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Methodology for Carbon Removal in Private Conservation Areas

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Contents

Methodology Details

1. Sources

This methodology makes use of the following documents:

- ASSOCIAÇÃO BRASILEIRA DE NORMAS TÉCNICAS. NBR ISO 14064: Norma Brasileira de Mudanças Climáticas. Rio de Janeiro, 2007.

- BRAZIL. MCTI – Ministry of Science, Technology and Innovation. Third National Communication of Brazil to the United Nations Framework Convention on Climate Change. Volume III. Brasília: Ministry of Science, Technology and Innovation, 2016. 336 p.

- IPCC – Intergovernmental Panel on Climate Change. Good Practice Guidance for Land Use, Land-Use Change and Forestry. Institute for Global Environmental Strategies (IGES), 2003. 590 p.

- IPCC – Intergovernmental Panel On Climate Change. 2006 IPCC Guidelines for National Greenhouse Gas Inventories. National Greenhouse Gas Inventories Programme. Kanagawa: Institute for Global Environmental Strategies, 2006.

- SOCIALCARBON. Social Carbon Standard. V6.0 of 3 Jan. 2022.

The following methodologies were also used in preparing this paper:

- CDM AR-AMS0003. Afforestation and reforestation project activities implemented on wetlands. (Version used: V 03.0 of 4 Oct. 2013).

- CDM AR-AMS0007. Afforestation and reforestation project activities implemented on lands other than wetlands. (Version used: V 03.1 of 4 Oct. 2013).

This methodology makes use of the latest versions of the following tools:

- CDM AR-TOOL15. Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity. (Version used: V 2.0 of 4 Oct. 2013).

- SCT0001. Tool for the Demonstration and Assessment of Additionality in SOCIALCARBON Agriculture, Forestry and Other Land Use (AFOLU) Project Activities. (Version used: 1.0 of 26 Sep. 2022). Available at: https://www.socialcarbon.org/sct0001

2. Summary description of the Methodology

Additionality and Credit Methodology	
Additionality	Project Method
Credit baseline	Project Method

The Methodology for Carbon Removal in Private Conservation Areas presents a procedure for determining the annual removal of CO_2 from the atmosphere by areas of native vegetation located on private properties. It was conceived based on understanding of the genuine contribution by such areas to the annual removal of CO_2 from the atmosphere[1]. In view of its particularity, the methodology applies to AFOLU projects, more specifically to the Afforestation, Reforestation and Revegetation (ARR) project category[2]. The eligible area of the project corresponds to "managed primary formations" and "managed secondary formations" of native vegetation, arising from anthropogenic GHG removals activities, which includes human-assisted natural regeneration on legally declared private property, independent of any legal instruments for mandatory or voluntary environmental conservation (as discussed in Section 3, below).

The methodology calculates CO_2 removal based on the defined eligible area of the project to ensure fulfilment of the conditions for applicability of the project.

2.1 Social motives

The social motivation underlying the development of the Methodology for Carbon Removal in Private Conservation Areas is the democratization of access to the carbon credit generating market, in order to enable thousands of landowners to obtain recognition and remuneration for the provision of environmental services involving the removal of CO_2 from the atmosphere, which contributes directly to mitigating the effects of climate change.

This methodology has the objective of providing financial incentives to Brazilian landowners that promote conservation of native vegetation in their lands, who are often not recognized for such activities. On the other hand, they usually deal with land use restrictions and neglect other opportunity costs that these areas could generate. It is also important to mention that, in Brazil, greenhouse gas emissions are directly linked to changes in land use[3]. The Methodology for Carbon Removal in Private Conservation Areas seeks to introduce

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[1] The concept of "removal in managed lands" was established by the IPCC and used by the Ministry of Science, Technology and Innovation (in Portuguese, "Ministério da Ciência, Tecnologia e Inovação", MCTI) for Brazil's National Communication on GHG emissions. According to this concept, removals occurring in these areas are related to anthropogenic GHG removals activities, as indicated by the documents "Good Practice Guidance for Land Use, Land-Use Change and Forestry" (IPCC, 2003) and "2006 IPCC Guidelines for National Greenhouse Gas Inventories" (IPCC, 2006).

[2] According to SOCIALCARBON Standard v6.0, Appendix 1, definition of Afforestation, Reforestation and Revegetation (ARR).

[3] According to the ninth edition of the analytical document drawn up by SEEG (System for Estimating Greenhouse Gas Emissions), an initiative of the Climate Observatory network, changes in land use accounted for the largest share of greenhouse gas emissions in Brazil during the year 2020: 46% of the overall total, representing 998 million tons of CO_2 equivalent (MtCO$_2$e). For more information, please go to: https://seeg-br.s3.amazonaws.com/Documentos%20Analiticos/SEEG_9/OC_03_relatorio_2021_FINAL.pdf

an element of social inclusion, by enabling areas to also have their contributions to change the Brazilian scenario of GHG emissions, using internationally recognized criteria from the IPCC.

The intention is, in this way, to spread the distribution of financial resources for the effective protection of more areas and for the socioeconomic development of local communities in which they are inserted, for example, by means of environmental education activities, training for income generation and helping to the employment generation which can also stimulate people to remain in the countryside.

According to the SOCIALCARBON Standard, project proponents shall conduct a Safeguarding Assessment and conform to the SOCIALCARBON Safeguarding Requirements[4]. In addition, projects shall undertake an assessment of the Sustainable Development Goals (SDG) impact and describe which SDG are delivered by the project, which shall be monitored periodically[5]. Project proponents shall use SOCIALCARBON indicators to detail the benefits and impacts generated by the project, encompassing: Social, Human, Financial, Natural, Biodiversity and Carbon. During the periodic verifications, the sustainability impacts that are measured by the SOCIALCARBON indicators must demonstrate prospects improvement and not decrease in score for the same resource three consecutive times.

3. Definitions

Alternative land use

The replacement of native vegetation and successive formations with other land cover, such as agricultural, industrial, energy generation and transmission, mining or transport activities, settlements or other forms of human occupation (Federal Law nᵒ 12,651/2012, Art. 3, subsection VI).

Anthropogenic GHG removals activities

For the AFOLU Sector, anthropogenic greenhouse gas removals by sinks are defined as all those occurring on 'managed land'. Managed land is land where human interventions and practices have been applied to perform production, ecological or social functions (IPCC, 2006[6]).

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[4] The Safeguarding Assessment is included in the Project Description Document and in the Monitoring Report, as set out in "SOCIALCARBON Standard".

[5] The SDG assessment shall be documented as part of the SOCIALCARBON Indicators component of the Project Description and monitored periodically in each Monitoring Report submitted.

