire within the project boundary shall be accounted for each incidence of fire which affects an area greater than the minimum threshold area reported by the host Party for the purpose of defining forest, provided that the accumulated area affected by such fires in a given year is ≥5% of the project area.

This applicability condition will be assessed during the monitoring of each CPA. The CME will verify if the area affected by fire in a given year exceeds the limit of 5% of the project area. If the burnt area exceeds 5% of the project area, the area affected will be delimited according to parameter $A_{BURN,i,t}$ and the calculation of non-CO_2 GHG emissions will be done according to item J.5.1.2.(b).

J.2.4) Conditions of applicability of the tool "*Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities, version 03.1*"

N/A. This tool has no internal applicability conditions.

J.2.5) Conditions of applicability of the tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/RCDM project activities, version 04.2*"

N/A. This tool has no internal applicability conditions.

J.2.6) Conditions of applicability of the tool "*Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity, version 2.0*"

i) This tool is not applicable if the displacement of agricultural activities is expected to cause, directly or indirectly, any drainage of wetlands or peat lands.

As mentioned above in item J.2.1(a), no CPA under this PoA will be implemented in areas containing wetlands, nor peat lands.

J.2.7) Conditions of applicability of the "*Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities, version 01.1.0"*

N/A. Conservatively, there will be no carbon accounting of this pool under this PoA.

J.3. Project boundary, carbon pools, sources and greenhouse gases (GHGs)

>>

The most recent version of the methodological tool *Demonstration of eligibility of lands for A/R CDM project activities* will be applied to each proposed CPA at the time of analysis for inclusion in the PoA (see Section L). The eligibility demonstration shall be conducted as below:

- Provide information that proves that the areas, at the beginning of the project, did not contain forest, based on the following parameters:
  - Vegetation on the land is below the forest threshold values applicable by Brazil (Host Country):
    - Areas larger than 1 ha;
    - Expected tree height above 5 meters;
    - Canopy cover greater than 30%.
  - It is expected that the young natural vegetation, existing in the areas at the beginning of the project, do not exceed the forest threshold values applicable by the Host Country;
  - The land is not a part of forest area that is temporarily unstocked as a result of human intervention (e.g. harvesting) or natural causes, and the land is not expected to revert to forest.

- Demonstrate that the areas did not contain forests (planted or native) as of 31 December 1989, according to the criteria above.

All areas will be identified through georeferencing. Maps of land use, satellite images and/or documentation of the property may be used to facilitate the designation of the project areas, as well as to verify that they are in accordance with the criteria established by the methodological tool.
The CPAs will have their limits defined using georeferencing methods. The geographical coordinates of the project boundaries will be collected, and from these the polygons of each project will be constructed in shape and/or KML files.

Carbon pools		Selected?	Justification/Explanation
Baseline	Above-ground biomass	Yes	This is the largest carbon sink considered by the project
	Below-ground biomass	Yes	The carbon stock in this sink is expected to increase due to the implementation of the project
	Dead wood Litter Soil organic carbon	No	Conservatively, there will be no carbon accounting in these pools.
Project activity	Above-ground biomass	Yes	This is the largest carbon sink considered by the project
	Below-ground biomass	Yes	The carbon stock in this sink is expected to increase due to the implementation of the project
	Dead wood Litter Soil organic carbon	No	Conservatively, there will be no carbon accounting in these pools. However, it is expected that there will be an increase in carbon in these pools throughout the project.
Leakage	Above-ground biomass Below-ground biomass	Yes	If leakage is applicable, these pools would represent the largest source of leakage emissions.
	Dead wood Litter Soil organic carbon	No	Carbon in these pools will not be accounted.

Source		GHG	Included ?	Justification/Explanation
Baseline	Burning of woody biomass	CO_2	No	CO_2 emissions due to the burning of biomass will be accounted for as a change in the carbon stock
		CH_4	Yes	Emissions from accidental fires will be monitored.
		N_2O	Yes	Emissions from accidental fires will be monitored.
Project activity	Burning of woody biomass	CO_2	No	Not applicable
		CH_4	Yes	Emissions from accidental fires will be monitored.
		N_2O	Yes	Emissions from accidental fires will be monitored.

J.4. Establishment and description of baseline scenario

>>

The identification of the baseline scenario for the areas at the limits of the component activity will follow the provisions of the methodology *AR-ACM0003* version 02.0 in its item "Identification of the baseline scenario and demonstration of additionality" which provides for the application of the "Combined tool to identify the baseline scenario and demonstrate the additionality of the CDM A/R project activities". The application of the tool is detailed in Section C of the final version of this PoA-DD.

The identified baseline scenario is the continuation of land use practices that existed prior to the CPA, i.e. non-forested areas.

J.5. Estimation of net anthropogenic removals

J.5.1. Explanation of methodological choices

>>

To determine the removals attributable to the project, the determinations established by the *AR-ACM0003* methodology were considered. Anthropogenic net GHG removals by sinks are calculated by the equation:

$$\Delta C_{AR-CDM,t} = \Delta C_{ACTUAL,t} - \Delta C_{BSL,t} - LK_t$$

Where:

$\Delta C_{AR-CDM,t}$	=	Net anthropogenic GHG removals by sinks, in year *t*; t CO_2-e
$\Delta C_{ACTUAL,t}$	=	Actual net GHG removals by sinks, in year *t*; t CO_2-e
$\Delta C_{BSL,t}$	=	Baseline net GHG removals by sinks, in year *t*; t CO_2-e
LK_t	=	GHG emissions due to leakage, in year *t*; t CO_2-e

Baseline removals

J.5.1.1. Net GHG removals by baseline sinks

$$\Delta C_{BSL,t} = \Delta C_{TREE\_BSL,t} + \Delta C_{SHRUB\_BSL,t} + \Delta C_{DW\_BSL,t} + \Delta C_{LI\_BSL,t}$$ Equation 1[41]

$\Delta C_{BSL,t}$	=	Baseline net GHG removals by sinks in year *t*; t CO_2-e

[41] For Equations 1, 2 and 3 the numeration adopted in methodology *AR-ACM0003* was maintained.

$\Delta C_{TREE\_BSL,t}$ = Change in carbon stock in baseline tree biomass within the project boundary in year *t*, as estimated in the tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities*"; t CO_2-e

$\Delta C_{SHRUB\_BSL,t}$ = Change in carbon stock in baseline shrub biomass within the project boundary, in year *t*, as estimated in the tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities*"; t CO_2-e

$\Delta C_{DW\_BSL,t}$ = Change in carbon stock in baseline dead wood biomass within the project boundary, in year *t*, as estimated in the tool "*Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities*"; t CO_2-e

$\Delta C_{LI\_BSL,t}$ = Change in carbon stock in baseline litter biomass within the project boundary, in year *t*, as estimated in the tool "*Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities*"; t CO_2-e

The latest version of the methodological tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities*" is applied to determine the baseline carbon stock.

According to section 5.11 of the tool, the carbon stock of trees in the baseline can be accounted as zero if all of the following conditions are met:

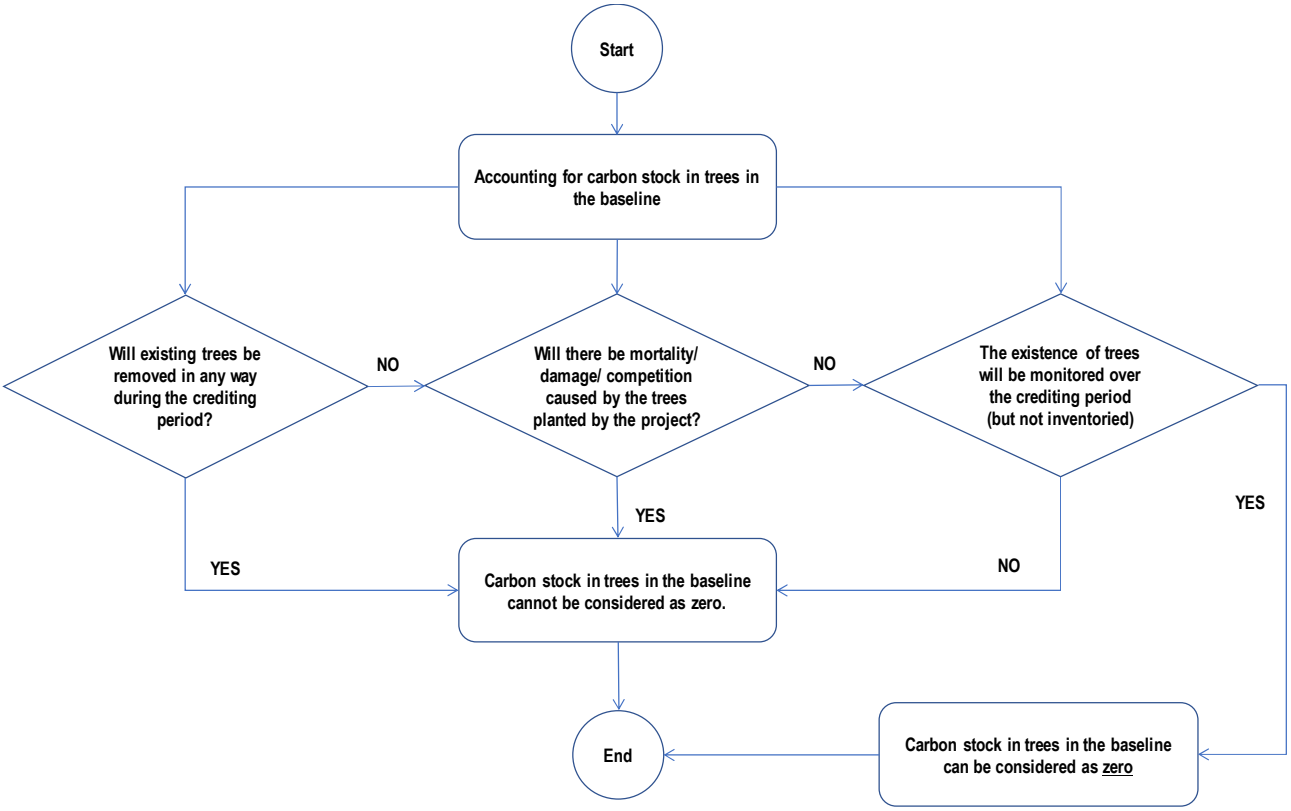
a) Existing pre-project trees are not harvested, deforested or removed during the entire crediting period of the project activity;

b) Existing pre-project trees do not suffer mortality due to competition with the trees planted due to the project, or damage caused by the implementation of the project activity, at any time during the crediting period;

c) Existing pre-project trees are not inventoried together with project trees when monitoring carbon stocks, but their continuous existence, consistent with the baseline scenario, is monitored throughout the crediting period of project activity.

Figure 13 shows a flow chart with the summary specified above.

