TERO.003 - CARBON STOCK IN FORESTS

VERSION 2.1

METHODOLOGY, AFOLU, CARBON STOCK

TERO CARBON AVALIAÇÕES E CERTIFICAÇÕES S.A.

IDENTIFICATION

ID	TERO.003
NAME	**Carbon Stock in Forests**
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METHODOLOGY	TERO.003 – Carbon Stock in Forests, v2.1
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AUTHOR	Hdom Engenharia e Projetos Ambientais Ltda (hdom@hdom.com.br)
STANDARD	Tero Carbon Avaliações e Certificações S.A. (contato@terocarbon.com)
SOLUTION	Nature-Based Solutions (NBS)
SECTOR	Agriculture, Forestry and Other Land Use (AFOLU)
TYPE	Carbon Stock
ASSET GENERATED	Verified Carbon Stock Unit (VCSU) - Carbon Stock Asset
PROJECT ACTIVITIES	Maintenance of protected areas
GHG MITIGATION	Carbon Flow

LIST OF ACRONYMS

AFOLU	Agriculture, Forestry and Other Land Uses
AGB	Above-Ground Biomass
BGB	Below-Ground Biomass
CS	Carbon Stock
DDW	Down Dead Wood
GHG	Greenhouse Gas
KPI	Key Performance Indicator
LRA	Legal Reserve Area
MUA	Multiple-Use Area
NBS	Nature-based Solutions
PA	Project Area
PDD	Project Design Document
PPA	Permanent Preservation Area
SOC	Soil Organic Carbon
TAC	Term of Conduct Adjustment (Termo de Ajustamento de Conduta)
VCSU	Verified Carbon Stock Unit - Carbon Stock Asset
VCU	Verified Carbon Unit - Carbon Credit Asset
VVB	Validation/Verification Body

LIST OF PROGRAMS

ID	NAME
DC.CER.001	Certification Program
DC.MET.001	Methodologies Program
DC.REG.001	Asset Program

LIST OF SUPPORTING DOCUMENTS

ID	NAME	SOLUTION
DC.COM.001	Definitions	All
DC.COM.003	Stakeholder Consultation Procedure	All
DC.GOV.001	Tero Carbon Governance Structure	All
DC.GOV.004	Grievance Management Procedure	All
DC.CER.002	Land Tenure Compliance Manual and Tero Carbon Seals for NBS Projects	NBS
FR.CER.002	Social and Environmental Safeguards Analysis Tool	All

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1. INTRODUCTION

This methodology establishes guidelines for projects aiming to certify Carbon Stock in existing forests, resulting in the issuance of Verified Carbon Stock Units (VCSUs) under the Tero Carbon Nature-Based Solutions (NBS) Program. As part of the AFOLU (Agriculture, Forestry, and Other Land Use) sector, this methodology defines the technical criteria for the quantification and verification of carbon stored in forest areas on a specific date.

It is crucial to emphasize that the VCSUs generated under this methodology represent the carbon stored in forest biomass at a given moment and are **NOT carbon credits (VCUs), nor are they intended for offsetting Greenhouse Gas (GHG) emissions**. VCSU certification aims to recognize and value the environmental asset represented by the forest carbon stock. Any new stock certification for the same area on a future date will require a new quantification and a new verification process.

The objective of this methodology is to guide the development of projects eligible for VCSU generation, providing a robust framework for valuing forest carbon and contributing to the recognition of the importance of forests.

This methodology is the intellectual property of Hdom Engenharia e Projetos Ambientais Ltda and was developed and registered under the Tero Carbon “Methodologies Program (DC.MET.001)”. It **MUST** be used in conjunction with the Tero Programs (“Certification Program (DC.CER.001)”, “Methodologies Program (DC.MET.001)”, “Asset Program (DC.REG.001)”) and their complementary documents (Tools, Policies, Manuals, Procedures, and Templates), which provide mandatory requirements for aspects such as land tenure compliance, application of social and environmental safeguards, stakeholder consultation, and the specific validation and verification processes for VCSUs. This document also operates under the principles of the “Tero Carbon Governance Structure (DC.GOV.001)”.