[6] IPCC – Intergovernmental Panel On Climate Change. 2006 IPCC Guidelines for National Greenhouse Gas Inventories. National Greenhouse Gas Inventories Programme. Kanagawa: Institute for Global Environmental Strategies, 2006. Available at: https://www.ipcc-nggip.iges.or.jp/public/2006gl/

Legal instruments for mandatory or voluntary environmental conservation

These are legal standards whose provisions require forms of mandatory or voluntary conservation on private land. This notably relates to federal laws nº 6.938/1981[7]; nº 12.651/2012[8] and nº 9.885/2000[9]. These regulations provide for the application of legal instruments on private property that make conservation mandatory, as in the case of an Permanent Preservation Area (in Portuguese, "Área de Proteção Permanente", APP) or Legal Reserve (in Portuguese, "Reserva Legal", RL). On the other hand, they also make legal provision for the owner of the area to perform voluntarily conservation, simply by maintaining the native vegetation beyond the minimum level required by law (Native Vegetation Surplus, in Portuguese, "Excedente de Vegetação Nativa", EVN) or through official voluntary conservation by setting up a Private Natural Heritage Reserve (in Portuguese, "Reserva Particular do Patrimônio Natural", RPPN).

Regarding the aforementioned legal instruments, it should be noted that their existence does not guarantee the preservation of the areas. That said, for the purposes of the Methodology for Carbon Removal in Private Conservation Areas, all areas of "Managed Primary Formations" and "Managed Secondary Formations" on private lands are considered to be eligible for the project, as long as the applicability conditions (set out in Section 4) and the demonstration of additionality (set out in Section 7) are met. Exceptions to the rule: areas that are subject to a Conduct Adjustment Agreement or similar instrument, as part of a judicial or administrative proceeding, as well as those that have been the subject of an Environmental Offence Notification within the last ten years, will not be considered eligible.

Any updates or changes in the regulatory framework and resulting normative instruments must be considered during the preparation of the Project Design Document by the project proponent.

Managed Primary Formations[10]

Vegetation cover where it is understood that human activities have not caused any significant changes in its original characteristics of structure and composition during a minimum period of 20 (twenty) years prior to the project start date. This cover is found in private conservation areas where legal instruments for mandatory or voluntary environmental conservation may or may not apply, subject to exceptions. It is also understood that carbon removal results from anthropogenic GHG removals activities (IPCC, 2006).

Managed Secondary Formations

Vegetation cover where it is understood that human activities have caused significant changes in its original characteristics of structure and composition, but there has been no conversion to alternative land use within the area or any degradation that would bring about a regression in its status within the process of ecological

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[7] Available at: http://www.planalto.gov.br/ccivil_03/leis/l6938.htm.
[8] Available at: http://www.planalto.gov.br/ccivil_03/_ato2011-2014/2012/lei/l12651.htm.
[9] Available at: http://www.planalto.gov.br/ccivil_03/leis/l9985.htm.
[10] Adapted from: BRAZIL. MCTI – Ministry of Science, Technology and Innovation. Third National Communication of Brazil to the United Nations Framework Convention on Climate Change. Volume III. Brasília: Ministry of Science, Technology and Innovation, 2016. p. 229. Available at: https://www.gov.br/mcti/pt-br/acompanhe-o-mcti/sirene/publicacoes/comunicacoes-nacionais-do-brasil-a-unfccc/arquivos/3mcti_volume_iii_ingles.pdf

succession, during the last 10 (ten) years prior to the project start date. This cover is found in private conservation areas where legal instruments for mandatory or voluntary environmental conservation may or may not apply, subject to exceptions. It is also understood that carbon removal results from anthropogenic GHG removals activities (IPCC, 2006).

3.1 List of Abbreviations and Acronyms

CDM – Clean Development Mechanism

GHG – Greenhouse Gases

IPCC – Intergovernmental Panel on Climate Change

N/A – Not applicable

SDG – Sustainable Development Goals

4. Applicability Conditions

Adoption of the Methodology for Carbon Removal in Private Conservation Areas is subject to the fulfilment of applicability conditions (Table 2), which is to be analyzed by the proponent at the time of the project request. The total area to be considered under the project is determined by the proponent, following confirmation of compliance with the applicability conditions, and there may be alterations to the size of the area initially presented by the landowner.

This methodology applies to project activities that include conservation activities, which implies the exclusion of any activity that degrades and/or negatively impacts the land. Areas where incentives are provided for conservation activities (such as the Payment for Environmental Services - PES, in Portuguese, "Pagamento por Serviços Ambientais", PSA) are eligible under this methodology, as long as: (i) compliance with the applicability conditions on Table 2 are satisfied; (ii) the demonstration of additionality is satisfied (as per procedures provided on Section 7); (iii) the project does not result in double counting with other GHG programs, as per the principles of the SOCIALCARBON Standard, especially Transparency and Conservativeness.

Projects must align with the SOCIALCARBON Guidance document called "Brazilian Protected Areas".

Table 2 – List of conditions for the applicability of the Methodology for Carbon Removal in Private Conservation Areas.

Criterion	Description
Type of project	Generating carbon (CO_2) removal in private conservation areas
Project area	Areas of native vegetation on formally registered private property within Brazil. Eligible Areas: • Managed primary formations. • Managed secondary formations. Observation: Native wetlands vegetation (under managed primary and secondary formations) are also considered eligible (such as bottomland forests, floodplain forests, mangrove forests, flooded fields) as long as they do not grow on peat. Ineligible Areas: • Areas where there have been changes in the land use and cover ("conversion" to alternative land use) within the 10 (ten) years prior to the project starting date). • Areas making alternative use of the land. • Non-native forest species. • Non-vegetation cover. • Wetlands growing on peat (e.g. peat swamp forests). • Areas that are subject to a Conduct Adjustment Agreement or similar instrument, as part of a judicial or administrative proceeding. • Areas that have been subject of an Environmental Offence Notification within the last ten years.
Project scale	This methodology is applicable to small-scale or large-scale project activities. Small-scale and large-scale designations are as per CDM definitions, according to the SOCIALCARBON Standard.
Eligibility of the property	Areas where all applicability conditions set out in this methodology, including land ownership, can be supported by legal and/or administrative documentation.
Eligibility of the property owner	Private Individual or Legal Entity legally established in Brazil.
Type of vegetation	Native vegetation cover (managed primary and secondary formations).
Condition of the vegetation	• Managed primary formations: vegetation cover where it is understood that human activities have not caused any significant changes in its original characteristics of structure and composition during a minimum period of 20 (twenty) years prior to the project start date. This cover is found in private conservation areas where legal instruments for mandatory or voluntary environmental conservation may or may not apply, subject to exceptions. It is also understood that carbon removal results from anthropogenic GHG removals activities (IPCC, 2006).