Figure 13: Flow chart for determining carbon stock in the baseline (based on item 5 of the tool)



The previous land use was determined as non-forested lands, especially agriculture and pasture. Although there may be some trees in the areas, their density will not characterize forest formation according to the Host Country's definition of forest. Preferably, the isolated trees in the project boundary will not be harvested and other forestry and planting activities will be carried out as to avoid competition with existing trees. However, whenever isolated trees occur in the project boundary, the CPA implementer could:

i) Georeference the isolated trees, at the time of inclusion of the CPA, to monitor their survival during the crediting period of the project (if the isolated trees are not georrefereced, conservatively, CPA implementer shall apply the baseline discount of these trees), and/or

ii) Harvest the trees and apply the baseline discount, as below.

Should the CPA implementer apply the discount, the carbon stock in baseline tree biomass within the project boundary will be estimated by measurement of sample plots using stratified random sampling, as described in the latest version of the methodological tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities*":

$$C_{TREE\_BL} = \frac{44}{12} \, xCF_{TREE\_BL} xB_{TREE\_BL}$$ Equation 12[42]

$$B_{TREE\_BL} = A \, x \, b_{TREE\_BL}$$ Equation 13

[42] For Equations 12 to 17, the numbering adopted in the methodological tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities" version 04.2* was maintained.

$$b_{TREE\_BL} = \sum_{i=1}^{M} w_i \, x \, b_{TREE\_BL,i}$$ Equation 14

$$u_{C\_BL} = \frac{t_{VAL} \, x \, \sqrt{\sum_{i=1}^{M} w_i^2 \, x \, \frac{s_i^2}{n_i}}}{b_{TREE\_BL}}$$ Equation 15

$$b_{TREE\_BL,i} = \sum_{p=1}^{ni} b_{TREE\_BL,p,i}$$ Equation 16

$$s_i^2 = \frac{n_i \, x \, \sum_{p=1}^{ni} b_{TREE\_BL,p,i}^2 \, - \, (\sum_{p=1}^{ni} b_{TREE\_BL,p,i})^2}{n_i \, x \, (n_i \, - \, 1)}$$ Equation 17

Where:

C_{TREE_BL}	=	Carbon stock in trees in the tree biomass estimation strata in the baseline; t CO2e
CF_{TREE_BL}	=	Carbon fraction of tree biomass; t C (t d.m.)-1 . A default value of 0.47 is used unless transparent and verifiable information can be provided to justify a different value.
B_{TREE_BL}	=	Tree biomass in the tree biomass estimation strata in the baseline; t d.m
A	=	Sum of areas of the tree biomass estimation strata; ha
b_{TREE_BL}	=	Mean tree biomass per hectare in the tree biomass estimation strata in the baseline; t d.m. ha^{-1}
w_i	=	Ratio of the area of stratum i to the sum of areas of tree biomass estimation strata (i.e.⁄); dimensionless
$b_{TREE\_BL,i}$	=	Mean tree biomass per hectare in stratum i; t d.m. ha^{-1}
u_{C_BL}	=	Uncertainty in C_{TREE_BL}
t_{VAL}	=	Two-sided Student's t-value for a confidence level of 90 per cent and degrees of freedom equal to n – M, where n is total number of sample plots within the tree biomass estimation strata and M is the total number of tree biomass estimation strata
s_i^2	=	Variance of tree biomass per hectare across all sample plots in stratum i; (t d.m. ha^{-1}) ^{2}
n_i	=	Number of sample plots in stratum i.
$b_{TREE\_BL,p,i}$	=	Tree biomass in the baseline per hectare in plot p of stratum i; t d.m. ha^{-1}

In this context, the biomass of the trees per hectare will be calculated as detailed in the Appendix 1 of the tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities" version 04.2*.

$$b_{TREE\_BL,p,i} = \frac{B_{TREE\_BL,p,i}}{A_{PLOT,i}} \quad \text{Equation 1}^{43}$$

$$B_{TREE\_BL,p,i} = \sum_{j} B_{TREE\_BL,j,p,i} \quad \text{Equation 2}$$

$$B_{TREE\_BL,j,p,i} = \sum_{l} B_{TREE\_BL,l,j,p,i} \quad \text{Equation 3}$$

$$B_{TREE\_BL,l,j,p,i} = f_{BL,j}(x_{1,l}, x_{2,l}, x_{3,l}, \ldots) \quad \text{Equation 4}$$

Where:

$b_{TREE\_BL,p,i}$	=	Tree biomass per hectare in sample plot *p* of stratum in the baseline *i*; t d.m. ha^{-1}
$B_{TREE\_BL,p,i}$	=	Tree biomass in sample plot *p* of stratum *i* in the baseline; t d.m
$A_{PLOT,i}$	=	Size of sample plot in stratum *i* in the baseline; ha
$B_{TREE\_BL,j,p,i}$	=	Biomass of trees of biome *j* in sample plot *p* of stratum *i* in the baseline; t d.m
$B_{TREE\_BL,l,j,p,i}$	=	Biomass of tree *l* of biome *j* in sample plot *p* of stratum *i* in the baseline; t d.m.
$f_{BL,j}(x_{1,l}, x_{2,l}, x_{3,l}, \ldots)$	=	Above-ground biomass of the tree returned by the allometric equation for biome *j* relating the measurements of tree *l* to the above-ground biomass of the tree; t d.m.

According to section 5.12 of the tool, changes in carbon stocks in trees and shrubs in the baseline may be accounted as zero for those lands for which the project participants can demonstrate, that one or more of the following indicators apply:

a) Observed reduction in topsoil depth (e.g. as shown by root exposure, presence of pedestals, exposed sub-soil horizons);
b) Presence of gully, sheet or rill erosion; or landslides, or other forms of mass movement erosion;
c) Presence of plant species locally known to be indicators of infertile land;
d) Land comprises of bare sand dunes, or other bare lands;
e) Land contains contaminated soils, mine spoils, or highly alkaline or saline soils;

[43] For Equations 1 to 4, the numbering adopted in the Appendix 1 methodological tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities" version 04.2* was maintained.

f) Land is subjected to periodic cycles (e.g. slash-and-burn, or clearing-regrowing cycles) so that the biomass oscillates between a minimum and a maximum value in the baseline;
g) Conditions (a), (b) and (c) under paragraph 11 apply.

As mentioned above, the previous land use was determined as non-forested lands, especially agriculture and pasture. So, probable the condition (f) will be applied to the CPA and the carbon stocks in shrubs in the baseline could be accounted as zero, or condition (g) will be checked as described in figure 13 above.

If the presence of shrubs is observed in the base line condition and these shrubs were harvested, the carbon stock in baseline shrub biomass within the project boundary will be estimated by proportionate crown cover, as described in the latest version of the methodological tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities*".

Those areas where the shrub crown cover is less than 5 per cent are treated as a single stratum and the shrub biomass in this stratum is estimated as zero. For those areas where the shrub crown cover is more than 5 per cent, the carbon stock in baseline shrub biomass within the project boundary will be estimated as follows:

$$C_{SHRUB,t} = \frac{44}{12} \times CF_s \times (1 + R_s) \times \sum_i A_{SHRUB,i} \times b_{SHRUB,i}$$

Equation 26[44]

$$b_{SHRUB,i} = BDR_{SF} \times b_{FOREST} \times CC_{SHRUB,i}$$

Equation 27

Where:

$C_{SHRUB,t}$	=	Carbon stock in shrubs within the project boundary at a given point of time in year *t*; t CO2-e. [In this PoA represents the carbon stock in baseline shrub biomass at the time of CPA inclusion].
CF_s	=	Carbon fraction of shrub biomass; t C $(t.d.m.)^{-1}$. A default value of 0.47 t C $(t.d.m.)^{-1}$ is used.
R_s	=	Root-shoot ratio for shrubs; dimensionless. The default value of 0.40 is used.
$A_{SHRUB,i}$	=	Area of shrub biomass estimation stratum *i*; ha
$b_{SHRUB,i}$	=	Shrub biomass per hectare in shrub biomass estimation stratum *i*; t d.m. ha^{-1}
BDR_{SF}	=	Ratio of shrub biomass per hectare in land having a shrub crown cover of 1.0 (i.e. 100 per cent) and the default above-ground biomass content per hectare in forest in the region/country where the A/R CDM project activity is located; dimensionless. A default value of 0.10 should be used unless transparent and verifiable information can be provided to justify a different value. [to be defined by the specific CPA at the time of CPA inclusion]

[44] For Equations 26 and 27, the numbering adopted in the methodological tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities" version 04.2* was maintained.

b_{FOREST}	=	Mean above-ground biomass in forest in the region or country where the A/R CDM project is located; t d.m. ha^{-1}. Values from Table 3A.1.4 of IPCC GPG-LULUCF 2003 are used unless transparent and verifiable information can be provided to justify different values. [to be defined by the specific CPA at the time of CPA inclusion]
$CC_{SHRUB,i}$	=	Crown cover of shrubs in shrub biomass estimation stratum *i* at the time of estimation, expressed as a fraction.

Project Removals

J.5.1.2. Actual net GHG removals by sinks

Actual net GHG removals sinks (ex ante) are calculated according to the applied methodology and the latest version of the methodological tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities*".

$$\Delta C_{ACTUAL,t} = \Delta C_{P,t} - GHG_{E,t}$$ Equation 2

Where:

$\Delta C_{ACTUAL,t}$	=	Actual net GHG removals by sinks, in year *t*; t CO_2-e
$\Delta C_{P,t}$	=	Change in the carbon stocks in project, occurring in the selected carbon pools, in year *t*; t CO_2-e
$GHG_{E,t}$	=	Increase in non-CO_2, GHG emissions within the project boundary as a result of the implementation of the A/R CDM project activity, in year *t*, as estimated in the tool "*Estimation of non-CO_2, GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity*"; t CO_2-e

a. Change in the carbon stock in the project, occurring in the selected carbon pools, in year *t*.

$$\Delta C_{P,t} = \Delta C_{TREE\_PROJ,t} + \Delta C_{SHRUB\_PROJ,t} + \Delta C_{DW\_PROJ,t} + \Delta C_{LI\_PROJ,t} + \Delta SOC_{AL,t}$$ Equation 3

Where:

$\Delta C_{P,t}$	=	Change in the carbon stocks in project, occurring in the selected carbon pools, in year *t*; t CO_2-e

$\Delta C_{TREE\ PROJ,t}$	=	Change in carbon stock in tree biomass in project in year *t*, as estimated in the tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities*"; t CO_2-e
$\Delta C_{SHRUB\ PROJ,t}$	=	Change in carbon stock in shrub biomass in project in year *t*, as estimated in the tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities*"; t CO_2-e
$\Delta C_{DW\ PROJ,t}$	=	Change in carbon stock in dead wood in project in year *t*, as estimated in the tool "*Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities*", t CO_2-e
$\Delta C_{LI\ PROJ,t}$	=	Change in carbon stock in litter in project in year *t*, as estimated in the tool "*Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities*"; t CO_2-e
$\Delta SOC_{AL,t}$	=	Change in carbon stock in SOC in project, in year *t*, in areas of land meeting the applicability conditions of the tool "*Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities*", as estimated in the same tool; t CO_2-e

To calculate the parameter $\Delta C_{SHRUB\_PROJ,t}$, the CME should assess the condition of the proposed area for the project in order to determine whether there was shrub vegetation in it and, if so, apply the calculations provided for in the methodological tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities*" in its latest version.