2. SCOPE, ACCEPTANCE CRITERIA, AND ACTIVITIES

2.1. Scope

This methodology aims to guide AFOLU sector projects that ensure the maintenance of carbon stock in forests located in legally protected areas, such as Permanent Preservation Areas (PPAs) and Legal Reserve Areas (LRAs).

2.2. Acceptance Criteria

This methodology applies to projects that meet the following acceptance criteria:

i. **Land Tenure Compliance:** The project must be implemented on rural properties with proven land tenure regularity, as per the “Land Tenure Compliance Manual and Tero Carbon Seals for NBS Projects” (DC.CER.002), which may be under private or public ownership.
ii. **Territorial Configuration:** The project area must be clearly delineated and can be contiguous or composed of multiple parcels.
iii. **Project Area Location:** The Project Area (PA) must consist of existing forests, which may include Permanent Preservation Areas (PPAs) and Legal Reserve Areas (LRAs). The existence of the forest may be due to legal obligations (e.g., TACs, environmental liabilities).
iv. **Clear Identification of Key Roles:** The project must explicitly identify the main responsible parties (Lead Proponent, Developer, Generator, Implementer), as per the requirements of the "Certification Program (DC.CER.001)”.
v. **Compliance with Social and Environmental Safeguards:** The project must comply with the social and environmental safeguards established by the “Social and Environmental Safeguards Analysis Tool (FR.CER.002)”, applicable to the maintenance of the area and verification activities.

2.3. Activities

This methodology provides for the certification of carbon stock through the maintenance and protection of existing forests in eligible areas, including those under legal protection regimes such as Permanent Preservation Areas (PPAs) and Legal Reserve Areas (LRAs). The main activity is the quantification and verification of carbon stored in the forest biomass on a specific date.

3. BASELINE

3.1. Selection of Project Activity Implementation Areas

The area for the implementation of project activities, the Project Area (PA), must be geographically identified (**Figure 1**), along with the main geographical polygons of the rural property: Hydrography, Property Boundary (PB), Permanent Preservation Area (PPA); Multiple-Use Area (MUA), and Legal Reserve Area (LRA).