Criterion	Description
	• <u>Managed secondary formations</u>: vegetation cover where it is understood that human activities have caused significant changes in its original characteristics of structure and composition, but there has been no conversion to alternative land use within the area or any degradation that would bring about a regression in its status within the process of ecological succession, during the last 10 (ten) years prior to the project start date. It is also understood that carbon removal results from anthropogenic GHG removals (IPCC, 2006).

5. Project Boundary

For the purpose of determining the project start date, there must be evidence of some significant conservation activity on the property that can be described as anthropogenic GHG removals activities and consequent carbon removal in managed lands (IPCC, 2006).

The project start date and the project crediting period shall be established according to the most recent version of the SOCIALCARBON Standard.

With regard to the project area, this usually corresponds to the area of primary and/or secondary vegetation, excluding: (i) areas where there were changes in land use and cover during the period under analysis ("conversion" to alternative land use) within a period of 10 (ten) years prior to the project start date; (ii) alternative land use areas (see the definition in Section 3); and (iii) non-vegetation cover (such as rocky outcrops, bodies of water and roads, among other things). The details of the process for determining the project area are described below.

In order to define the project area, accuracy analysis of the reference base for the land use and cover shall be performed, using land use and cover classification that is publicly accessible and was carried out by a qualified agency/institution (it is recommended that the classification be pixel by pixel, using Landsat[11] satellite images or higher resolution). This analysis is to check the validity of using the reference base in the quantification of carbon removal (see content in Section 8).

To that end, it is necessary to identify the transitions[12] between the classification of land use and cover using the adopted reference base (in principle, the most recent MapBiomas[13] land use and cover base could be used) and the reclassification (using photo interpretation[14] of georeferenced images with 30m spatial resolution or better) of the same base year. This identification of transitions involves random sampling (geographically plotted points distributed within the area), so as to represent 0.2% of the area of the property (e.g.: for image with 30 m spatial resolution, each sample point is understood to represent 0.09 hectares or

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[11] Maximum resolution of 30 metres.
[12] Detected differences between the classification of the land use and cover by the adopted reference base and that performed by photo interpretation of georeferenced images with 30 m spatial resolution or better, for the same base year.
[13] When a reference base offering greater precision is found, it can be adopted upon confirmation of its superior resolution.
[14] Must be performed by a fully trained and duly qualified professional.

900 m² of sampled area). A minimum number of 10 (ten) and a maximum of 300 (three hundred) samples is required, independent of the size of the area of the property[15]. Subsequently, each sample is classified according to its land use and cover, and then compared to the classification of that same sample point using the adopted reference base. Finally, the percentage variation between the samples that match in the classification of the land use and cover is calculated. In the accuracy analysis, a minimum 90% match[16] must be attained, in order to show that there are no significant discrepancies between the classifications of land use and cover by the adopted reference base and by photo interpretation (like cited above) of the area of the property – thus validating the use of the reference base classification adopted by the project.

Following validation through accuracy analysis, the eligible and ineligible areas of the project will be determined. Any managed primary and secondary formations (see definitions in Section 3) on the property[17] are considered to be eligible areas, which must be analyzed according to the classification of land use and cover by the reference base adopted for the project. As for ineligible areas, these include: (i) areas where there have been changes in land use and cover ("conversion" to alternative land use) within a period of 10 (ten) years prior to the project start date; (ii) areas of alternative land use (see definition in Section 3); and (iii) non-vegetation cover.

With regard to the verification and description of the condition of the vegetation, the following time frames[18] should be considered:

I. 20 (twenty) years prior to the project start date, for the purpose of confirming the existence of native vegetation formations (whether managed primary or secondary formations) within the area of the property (IPCC, 2003[19])[20];

    A. verification on an annual basis, from the 20th to the 10th year prior to the project start date, to verify the conservation status of native vegetation formations during that period, with the following possibilities:

        1. as a managed primary formation, the condition having been confirmed in the 20th year prior to the project start date, it can: (i) maintain this conservation status; or (ii) be classified as a managed secondary formation; or (iii) as an alternative land use.

        2. as a managed secondary formation, the condition having been confirmed in the 20th year prior to the project start date, it can: (i) maintain this conservation status; or (ii)

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[15] In view of the variations in the resolution of the Landsat image (due to the diversity of existing scales), an area of 0.09 hectare is defined as the unit for calculating the required number of samples.

[16] If the figure obtained in the accuracy analysis is less than 90%, the project proponent must adopt the reclassification using photointerpretation of the features, polygon by polygon, provided that this has been carried out by a fully trained and duly qualified professional.

[17] Provided they meet the applicability conditions previously described in Table 2, Section 4 - Applicability Conditions.

[18] It is good practice to collect the data that will be used to analyze land use and cover change during the 10 (ten) years prior to the project start date within the project area for at least three time points, about 3-5 years apart. For areas covered by managed primary formations, it is sufficient to collect data for one single date, which must be as closest as possible to the project start date.

[19] IPCC – Intergovernmental Panel on Climate Change. Good Practice Guidance for Land Use, Land-Use Change and Forestry. Institute for Global Environmental Strategies (IGES), 2003. 590 p. Available at: https://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf_files/GPG_LULUCF_FULL.pdf

[20] The use of the 20-year time period, counting from the earliest year used in the quantifying of the carbon removal, is in line with the methodology provided in the "Good Practice Guidance" (IPCC, 2003). According to that document, there tends to be a stabilization in the vegetation's increments of biomass following that period.

be classified as an alternative land use.

II. 10 (ten) years prior to the project start date, perform at least 1 (one) verification from the 10th to the 5th year prior to the project start date, with the following possibilities: (i) to remain classified as managed primary formations, in areas where the conservation status has been maintained; (ii) to be classified as managed secondary formations, in areas where the conservation status has been maintained or where there has been a regression in the conservation status (and, in this last case, classified as an ineligible area); or (iii) to be classified as an alternative land use (and, therefore, as an ineligible area), where there has been clear-cutting or where alternative land use persists.

III. in the 5 (five) years prior to the project start date, perform at least 1 (one) verification, offering two possibilities: (i) the managed primary or secondary formations remain at this conservation status; or (ii) new areas of secondary formation and/or new alternative land uses have emerged and are classified as ineligible areas.

IV. 1 (one) year prior to the project start date, so as to repeat the procedure in time frame III and also to serve as proof of the conservation status of the area of the property.

All the ineligible areas mapped out for each year under analysis are grouped and then subtracted from the area submitted by the implementation partner[21], which will apply for the entire duration of the project, including any renewals. Thus, the final eligible area will effectively comprise the final project area for calculation of CO_2 removal.

Important Observations

- In cases where there has been clear-cutting of vegetation or regression in the conservation status of a managed primary formation to a secondary formation during the project period, regardless of the cause of the degradation, the area must be classified as ineligible[22].