If the existence of shrubs is not observed in the project scenario, the carbon stocks in the shrubs in the project scenario will be considered as zero in ex ante and ex post analyses:

$\Delta C_{SHRUB\_PROJ,t} = 0$

Even if the existence of shrubs is observed in the project scenario, conservatively, the CPA implementer will not account for carbon stock in shrub biomass in the project scenario.

The project activity conservatively will not account for carbon pools of dead wood biomass, litter biomass or soil organic carbon. Therefore, the parameters for these carbon pools will be considered as zero. Like this,

$\Delta C_{DW\_PROJ,t} = 0$
$\Delta C_{LI\_PROJ,t} = 0$
$\Delta SOC_{AL,t} = 0$

The **average tree carbon stock** within the strata for estimating the tree's biomass and the associated uncertainty are calculated as follows (all time-dependent quantities refer to the measurement time):

$\Delta C_{TREE\_PROJ,t} = C_{TREE}$

Therefore,

$$C_{TREE} = \frac{44}{12} \times CF_{TREE} \times B_{TREE}$$ Equation 12[45]

$$B_{TREE} = A \times b_{TREE}$$ Equation 13

$$b_{TREE} = \sum_{i=1}^{M} Wi \times b_{TREE,i}$$ Equation 14

$$u_C = \frac{t_{VAL} \times \sqrt{\sum_{i=1}^{M} w_i^2 \times \frac{s_i^2}{n_i}}}{b_{TREE}}$$ Equation 15

Where:

C_{TREE}	=	Carbon stock in trees in the tree biomass estimation strata; t CO_2-e
CF_{TREE}	=	Carbon fraction of tree biomass; t C (t d.m.)$^{-1}$. A default value of 0.47 is used unless transparent and verifiable information can be provided to justify a different value.
B_{TREE}	=	Tree biomass in the tree biomass estimation strata; t d.m.
A	=	Sum of areas of the tree biomass estimation strata; ha
b_{TREE}	=	Mean tree biomass per hectare in the tree biomass estimation strata; t d.m.
Wi	=	Ratio of the area of stratum *i* to the sum of areas of tree biomass estimation strata (i.e. $w_i = A_i/A$); dimensionless
$b_{TREE,i}$	=	Mean tree biomass per hectare in stratum *i*; t d.m. ha^{-1}
u_C	=	Uncertainty in C_{TREE}
t_{VAL}	=	Two-sided Student's t-value for a confidence level of 90 per cent and degrees of freedom equal to n – M, where n is total number of sample plots within the tree biomass estimation strata and M is the total number of tree biomass estimation strata
s_i^2	=	Variance of tree biomass per hectare across all sample plots in stratum *i*; (t d.m. ha^{-1})
n_i	=	Number of sample plots in stratum *i*.

[45] For Equations 12 to 15, the numbering adopted in the methodological tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities" version 04.2* was maintained.

If the estimate from Equation (15) is higher than 10 per cent, its conservativeness can be increased by applying the uncertainty discount provided in Appendix 2 of the tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities*", version 04.2.

The same allometric equation will be used for parameter $B_{TREE,p,i}$, both ex ante and ex post. The equation chosen is presented in section J.5.2 and meets condition 6(c) of the tool "*Demonstrating appropriateness of allometric equations for estimation of aboveground tree biomass in A/R CDM project activities*", version 01.0.0. In addition, the source referenced corresponds to a scientific article published in one of Brazilian most relevant forestry scientific journals.

$$b_{TREE,p,i} = \frac{B_{TREE,p,i}}{A_{PLOT,i}} \times (1 + R_i)$$ Equation 1[46]

$$B_{TREE,p,i} = \sum_j B_{TREE,j,p,i}$$ Equation 2

$b_{TREE,p,i}$ = Tree biomass per hectare in sample plot *p* of stratum *i*, t d.m. ha^{-1}

$B_{TREE,p,i}$ = Tree biomass in sample plot *p* of stratum *i*, t d.m.

$A_{PLOT,i}$ = Size of sample plot in stratum *i*; ha

$B_{TREE,j,p,i}$ = Biomass of trees of species *j* in sample plot *p* of stratum *i*; t d.m.

R_i = Root-shoot ratio for stratum *i*; dimensionless

The value of R_i is estimated as $R_i = \frac{e^{(-1.085+0.9256\times\ln b)}}{b}$, where *b* is the above-ground tree biomass per hectare (in t d.m. ha^{-1}), as presented in the methodological tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities" version 04.2*

$$B_{TREE,j,p,i} = f_j(x_{1,j}, x_{2,j}, x_{3,j}, \ldots)$$ Equation 4

Where:

$B_{TREE,j,p,i}$ = Biomass of tree *I* of species *j* in sample plot *p* of stratum *r*, t d.m.

$f_j(x_{1,j}, x_{2,j}, x_{3,j}, \ldots)$ = Above-ground biomass of the tree returned by the allometric equation for species *j* relating the measurements of tree *I* to the above-ground biomass of the tree; t d.m.

[46] For Equations 1, 2 and 4, the numbering adopted in Appendix 1 of methodological tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities" version 04.2* was maintained.

The parameter $f_i(x_{1,j}, x_{2,j}, x_{3,j}, \ldots)$ represents the allometric equation as a function of DBH and height (Ht) and will be considered as planted forest, by species.

b. Project GHG emissions

According to the applied methodology, the only source of GHG emissions accounted for by the projects results from fires, accidental or not. The methodological tool "*Estimation of non-CO_2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity*"[47] is used for the calculation of GHG emissions through burning.

$$GHG_{E,t} = GHG_{SPF,t} + GHG_{FMF,t} + GHG_{FF,t}$$ Equation 1[48]

Where:

$GHG_{E,t}$	=	Emission of non-CO_2 GHGs resulting from burning of biomass and forest fires within the project boundary in year *t*; t CO_2-e
$GHG_{SPF,t}$	=	Emission of non-CO_2 GHGs resulting from the use of fire in site preparation in year *t*; t CO_2-e
$GHG_{FMF,t}$	=	Emission of non-CO_2, GHGs resulting from the use of fire to clear the land of harvest residue prior to replanting of the land or other forest management in year *t*; t CO_2-e
$GHG_{FF,t}$	=	Emission of non-CO_2 GHGs resulting from fire in year *t*; t CO_2-e

The three circumstances admitted by the tool in which there may be GHG emissions in the projects are:

- ✓ *Emission of non-CO_2 resulting from the use of fire in preparing the area;*
- ✓ *Emission of non-CO_2 resulting from the use of fire to clear the area of harvest residues before replanting or other forest management; and*
- ✓ *Emission of non-CO_2 resulting from forest fire.*

According to section I.4, the CME does not use fire as a clearing technique ($GHG_{SPF,t}$ and $GHG_{FMF,t}$). Thus, only the third option, forest fires, can occur, which are usually accidental and not part of the usual management practices.

In case of forest fires, the area affected will be monitored according to parameter $A_{BURN,i,t}$ described in section J.6.1. The emissions of non-CO_2 resulting from forest fire will be calculated as

[47] See https://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-08-v4.0.0.pdf

[48] For Equation 1 and 6, the numbering adopted in the methodological tool "*Estimation of non-CO_2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity" version 04.0.0* was maintained.

per the tool "*Estimation of non-CO_2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity*":

$$GHG_{FF,t} = GHG_{FF\_TREE,t} + GHG_{FF\_DOM,t} \quad \text{Equation 6}^{32}$$

Where:

$GHG_{FF,t}$	=	Emission of non-CO_2 GHGs resulting from forest fire, in year *t*; tCO_2-e
$GHG_{FF\_TREE,t}$	=	Emission of non-CO_2 GHGs resulting from the loss of aboveground biomass of trees due to forest fire, in year *t*; tCO_2-e
$GHG_{FF\_DOM,t}$	=	Emission of non-CO_2 GHGs resulting from the loss of dead organic matter due to forest fire, in year *t*; tCO_2-e

As the pool *dead organic matter* will not be monitored in this CPA, the stock of dead organic matter is considered zero and emissions of non-CO_2 GHGs resulting from the loss of dead organic matter due to forest fire are not accounted.

$GHG_{FF\_DOM,t} = 0$

$$GHG_{FF\_TREE,t} = 0.001 * \sum_{i=1}^{M} A_{BURN,i,t} * b_{TREE,i,t_L} * COMF_i * \left(EF_{CH4,i} * GWP_{CH4} + EF_{N2O,i} * GWP_{N2O}\right) \quad \text{Equation 7}^{49}$$

Where:

$GHG_{FF\_TREE,t}$	=	Emission of non-CO_2 GHGs resulting from the loss of aboveground biomass of trees due to forest fire, in year *t*; tCO_2-e
$A_{BURN,i,t}$	=	Area burnt in stratum *i* in year *t*; ha
b_{TREE,i,t_L}	=	Mean aboveground tree biomass per hectare in stratum *i* in year t_L which is the year in which last verification was carried out before occurrence of the fire; t d.m. ha^{-1} Where aboveground biomass of living trees is not burnt by fire, b_{TREE,i,t_L} may be set equal to zero

[49] For Equation 7 the numbering adopted in the methodological tool "*Estimation of non-CO_2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity" version 04.0.0*. was maintained.

$COMF_i$ = Combustion factor for stratum *i*; dimensionless

$EF_{CH4,i}$ = Emission factor for CH_4 in stratum *i*; g CH4 (kg dry matter burnt)$^{-1}$

GWP_{CH4} = Global warming potential for CH4*;* dimensionless

$EF_{N2O,i}$ = Emission factor for N_2O in stratum *i*; g N_2O (kg dry matter burnt)$^{-1}$

GWP_{N2O} = Global warming potential for N2O; dimensionless

I = 1, 2, 3 ... *M* strata

T = 1, 2, 3, . years elapsed since the start of the project activity

J.5.1.3. Leakage

According to the methodology, project activity leakage refers to the displacement of agricultural activities that existed in the project area before the project to other areas. To calculate leakage, the methodological tool "*Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity*" will be applied in its latest version.

$$LK_t = LK_{AGRIC,t} \quad \text{Equation 4}$$

Where:

LK_t = GHG emissions due to leakage, in year *t*; t CO_2-e

$LK_{AGRIC,t}$ = Leakage due to the displacement of agricultural activities in year *t*, as estimated in the tool "*Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity*"; t CO_2-e

As set out in Section L, one of the eligibility criteria for CPAs is the assessment of the proposed area for the project in order to determine whether there has been/will be a shift in agricultural activity to a new area.

