CERCARBONO
Certified Carbon Standard

REDD+ Methodology

For the Implementation of REDD+ Projects Consistent with National Reference Levels

METHODOLOGY M/UT-REDD+

For the Implementation of
REDD+ Projects Consistent with
National Reference Levels

Version
1.2.1

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Acronyms and abbreviations

CCMP	Climate Change Mitigation Programme or Project
CDM	Clean Development Mechanism
CO_2e	Carbon dioxide equivalent
COP	Conference of the Parties
CSE	Carbon stocks enhancement
EROS	Earth Resources Observation and Science
FCPF	Forest Carbon Partnership Facility
FREL	Forest Reference Emission Leve
FRL	Forest Reference Leve
GHG	Greenhouse Gases
GPG	Good Practice Guidance
IPCC	Intergovernmental Panel on Climate Change
MRV	Measurement/Monitoring, Reporting, and Verification System
NSS	National Safeguards System
PCA	Principal Components Analysis
PDD	Project Description Document
PES	Payment for Environmental Services
REM	REDD Early Movers
SDGs	Sustainable Development Goals
SFM	Sustainable Forest Management
SOC	Soil Organic Carbon
UNFCCC	United Nations Framework Convention on Climate Change

Terms and definitions

The following are the terms relevant to this methodology. For their definition, please refer to the ***Terms and Definitions of the Voluntary Certification Programme of Cercarbono***, available at www.cercarbono.com, section: Documentation.

- above ground biomass
- accreditation period
- activity data
- additionality
- agricultural activity
- avoidance of greenhouse gas emissions
- baseline scenario
- below ground biomass
- biomass
- bush
- carbon buffer
- carbon credit
- carbon dioxide equivalent
- carbon offset
- carbon stock
- Carboncer
- CCMP area
- CCMP developer
- CCMP duration
- CCMP holder
- CCMP start date
- certification
- climate change mitigation
- climate change mitigation action
- climate change mitigation programme
- climate change mitigation project
- co-benefit
- dead wood
- deforestation
- direct emission
- eligibility
- emission factor
- *ex-ante* evaluation
- *ex-post* evaluation
- forest
- forest activity
- forest degradation
- Forest Emissions Reference Level
- forest plantation
- forest suitability area
- governance
- greenhouse gas
- greenhouse gas emissions
- greenhouse gas emissions source
- greenhouse gas removal
- greenhouse gas storage
- grouped project
- historical reference period
- holdership
- indirect emission
- instance
- inventory
- land use
- leakage
- leakage management area
- litter
- mangrove
- methodological reconstruction
- methodology
- monitoring
- national circumstances
- natural forest regeneration
- non-forest
- non-permanence
- overlap
- overlap between a REDD+ project and a NREF
- plot (measurement)
- potential leakage area
- potentially significant emission
- principle
- project cycle
- Project Description Document
- project scenario
- projection period
- REDD+ activity
- Reduction of Emissions from Deforestation and Forest Degradation and other actions in this sector (REDD+)
- reduction of greenhouse gas emissions
- reference area
- removal factor
- restoration
- reversal
- segment

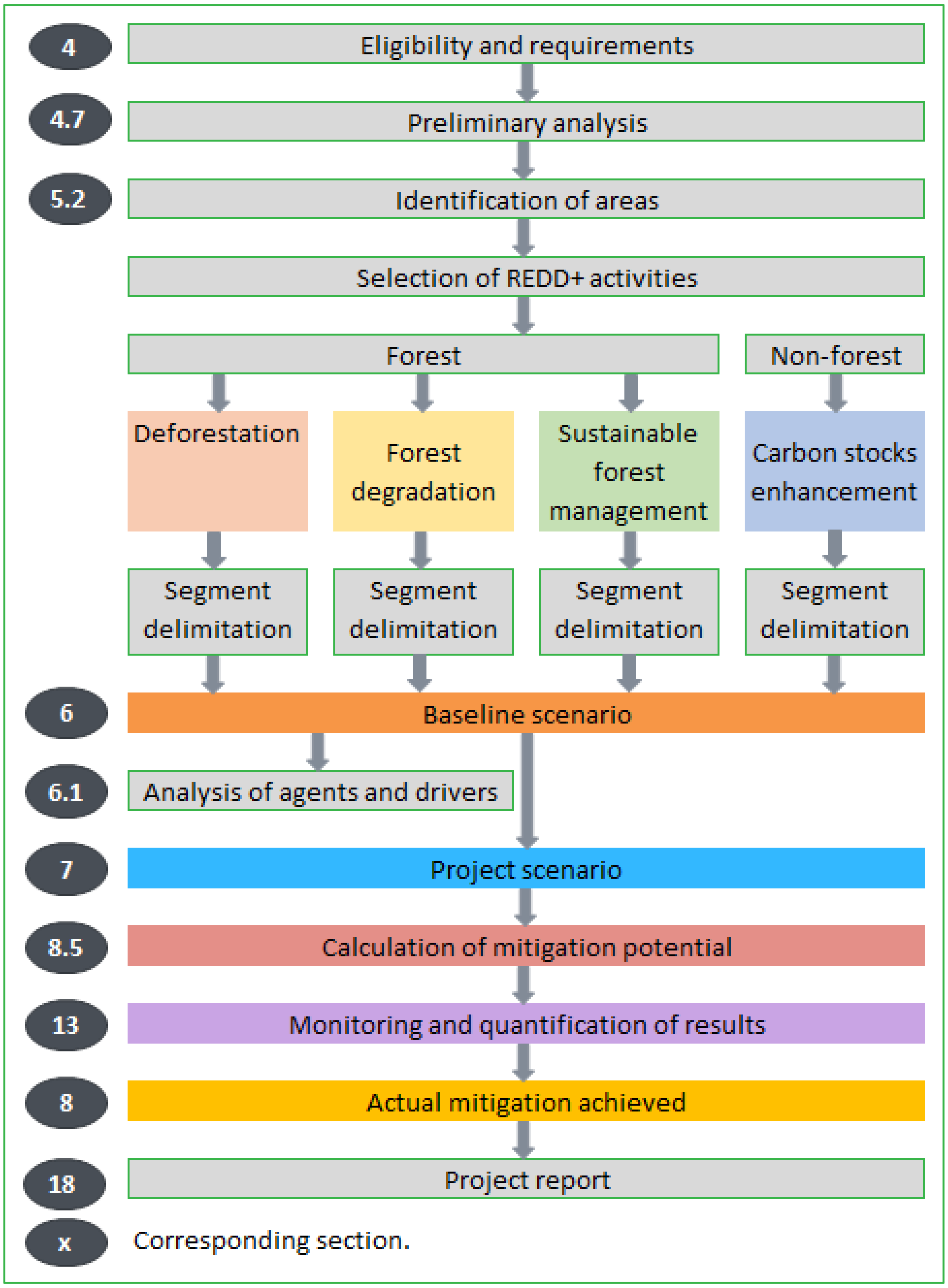
- silvopastoral system
- soil organic carbon
- stratum
- sustainable development
- sustainable forest management
- timber product
- traditional knowledge
- tree
- uncertainty
- validation
- verification
- verifier
- voluntary carbon market