- In cases where there has been a regression in the conservation status of a managed primary formation to a managed secondary formation, it is considered as an eligible area from the 20th to the 10th year prior to the project start date; and as an ineligible area from 10 (ten) years prior to the project start date.

- In cases where there has been a regeneration from a managed secondary formation to a managed primary formation from a minimum period of 20 (twenty) years since the event of regeneration, a new annual carbon incrementation parameter will need to be adopted to quantify the carbon removal that is consistent with the condition of the vegetation, as explained in Section 8, item 8.2, Step 1.

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[21] The owner of an area containing native vegetation, who may be a private individual or legal entity governed by the laws of the public and/or private sphere and has the ability to act as a provider of environmental services, maintaining the integrity of the environmental assets present on their property, and is interested in submitting the area to evaluation and the subsequent generation of carbon removal credits, in accordance with the Methodology for Carbon Removal in Private Conservation Areas.

[22] Biomass burning may occur in the project scenario during the project period causing GHG emissions. Although there are two general types of biomass burning covered by IPCC (2003), only burning within managed lands is considered under this methodology. On the other hand, burning in the course of land use conversion is not considered under this methodology as the affected area shall be deemed ineligible if conversion to land use occurs.

- Project proponent must verify its adopted reference base so that the verification proposal of the condition of the vegetation brings security from the perspective of detecting changes in land use and cover, especially with regards to the change from native vegetation formations to alternative land use and non-vegetation cover.

Table 3 below presents the rationale for the inclusion or exclusion of carbon pools within the Project Boundary. The carbon pools used by the Ministry of Science, Technology and Innovation (in Portuguese, "Ministério da Ciência, Tecnologia e Inovação", MCTI) for removals' estimations may be adopted, using the most recent data available from Brazil's National Communication to the United Nations Framework Convention on Climate Change[23].

Carbon pools may be deemed insignificant and do not need to be accounted for if any carbon pool result in an increment of less than 5% of the total CO_2 removals or if the total omitted increase in GHG emissions amounts to less than 5% of the total GHG benefit generated by the project.

Table 3 – List of Carbon Pools included and not included within the Project Boundary

Carbon Pools	Inclusion in the Methodology	Observations
Aboveground woody biomass	Included	This is the largest carbon pool covered by the project's activities
Aboveground non-woody biomass	Optional	Shall be included where project activities result in significant changes to this carbon pool
Belowground biomass	Included	The carbon stock in this pool is expected to increase as a result of the implementation of this project
Litter	Optional	Shall be included where project activities result in significant changes to this carbon pool
Deadwood	Optional	Shall be included where project activities result in significant changes to this carbon pool
Soil Organic Carbon (SOC)	Optional	Shall be included where project activities result in significant changes to this carbon pool
Wood products	Optional	Shall be included where project activities result in significant changes to this carbon pool

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[23] Available at: https://www.gov.br/mcti/pt-br/acompanhe-o-mcti/sirene/publicacoes/comunicacoes-nacionais-do-brasil-a-unfccc.

Table 4 presents the GHG sources included or excluded from the Project Boundary in this methodology.

Table 4 – GHG Sources included in or excluded from the Project Boundary

Source		Gas	Included?	Rationale
Baseline	Biomass burning	CO_2	No	Conservatively omitted
		CH_4	No	Conservatively omitted
		N_2O	No	Conservatively omitted
Project	Biomass burning	CO_2	Yes	Major emission source considered.
		CH_4	Yes	Major emission source considered.
		N_2O	Yes	Major emission source considered.

6. Baseline Scenario

The project proponent must establish the baseline scenario depending on the scale of the project.[24]

For small-scale projects, the baseline is the scenario where no investments or conservation activities are undertaken by the project proponent, leading to a situation where native vegetation formations are not anthropically managed and protected. Therefore, the baseline scenario implies the absence of CO_2 removals as a result of anthropogenic GHG removals activities, since the area is not classified under the concept of carbon removal on managed lands according to the IPCC (2003, 2006), as mentioned above.

For large-scale projects, the baseline scenario shall be established according to the most recent version of the "Tool for the Demonstration and Assessment of Additionality in SOCIALCARBON Agriculture, Forestry and Other Land Use (AFOLU) Project Activities" (SCT0001)[25].

For both project scales, project proponent shall demonstrate that project activities aimed to manage the project area are additional, by applying the tools described on Section 7 – Additionality.

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[24] Small-scale and large-scale designations are as per CDM definitions, according to the SOCIALCARBON Standard.
[25] SCT0001. Tool for the Demonstration and Assessment of Additionality in SOCIALCARBON Agriculture, Forestry and Other Land Use (AFOLU) Project Activities. (Version used: 1.0 of 26 Sep. 2022). Available at: https://www.socialcarbon.org/sct0001.

7. Additionality

This methodology uses a project method for the demonstration of additionality.

Step 1: Regulatory Surplus

Project proponents must demonstrate regulatory surplus in accordance with the rules and requirements regarding regulatory surplus set out in the latest version of the SOCIALCARBON Standard.

Step 2: *Project Method*

The project activity shall apply the additionality analysis method set out in the latest version of the SOCIALCARBON *Tool for the Demonstration and Assessment of Additionality in SOCIALCARBON Agriculture, Forestry and Other Land Use (AFOLU) Project Activities (SCT0001).*

8. Quantification of GHG Emissions and Removals

In order to measure CO_2 removals from the atmosphere by native vegetation in managed lands, the methodology used by the Ministry of Science, Technology and Innovation (in Portuguese, "Ministério da Ciência, Tecnologia e Inovação", MCTI) may be adopted, using the most recent data available from Brazil's National Communication to the United Nations Framework Convention on Climate Change[26]. If new and more accurate carbon removal data become available, these can be used to estimate the annual increase in biomass. As a basic technical guideline, the following documents, prepared by the Intergovernmental Panel on Climate Change (IPCC), were used by the MCTI: "Revised 1996 IPCC Guidelines for National Greenhouse Inventories" (Guidelines 1996); "Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories" (Good Practice Guidance 2000); "Good Practice Guidance for Land Use, Land-Use Change and Forestry" (Good Practice Guidance 2003) and "2006 IPCC Guidelines for National Greenhouse Gas Inventories" (Guidelines 2006).

8.1 Baseline Emissions and Removals

According to Section 6 - Baseline Scenario above, the baseline scenario shall be established depending on the scale of the project. Removal in areas where there are no anthropogenic GHG removals activities is considered to be zero, in accordance with the IPCC "Good Practice Guidance" (IPCC, 2003).

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[26] Available at:
https://www.gov.br/mcti/pt-br/acompanhe-o-mcti/sirene/publicacoes/comunicacoes-nacionais-do-brasil-a-unfccc.