If it is found that the specific CPA does not cause emissions due to leakage, according to the methodological tool "*Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity*" in its latest version, then the GHG emissions due to leakage can be considered as zero:

$LK_t = 0$

If the area qualifies for the calculation of leakage emissions due to activity displacement, the following equations of the tool "*Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity*" should be applied:

$$LK_{AGRIC,t} = \frac{44}{12} \times (\Delta C_{BIOMASS,t} + \Delta SOC_{LUC,t}) \quad \text{Equation 1}^{50}$$

$$\Delta C_{BIOMASS,t} = [1{,}1 \times b_{TREE} \times (1 + R_{TREE}) + b_{SHRUB} \times (1 + R_S)] \times CF \times A_{DISP,t} \quad \text{Equation 2}$$

$$\Delta SOC_{LUC,t} = SOC_{REF} \times (f_{LUP} \times f_{MGP} \times f_{INP} - f_{LUD} \times f_{MGD} \times f_{IND}) \times A_{DISP,t} \quad \text{Equation 3}$$

Where:

$\Delta C_{BIOMASS,t}$	=	Decrease in carbon stock in the carbon pools of the land receiving the activity displaced in year *t*; t d.m. Note. The factor of 1.1 is used to account for the carbon stock in the dead wood and litter pools as a fixed percentage of the carbon stock in living trees.
CF	=	Carbon fraction of woody biomass; dimensionless. A default value of 0.47 is used unless transparent and verifiable information can be provided to justify a different value.
$A_{DISP,t}$	=	Area of land from which agricultural activity is being displaced in year *t*; ha
b_{TREE}	=	Mean above-ground tree biomass in land receiving the displaced activity; t d.m.
R_{TREE}	=	Root-shoot ratio for trees in the land receiving the displaced activity; dimensionless. A default value of 0.25 is used unless transparent and verifiable information can be provided to justify a different value.
b_{SHRUB}	=	Mean above-ground shrub biomass in land receiving the displaced activity; t d.m. ha^{-1}. The value of this parameter is obtained by applying one of the applicable methods from the tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities*" to the land receiving the displaced activity.
R_S	=	Root-shoot ratio for shrubs in the land receiving the displaced activity, dimensionless. A default value of 0.40 is used unless transparent and verifiable information can be provided to justify a different value.

[50] For Equations 1, 2 and 3, the numeration adopted in the methodological tool "*Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity*" were maintained.

$\Delta SOC_{LUC,t}$ = Change in soil organic carbon (SOC) stock due to land-use change in the land receiving the displaced activity in year *t*; t C ha^{-1}.
The value of this parameter may be set to zero if.
(a) The only displaced activity being received in the area is grazing activity; or
(b) The value of the parameter as estimated from Equation (3) is less than zero (i.e. negative).

SOC_{REF} = SOC stock corresponding to the reference condition in native lands by climate region and soil type applicable to the land receiving the displaced activity; t C ha^{-1}.
The value of this parameter is taken from Table 3 of the "*Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities*".

f_{LUP} , f_{MGP} , f_{INP} = Relative SOC *stock change factors* for land-use, management practices, and inputs respectively, applicable to the receiving land before the displaced activity is received; dimensionless.

The value of these parameters is taken from Tables 4, 5, and 6 of the "*Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities*".

f_{LUD} , f_{MGD} , f_{IND} = Relative SOC *stock change factors* for land-use, management practices, and inputs respectively, applicable to the receiving land after the displaced activity is received; dimensionless.

The value of these parameters is taken from Tables 4, 5, and 6 of the "*Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities*".

t = 1, 2, 3, ... years elapsed since the start of the A/R CDM project activity

J.5.2. Data and parameters fixed ex ante

Data/Parameter	$\Delta C_{BSL,t}$
Data unit	t CO_2-e
Description	Baseline net GHG removals by sinks in year *t*
Source of data	[to be completed by the specific CPA at the time of the CPA's inclusion in the PoA]
Value(s) applied	[to be calculated/estimated by the specific CPA at the time of the CPA's inclusion in the PoA]
Choice of data or Measurement methods and procedures	Value based on the methodological tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A / R CDM project activities*", as described in section J.5.1. of this document
Purpose of data	Calculation of net baseline removals
Additional comment	N / A

Data/Parameter	CF_{TREE}
Data unit	t C (t d.m.)$^{-1}$
Description	Carbon fraction in of tree biomass
Source of data	Default value of the methodological tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities*" version 04.2
Value(s) applied	0.47
Choice of data or Measurement methods and procedures	The default value from the methodological tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities*" version 04.2 is used
Purpose of data	Calculation of net baseline removals and Calculation of actual net removals
Additional comment	N/A

Data/Parameter	$f_j(x_{1,l}, x_{2,l}, x_{3,l}, \ldots)$
Data unit	t d.m.
Description	Above-ground biomass of the tree returned by the allometric equation tree biomass given by the allometric equation for stratum *i* which represents a ratio between measurement of the tree diameter (DBH) and tree height and aboveground tree biomass
Source of data	Soares & Oliveira (2002)
Value(s) applied	Stem biomass = $e^{(-6,609865 + 1,661056.Ln(DAP) + 1,851121.Ln(Ht))}$ x 1/0.5 Branch biomass: = $e^{(-1,695267 + 3,888792.Ln(DAP) - 2,492777.Ln(Ht))}$ x 1/0.5 Leaf biomass: = $e^{(-6,649474 + 2,273838.Ln(DAP) - 0,155153.Ln(Ht))}$ x 1/0.5 Total biomass = Stem biomass + Branch biomass + Leaf biomass Where: DBH = Diameter at breast height(cm); Ht = Total height of tree (m)

Choice of data or Measurement methods and procedures	Allometric equation from literature will be used in ex-ante and ex-post estimates unless new equations obtained from transparent and verifiable data are used. The source for the equation used meets condition 6(c) of the tool "Demonstrating appropriateness of allometric equations for estimation of aboveground tree biomass in A/R CDM project activities", version 01.0.0. In addition, the said source refers to a scientific article published in one of the most relevant Brazilian forestry scientific journals.
Purpose of data	Calculation of actual net removals
Additional comment	N/A

Data/Parameter	$f_{BL,j}(x_{1,l}, x_{2,l}, x_{3,l}, \dots)$
Data unit	t d.m.
Description	Above-ground biomass of the tree returned by the allometric equation for biome *j* which represents a ratio between measurement of the tree diameter (DBH) and/or tree height and aboveground tree biomass
Source of data	[to be completed by the specific CPA at the time of the CPA's inclusion in the PoA]
Value(s) applied	[to be completed by the specific CPA at the time of the CPA's inclusion in the PoA]
Choice of data or Measurement methods and procedures	The source for the equation to be used, shall meets the condition of the tool "Demonstrating appropriateness of allometric equations for estimation of aboveground tree biomass in A/R CDM project activities", version 01.0.0.
Purpose of data	Calculation of baseline net removals
Additional comment	N/A

Data/Parameter	$COMF_i$
Data unit	Dimensionless
Description	Combustion factor for stratum *i*
Source of data	Default value of the methodological tool "*Estimation of non-CO2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity*" version 04.0.0
Value(s) applied	**Age Range** **Default Value** 3 - 5 years 0.46 6 -10 years 0.67 11 - 17 years 0.50 18 and above 0.32
Choice of data or Measurement methods and procedures	The default value of the methodological tool "Tropical Forest" of the methodological tool "*Estimation of non-CO2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity*" version 04.0.0 is used
Purpose of data	Calculation of actual net removals
Additional comment	N/A

Data/Parameter	$EF_{CH4,i}$
Data unit	g kg^{-1} burnt dry matter
Description	CH_4 emission factor in stratum i
Source of data	Default value of the methodological tool "*Estimation of non-CO2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity*" version 04.0.0
Value(s) applied	6.8
Choice of data or Measurement methods and procedures	The default value for "Tropical Forest" of the methodological tool "*Estimation of non-CO2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity*" version 04.0.0 is used
Purpose of data	Calculation of actual net removals
Additional comment	N/A

Data/Parameter	GWP_{CH4}
Data unit	Dimensionless
Description	Global warming potential for CH_4
Source of data	IPCC - *Fourth Assessment Report*
Value(s) applied	21
Choice of data or Measurement methods and procedures	Default value
Purpose of data	Calculation of actual net removals
Additional comment	N/A

Data/Parameter	$EF_{N2O,i}$
Data unit	g kg^{-1} burnt dry matter
Description	Emission factor for N_2O in stratum *i*
Source of data	Default value of the methodological tool "*Estimation of non-CO2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity*" version 04.0.0
Value(s) applied	0.2
Choice of data or Measurement methods and procedures	The default value for "Tropical Forest" of the methodological tool "*Estimation of non-CO2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity*" version 04.0.0 is used
Purpose of data	Calculation of actual net removals
Additional comment	N/A

Data/Parameter	GWP_{N2O}
Data unit	Dimensionless
Description	Global warming potential for N_2O
Source of data	IPCC – *Fourth Assessment Report*
Value(s) applied	298
Choice of data or Measurement methods and procedures	Default value
Purpose of data	Calculation of actual net removals
Additional comment	N/A

J.5.3. Modalities for ex ante calculation of net anthropogenic removals

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The following is an example of how ex ante estimates will be given for each specific CPA. Values may change for each CPA and specific CPA calculations will be provided for each CPA-DD. For this simulation, an area of 200 ha of *Eucalyptus* spp was used where the land use prior to the project's implementation was non-forested, for example agriculture.