Summary

This methodology has been developed considering official sources and international standards. It provides the necessary elements for the design and implementation of Climate Change Mitigation Programmes or Projects (CCMP) focused on the removal of Greenhouse Gases (GHG) through the establishment of restoration processes or on the reduction of GHG emissions from deforestation, forest degradation and other actions in this sector, which are eligible for payments for results or similar compensations due to the integration of climate change mitigation actions (***Figure 1***).

The methodology allows demonstrating mitigation results by reducing deforestation and forest degradation, under two perspectives (avoidance of forest fragmentation or extraction of timber products), as well as GHG removals achieved by the establishment of areas under restoration processes. For which the CCMP must be developed within the framework of the eight principles explained here (***Section 3***) as well as those set out in the Cercarbono's Protocol, while complying with the eligibility conditions set out (***Section 4***). The methodology presents the guidelines for generating the baseline scenario (***Section 6***) and the project scenario (***Section 7***), including the GHG emission sources and carbon pools in each of these scenarios. It also provides the necessary means to estimate total GHG removals or total GHG emission reductions (***Section 8***) from project activities that avoid conversion from forest to other land use and establishes their respective monitoring consistent with the national (or interim sub-national) scale where the CCMP is developed (***Section 13***).

Figure 1. Sequential steps in the applicability of the REDD+ methodology. Some sections are omitted for general ease of understanding.



Preface

Cercarbono, as a voluntary carbon certification standard, has supported and financed the elaboration of this methodology, developed by an external consultancy firm and its internal technical team endorsed by its board of directors and CEO.

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This document has been updated to consider its applicability in different countries reporting their FRELs/FRLs to the UNFCCC and new elements of the voluntary Cercarbono's certification scheme.

Version 1.0 of this methodology was made available for consideration by society at large through a public consultation on the Cercarbono's website and through invitations to individuals and public and private organisations. The following is a list of the entities that participated in the public consultation, to whom we are very grateful for their valuable contribution:

ALLCOT
AMERICANA DE CURTIDOS LTDA Y CIA SCA
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ONUDI
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REDD-MONITOR
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[1] Consulting firm contracted under the contract established between Icontec and Cercarbono.

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CHEVRON PETROLEUM COMPANY
CLIMATE FOCUS
CLIMATE MARKETS & INVESTMENT ASSOCIATION
CLIMATECARE
CO2CERO SAS
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INVERSIONES EL PARAÍSO PARQUE CEMENTERIO SA
MC ECOCARBONO SAS
MEDIAMOS F&M SAS
MINISTERIO DE AMBIENTE Y RECURSOS NATURALES (COL)
NEBIOT
SHELL
SOUTH POLE
PROFESIONAL THE NATURE CONSERVANCY
VERRA
WILDLIFE WORKS COLOMBIA
WINROCK
YAUTO

1 Introduction

Given the problems posed by climate change caused by human activities, different efforts are currently being made to mitigate its effects. In this sense, States, private companies, and civil society are actively participating in mitigation actions to contribute to its solution, for which the role of forests in biodiversity conservation, climate change mitigation and especially in the improvement of livelihoods, including urban ones, is increasingly recognised. In fact, we are in a dynamic period of discussion on economic development alternatives that do not involve deforestation and on how to protect forests in the face of increased climate variability, which is having a significant negative impact, an issue that positions forestry mitigation projects, with contributions to adaptation, not only as carbon providers, but also as drivers of local development.

Forests cover more than 30 % of the world's land area, but their distribution is not uniform, with 45 % of them located in the tropics, followed by the boreal, temperate, and subtropical zones (FAO and UNEP, 2020). Forests are home to most of the planet's terrestrial biodiversity and their management generates multiple benefits including their contribution to economic growth, poverty reduction and improved local governance.