The baseline scenario implies there is no CO_2 removal due to the absence of anthropogenic GHG removals activities and therefore the area is not classified under the concept of removal in managed lands, as defined by the IPCC (2003, 2006). Pursuant to those guidelines, removal that occurs in unmanaged lands are not counted and thus, baseline scenario removal is set at 0 (zero).

According to the aforementioned documents (IPCC, 2003 and IPCC, 2006), removal in managed lands, where land use is not subject to change, is estimated using the carbon increment under the same type of land use (e.g.: growth of secondary or primary vegetation in managed lands) between two points in time. In this way, the accumulation of removal over a certain time interval is accounted for, so other emissions or removals are not considered in the baseline scenario.

8.2 Project Emissions and Removals

Step 1

- Based on the delineation of the eligible project area[27], the area (hectares) of each class of vegetation cover is calculated and compared with the classification developed by the MCTI[28].
    - Based on the MCTI classes and the adopted reference base, the nomenclature of the different classes of vegetation cover under the project is established.
- Subsequently, the annual carbon incrementation parameters[29] are applied, based on the respective area and condition of the vegetation[30] in each class of the vegetation cover within the project area, according to the calculation presented in Equation 1.

$$\left(\frac{AI^c \times 44}{12}\right) \times A = RV_y \qquad \text{(Equation 1)}$$

Where:

A = Area of that class of vegetation cover; ha

AI^c = Annual carbon increment, which varies according to the biome and class of vegetation cover; tC/ha

RV_y = CO_2 removal for each class of vegetation cover, during year y; tCO_2e/year

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[27] Subject to the Applicability Conditions described in Section 4 of this methodology.
[28] As presented in Brazil's National Communication to the United Nations Framework Convention on Climate Change. It should be adopted on the basis of the most recent version, as mentioned earlier in this section.
[29] As presented in Brazil's National Communication to the United Nations Framework Convention on Climate Change. They should be adopted on the basis of the most recent version of this document, as mentioned previously in this section. If new and more accurate carbon removal data become available, these can be used to estimate the annual increase in biomass.
[30] As described previously, in Table 2, Section 4 - Applicability Conditions

Step 2

The sum of CO_2 removals for each class of vegetation cover during year y (tCO$_2$e/year) yields the total removals (tCO$_2$e/year) for the project area during year y, according to Equation 2, below.

$$\Sigma RV_y = PR_y \qquad\qquad \text{(Equation 2)}$$

Where:

ΣRV_y =   Sum of CO_2 removals for each class of vegetation cover during year y; tCO$_2$e

PR_y =   Total CO_2 removal under the project during year y; tCO$_2$e

GHG emissions from biomass burning

Biomass burning may occur in the project scenario causing GHG emissions. Although there are two general types of biomass burning covered by IPCC (2003)[31], only burning within managed lands is considered under this methodology. On the other hand, burning in the course of land use conversion is not considered under this methodology as the affected area shall be deemed ineligible if conversion to land use occurs.

GHG emissions from biomass burning in the project scenario must be calculated. It is necessary to estimate the burned area (BAPA$_y$), the average proportion of mass burnt in each carbon pool (Pburnt$_p$), and the proportion of vegetation area burned (Fburnt).

GHG emissions from biomass burning can be estimated based on IPCC (2003).

$$EBB_y = EBBCO_{2,y} + EBBN_2O_y + EBBCH_{4,y} \qquad\qquad \text{(Equation 3)}$$

Where:

EBB_y =   Total GHG emission from biomass burning at year y; tCO$_2$e/ha

$EBBCO_{2,y}$ = CO_2 emission from biomass burning at year y; tCO$_2$e/ha

$EBBN_2O_y$ = N_2O emission from biomass burning at year y; tCO$_2$e/ha

$EBBCH_{4,y}$ = CH_4 emission from biomass burning at year y; tCO$_2$e/ha

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[31] IPCC – Intergovernmental Panel on Climate Change. Good Practice Guidance for Land Use, Land-Use Change and Forestry. Institute for Global Environmental Strategies (IGES), 2003. 590 p. Available at: https://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf_files/GPG_LULUCF_FULL.pdf

$$EBBN_2O_y = EBBCO_{2,y} \times \frac{12}{44} \times NCR \times ERN_2O \times \frac{44}{28} \times GWP_{N2O} \qquad \text{(Equation 4)}$$

Where:

$EBBN_2O_y$	=	N$_2$O emission from biomass burning at year y; tCO$_2$e/ha
$EBBCO_{2,y}$	=	CO$_2$ emission from biomass burning at year y; tCO$_2$e/ha
NCR	=	Nitrogen to Carbon Ratio (IPCC default value = 0.01); dimensionless
ERN_2O	=	Emission ratio for N2O (IPCC default value = 0.007); dimensionless
GWP_{N2O}	=	Global Warming Potential for N$_2$O

$$EBBCH_{4,y} = EBBCO_{2,y} \times \frac{12}{44} \times ER_{CH4} \times \frac{16}{12} \times GWP_{CH4} \qquad \text{(Equation 5)}$$

Where:

$EBBCH_{4,y}$	=	CH$_4$ emission from biomass burning at year y; tCO$_2$e/ha
$EBBCO_{2,y}$	=	CO$_2$ emission from biomass burning at year y; tCO$_2$e/ha
ER_{CH4}	=	Emission ratio for CH$_4$ (IPCC default value = 0.012); dimensionless
GWP_{CH4}	=	Global Warming Potential for CH$_4$

$$EBBCO_{2,y} = Fburnt \times \sum_{p=1}^{p}\left(C_{p,y} \times Pburnt_p \times CE_p\right) \qquad \text{(Equation 6)}$$

Where:

$EBBCO_{2,y}$	=	CO$_2$ emission from biomass burning at year y; tCO$_2$e/ha
$Fburnt$	=	Proportion of vegetation area burned (%); percentage
$C_{p,y}$	=	Average carbon stock per hectare in the carbon pool p burnt at year y; tCO$_2$e/ha
$Pburnt_p$	=	Average proportion of mass burnt in the carbon pool p; percentage
CE_p	=	Average combustion efficiency of the carbon pool p; dimensionless (IPCC default of 0.5)
p	=	Carbon pool that could burn, above-ground biomass

According to IPCC (2003), the default value for combustion efficiency of 0.5 should be used. The Nitrogen to Carbon Ratio (NCR) is approximated to be about 0.01.

Thus, the total GHG emissions from biomass burning at year y in the project area at the project scenario (EBBPSPA$_y$) shall be calculated as follows.

$$EBBPSPA_y = BAPA_y \times EBB_y \hspace{4cm} \text{(Equation 7)}$$

Where:

$EBBPSPA_y$ =   Total actual GHG emissions from biomass burning at year y in the project area in the project scenario; tCO_2e

$BAPA_y$ =   Burned area within the project area at year; hectares

EBB_y =   Total GHG emission from biomass burning at year y; tCO_2e/ha

Therefore, project emissions during year y (PE$_y$) are equivalent to the total actual GHG emissions from biomass burning at year y in the project area in the project scenario (EBBPSPA$_y$).