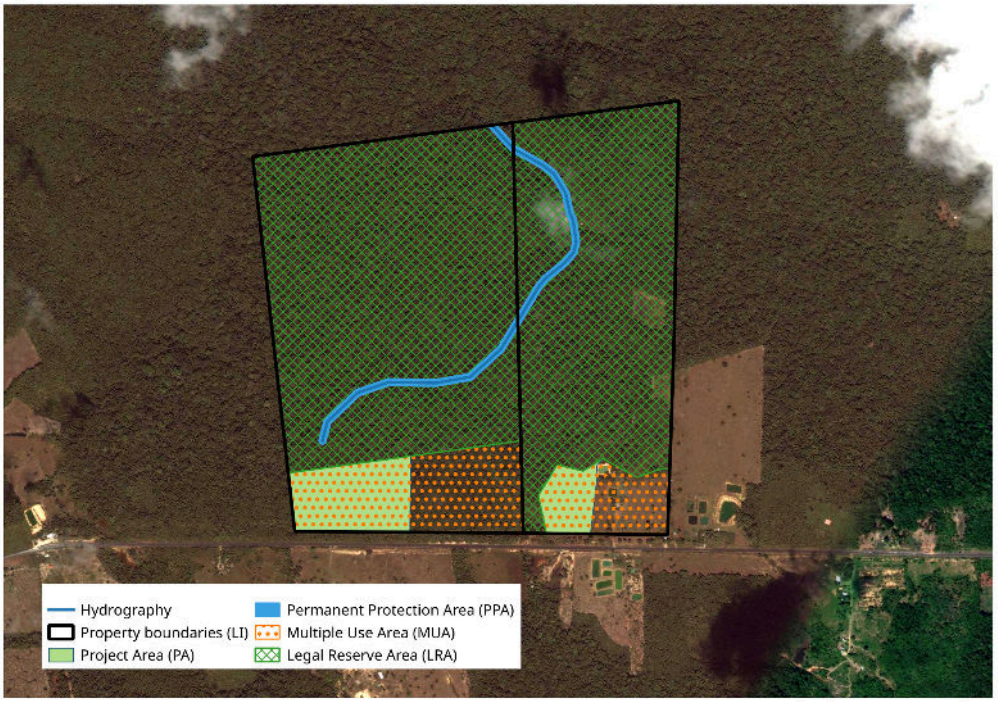

Figure 1. Map identifying the main geographical polygons of the project: Hydrography, Property Boundary (PB), Project Area (PA), Permanent Preservation Area (PPA); Multiple-Use Area (MUA), and Legal Reserve Area (LRA).

3.2. Selection of Carbon Pools Used in Carbon Stock Accounting

The project must indicate which carbon pools were used in the carbon stock accounting. **Table 1** presents the types of pools accepted by this methodology.

Table 1. Types of carbon pools accepted by the methodology.

POOL	ACRONYM	MANDATORY
Above-Ground Biomass	AGB	Yes
Below-Ground Biomass	BGB	Yes
Litter	Litter	No
Down Dead Wood	DDW	Optional
Soil Organic Carbon	SOC	Optional

The greenhouse gases (GHG) considered in the quantification of the carbon stock are detailed in **Table 2**.

Table 2. Greenhouse Gases (GHG) considered in the carbon stock quantification.

GAS	USED	JUSTIFICATION
CO_2	Yes	The carbon stored in biomass is quantified and reported in tonnes of carbon dioxide equivalent (tCO_2e) using the molecular mass ratio (44/12), which is the standard practice to represent the GHG potential of the stored carbon if it were released into the atmosphere.
CH_4	No	Excluded from the stock quantification. These gases are primarily associated with emission fluxes from decomposition or combustion, and are not direct components of the carbon stored in living or dead biomass at a given time.
N_2O		

3.3. Baseline Selection and Additionality Demonstration

This methodology does **NOT** require the development of a baseline or a demonstration of additionality, as it does not provide for the generation of carbon credits. The certification is limited to the quantification and verification of the carbon stock existing on the assessment date, without the need to compare scenarios or justify additional benefits relative to a reference scenario.

3.4. Leakage

This methodology does **NOT** require the estimation of leakage, as it does not provide for the generation of carbon credits. The certification is based exclusively on the quantification and verification of the carbon stock existing on the assessment date, without the need to assess potential emission displacements to other areas.

3.5. Quantification of Carbon Stock in the Project Area

The quantification of the carbon stock (CS) in the forest biomass of the Project Area (PA) on a specific reference date is the core of this methodology. The result **MUST** be presented with a known confidence interval (CI), ensuring the precision and methodological robustness of the calculation.

This methodology **requires** the use of the "Technical Guidelines for Carbon Quantification in AFOLU Projects (DC.CER.003)" as the primary technical reference for forest inventory procedures, sampling, tree measurement, use of allometric equations, and calculation of biomass and carbon.

The Project Developer **HAS** the freedom to propose methodological adaptations specific to the site or forest type, or the use of more precise local/regional allometric equations, provided that they:

a. Are technically and scientifically valid and robust;
b. Are transparently documented and justified in the Project Design Document (PDD);
c. Demonstrate equivalence or superiority in precision and conservatism compared to the standard methods of the Tero Methodological Base; and
d. Are approved by the Tero Carbon technical team during internal validation and by the VVB during stock verification.