Beyond this importance, forests can also contribute to climate change mitigation, to the extent that GHG emissions due to possible deforestation or forest degradation are reduced or GHG are removed through conservation, sustainable management, and the enhancement of forest carbon stocks. These activities fall under the REDD+ strategy (Reducing GHG emissions from deforestation, forest degradation, and other forest activities).

REDD+ is framed within climate change strategies, in which community, business and civil society-driven project interventions can and should play an important role in leveraging finance towards site-specific mitigation, while supporting and aligning with established country efforts to halt deforestation.

For project-level contributions under the REDD+ mechanism to be real and effective, they need to be quantified and verified in a rigorous and transparent manner, and properly aligned with proposed country-level strategies.

The Cancun Agreements, reached by the United Nations Framework Convention on Climate Change (UNFCCC)[2], defined the following REDD+ activities: a) reducing GHG emissions from deforestation, b) reducing GHG emissions from forest degradation, c) conservation of forest carbon stocks, d) sustainable management of forests, and e) enhancement of forest carbon stocks, which contribute to reducing GHG emissions and removing GHG from the atmosphere.

[2] https://unfccc.int/sites/default/files/resource/docs/2010/cop16/eng/07a01.pdf.

In this line and to create an enabling environment for mitigation, States have allocated funding through international cooperation agreements and green taxes with a central participation of private actors in the formulation of projects. In this sense, Cercarbono, under its voluntary certification programme, with the aim of facilitating access to communities, companies, and individuals to contribute to the removal of GHG or reduction of GHG emissions with REDD+ actions and to generate carbon credits -Carboncer- with quality criteria, has developed this methodology considering the following characteristics:

- The official MRV (Measurement/Monitoring, Reporting and Verification) systems in each country, which increasingly require consistency between project level and UNFCCC reporting, thus delimiting the scope of this methodology.
- It is based on academic and regulatory sources (State and voluntary), expert knowledge, academic literature, UNFCCC decisions, methods of voluntary certification programmes, and methods that support agreements between countries and rules at country level. By refining these references, this methodology proposes the combination of three elements from public, private and international institutions: (i) the family of *ISO 14064* Standards, (ii) the technical references in the regulated and voluntary standards, and (iii) the regulatory framework of the country where the project is developed, responding to the accounting criteria formulated in the existing MRV systems, always guaranteeing environmental integrity, additionality and promoting direct benefits to the implementers of mitigation in the territory.
- It follows UNFCCC REDD+ guidelines and includes mechanisms for managing risks due to leakage and non-permanence. It also includes mechanisms for managing uncertainty in the quantification of baseline and project scenarios and mitigation outcomes.
- It is verifiable according to *ISO 14064-2:2019* Standard and in articulation with the Cercarbono's Protocol for Voluntary Carbon Certification. This methodology details technical requirements for the determination of the baseline scenario, project scenario, quantification, reporting, and monitoring of GHG removals and GHG emission reductions from REDD+ projects.

2 Purpose and scope of the methodology

This methodology is specific and applicable to the Cercarbono certification programme. It establishes principles, requirements and provides project-level guidance for GHG Removal or Reducing GHG Emissions from Deforestation, Forest Degradation, and other actions in this sector (REDD+), for the quantification, monitoring, and reporting of activities aimed at producing GHG emission reductions or enhancements of GHG[3] removals.

The methodology includes recommendations for the design of a REDD+ focused programme or project, the identification and selection of the baseline scenario and the relevant GHG emission sources and carbon pools for the project, as well as for quantification, monitoring, and documentation.

This methodology is characterised by the following elements:

- It sets out the steps for the construction of the baseline scenario in a CCMP, consistent with the Forest Reference Emission Levels (FRELs)[4] or Forest Reference Levels (FRLs) reviewed by the expert group under the UNFCCC according to decisions of the Conference of the Parties (COP): 4/CP.15, 1/CP.16, 2-12/CP.17, 29/CP.18, 9/CP.19, 13/CP.19 and 13-Annex/CP.19.
- It sets out recommendations based on the principles of completeness, reliability, conservatism, consistency, evidence, accuracy, and transparency for the design and implementation of the CCMP and includes recommendations on the operation of social and environmental safeguards. The principles for a CCMP to be verifiable are operational and described in detail.
- It is intended for use by REDD+ project holders who want their accounting to be consistent with the FRELs/FRLs submitted to the UNFCCC.
- It is complementary to ***Cercarbono's Tool to Estimate Carbon Buffer in Initiatives to Mitigate Climate Change in the Land Use Sector***, available at www.cercarbono.com, section: Documentation.

This methodology does not specifically address the CCMP's Carboncer emission certification and carbon credit registry process, this process is described in the ***Cercarbono's Protocol for Voluntary Carbon Certification***, available at www.cercarbono.com, section: Documentation.

[3] This methodology indicates the possibility of a concept similar to "nesting" through the tools of methodological reconstruction, area exclusion, socio-enforcer and the requirement for consistency. Furthermore, it operationalises the concept of consistency and recommends steps for methodological reconstruction, in line with the established MRV system standards available in different countries. The term "nesting" is not used because it is a term coined by other standards, with specific rules in them.