Important Observations

- CO_2 emissions as a result of the removal of herbaceous vegetation, burning of fossil fuels, application of fertilisers, use of wood, decomposition of the humus layer and fine tree roots fixing N_2 (nitrogen), building of minor access within the project limits and transportation attributable to the project should be considered insignificant and therefore counted as zero.
- In the event of changes in the land use and cover ("conversion" to alternative land use), the identified area shall be definitively excluded from the project, and therefore is not eligible anymore for future accounting of removal.

8.3 Leakage

The possible sources of leakage are associated with the displacement of pre-project agricultural activities from the project boundary, and should be estimated through CDM AR-TOOL15[32]. However, according to Section 4 above, which describes the applicability conditions for this methodology, areas where there have been changes in the land use and cover ("conversion" to alternative land use) within the 10 (ten) years prior to the project starting date shall be ineligible. Therefore, there is no possibility of displacement of pre-project

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[32] CDM AR-TOOL15. Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity. (Version used: V 2.0 of 4 Oct. 2013).

agricultural activities from the project boundary to outside the project area. Consequently, this methodology does not include leakage emissions.

8.4 Net GHG Emissions and Removals

The net GHG emissions and removals during year y corresponds to the project removals during year y, minus the project emissions during year y, the baseline scenario removals and the leakage during year y (according to Equation 8).

$$NER_y \ = \ PR_y \ – \ PE_y \ – \ LE_y \qquad\qquad\qquad\qquad\text{(Equation 8)}$$

Where:

NER_y	=	Net GHG emissions and removals during year y; tCO2e
PR_y	=	Project removals during year y; tCO$_2$e
PE_y	=	Project emissions during year y; tCO$_2$e
LE_y	=	Leakage emissions during year y; tCO$_2$e

8.5 Uncertainty

When defining the project area, uncertainties should be reduced as much as possible. The methodological procedure for accuracy analysis of the reference base adopted for classification of the land use and cover is described in Section 5 (Project Boundary). The minimum overall accuracy shall be 90% for the reference base of land use and cover class. This procedure is also applied to the monitoring plans, described in Section 9 (Monitoring). In the event that a figure of less than 90% is obtained, the land use and cover must be classified by means of remote sensing, using orbital imaging, by a fully trained and duly qualified professional.

Regarding CO$_2$ removal factors and related uncertainties, the uncertainty adopted by the most recent data available from Brazil's National Communication to the United Nations Framework Convention on Climate Change should be used. According to SOCIALCARBON Methodology Requirements, confidence deductions shall be applied using conservative factors specified in the CDM Meth Panel guidance on addressing uncertainty in its Thirty Second Meeting Report, Annex 14[33].

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[33] CDM Thirty Second Meeting Report, Annex 14: Proposed guidance on addressing bias uncertainty. Available at: https://cdm.unfccc.int/Panels/meth/meeting/08/032/mp_032_an14.pdf

9. Monitoring

9.1 Data and Parameters Available at Validation

Data / Parameter:	Annual carbon incrementation parameters
Data unit:	tC/ha
Description:	Annual increase in biomass (tC/ha) of managed primary and secondary forest vegetation, by biome
Equations:	
Source of data:	BRAZIL. MCTI – Ministry of Science, Technology and Innovation. Brazil's National Communication to the United Nations Framework Convention on Climate Change.[34]
Value applied:	Depends on each project.
Justification of choice of data or description of measurement methods and procedures applied:	Adoption of annual carbon incrementation parameters for the managed forest vegetation and managed grasslands in Brazilian biomes, as presented in the most recent version of Brazil's National Communication to the United Nations Framework Convention on Climate Change.
Purpose of Data:	Calculating the project CO_2 removal.
Comments:	Project proponents must upload relevant datasets/remote imagery onto the SOCIALCARBON Registry to facilitate independent reviews of the recorded project outcomes. If new and more accurate carbon removal data become available, these can be used to estimate the annual increase in biomass.

Data / Parameter:	GWP_{N2O}
Data unit:	tonnes CO_2e per tonne N_2O (tCO_2e/tN_2O)

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[34] On the date of issue of this methodology, the document used corresponds to the Third National Communication of Brazil to the United Nations Framework Convention on Climate Change - Volume III. The annual carbon incrementation parameters can be found on pages 292-293 ("Annual removal of carbon in managed areas"). However, it should be noted that, from any parameter updates by the MCTI, the most recent version of the document with the latest available data must be used.

Description:	Global warming potential of nitrous oxide
Equations:	4
Source of data:	IPCC Fifth Assessment Report[35]
Value applied:	265
Justification of choice of data or description of measurement methods and procedures applied:	The SOCIALCARBON Standard requires that N_2O is converted to CO_2e using the 100-year global warming potential derived from the most recent IPCC Assessment Report.
Purpose of Data:	Calculation of project emissions
Comments:	N/A

Data / Parameter:	GWP_{CH_4}
Data unit:	tonnes CO_2e per tonne CH_4 (tCO_2e/tCH_4)
Description:	Global warming potential of methane
Equations:	5
Source of data:	IPCC Fifth Assessment Report
Value applied:	28
Justification of choice of data or description of measurement methods and procedures applied:	The SOCIALCARBON Standard requires that CH_4 is converted to CO_2e using the 100-year global warming potential derived from the most recent IPCC Assessment Report.
Purpose of Data:	Calculation of project emissions
Comments:	N/A

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[35] IPCC – Intergovernmental Panel on Climate Change. Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. R. K. Pachauri & L. A. Meyer (Eds.). Available at https://www.ipcc.ch/report/ar5/syr/

9.2 Data and Parameters Monitored

Data / Parameter:	Area per class of vegetation cover
Data unit:	Hectare (ha)
Description:	Area per class of vegetation cover within the project area.
Equations:	1
Source of data:	Reference base adopted for the project; Project proponent.
Description of measurement methods and procedures to be applied:	Calculating the area (hectares) of the classes of vegetation cover in the adopted reference base, using the GIS software's[36] field calculator (*"$area/10000"* expression). There will be subsequent validation of the adopted reference base classes using the MCTI classification for the adoption of nomenclature for the project.
Frequency of monitoring/recording:	Annual
QA/QC procedures to be applied:	An accuracy analysis shall be applied to the classification of the reference base adopted for the project, through reclassification by photo interpretation of georeferenced images with 30 m spatial resolution or better. A minimum 90% match must be attained. In the event that a figure of less than 90% is obtained, the land use and cover must be classified by means of remote sensing, using orbital imaging, by a fully trained and duly qualified professional.
Purpose of data:	Calculating the project CO_2 removal.
Calculation method:	Using the GIS software's field calculator (*"$area/10000"* expression).
Comments:	Project proponents must upload relevant datasets/remote imagery onto the SOCIALCARBON Registry to facilitate independent reviews of the recorded project outcomes.