Baseline net removals

According to the methodological tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities*", baseline net removals are estimated as:

$$\Delta C_{BSL,t} = \Delta C_{TREE\_BSL,t} + \Delta C_{SHRUB\_BSL,t} + \Delta C_{DW\_BSL,t} + \Delta C_{LI\_BSL,t}$$

Where:

$\Delta C_{BSL,t}$ = Baseline net GHG removals by sinks in year *t*; t CO_2-e

$\Delta C_{TREE\_BSL,t}$ = Change in carbon stock in baseline tree biomass within the project boundary in year *t*, as estimated in the tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities*"; t CO_2-e

$\Delta C_{SHRUB\_BSL,t}$ = Change in carbon stock in baseline shrub biomass within the project boundary in year *t*, as estimated in the tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities*"; t CO_2-e

$\Delta C_{DW\_BSL,t}$ = Change in carbon stock in baseline dead wood biomass within the project boundary in year *t*, as estimated in the tool "*Estimation of carbon stocks and change in carbon stocks of dead wood and litter in A/R CDM project activities*"; t CO_2-e

$\Delta C_{LI\_BSL,t}$ = Change in carbon stock in baseline litter biomass within the project boundary in year *t*, as estimated in the tool "*Estimation of carbon stocks and change in carbon stocks of dead wood and litter in A/R CDM project activities*"; t CO_2-e

As described in section J.5.1, the project will conservatively not consider carbon removals from dead wood, litter and organic carbon pools in the soil. So, baseline dead wood and litter can also be considered as zero:

$\Delta C_{DW\_BSL,t} = 0$

$\Delta C_{LI\_BSL,t} = 0$

According to the flowchart (Figure 13) presented in section J.5.1, the CPA is expected to assess the existence of trees in the project area before its implementation and if there are trees, they will be monitored as shown in the flowchart in Figure 13. Therefore, the biomass of trees in the baseline is expected to be zero:

$\Delta C_{TREE\_BSL,t} = 0$

Finally, the respective CPA will assess the following conditions to determine the existence of baseline shrub biomass (described in the methodological tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities*", in its latest version):

"Changes in baseline carbon stocks in trees and shrubs can be counted as zero areas where project participants can demonstrate, through documented evidence or through participatory rural assessment (PRA), that one or more of the following indicators apply:

(a) Observed reduction in the depth of the topsoil (for example, as shown by root exposure, presence of pedestals, exposed subsoil horizons);
(b) Presence of erosion in a ravine, underground river or stream; or landslides, or other forms of erosion through mass movement;
(c) Presence of plant species locally known as indicators of infertile land;
(d) The land is made up of sand dunes or other barren land;
(e) The land contains contaminated soils, mine tailings or highly alkaline or saline soils;
(f) The land is subjected to periodic cycles (for example, cutting and burning or harvest-regeneration cycles) so that the biomass oscillates between a minimum and a maximum baseline value;

(g) Conditions (a), (b) and (c) of paragraph 11 apply."

For the proposed baseline scenarios, the conditions of letters (f) and (g) are more likely to be met, and the conditions of letter (g) were expressed in the flowchart of Figure 13. Therefore, it is expected that the baseline biomass of shrubs is also zero:

$\Delta C_{SHRUB\_BSL,t} = 0$

So, baseline net removals are not expected to occur:

$\Delta C_{BSL,t} = 0$

Actual net removals

For the simulation of the ex-ante calculation, we will consider that the entire area of 200 ha was implemented in year 1 of the project with planting of *Eucalyptus* spp., So there will be only one stratum for calculating actual net removals. The data used in the ex-ante section results from a simulation that was based on the inventory of a Eucalyptus area implemented in the "*cerrado*" (Brazilian savanna) region, which is representative of the majority of the PoA's region. Plots of various ages were used and the mean of DBH and height by age was calculated in order to simulate a very heterogeneous forest. From these data, Excel's random function was used (copy/paste values) to simulate DBH and HT values of trees where the maximum and minimum values corresponded to the mean values of the calculated means.

As shown in section J.5.1, actual net removals are calculated from the equation:

$$\Delta C_{ACTUAL,t} = \Delta C_{P,t} - GHG_{E,t}$$

Where:

$\Delta C_{ACTUAL,t}$	=	Actual net GHG removals by sinks, in year *t*, t CO_2-e
$\Delta C_{P,t}$	=	Change in the carbon stocks in project, occurring in the selected carbon pools, in year *t*; t CO_2-e
$GHG_{E,t}$	=	Increase in non-CO_2 GHG emissions within the project boundary as a result of the implementation of the A/R CDM project activity, in year *t*, as estimated in the tool "*Estimation of non-CO_2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity*"; t CO_2-e

Non-CO_2 GHG emissions within the limits will be monitored as described in section J.6. For the purposes of exemplifying actual net removals, we consider that there were no accidental fires, therefore:

$GHG_{E,t} = 0$

Therefore, the actual net removals from the project will be:

$$\Delta C_{P,t} = \Delta C_{TREE\_PROJ,t} + \Delta C_{SHRUB\_PROJ,t} + \Delta C_{DW\_PROJ,t} + \Delta C_{LI\_PROJ,t} + \Delta SOC_{AL,t}$$

Where:

$\Delta C_{P,t}$	=	Change in the carbon stocks in project, occurring in the selected carbon pools, in year *t*; t CO_2-e
$\Delta C_{TREE\ PROJ,t}$	=	Change in carbon stock in tree biomass in project in year *t*, as estimated in the tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"*; t CO_2-e
$\Delta C_{SHRUB\ PROJ,t}$	=	Change in carbon stock in shrub biomass in project in year *t*, as estimated in the tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities*"; t CO_2-e
$\Delta C_{DW\ PROJ,t}$	=	Change in carbon stock in dead wood in project in year *t*, as estimated in the tool "*Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM Project activities*"; t CO_2-e
$\Delta C_{LI\ PROJ,t}$	=	Change in carbon stock in project in litter in year *t*, as estimated in the tool "*Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities*"; t CO_2-e
$\Delta SOC_{AL,t}$	=	Change in carbon stock in SOC in project hin year *t*, in areas of land meeting the applicability conditions of the tool "*Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities*"; t CO_2-e

In this example, it was conservatively considered that there are no shrubs in the project scenario, so the carbon stocks in the shrubs will be considered as zero:

$\Delta C_{SHRUB\_PROJ,t} = 0$

In the example, the belief that the project will not account for carbon pools, biomass of dead wood, litter biomass and organic carbon in the soil was adopted. In this case, the parameters for these carbon pools will be considered as zero. Thus,

$\Delta C_{DW\_PROJ,t} = 0$

$\Delta C_{LI\_PROJ,t} = 0$

$\Delta SOC_{AL,t} = 0$

Therefore, the project actual net removals are estimated based on the change in the carbon stock in the biomass of the trees. The first step is to estimate the above-ground biomass of the trees within the sample plots, for which the inputs DBH and tree height will be used for the allometric equations.

$$B_{TREE,j,p,i} = f_j(x_{1,j}, x_{2,j}, x_{3,j}, \dots)$$

Where:

$B_{TREE,j,p,i}$	=	Biomass of trees of species *j* in sample plot *p* of stratum *i*; t d.m.
$f_i(x_{1,j}, x_{2,j}, x_{3,j}, \dots)$	=	Above-ground biomass of the tree returned by the allometric equation for stratum *i* that represent the relationship between measurements of diameter at breast height (DBH) and tree height to the above-ground biomass of the tree; t d.m.

In Table 5 below, the measurement data of a 0.04 ha sample plot that could contain about 66 trees were simulated. The biomass values in each of the tree's compartments were calculated using the equations described in section J.5.2 of the ex-ante fixed parameter $f_j(x_{1,l}, x_{2,l}, x_{3,l}, \dots)$.

Table 05: Example of calculation of the biomass of trees of species *j* in plot *p* of stratum *i*.

Tree	DBH (cm)	Ht (m)	Stem biomass (kg)	Branch biomass (kg)	Leaf biomass (kg)	Above-ground biomass (kg)
1	8.03	12.05	8.594490265	2.43977846	0.200564033	11.23483276
2	8.04	12.07	8.628553417	2.442894443	0.201019745	11.27246761
3	8.24	12.37	9.419661787	2.536412045	0.212169189	12.16824302
4	8.25	12.45	9.541705867	2.501777949	0.212240033	12.25572385
5	8.25	12.50	9.624630323	2.477305537	0.212238475	12.31417433
6	8.27	12.52	9.696253844	2.49443966	0.213521459	12.40421496
7	8.30	12.70	10.01563247	2.439909354	0.214756627	12.67029845
8	8.39	12.75	10.24821161	2.517634909	0.219666889	12.98551341
9	8.52	12.79	10.57782959	2.653491522	0.227455755	13.45877686
10	8.81	13.37	12.14717112	2.70123574	0.243659087	15.09206594
11	8.82	13.39	12.2050606	2.702815383	0.244233308	15.15210929
12	8.85	13.68	12.7682789	2.604303027	0.245586232	15.61816816
13	8.96	13.76	13.18421756	2.689480204	0.252306431	16.1260042
14	9.04	14.15	14.08851936	2.598083589	0.256378819	16.94298176
15	9.22	14.62	15.47101162	2.587781461	0.266907451	18.32570054
16	9.35	14.63	15.85185654	2.723638721	0.275316304	18.85081157
17	9.42	15.00	16.81416301	2.637155271	0.279089721	19.730408
18	9.46	15.03	16.9755232	2.664394671	0.28141977	19.92133764
19	9.49	15.21	17.48089158	2.623168239	0.283385356	20.38744518
20	9.88	15.24	18.72130309	3.051625591	0.310140714	22.0830694
21	9.89	15.61	19.61293148	2.882286286	0.309611503	22.80482927
22	9.96	15.63	19.88860884	2.957511497	0.314725914	23.16084625
23	10.06	16.12	21.40420719	2.840612551	0.320095234	24.56491497
24	10.10	16.87	23.47632058	2.583095377	0.321326141	26.3807421
25	10.47	16.96	25.16530434	2.930912845	0.348365162	28.44458234