[4] The type of approach a country chooses on the construction of FRELs and FRLs will depend on the analysis of the drivers of deforestation and forest degradation, as well as their national circumstances and respective capacities.

2.1 Scope

This methodology can be applied by any natural or legal person, public or private, that intends to establish a CCMP that includes REDD+ activities, to qualify for payments for results or similar compensations as well as to contribute to international mitigation in the framework of voluntary projects, because of actions that generate GHG emission reductions or GHG removals.

This methodology is applicable for CCMPs located in countries that have submitted subnational[5] or national FRELs or FRLs to the UNFCCC[6], which should be consistent with the GHG emissions and removals, or conservation of forest carbon pools presented in each country's GHG inventories, as well as the pools, GHG emission sources and REDD+ activities considered in the FRELs/FRLs and in the measures and actions that each country has proposed in its Nationally Determined Contributions (NDCs).

GHG emission reduction or GHG removal results from REDD+ activities that a CCMP considers should be consistent with the national scale and may contribute to their accounting (in NDC reporting of the country's mitigation results) to climate change mitigation. GHG emission reduction or GHG removal outcomes from additional REDD+ activities (as well as pools and sources of GHG emissions not included in the FRELs/FRLs) to those established in a national context, even if not accounted for at that scale, may be mitigation outcomes in the scope of this methodology.

The CCMP shall make an annual disaggregation of the mitigation outcomes derived by each REDD+ activity and specify which may or may not be part of the national accounting. This disaggregation shall be supported in the certification report, recorded in the registry platform, and considered by Cercarbono for the determination and tracking of the final use of credits.

This methodology is applicable when a project is or is not in an overlapping situation with a FREL/FRL. In the overlap scenario it allows for consistent monitoring between the CCMP baseline scenario, the project scenario, and the FREL/FRL.

This methodology is consistent with *ISO 14064-2:2019* Standard, the UN-REDD Programme (2015) and is articulated with the Cercarbono's Protocol.

The REDD+ activities covered by this methodology are:

a) **Reduction of GHG emissions due to deforestation** corresponds to the avoidance of GHG emissions that would have been caused by deforestation and is given because of the sum

[5] As an interim measure but expected to transition over time to national FRELs/FRLs.

[6] The UNFCCC requested countries to develop the following four elements for undertaking REDD+ activities in a way that fits with their national processes and priorities: 1) National strategy or action plan (1/CP.16 15/CP.19); 2) National forest monitoring system (4/CP.15 1/CP.16 11/CP.19); 3) Safeguards information system (12/CP.17 1/CP.16 12/CP.19); and 4) FREL or FRL (4/CP.15 1/CP.16 12/CP.17 13/CP.19).

of the differences of the gross annual emissions due to deforestation during the result period with respect to the baseline scenario.

b) **Reduction of GHG emissions from forest degradation due to fragmentation** corresponds to the avoidance of GHG emissions that would have been caused by forest degradation and is given as the sum of the differences in gross annual emissions due to forest degradation during the result period with respect to the baseline scenario.

c) **Forest carbon stocks enhancement (CSE)** corresponds to the implementation of restoration processes in non-forest areas (but suitable for forest establishment), and results from the increase of carbon content in pools during the results period.

d) **Sustainable Forest Management (SFM)** is included in the processes of reducing forest degradation, it corresponds to the implementation of activities for managing the extraction of timber products in forest areas. It is the result of maintaining the carbon content in pools during the results period with respect to the baseline scenario by optimising the processes of harvesting, extraction, transport, and transformation of timber forest products.

Accordingly, CCMPs may be formulated considering the choice of activities to be monitored, as shown in the table below:

Table 1. REDD+ activities[7] eligible for inclusion by the CCMP developer.

REDD+ Activity	Included	Explanation
Deforestation	Optional	Deforestation will be estimated in the projection period in the following cases: 1) In the absence of project activities (baseline scenario), based on the historical trend projection calculated over the historical period. 2) In the presence of project activities (project scenario) compared to projections.
Forest degradation (Fragmentation, fire, fuelwood extraction, fuelwood, and charcoal production, grazing or establishment of agricultural activities)	Optional	Its selection will depend on how significant the decrease in carbon content in an area of forest that is maintained as forest and the technical or managerial capacity of the project to address it. If included, forest degradation will be estimated over the projection period in the following cases: 1) In the absence of project activities (baseline scenario), based on the projection of the historical trend calculated over the historical period or based on the carbon emission per cubic metre of wood removed.

[7] This methodology covers four of the REDD+ activity types, in line with the international context, but in order with the national FREL/FRL, and creates a segment accounting system (detailed below), which avoids accounting overlaps between the different REDD+ activities. In that sense, it ensures national consistency and integrates the other internationally supported REDD+ actions.

REDD+ Activity	Included	Explanation
		2) In the presence of project activities (project scenario), compared to projections or based on carbon emission per cubic metre of wood removed. **Note:** Areas estimated to undergo forest degradation should not overlap with areas estimated to be deforested, nor areas estimated to undergo increases in carbon content.
Forest Carbon Stocks Enhancement (CSE)	Optional	It must be ensured that it is implemented in areas of stable non-forest (during the historical period) and in an area suitable for forest use. Its choice will depend on the operational, technical, and administrative capacity of the project to address it. Carbon buffer increases will be estimated for the results period.
Sustainable Forest Management (SFM) (Addresses the extraction of timber products, their wastes, or associated impacts)	Optional	This activity takes place in a forest area that is maintained as such during the historical period of the project and that shows a decrease in its carbon content. Its choice will depend on the technical or administrative capacity of the project to address it.
Conservation of forest carbon stocks	No	This REDD+ activity is not covered.