Data / Parameter:	$BAPA_y$
Data unit:	ha

[36] Project proponents may use any GIS software as they wish, since it provides the same functionality as stated in the "Description of measurement methods and procedures to be applied".

Description:	Burned area within the project area at year y
Equations:	7
Source of data:	Remote sensing data and GIS Local management team and other field data
Description of measurement methods and procedures to be applied:	In addition to field data from the management team, the following sources will also be monitored: - INMET[37] - INPE[38]
Frequency of monitoring/recording:	The frequency of monitoring of this parameter must be annual or in a shorter time frame that allows accurate detection of the affected area.
QA/QC procedures to be applied:	Best practices in remote sensing and GIS must be applied. Furthermore, the following sources will be also monitored to confirm the data obtained from remote sensing and GIS: - INMET - INPE - Field data from the management team An accuracy analysis shall be applied to the detection of the burned area within the project area, through reclassification by photo interpretation of georeferenced images with 30 m spatial resolution or better. A minimum 90% match must be attained. In the event that a figure of less than 90% is obtained, the burned area must be detected by means of remote sensing, using orbital imaging, by a fully trained and duly qualified professional.
Purpose of Data:	This parameter is used to calculate project emissions in the project scenario. Provides an estimation of the area affected by fires within the project area during the project scenario.
Calculation method:	Remote sensing and GIS
Comments:	N/A

Data / Parameter:	C_p
Data unit:	tCO_2e/ha

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[37] INMET. Instituto Nacional de Meteorologia. Available at: <https://portal.inmet.gov.br/>.
[38] INPE. Instituto Nacional de Pesquisas Espaciais. Available at: <http://www.inpe.br/>.

Description:	Average carbon stock per hectare in the carbon pool p burnt at year y
Equations:	6
Source of data:	Average values for the above-ground biomass may be taken from official data, such as national inventory or Forest Reference Emissions Level (FREL).
Description of measurement methods and procedures to be applied:	The following sources will be monitored: - National data - Peer-reviewed scientific studies The calculation method must be a literature search about the above-ground biomass values that could be determined to accurately represent the values of vegetation within the project area.
Frequency of monitoring/recording:	The frequency of monitoring of this parameter must be annual or in a shorter time frame that allows accurate detection of the affected area.
QA/QC procedures to be applied:	National data or peer-reviewed scientific studies must be used to estimate the average above ground biomass per hectare.
Purpose of Data:	This parameter is used to calculate project emissions resulting from biomass burning in the project scenario.
Calculation method:	Literature search about the above-ground biomass values that could be determined to accurately represent the values of vegetation within the project area.
Comments:	N/A

Data / Parameter:	$Pburnt_p$
Data unit:	%
Description:	Average proportion of mass burnt in the carbon pool
Equations:	6
Source of data:	Estimated from peer-reviewed academic literature.
Description of measurement methods	The calculation method must use literature reference about biomass burning in the affected carbon pool that could be determined to accurately represent the values of mass burnt.

and procedures to be applied:	
Frequency of monitoring/recording:	The frequency of monitoring of this parameter must be annual or in a shorter time frame that allows accurate detection of the affected area.
QA/QC procedures to be applied:	National data or peer-reviewed scientific studies must be used to estimate the average proportion of mass burnt in the above ground biomass pool.
Purpose of Data:	This parameter is used to calculate project GHG emissions from biomass burning at year y in the project area (parameter EBBPSPAy).
Calculation method:	National data or peer-reviewed scientific studies must be used to estimate the average proportion of mass burnt in the above ground biomass pool.
Comments:	N/A

Data / Parameter:	Fburnt
Data unit:	%
Description:	Proportion of vegetation area burned
Equations:	6
Source of data:	Estimated from literature. Fburnt data source: BRAZIL. MCTI – Ministry of Science, Technology and Innovation. Brazil's National Communication to the United Nations Framework Convention on Climate Change
Description of measurement methods and procedures to be applied:	This parameter must be calculated according to requirements and default values established by the most recent data available from MCTI – Ministry of Science, Technology and Innovation. Brazil's National Communication to the United Nations Framework Convention on Climate Change.
Frequency of monitoring/recording:	The frequency of monitoring of this parameter must be annual or in a shorter time frame that allows accurate detection of the affected area.
QA/QC procedures to be applied:	The most recent data available from MCTI must be used to estimate the proportion of vegetation area burned.

Purpose of Data:	This parameter is the average percentage of the area within the project area that is burnt and is used to calculate project GHG emissions from biomass burning at year t in the project area (parameter $EBBPSPA_y$).
Calculation method:	The most recent data available from MCTI must be used to estimate the proportion of vegetation area burned.
Comments:	N/A

Data / Parameter:	$EBBPSPA_y$
Data unit:	tCO_2e
Description:	Total actual GHG emissions from biomass burning at year t in the project area in the project scenario
Equations:	7
Source of data:	Remote sensing data and GIS Field data
Description of measurement methods and procedures to be applied:	If biomass burning occurs, the resulting GHG emissions will be subject to monitoring and accounting, when significant. In addition to remote sensing data and GIS, which can identify the area affected by forest fire, field data could also confirm the obtained data.
Frequency of monitoring/recording:	The frequency of monitoring of this parameter must be annual or in a shorter time frame that allows accurate detection of the affected area.
QA/QC procedures to be applied:	Best practices in remote sensing and GIS.
Purpose of Data:	This parameter will be used to calculate GHG emissions due to biomass burning within the project area in the project scenario.
Calculation method:	Remote sensing data and GIS Field data
Comments:	N/A

Data / Parameter:	EBB_y

Data unit:	tCO_2e/ha
Description:	Total GHG emission from biomass burning at year y
Equations:	3 and 7
Source of data:	Calculated according to IPCC (2003).
Description of measurement methods and procedures to be applied:	This parameter must be calculated according to requirements and default values established by the IPCC (2003).
Frequency of monitoring/recording:	The frequency of monitoring of this parameter must be annual or in a shorter time frame that allows accurate detection of the affected area.
QA/QC procedures to be applied:	Determined by IPCC (2003).
Purpose of Data:	This parameter is used to calculate GHG emissions from biomass burning occurred in the project scenario.
Calculation method:	Determined by IPCC (2003).
Comments:	N/A

Data / Parameter:	$EBBN_2O_y$
Data unit:	tCO_2e/ha
Description:	N_2O emission from biomass burning at year y
Equations:	4
Source of data:	Calculated according to IPCC (2003).
Description of measurement methods and procedures to be applied:	This parameter must be calculated according to requirements and default values established by the IPCC (2003).
Frequency of monitoring/recording:	The frequency of monitoring of this parameter must be annual or in a shorter time frame that allows accurate detection of the affected area.