Tree	DBH (cm)	Ht (m)	Stem biomass (kg)	Branch biomass (kg)	Leaf biomass (kg)	Above-ground biomass (kg)
26	10.53	17.03	25.56173887	2.962376983	0.352284522	28.87640037
27	10.59	17.48	27.07193299	2.834509661	0.355205522	30.26164817
28	10.97	17.48	28.74544967	3.25310182	0.385194338	32.38374583
29	10.98	17.70	29.44300193	3.161230188	0.38497266	32.98920478
30	11.05	17.76	29.9455627	3.214563703	0.390458859	33.55058526
31	11.24	17.88	31.20804201	3.386964915	0.405997585	35.00100451
32	11.25	17.97	31.54213188	3.350041392	0.406175512	35.29834878
33	11.51	18.04	32.9677714	3.622736595	0.427245298	37.01775329
34	11.56	18.12	33.51099414	3.645235339	0.431426455	37.58765593
35	11.59	18.18	33.85706515	3.650580504	0.433661088	37.94130675
36	11.66	18.44	35.12659124	3.612781647	0.439046432	39.17841931
37	11.74	18.55	35.88036291	3.650893515	0.445065929	39.97632235
38	12.00	18.90	38.54641287	3.79423534	0.466569287	42.8072175
39	12.05	19.06	39.40236534	3.776240481	0.470287282	43.64889311
40	12.26	19.13	40.88248331	4.009588477	0.489524556	45.38159634
41	12.29	19.30	41.68395696	3.95876542	0.491312942	46.13403532
42	12.39	19.30	42.27059202	4.081837804	0.500387945	46.85281777
43	12.48	19.58	43.89261905	4.049495855	0.507282905	48.44939781
44	12.48	19.78	44.748605	3.955265489	0.506954258	49.21082475
45	12.49	19.78	44.81415518	3.968289424	0.507943183	49.29038778
46	12.50	19.99	45.77780166	3.871578553	0.507833221	50.15721343
47	12.52	20.23	46.91966007	3.779567435	0.508610565	51.20783808
48	12.55	20.51	48.28758998	3.686674234	0.510155636	52.48441985
49	12.64	20.52	48.92119868	3.79226798	0.518874988	53.23234164
50	12.69	20.58	49.47081764	3.817419539	0.522830431	53.81106761
51	12.71	20.61	49.78685493	3.831726875	0.525092898	54.14367471
52	12.90	20.67	51.27356955	4.021807756	0.542284289	55.8376616
53	12.98	20.77	52.29378444	4.079285184	0.550144253	56.92321388
54	13.04	20.83	52.95129267	4.110348137	0.554878888	57.61651969
55	13.04	20.83	53.0090128	4.119725919	0.555647567	57.68438628
56	13.12	20.90	53.83375754	4.17394912	0.562381891	58.57008855
57	13.27	21.03	55.49669435	4.300058867	0.576799967	60.37355318
58	13.33	21.08	56.15743886	4.350425716	0.582523413	61.09038799
59	13.33	21.15	56.53703641	4.317959526	0.582557339	61.43755328
60	13.37	21.27	57.39097846	4.302790976	0.585658779	62.27942821
61	13.61	21.29	59.21196256	4.605591803	0.610012539	64.42756691
62	13.70	21.40	60.48274782	4.66580047	0.618984741	65.76753303
63	13.71	21.47	60.8496229	4.636935247	0.619143552	66.1057017
64	13.81	21.55	62.04213866	4.732297214	0.629562607	67.40399848
65	13.84	21.81	63.68109733	4.633603398	0.631671273	68.946372
66	13.97	21.95	65.41607406	4.723060054	0.644134932	70.78326904

The total above-ground biomass of the plot was **2.476 ton of dry matter** (sum of the above-ground biomass of all 66 trees). The next step to calculate the actual net removals is to calculate the biomass of the tree per hectare in the *p* portion of stratum *i*, according to the equations below:

$$b_{TREE,p,i} = \frac{B_{TREE,p,i}}{A_{PLOT,i}} \times (1 + R_i)$$

$$B_{TREE,p,i} = \sum_j B_{TREE,j,p,i}$$

Where:

$b_{TREE,p,i}$	=	Tree biomass per hectare in sample plot *p* of stratum *i*; t d.m. ha^{-1}
$B_{TREE,p,i}$	=	Tree biomass in sample plot *p* of stratum *i*; t d.m.
$A_{PLOT,i}$	=	Size of sample plot in stratum *i*; ha
$B_{TREE,j,p,i}$	=	Biomass of trees of species *j* in sample plot *p* of stratum *i*; t d.m.
R_i	=	Root-shoot ratio for stratum *i*; dimensionless.

In this simulation we are considering that the result of the plot will represent the sum of the sample plots of species *j* in plot *p* of stratum *i*. As the plot area is 0.04 ha, we have:

$\frac{B_{TREE,p,i}}{A_{PLOT,i}}$ = 2.476 ton of dry matter / 0.04 ha = **61.912 ton dry matter ha^{-1}**

From this value, the value R_i is estimated as described in section J.5.1:

$R_i = \frac{e^{(-1.085+0.9256 \times \ln b)}}{b}$ where b is the tree biomass above the ground per hectare (t d.m. ha^{-1}).

$R_i = e^{(-1.095+0.9256 \times \ln(61.912))} / 61.912$ = **0.249**

Thus, the tree biomass per hectare in sample plot *p* of stratum *i* will be:

$b_{TREE,p,i} = \frac{B_{TREE,p,i}}{A_{PLOT,i}} \times (1 + R_i)$ = 61.912 x (1+0.249) = **77.302 ton d.m. ha^{-1}**

Then, the biomass of the trees obtained in the strata is converted into carbon stocks:

$\Delta C_{TREE\_PROJ,t} = C_{TREE}$

Therefore:

$$C_{TREE} = \frac{44}{12} \times CF_{TREE} \times B_{TREE}$$

$$B_{TREE} = A \times b_{TREE}$$

$$b_{TREE} = \sum_{i=1}^{M} Wi \times b_{TREE,i}$$

Where:

C_{TREE}	=	Carbon stock in trees in the tree biomass estimation strata; t CO_2e
CF_{TREE}	=	Carbon fraction of tree biomass; t C (t d.m.)$^{-1}$. A default value of 0.47 is used unless transparent and verifiable information can be provided to justify a different value.
B_{TREE}	=	Tree biomass in the tree biomass estimation strata; t d.m.
A	=	Sum of areas of the tree biomass estimation strata; ha
b_{TREE}	=	Mean tree biomass per hectare in the tree biomass estimation strata; t d.m. ha^{-1}
Wi	=	Ratio of the area of stratum *i* to the sum of areas of tree biomass estimation strata (i.e., $w_i = A_i/A$); dimensionless
$b_{TREE,i}$	=	Mean tree biomass per hectare in stratum *i*; t d.m. ha^{-1}

As the simulation used a single layer, the value of W*i* will be 1 (200 ha / 200 ha). The average tree biomass per hectare in the tree biomass estimation strata will be:

$B_{TREE} = A \times b_{TREE}$ = 200 ha x 77.302 ton d.m. ha^{-1} = **15,460.481 ton d.m.**

From the fixed ex ante value of the CF_{TREE} parameter of 0.47 (presented in section J.5.2) we have:

$C_{TREE} = \frac{44}{12} \times CF_{TREE} \times B_{TREE}$ = (44/12) x 0.47 x 15,460.481 ton d.m. = **26,643.562 tCO_2e**

With the value of the tree carbon stock in the stratum, the carbon stock change in the project will be:

$$\Delta C_{P,t} = \Delta C_{TREE\_PROJ,t} + \Delta C_{SHRUB\_PROJ,t} + \Delta C_{DW\_PROJ,t} + \Delta C_{LI\_PROJ,t} + \Delta SOC_{AL,t}$$

$$\Delta C_{P,t} = \Delta C_{TREE\_PROJ,t} + 0 + 0 + 0 + 0$$

$\Delta C_{P,t} = \Delta C_{TREE\_PROJ,t} = C_{TREE}$ = **26,643.562 tCO₂e**

Finally, the actual net removals will be:

$\Delta C_{ACTUAL,t} = \Delta C_{P,t} - GHG_{E,t}$ = 26,643.562 tCO₂e – 0 = **26,643.562 tCO₂e.**

GHG emissions due to leakage

As outlined in Section L, one of the eligibility criteria for the CPA is the assessment of the proposed area for the project in order to determine whether there has been/will be displacement of agriculture to a new area.

For the purposes of the ex-ante calculations, we will consider that there would be no emissions due to leakage, since verification will take place at the specific CPA level, which will conduct the assessment according to the methodological tool "*Estimation of the increase in GHG emissions attributable to displacement of pre -project agricultural activities in A/R CDM project activity*" in its latest version. Therefore, GHG emissions due to leakage in this estimate are considered as zero:

LK_t = 0

Anthropogenic net GHG removals by sinks

Anthropogenic net GHG removals by sinks are calculated by the equation:

$$\Delta C_{AR-CDM,t} = \Delta C_{ACTUAL,t} - \Delta C_{BSL,t} - LK_t$$

Where:

$\Delta C_{AR-CDM,t}$ = Net anthropogenic GHG removals by sinks, in year *t*; t CO_2-e

$\Delta C_{ACTUAL,t}$ = Actual net GHG removals by sinks, in year *t*; t CO_2-e

$\Delta C_{BSL,t}$ = Baseline net GHG removals by sinks, in year *t*; t CO_2-e

LK_t = GHG emissions due to leakage, in year *t*; t CO_2-e

From the results presented in the above ex-ante simulation:

$$\Delta C_{AR-CDM,t} = \Delta C_{ACTUAL,t} - \Delta C_{BSL,t} - LK_t$$

$\Delta C_{AR-CDM,t}$ = 26,643.562 – 0 – 0 = **26,643.562 tCO_2e**

J.6. Monitoring plan

J.6.1. Data and parameters to be monitored

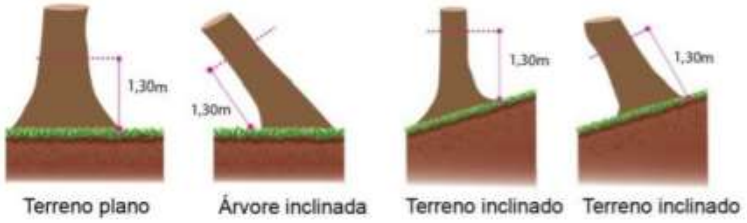
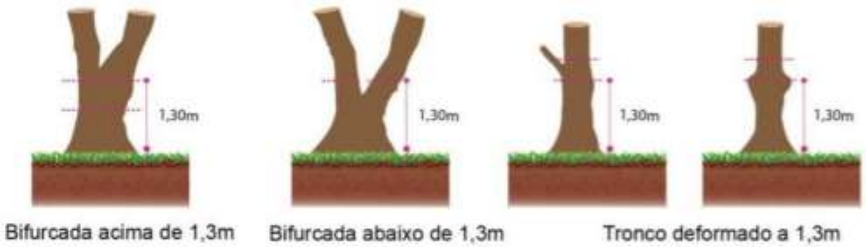
Data/Parameter	$A_{BURN,i,t}$
Data unit	Ha
Description	Area burned in stratum *i* in year *t*
Source of data	GPS and/or GIS
Value(s) applied	[to be completed by the specific CPA at each check]
Measurement methods and procedures	The project's planting areas will be delimited via GPS or GIS
Monitoring frequency	Yearly
QA/QC procedures	Refer to IPCC 2003 2.4.4.2 "Ground-based surveys". Field teams will be formed by the CME's own team or outsourced. The team members will have appropriate qualification to perform the activity and correct use of the equipment and will act in accordance with the best practices for area measurement. GPS instruments used are free of error and as per the manufacturer's specifications.
Purpose of data	Calculation of actual net removals
Additional comment	N/A

Data/Parameter	b_{TREE,i,t_L}
Data unit	t d.m. ha^{-1}
Description	Mean aboveground tree biomass per hectare in stratum *i* in year t_L, which is the year in which last verification was carried out before occurrence of the fire
Source of data	Estimated from the last measurement of stratum biomass *i*
Value(s) applied	[to be completed by the specific CPA at each check]
Measurement methods and procedures	Reference value will be the average biomass of the last measurement in stratum *i.* The values of the biomass of trees above ground per hectare in stratum *i* will be searched for in the CME database to be applied as a reference value.
Monitoring frequency	Every verification period
QA/QC procedures	N/A
Purpose of data	Calculation of actual net removals
Additional comment	N/A