3 Principles and their operability at CCMP level

The principles set out the basis for the justifications and explanations required in this document and the CCMP should refer to the relevant principles and how they have been applied according to the Cercarbono's Protocol and the guidelines of the *ISO 14064-2:2019* Standard. The principles listed here aim for a fair representation and credible accounting of the carbon credits achieved by CCMPs.

Accuracy

Measurements at the CCMPs agree with or reasonably close to the actual values.

Coherence

The results of GHG emission inventories in both the baseline and project scenarios must be comparable over time. Any changes in data, scope, calculation methods or other factors that are relevant to the time series need to be clearly documented.

The calculations performed by the CCMP must be reproducible and technically validated, so that they can generate consistently well-supported results.

Comparability

The results obtained by the CCMP activity should be comparable against the use of methodologies, guidelines, and protocols, among others, so that the estimation and calculation of GHG emissions and removals and GHG emission reductions achieved by the CCMP can be independently assessed and comparable.

Completeness

All significant GHG emission sources generated by the CCMP shall be included, as appropriate to the type of programme or project. Sources that do not exceed 5 % of the total emissions generated by the CCMP over its results accounting period are considered non-significant. It shall also include all relevant information to support decision-making and the results expected or achieved by the CCMP, as well as the procedures to achieve these results.

Conservatism

Conservative assumptions, values and procedures should be used to ensure that CCMP GHG emissions are not underestimated and that CCMP GHG removals and GHG emission reductions are not overestimated.

The data, assumptions and procedures used for the calculation of GHG emissions and removals and GHG emission reductions should be technically correct, consistent, and reproducible. On the feasibility of using two values of the same parameter at the same scale, the most conservative one should be used.

Consistency

The assumptions, values and procedures used by the CCMP for the calculation of GHG emissions and removals and GHG emission reductions must be technically sound, consistent, comparable, and reproducible.

For REDD+ activities, consistency is reported and verified at two levels: internal and exogenous. Internal consistency corresponds to Principle 4.4 of *ISO 14064-2:2019* Standard, where it requires that the information presented in the monitoring is measured with the same methods and that monitoring of the years covered in the historical and projection period is encouraged. If for some reason a year cannot be monitored, it is recommended to follow the splicing methods in Volume 1, Chapter 5.3 of the IPCC GPG (2006):

Overlapping: when there is information from another reference measurement that has a homologous (dynamic) behaviour to the missing information in each period, the data from another method can be used to estimate the missing data, considering the comparison in the periods where information from the two methods is available.

Subrogation: when some variable with information available for the missing data period has a significant correlation and allows estimating the missing data.

Interpolation or extrapolation: when a trend is assumed in the missing period and its value is estimated according to the available data for the same variable.

Similarly, internal consistency is applicable to the extent that the following requirements are met:

- The total area of the CCMP must be the same in all years of the historical period.
- If for some reason the CCMP area changes in the implementation, a recalculation for the whole data series must be performed and the CCMP information updated.
- The sum of all land use categories (forest/non-forest areas) in the project must equal the total area, over the entire historical period and in the period where results are estimated.
- There must be a mass balance between GHG emission sources and carbon pools and reported emissions in all years of the historical and projection period.
- The methods implemented for the estimation of an emission factor and activity data correspond to the methods for the other years of the historical period and the projection period.

Exogenous consistency corresponds to the comparability of different levels of measurement (International - National - Local) of factors, assumptions, and methods.

In cases of overlaps between a FREL/FRL submitted to the UNFCCC and a CCMP, the baseline scenario should make a methodological reconstruction of the project area (according to the principles of this methodology), based on the methods proposed in the FREL/FRL, but representative for the project area.

The overlap between a CCMP and a national or sub-national FREL/FRL for payment by results shall be identified by the following steps:

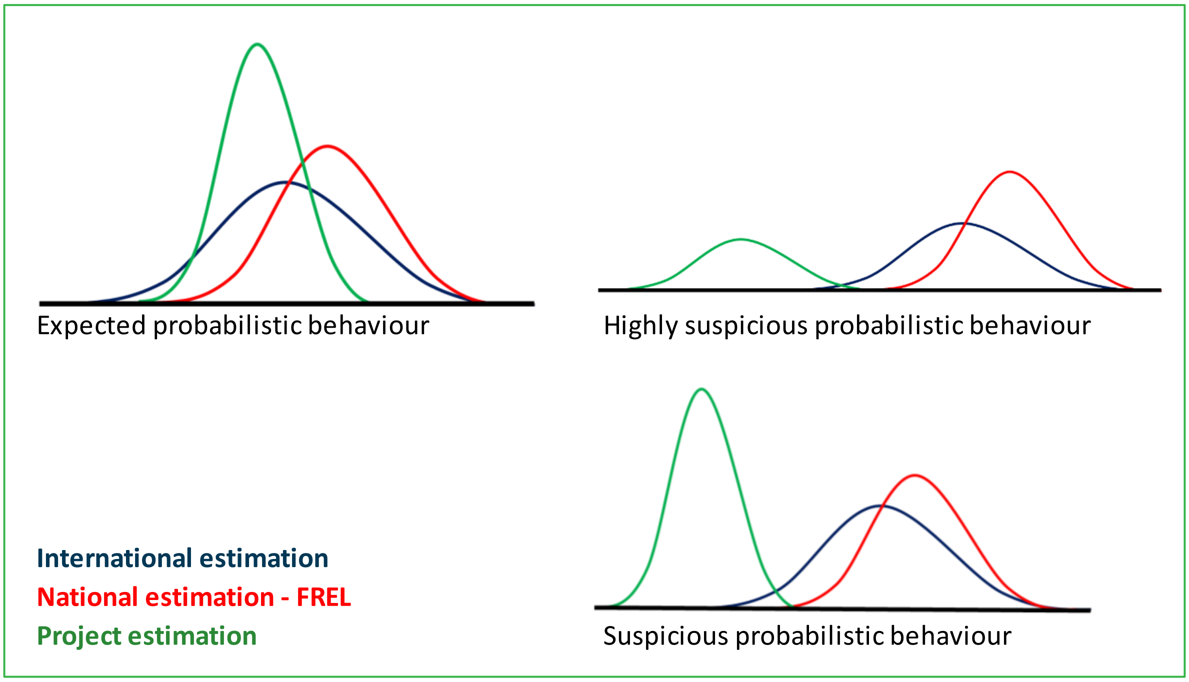
1) Consultation of the Cercarbono information and registration system (website and EcoRegistry platform).
2) Consultation of national GHG Emission Reduction registries (where applicable) or existing repositories of REDD+ focused projects.
3) Consult the repository of information on FRELs/FRLs submitted to the UNFCCC or results-based payment programmes of the Forest Carbon Partnership Facility (FCCB), Biocarbon Fund, REDD Early Movers Programme (REM), Green Climate Fund (GCF) and the climate action reporting pages of the German, Norwegian and UK governments.

In the case of overlap between two REDD+ projects, the second project to be formulated will be unviable if the first project is registered in a national registry (if available) in the implementation phase or is registered and verified in Cercarbono registry or another project registry.

In any scenario, and especially in cases of overlap between a CCMP and a sub-national or national FREL/FRL, there should be an analysis of the consistency between biomass expansion factors, wood densities, and any other parameters available at different monitoring scales that have been considered in the baseline scenario calculation equations and corresponding results.

Consistency can be assessed by explaining compliance with the criteria included in ***Figure 2***, where the probability distribution at different scales (green, blue and red lines) tends to be more accurate (distributions closer to the mean) at the local level and the local scale means are in the range of the national (FREL/FRL) or international (as cited in the GPG) default values.

Figure 2. Statistical comparison of theoretical curves of probability values of available factors at different measurement levels.



Note: The X-axes identify the different values of the mean at different scales of monitoring, and the Y-axes the probability of occurrence of this value.

Not all data for the reconstruction of probability curves at various scales are always available, so in practice it is compared that the local measurement is within the range of the mean of the national estimate (plus or minus the margin of error). The sources for comparing the national data are in respective priority: the FRELs/FRLs, those in the National GHG Inventory (if available) and internationally the most up-to-date IPCC GPG.

If a local parameter has a mean outside the values of a national or international benchmark (plus or minus the standard error), the use of the national or international factor can be chosen, supported by a justification.

If a parameter is not reported on the national or international scale (IPCC GPG) or does not present its margin of error, it is not subject to consistency assessment.

If a local datum is consistent with an official national datum (FREL/FRL) and not with the corresponding international datum, consistency with the national datum takes precedence.

Table 2. Type of information for calculations in the baseline and project scenarios.

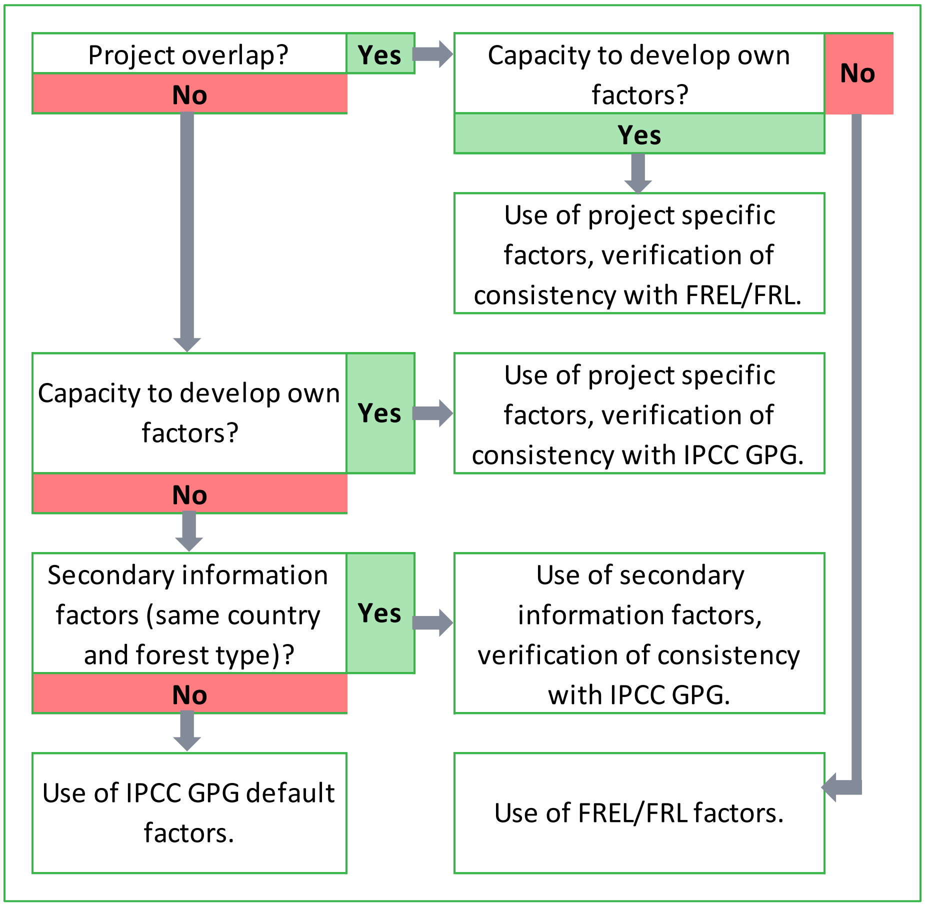
Parameter	**Local scale**		**National or international scale**	
	Information or process from representative forest inventories*.	Information from a remote sensing process for the project area.	Information or process estimable with default values.	Default remote sensing information on the project area.
Dasometric variables: diameters, heights, and tree densities per area.	X			
Biomass emission factors by forest type.	X		X	
Non-biomass emission factors.	X		X	
Taxonomic variables of species present: scientific names of families, genera, and species.	X			
Wood densities.	X		X	
Biomass expansion factors.	X		X	
Allometric equations.	X		X	
Area of ordinate figures.				X
Topographic variables: slopes.		X		X
Predial variables.		X		X
Estimation of activity data: rates of deforestation or forest degradation.		X		X
Thematic validation of activity data in the project area.		X		