QA/QC procedures to be applied:	Determined by IPCC (2003).
Purpose of Data:	This parameter is used to calculate GHG emissions from biomass burning occurred in the project scenario.
Comments:	N/A

Data / Parameter:	$EBBCH_{4,y}$
Data unit:	tCO_2e/ha
Description:	CH_4 emission from biomass burning at year y
Equations:	5
Source of data:	Calculated according to IPCC (2003).
Description of measurement methods and procedures to be applied:	This parameter must be calculated according to requirements and default values established by the IPCC (2003).
Frequency of monitoring/recording:	The frequency of monitoring of this parameter must be annual or in a shorter time frame that allows accurate detection of the affected area.
QA/QC procedures to be applied:	Determined by IPCC (2003).
Purpose of Data:	This parameter is used to calculate GHG emissions from biomass burning occurred in the project scenario.
Comments:	N/A

Data / Parameter:	$EBBCO_{2,y}$
Data unit:	tCO_2e/ha
Description:	CO_2 emission from biomass burning at year y
Equations:	6

Source of data:	Calculated according to IPCC (2003).
Description of measurement methods and procedures to be applied:	This parameter must be calculated according to requirements and default values established by the IPCC (2003).
Frequency of monitoring/recording:	The frequency of monitoring of this parameter must be annual or in a shorter time frame that allows accurate detection of the affected area.
QA/QC procedures to be applied:	Determined by IPCC (2003).
Purpose of Data:	This parameter is used to calculate GHG emissions from biomass burning occurred in the project scenario.
Comments:	N/A

Data / Parameter:	Analysing the Non-Permanence Risk[39]
Data unit:	% (percentage)
Description:	Calculating the internal, external and natural risks of the project using the "AFOLU Non-Permanence Risk Tool"
Equations:	N/A
Data source:	AFOLU Non-Permanence Risk Tool
Description of measurement methods and procedures to be applied:	Performing a non-permanence risk analysis (as described under the "AFOLU Non-Permanence Risk Tool"), to determine the non-permanence risk rating ("risk rating"), which is to be used to determine the number of buffer credits.
Frequency of monitoring/recording:	Annual

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[39] In performing the Non-Permanence Risk analysis, the document "SOCIALCARBON Risk Report Calculation Tool" must be used in the project validation and verification. The Non-Permanence Risk Report must be prepared using the "SOCIALCARBON Non-Permanence Risk Report Template", which may be included as an appendix to the project description or to the monitoring report, as applicable, or provided as a stand-alone document. The most recent versions of the aforementioned documents must be used, which are available at: https://www.socialcarbon.org/documentation.

QA/QC procedures to be applied:	Determined by the "AFOLU Non-Permanence Risk Tool" itself and subsequently verified by the responsible Social Carbon Unit.
Purpose of data:	Calculating the number of buffer credits (retentions).
Calculation method:	Determined by the "AFOLU Non-Permanence Risk Tool" itself
Comments:	Project proponents must upload relevant datasets/remote imagery onto the SOCIALCARBON Registry to facilitate independent reviews of the recorded project outcomes.

9.3 Description of the Monitoring Plan

The monitoring plan comprises the quantification of CO_2 removal in the project area, for the purpose of validating the calculated removals that will give rise to carbon credits. Monitoring Report[40] shall be generated by the project developer in accordance with the monitoring plan set out in the project description.

The monitoring shall be performed in four steps, for each year:

I. classification of the vegetation cover: validation of the classification of the land use and cover for the adopted reference base will be carried out by means of an accuracy analysis of the reference base for the land use and cover, following the same procedure for accuracy analysis of the reference base described in Section 5 (Project Boundary), looking for a minimum 90% match; in the event that a figure of less than 90% is obtained, the land use and cover must be classified by means of remote sensing, using orbital imaging.

II. comparative vegetation cover analysis: any and all changes in the land use and cover that result in a regression in the conservation status indicate that the areas must be excluded from the accounting, for the purpose of issuing credits.[41]

III. quantification of the project emissions and removals (tCO$_2$e): calculation of project emissions and removals, as provided in sub-section 8.2.

IV. comparative analysis of the net GHG emissions and removals: identification of the percentage change in net GHG emissions and removals calculated in the monitoring year, compared to the previous year, according to sub-section 8.3.

At the end of the 10th year of the project, if it is not renewed, confirmation of the end of the monitoring period shall be added to the Monitoring Report (see Section 5; time horizon for generating carbon credits). The project

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[40] Refers to the "Monitoring Report" concept, set out in the most recent version of the document "SOCIALCARBON Definitions".

[41] Biomass burning may occur in the project scenario during the project period causing GHG emissions. Although there are two general types of biomass burning covered by IPCC (2003), only burning within managed lands is considered under this methodology. On the other hand, burning in the course of land use conversion is not considered under this methodology as the affected area shall be deemed ineligible if conversion to land use occurs.

proponent will only be responsible for indicating what was found and it is up to the credit certifier to compare this data with the reference amounts contained in this methodology.

Monitoring of GHG emissions from biomass burning

Project Proponents shall monitor the burning in the project area, as part of step i. (classification of the vegetation cover) described above. If biomass burning occurs during the project scenario, which does not involve land use conversion, these GHG emissions will be accounted for.

Important Observations

In general, the same source of remotely sensed data and data analysis techniques must be used within a period for which the project boundary is defined. However, if remotely sensed data have become available from new and higher resolution sources (e.g. from a different sensor system) during this period, these can only be used if the images based on interpretation of the new data overlap the images based on interpretation of the old data by at least 1 year and they cross calibrate to acceptable levels based on commonly used methods in the remote sensing community. The detailed methodological procedures used shall be documented in an Annex to the PD, such as the following information listed below:

a) Data sources and pre-processing: Type, resolution, source and acquisition date of the remotely sensed data (and other data) used; geometric, radiometric and other corrections performed, if any; spectral bands and indexes used (such as NDVI); projection and parameters used to georeference the images; error estimate of the geometric correction; software and software version used to perform pre-processing tasks; etc.

b) Data classification and post-processing: Definition of the land use and cover classes and land use and cover categories; classification approach and classification algorithms; coordinates and description of the ground-truthing data collected for training purposes; ancillary data used in the classification, if any; software and software version used to perform the classification; additional spatial data and analysis used for post-classification analysis, including class subdivisions using non-spectral criteria, if any; etc.

c) Classification accuracy analysis: Accuracy analysis used; coordinates and description of the ground-truth data collected for classification accuracy analysis; postprocessing decisions made based on the preliminary classification accuracy analysis, if any; and final classification accuracy analysis.

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