The certified carbon stock (`CS_VCSU`) will be the value verified by the VVB on the reference date.

3.5.1. Carbon Stock Calculation

The calculation of the total carbon stock (`CS_total`) in the Project Area (PA) is the sum of the carbon stocks in all selected and measured pools, according to equation (1):

$$CS_{total} = CS_{AGB} + CS_{BGB} + CS_{DDW} \quad (1)$$

Where:

`CS_total`	=	Total carbon stock in the Project Area on the reference date (tCO_2e).
`CS_AGB`	=	Carbon stock in above-ground biomass (tCO_2e).
`CS_BGB`	=	Carbon stock in below-ground biomass (tCO_2e).
`CS_DDW`	=	Carbon stock in dead wood (if included) (tCO_2e).

Each of these components must be calculated following the guidelines of DC.CER.003.

To ensure the principle of conservatism, the carbon stock certified for VCSU issuance (`CS_VCSU`) must correspond to the lower bound of the confidence interval of the total stock estimate. The methodology must specify the confidence level (e.g., 90%). The calculation is performed according to equation (2):

$$CS_{VCSU} = CS_{total} - IC_{CS\ total} \quad (2)$$

Where:

`CS_VCSU`	=	Carbon stock certified for the issuance of VCSUs (tCO_2e), rounded to the nearest integer.
`CS_total`	=	Estimated total carbon stock, as per Equation 1 (tCO_2e).
`IC_CS_total`	=	Confidence interval margin (e.g., half the width of the 90% CI) associated with the total stock estimate, obtained by propagating the uncertainties of each pool (tCO_2e).

The value of CS_VCSU verified by the VVB on the reference date will be the quantity of VCSUs to be issued.

3.6. Non-Permanence Risk and Buffer Pool Calculation

This methodology does **NOT** require the estimation of non-permanence risk or the application of a buffer pool, in the terms applied to VCU projects, as it does not provide for the generation of carbon credits for offsetting. The certification is limited to the quantification and verification of the carbon stock existing on the assessment date.

3.7. Definition of Project Scale

The Tero Carbon “Project Scale Analysis Tool (FR.CER.001)”, which is based on the annual generation of VCUs, does **NOT** apply directly to this VCSU methodology. For VCSU projects, the scale is determined by the project area (in hectares) and the volume of the certified carbon stock, without a formal classification into "Small" or "Large Scale" for the purpose of differentiating procedural requirements as occurs with VCUs. All VCSU projects follow the same validation and verification pathway defined in the “Certification Program (DC.CER.001)”.

4.MONITORING PROCEDURE FOR VCSU INTEGRITY

Although this methodology certifies the carbon stock on a specific date and does not generate carbon credits based on stock changes over time (VCUs), a

minimum level of monitoring is necessary to ensure the integrity of the Project Area and the maintenance of the conditions that support the VCSU certification, especially between the documentary validation and the field verification of the stock, and to inform potential future stock re-certifications.

4.1. Simplified Monitoring Plan

The Project Developer **MUST** include in the Project Design Document (PDD) a Simplified Monitoring Plan, focused on:

1. **Project Area Integrity:**
    - Monitoring of forest cover by remote sensing to detect significant unauthorized deforestation or degradation events in the PA.
    - Surveillance against fires, invasions, or other direct threats to the physical integrity of the forest.
2. **Social and Environmental Safeguards:**
    - Monitoring the application of relevant social and environmental safeguards, as per the "Social and Environmental Safeguards Analysis Tool (FR.CER.002)", especially those related to the rights of local communities and the protection of biodiversity in the PA.
3. **Stakeholder Engagement:**
    - Monitoramento da aplicação das salvaguardas socioambientais relevantes, conforme a "Ferramenta de Análise das Salvaguardas Socioambientais (FR.CER.002)", especialmente aquelas relacionadas aos direitos das comunidades locais e à proteção da biodiversidade na AP.
4. **Engajamento com Stakeholders:**
    - Maintenance of basic communication channels with local stakeholders, as per the "Stakeholder Consultation Procedure (DC.COM.003)".