*There are remote sensing techniques that generate dasometric information (e.g., Lidar technology). In this case, it is equivalent to inventories.

Note: Highlighted in bold are those that are subject to selection according to the election process presented in below in *Figure 3*.

Once a local value has been estimated for a given variable (with the possibility of measurement at more general scales, examples in ***Table 2***), the principles of consistency and conservatism apply, leading in practice to outliers from local measurements being replaced or restricted by the ranges of the default values.

Figure 3. Flow chart on the process of choosing available factors at different monitoring scales, exemplified in ***Table 2***.



Data and parameters from the most current version of the Intergovernmental Panel on Climate Change (IPCC) Good Practice Guidance (GPG) or previous versions can be included as comparable data if their use is technically justified. Academic articles published in indexed journals or approved theses from accredited programmes are also valid.

Evidence

The evidence used by the CCMP must be sufficient and appropriate to ensure that rational, reliable, and reproducible methods are employed to ensure that GHG removals and GHG emission reductions are genuine and properly calculated.

Integrity

All GHG emission sources and carbon pools should be included along with quantification of their GHG emissions and removals in the baseline scenario, as well as GHG emissions and removals and GHG emission reductions generated in the project scenario, using data and parameters from recognised sources as well as technically supported modelling.

No net damage

Efforts should be made to ensure that the programme or project activities considered by the CCMP do not generate net damage to the surrounding areas or communities, in social, environmental, or legal aspects, due to the benefits achieved around climate change mitigation.

Precision

Efforts should be made to reduce the variability or dispersion (standard deviation) of the information obtained in the measurement of GHG emissions, and removals and GHG emission reductions of the CCMP, minimising the standard deviation between the data. Efforts should also be made to ensure the accuracy of the information, raising its credibility, and strengthening the principles of accuracy and transparency.

Reliability

Data and parameters from recognised sources as well as technically substantiated models supporting GHG removals and GHG emission reductions calculated, accounted for, or monitored by the CCMP should be included.

The results must be representative of the local reality of the CCMP, which is why it is preferred that the data supporting them be obtained from direct and statistically representative sampling; however, due to the nature of some information, secondary inputs may be used. In this sense, ***Table 2*** sets out the information needed for the calculations of a baseline scenario and a project scenario, in each case specifying the source of information (locally generated or default) and indicating those that can be estimated and compared at international, national, and local scales.

Transparency

Genuine, clear, honest, substantiated, appropriate, understandable, truthful, timely, transparent, robust, sufficient, and auditable information related to the CCMP's procedures, assumptions, processes, and intrinsic limitations shall be used to ensure the reliability and credibility of its GHG removal and GHG emission reduction results.

The data, assumptions and methods used for the construction of the baseline scenario and the corresponding monitoring of results must be permanently and publicly available so that any calculations contained in the CCMP Project Description Document (PDD) can be reconstructed. The availability of this information is essential for assessing the other principles mentioned above. Therefore, the information is expected to include as a minimum:

- Definitions used in the quantification of activity data, emission factors, projection methods, and procedures and uncertainty calculation.

- Methodologies and procedures used for area estimation, area changes, emission factors, projections, and uncertainty calculation.
- Data used for area estimation, area changes, emission factors, projections, and uncertainty calculation.
- Any other information required in the reconstruction of the data.

4 Eligibility and inclusion requirements

This methodology is applicable in areas where deforestation, forest degradation, including timber extraction, with potential for implementation or capacity to improve forest management or where carbon content in pools can be increased.

4.1 Additionality

Additionality under this methodology must demonstrate two aspects: first, the implementation of REDD+ actions in a territory that enable forest cover maintenance, forest restoration or SFM, linked to mitigation outcomes. The second aspect highlights that carbon offset credits represent GHG removals or GHG emission reductions that exceed any GHG removals or GHG emission reductions that would occur under a conservative scenario (***Section 6***).