Data/Parameter	A_i
Data unit	Ha
Description	The area of stratum *i* of the areas of land
Source of data	GPS and/or GIS
Value(s) applied	[to be completed by the specific CPA at each check]
Measurement methods and procedures	The project's planting areas will be delimited via GPS or GIS
Monitoring frequency	Every verification period
QA/QC procedures	Refer to IPCC 2003 2.4.4.2 "Ground-based surveys". Field teams will be formed by the CME's own team or outsourced. The team members will have appropriate qualification to perform the activity and correct use of the equipment and will act in accordance with the best practices for area measurement. GPS instruments used are free of error and as per the manufacturer's specifications.
Purpose of data	Calculation of actual net removals
Additional comment	N/A

Data/Parameter	n_i
Data unit	Dimensional
Description	Number of sample plots in stratum *i*
Source of data	Calculated
Value(s) applied	[to be completed by the specific CPA at each check]
Measurement methods and procedures	The calculation method is described in the tool "*Calculation of the number of sample plots for measurements within A/R CDM project activities*" (version 02.1.0)
Monitoring frequency	Every verification period
QA/QC procedures	N/A
Purpose of data	Calculation of actual net removals
Additional comment	N/A

Data/Parameter	$A_{PLOT,i}$
Data unit	Ha
Description	Size of sample plot in stratum *i*
Source of data	Measured/calculated
Value(s) applied	[to be completed by the specific CPA at each check]
Measurement methods and procedures	The plots will be located in the field with the aid of GPS. The plots will have a circular and or rectangular shape of approximately 0.04 ha. The plots will be allocated in the field in a systematic way, beginning randomly.
Monitoring frequency	Every verification period
QA/QC procedures	Refer to IPCC 2003 2.4.4.2 “Ground-based surveys”. Field teams will be formed by the CME’s own team or outsourced. The team members will have appropriate qualification to perform the activity and correct use of the equipment and will act in accordance with the best practices for area measurement. GPS instruments used are free of error and as per the manufacturer’s specifications.
Purpose of data	Calculation of actual net removals
Additional comment	N/A

Data/Parameter	DBH
Data unit	Cm
Description	Diameter at breast height
Source of data	Measurement
Value(s) applied	[to be completed by the specific CPA at each check]
Measurement methods and procedures	The measurement of the circumference of the trees in the plot is made using a tape measure (thus measuring the circumference at breast height) and the circumference is converted into diameter at breast height according to the equation W below: $DAP = \frac{CAP}{\pi}$ Equation W Where: DAP = Diameter at breast height, cm CAP = Circumference at breast height, cm π = Pi, 3.1416 The measurement of the circumference at breast height is made at 1.30 m from the ground and must follow the forest inventory procedures according to the “Field Manual of the National Forestry Inventory of Brazil” published by the Ministry of the Environment (2020). The figure below is from the manual and illustrates how measurements should be taken on the stem in different situations. **Medição do DAP em terrenos planos e inclinados**  **Medição do DAP em árvores com troncos bifurcados e deformados** 
Monitoring frequency	Every verification period

QA/QC procedures	[SOP will be prepared based on commonly accepted principles and practices of forest inventory and forest management in the host country or an adaptation of SOPs available from published handbooks or scientific literature, or from the "IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry 2003"]
Purpose of data	Calculation of actual net removals
Additional comment	N/A

Data/Parameter	**Ht**
Data unit	Metres
Description	Total height of tree
Source of data	Measured/estimate
Value(s) applied	[to be completed by the specific CPA at each check]
Measurement methods and procedures	The height of the tree is measured with the aid of height measurement equipment (for example: hypsometer, clinometer, laser sensor) or estimated by hypsometric equations. From the correlation between the DBH data and the height measured, the heights of the other trees in the plot will be estimated using a hypsometric equation. The choice for hypsometric equation will consider the correlation between diameter and height in order to guarantee the best quality and accuracy of the adjustments.
Monitoring frequency	Every verification period
QA/QC procedures	[SOP will be prepared based on commonly accepted principles and practices of forest inventory and forest management in the host country or an adaptation of SOPs available from published handbooks or scientific literature, or from the "IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry 2003"]
Purpose of data	Calculation of actual net removals
Additional comment	N/A

Data/Parameter	$B_{TREE,l,j,p,i}$
Data unit	T d.m.
Description	Biomass of trees of species *j* in sample plot *p* of stratum *i*
Source of data	Calculated
Value(s) applied	N/A
Measurement methods and procedures	$B_{TREE,l,j,p,i} = f_j(x_{1,l}, x_{2,l}, x_{3,l}, \dots)$ Where: $f_j(x_{1,l}, x_{2,l}, x_{3,l}, \dots)$ = Above-ground tree biomass given by the allometric equation for stratum *i* that represents a relationship between the diameter (DBH) and tree height measurements and the tree's above-ground biomass.
Monitoring frequency	Every verification period
QA/QC procedures	N/A
Purpose of data	Calculation of actual net removals
Additional comment	N/A

Data/Parameter	R_j
Data unit	Dimensionless
Description	Root-shoot ratio for stratum *i*
Source of data	Calculated according to the methodological tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities*" version 04.2
Value(s) applied	$R_j = \frac{e^{(-1.085+0.9256\times\ln b)}}{b}$ Where: b = above-ground biomass per hectare (t d.m. ha^{-1})
Measurement methods and procedures	Equation used in ex-ante and ex-post estimates. Standard calculation of the methodological tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities*" version 04.2
Monitoring frequency	Every verification period
QA/QC procedures	N/A
Purpose of data	Calculation of actual net removals
Additional comment	N/A

Data/Parameter	$B_{TREE\_BL,l,j,p,i}$
Data unit	T d.m.
Description	Biomass of tree *l* of biome *j* in sample plot *p* of stratum *i* in the baseline
Source of data	Calculated
Value(s) applied	N/A
Measurement methods and procedures	$B_{TREE\_BL,l,j,p,i} = f_{BL,j}(x_{1,l}, x_{2,l}, x_{3,l}, \dots)$ Where: $f_{BL,j}(x_{1,l}, x_{2,l}, x_{3,l}, \dots)$ = Above-ground biomass of the tree returned by the allometric equation for biome *j* which represents a ratio between measurement of the tree diameter (DBH) and/or tree height and aboveground tree biomass in the baseline.
Monitoring frequency	Measured only once (at the CPA inclusion)
QA/QC procedures	N/A
Purpose of data	Calculation of baseline net removals
Additional comment	N/A

Data/Parameter	$C_{SHRUB,t}$
Data unit	Dimensionless
Description	Crown cover of shrubs in the baseline stratum *i*
Source of data	Field measurement
Value(s) applied	[to be completed by the specific CPA at the time of CPA inclusion
Measurement methods and procedures	CPA implementer will measure the shrub crown cover using the transect line (ocular estimation), drones or other methods to estimate the crown cover of shrubs in m^2. A random sample plots should be used to estimate the shrub crown cover in the project area.
Monitoring frequency	Measured only once (at the CPA inclusion)
QA/QC procedures	[SOP will be prepared based on commonly accepted principles and practices of forest inventory and forest management in the host country or an adaptation of SOPs available from published handbooks or scientific literature, or from the "IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry 2003"]
Purpose of data	Calculation of baseline net removals
Additional comment	When land is subjected to periodic cycles (e.g. slash-and-burn, or clearing-regrowing cycles) so that the shrub crown cover oscillates between a minimum and maximum values in the baseline, an average shrub crown cover equal to 0.5 is used unless transparent and verifiable information can be provided to justify a different value.

J.6.2. Sampling plan

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The identification of the strata of the proposed project activity follows the stratification guidelines mentioned in the AR-ACM003 version 02.0 methodology, both for baseline net GHG removals by sink and for actual net GHG removals by sink:

(a) For baseline net GHG removals by sink, the stratification of the project area is by the type of vegetation existing at the site;

(b) For actual net GHG removals by sink, the ex-ante stratification of the project area is according to the year of implementation planned for the area. The implementation of the project will only involve planted forests.

The project will adopt a simple sampling procedure.

Number of sample plots:

In principle, a plot will be set up every 20ha systematically, beginning randomly, to ensure uniform coverage of the area. Subsequently, based on the standard deviation, the minimum number of plots will be calculated in order to guarantee that the biomass estimate error is up to +/- 10% at a confidence level of 90%. The number of plots required for the project (n) will be defined by the following equation (according to the tool *Calculation of the number of sample plots for measurements within A/R CDM project activities, version 02.1.0*):

$$n = \frac{N * t_{VAL}^{\ 2} * \left(\sum_i w_i * s_i \right)^2}{N * E^2 + t_{VAL}^{\ 2} * \sum_i w_i * s_i^{\ 2}}$$

Where:

n	=	Number of sample plots required for estimation of biomass stocks within the project boundary; dimensionless
N	=	Total number of possible sample plots within the project boundary (i.e.: the sample space or the population); dimensionless
t_{VAL}	=	Two-sided Student's t-value, in infinite degrees of freedom, for the required confidence level; dimensionless
w_i	=	Relative weight of the area of stratum *i*; (i.e. the area of the stratum *i* divided by the project area); dimensionless
s_i	=	Estimated standard deviation of biomass stock in stratum *i*; t d.m. (or t d.m. ha^{-1})
E	=	Acceptable margin of error (i.e. one-half the confidence interval) in estimation of biomass stock within the project boundary; t d.m. (or t d.m. ha^{-1}), i.e., in the units used for s_i
i 1,2,3,…..	=	Biomass stock estimation strata within the project boundary

The number of sample plots allocated to a stratum is calculated as

$$n_i = n * \frac{w_i * s_i}{\sum_i w_i * s_i}$$

Where:

n_i	=	number of sample plots allocated to stratum *i*; dimensionless
n	=	number of sample plots required for estimation of biomass stocks within the project boundary; dimensionless
w_i	=	Relative weight of the area of stratum *i* (i.e. the area of the stratum *i* divided by the project area); dimensionless
s_i	=	Estimated standard deviation of biomass stock in stratum *i*; t d.m. (or t d.m. ha^{-1})
i 1,2,3,…..	=	*1, 2, 3,* . biomass stock estimation strata within the project boundary

The internal quality control (QC) and quality assurance (QA) procedures will be used to guarantee the highest possible standardisation and accuracy to the field data.