This plan must describe the monitoring activities, the frequency (which can be less intensive than for VCUs), and the responsible parties.

4.2. Purpose of Monitoring for VCSU

The objective of this monitoring is to:

a. Provide Tero Carbon and the VVB, during the stock verification process, with information confirming that the Project Area has remained substantially intact since the documentary validation.
b. Identify any events that may have significantly compromised the carbon stock before the verification reference date.
c. Maintain compliance with the safeguards and land tenure requirements of the Tero Program.
d. Facilitate future requests for stock re-certification by providing a history of the area.

4.3. Stock Verification and Re-certification

The certified VCSU refers to the stock on the specific date of the field verification conducted by the VVB.

- **First Certification:** The verification confirms the initial stock proposed in the PDD.
- **Re-certification:** If the Developer wishes to obtain a new VCSU for the same area at a later date, a new complete process of stock quantification and VVB verification will be necessary. The monitoring history of the area's integrity can be useful in this process. There is no fixed period between verifications for VCSU; it depends on the proponent's needs.

4.4. Report for Stock Verification (VCSU)

For the verification of the carbon stock by a VVB, the Developer must prepare a Stock Quantification Report, which will include:

a. A description of the Project Area.
b. The inventory methodology used (as per Section 3.5 and the "Technical Guidelines for Carbon Quantification in AFOLU Projects (DC.CER.003)").
c. The raw inventory data (or access to it).
d. The detailed calculations of the carbon stock and its confidence interval.
e. A summary of the area integrity monitoring activities (as per Section 4.1) carried out since the documentary validation (for the first verification) or since the last verification (for re-certifications).
f. Updated information on land tenure compliance and safeguards.

This documentation will be assessed by the VVB during the field verification of the stock.

5. REVIEW OF THIS METHODOLOGY

This methodology (**TERO.003 – Carbon Stock in Forests**) will be periodically reviewed by Tero Carbon in collaboration with the methodology author (Hdom Engenharia e Projetos Ambientais Ltda) or at the initiative of Tero Carbon, according to the procedures established in the "Methodologies Program (DC.MET.001)". Reviews may occur at least every **5 years**, or sooner if necessary, to:

a. Incorporate relevant scientific and technical advances for the quantification of carbon stocks in forests, including new approaches for inventory, use of remote sensing for biomass estimation, or best sampling practices.
b. Reflect significant changes in relevant national or international policies and regulations for the certification of environmental stocks.
c. Incorporate consistent and constructive feedback from Project Developers, VVBs, experts, and other stakeholders, obtained through Tero Carbon's formal channels.
d. Correct any inconsistencies, ambiguities, or errors identified that could compromise the clarity, applicability, or integrity of the certified VCSUs.
e. Ensure continuous alignment with the latest versions of the Tero Programs and their complementary documents.

Substantial revisions will follow the full process of the "Methodologies Program (DC.MET.001)". Minor revisions may have a simplified process. Tero Carbon reserves the right to suspend or deactivate this methodology as detailed in the "Methodologies Program (DC.MET.001)".

VERSION HISTORY

VERSION	DATE	NOTES
2.1	06/16/2025	Full alignment with Tero Programs v2.1. Reinforcement of the nature of the VCSU (stock on a specific date, not for offsetting). Integration with Tero Program documents for Land Tenure Compliance, Safeguards, and Methodological Base for Stocks. Reformulation of the Monitoring section to focus on area integrity and support for stock verification. Clarification on the inapplicability of additionality, leakage, and VCU permanence mechanisms.
2.0	04/02/2025	Version with substantial updates to the methodology structure, including the removal of the possibility of generating carbon credits from the increment of stock in the project area.
1.0	12/18/2023	Initial version approved by the Directorate and launched for public consultation.