Sampling Project

Type of plot	Permanent and/or temporary plots
Plot format	Circular and/or rectangular
Plot size	Approximately 400m²
Number of plots	Calculated according to the variability of the forest using accepted formulas
Plot location	Plots will be distributed systematically, beginning randomly in order to represent all strata. Plot coordinates, location, number and other registration information of each plot will be stored
Monitoring frequency	Plots will be monitored each credit period
Assessment of carbon stock changes over time	Changes will be estimated using an allometric equation based on DBH and Ht
Monitoring of GHG emissions from project activity	Monitoring of accidental fires according to tool AR-ACM008 (section J.5.1)

J.6.3. Other elements of monitoring plan

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Field data collection may be performed by a third-party specialised in carrying out forest inventories. For third-party selection, the CME will assess their technical capabilities to carry out the work. The teams and data collected will be audited by the CME as specified in contracts. All plots will be measured at each check. DBHs and tree Heights will be collected as described in section J.6.1., and upon receipt of the data, the CME will verify that the data meets the parameters determined in the generic CPA. If so, they will be responsible for collecting, processing and archiving the data for at least 2 years after the end of the project verification period using inventory system, databases or

spreadsheets. Monitoring of the project activities will be planned and executed according to Section 6 of the tool "*Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities*", version 4.2, and data will be archived and kept for at least 2 years after the end of the project verification period.

As per Table 06, the CME may conduct the A/R CPAs' verifications in between the third and sixth year of planting, "such that a systematic coincidence of verifications and peaks in carbon stocks is avoided"[51]. This may be done by grouping CPAs according to their age range, optimizing resources.

Table 06: proper period for monitoring carbon stocks of forests

Year	1	2	3	4	5	6	7
Age (months)	0 to 12 months	12 to 24 months	24 to 36 months	36 to 48 months	48 to 60 months	60 to 72 months	72 to 84 months
Monitoring	-	-	X	X	X	X	Harvesting

Monitoring of applicability conditions:

(a) Previous land use: the CME will use satellite images circa 31 December 1989, and a year prior to the project implementation, to ensure that the proposed project area was not occupied by forests in this period,

(b) The area of the project activity does not fall into the category of wetlands: The CME will verify through shapes and/or maps that the proposed project is not located in wetlands.

(c) Soil disturbance attributed to the proposed project activity do not cover more than 10% of the project area that:

i. Contain organic soils: CME will verify through shapes and/or maps that the proposed project is not located in areas where organic soils occur.

ii. At the baseline are subject to land use management conditions which receive inputs listed in Appendices 1 and 2 of the AR-ACM003 methodology, version 02.0: if the land use at baseline falls within one of the conditions listed in Appendices 1 and 2 of the AR-ACM003 methodology, the CME will check if tillage do not disturb more than 10% of the project area, e.g. evaluation of the proportion of tilled area (width x length of the tilled line x number of tilled lines or dug area x number of pits) in relation to the total area of the project. In general, the CME adopts minimal cultivation, that is, it only performs the revolving of the soil in the planting line, resulting in very low impact on the soil cover.

(d) Forestation of the land within the proposed project boundary performed with or without being registered as the A/R CDM project activity shall not lead to violation of any applicable law even if the law is not enforced: the CME will present all the necessary documentation for the implementation of the project to the relevant agencies of the Host Country.

(e) Non-applicable to small-scale A/R project activities: all CPAs are large-scale activities, taking into consideration the current criteria of the CDM and the Brazilian Designated National Authority.

Project boundary: archiving the project boundary's records is one of the most important activities during monitoring. The geographical coordinates of the project boundary and all stratifications will

[51] See "Standard: CDM project standard for programmes of activities Version 02.0", paragraph 141.

be recorded using GPS, satellite images and land use maps. The CME will designate a GIS expert to coordinate this activity together with a team or hire a specialized company.

Existing vegetation: according to the standard for eligible areas, pre-project/existing vegetation are sparse and scattered. Protected trees will not be cut, however, they may or may not be monitored. Thus, if monitoring is not carried out, as will be done with the trees and shrubs removed, their carbon stock will be verified before the project is implemented and included in the baseline.

Isolated trees: isolated trees in the baseline that will not be cut will be georeferenced using GPS equipment or satellite images that allow the identification of the isolated trees. The files with the geographic coordinates ("points") will be made available to and archived by the CME. At each verification period the geocoordinates of the isolated trees will be checked to evidence their survival, either by field inspection using GPS equipment or analysis of a new satellite image taken in the year of the verification.

Leakage: according to the applied methodology, leakage refers to the displacement of agricultural activities. In order to identify and minimize potential leakage, the CME will prepare and apply a questionnaire to all potential CPAs regarding the situation of the land to be leased, the existence of any agricultural activity/ cattle and its possible displacement and destination.

QA/QC procedures: the QA/QC procedures under the PoA aim to standardize procedures for monitoring and collection of data to address (i) reliability of field measurements/ data collection, (ii) methods used to collect field data, (iii) data maintenance and archiving, (iv) continuous improvement. They are presented below.

(i) Reliability regarding field measurements/ data collection

Field team members will have appropriate qualification to perform the monitoring activities related to each parameter and will act in accordance with the best practices for data collection (see section J.6.1 above).

Each team member is fully aware of the importance of collecting the data as accurately as possible and the impact that this activity can have on the final calculation of GHG removals from the atmosphere by the CPA.

All training, whether internal or external, generates a record, with attendance list, and certificate of participation.

(ii) *Methods used to collect field data*

As per the methodology *AR-ACM0003 version 02.0*, QA/QC measures will be included in standard operational procedures adopted by the CME based on commonly accepted principles and practices of forest inventory and forest management in the host country or an adaptation of SOPs available from published handbooks or scientific literature or from the "IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry 2003".

All standard operational procedures are subject to change/ continuous improvement throughout the implementation of the PoA, provided they comply with the requirements within this PoA-DD.

(iii) *Data maintenance and archiving*

The CME will address data storage, archiving of data, and QA/QC in an internal procedure that will be developed for the PoA.

Monitored data required for verification and issuance are kept and archived for at least two years after the end of the final crediting period or the last issuance of CERs, whichever occurs later.

(iv) Continuous improvement

The data accumulated in previous years will guide the continuous improvements in operations. Continuous process of observation, verifications, checks, comparations and analyses, aiming at identifying needs for corrections, improvements of procedures and their execution at all levels are to be carried out.

SECTION K. Crediting period type and duration

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Fixed crediting period of 30 years.

SECTION L. Eligibility criteria for inclusion of CPAs

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No.	Eligibility criterion Category	Eligibility criterion Required condition	Supporting evidence for inclusion
1	Location	a. The CME must prove that the geographical boundaries of the CPA are consistent with those of the PoA, i.e., those set out in section A.2 of this PoA-DD.	- Georeferencing the limits of each CPA.
2	Double count	b. Each CPA must avoid double counting of GHG removals.	- Locations where the project will be implemented will be clearly demarcated, georeferenced and shapefiles will be created. This data will clearly show that the areas of each CPA do not overlap.
3	Double count	c. The CME must confirm that CPAs are not registered as a CDM activity, included in another registered PoA or are project activities that have been cancelled.	- Prior research on the UNFCCC website for projects or PoAs in the PoA region.
4	Technology	d. Each CPA must specify the technology/measure, such as the level and type of service, as well as detailing the performance based on tests/certification, among others.	- Presentation of the Management Plan for the area with information on land regularization, location of preservation areas and any environmental certification (e.g. FSC). Reforestation activities in areas previously occupied by agriculture: Use of shapefiles/maps with these evidence and project activities, as described in the CPA-DD. Selection of eligible areas according to the latest version of the tool "*Demonstration of eligibility of lands for A/R CDM project activities"*.
5	Start date	e. CME must confirm the CPA start date with documentary evidence.	- Use the date on which the site preparation or planting activities begin: registration in the company's forestry system identifying project and plot, providing plot relevant information such as area in hectares and starting date of planting.
6	Applicability	f. Each CPA must ensure compliance with the methodology's applicability conditions.	The CPA-DD will address the requirement and contain evidence of compliance with the items presented in section J.2 of this generic CPA.

7	Additionality	g. Each CPA must meet the requirements for demonstrating additionality. According to the methodology *AR-ACM0003* version 02.0, applying the most recent version of the "Combined tool to identify the baseline scenario and demonstrate the additionality of the CDM F/R project activities"	The CPA-DD will address the requirement and contain evidence to confirm that the additionality demonstrated at the PoA level (see Section C of this PoA-DD) also applies to the CPA.
8	Eligibility	h. Each CPA must prove the eligibility of the areas where the project will be implemented, according to the most recent version of the methodological tool "*Demonstration of eligibility of lands for A/R CDM project activities*", especially: h.1. Show that at the start of the project activity the areas do not contain forests; and h.2. Show that on 31 December 1989 the areas did not contain forests.	Use one or more of the options below: - Aerial or satellite images; - Land use or land cover information through maps or data sets; - Documents that attest to the characteristic of the land (information on land use or coverage through local documents such as land registration, deeds or other records that attest to land use); - Written declaration resulting from a Participatory Rural Assessment.
10	Public funding	j. The CME will provide a declaration that funding from Annex I party, if any, does not result in a diversion of official development assistance	- Insert a clause in the lease agreements with such a declaration.
11	Sampling	i. Conditions related to the requirements for sampling in the case of PoA, according to "*Standard: Sampling and surveys for CDM project activities and program of activities*", if the generic CPA applies sampling to determine parameter values for the calculation of GHG emission reductions or GHG removals.	- The parameters that require sampling will be monitored as described in section J6 and presented to the CME at each check of the specific CPA.
12	Leakage	o. Assessment of the proposed area for implementation of the project to determine whether there has been/will be displacement of agricultural activity to a new area.	- Questionnaire to be applied to the partner in order to register the displacement conditions and destination of cattle, if any.

Appendix 1. Contact information of coordinating/managing entity and project participants

Coordinating/managing entity and/or project participants	☒ Coordinating/managing entity ☒ Project participant
Organisation name	Lacan Investimentos e Participações Ltda
Country	Brazil
Address	Av Brigadeiro Faria Lima, 2179 – cj 61 – Jardins – SP – cep 01451-000
Telephone	+ 55 (11) 3372-1234
Fax	--
E-mail	alexandre.bomfim@lacanativosreais.com.br guilherme.ferreira@lacanativosreais.com.br
Website	https://www.lacanativosreais.com.br
Contact person	Alexandre Bomfim and/ or Guilherme Ferreira

Appendix 2. Affirmation regarding public funding

N/A

Appendix 3. Applicability of methodologies and standardised baselines

N/A

Appendix 4. Further background information on ex-ante calculation of net anthropogenic removals

N/A

Appendix 5. Further background information on monitoring plan

N/A

Appendix 6. Summary report of comments received from local stakeholders

N/A

Appendix 7. Summary of post-registration changes

N/A

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