The mechanisms for verifying the additionality of a CCMP are:

- The construction of a cause-effect chain for each CCMP action and its result in at least one REDD+ activity. For example, if it is defined to register a set of farms as civil society reserves, describe how the reserve enables the conservation of forest areas. Each action reported should coincide with or be after the start of the projection period.
- Demonstrate that there are no other initiatives in the project area that are financing REDD+ activities or that the volume of results corresponds to the actions generated by the CCMP, by consulting official repositories on areas with carbon results payment schemes and investments of results payment programmes in overlap with the project area and available national registries.
- Consider the criteria set out in ***Cercarbono's Tool to Demonstrate Additionality of Climate Change Mitigation Initiatives***, available at www.cercarbono.com, section: Documentation.

The CCMP must clearly demonstrate that it has procedures in place to assess or test additionality and that these provide reasonable assurance that GHG removals or GHG emission reductions would not have occurred in the absence of the project.

4.2 Eligibility

The eligibility of a CCMP area is based on analyses of the drivers and causes of deforestation or forest degradation and the feasibility of changing the behavioural trajectories of their direct or indirect causes.

The conditions to be met by CCMPs include that:

- The areas where it is developed must be forest[8] or be areas of forest suitability for the establishment of restoration processes. The definition of forest must be aligned with that established in the international context and adapted in the national context where the CCMP is implemented.

[8] Demonstrate that they have been so for at least ten years prior to the start date of the CCMP.

- They must demonstrate that GHG removals or GHG emission reductions would not have occurred in the absence of the initiative. Demonstrability is achieved through the reporting of three elements: documentary evidence of a willingness to mitigate climate change that motivated the structuring of the CCMP, financial complementarity by reporting how revenues from the sale of verified carbon credits allow the financial closure of the actions to be implemented, or through a historical analysis of the CCMP's consistency of action.
- Areas where REDD+ activities are implemented must demonstrate holdership or administrative capacity by the communities established in the CCMP.
- They may be established on forested wetland land (mangroves, freshwater wetlands, and peatlands), provided that potential GHG movements out of the ecosystem are adequately considered (controlled or discounted).

Eligible mitigation results have an established lifetime in line with the regulation and with the date of the execution of the verification process as set out in the Cercarbono's Protocol.

4.3 Demonstration of capacity for action in CCMP areas

The holder of the initiative must demonstrate or obtain the express authorisation of the individual, public or collective owner, holder, or administrator of the property(ies) or boundary(ies) on which the CCMP is to be implemented.

In the case of privately owned land, express proof must be provided by the owner, possessor or holder of the land(s) authorising the CCMP to be carried out. The delimitation of the area of possession corresponds to a declaration of ownership or administration. In the absence of title or administrative designation by legal means, the possession of the land may not exceed the size of the Family Agricultural Unit per family, according to the regulations in force at the time of development of the CCMP actions.

The structure of agreements or contracts to ensure administrative capacity should consider the safeguards set out in ***Section 9***.

4.4 Effective participation

The CCMP must identify the local or ethnic communities present in the reference area (***Section 5.3***) and ensure their full and effective participation in accordance with the legal mandates that operate in line with ethnic minority rights.

The CCMP must have an effective participation protocol that includes:

- A stakeholder map, an institutional map of the other governance structures or institutions and leaders associated with decision-making in the territory, associated with CCMP activities.
- Consensual decisions with local governance structures.
- Mapping of consensus processes.
- Handling of petitions, complaints, claims and requests, and their traceability.
- A schedule of CCMP decision-making meetings.
- A conflict management protocol.

- A document of agreement, signed by the local community representative parties for the development of the CCMP. In this case, community representativeness is given, as a minimum, by explicit agreement with the local governance structures and represented in their designated leader(s).

4.5 Compatibility with planning or land-use planning and environmental regulation instruments

The holder of the initiative must demonstrate compatibility of the actions developed under the CCMP with the nationally determined land use categories, for which he has two options:

1) Request the certificate of compatibility of use from the public body or authority in charge of the area in which the CCMP is implemented, which must issue an administrative act indicating whether the initiative to be carried out is in accordance with land use planning, according to the land use or territorial planning instrument. If the initiative is to be carried out in areas of special ecological protection, a permit or authorisation, as appropriate, must also be obtained from the administrative environmental authority with jurisdiction in the area of intervention, which will verify the harmony of the CCMP with the management instrument and the zoning established therein.
2) Carry out a comparative cross-check of the land use guidelines resulting from land use planning, the programmes that have been formulated and the project activities. This comparison must be descriptive and show the geographical compatibility of the activities. For each CCMP action, it must be reported under which land use planning or management is being developed and describe how it adds to the official institutional efforts.

In addition to the above, the initiative holder must specify all existing local, regional, and national laws, statutes and regulatory frameworks that are applicable to management or planning in the CCMP reference area. These include identifying, implementing and periodically assessing compliance with legal environmental requirements.

GHG removals or GHG emission reductions achieved by the CCMP shall be registered in the national emission reduction registry of the country where the CCMP is implemented, if such a registry exists.

4.6 General objective of the CCMP

The CCMP must describe, at a minimum, the main and complementary activities, the location of the implementation area or process, and the period of execution of project actions.

4.7 Preliminary analysis

The preliminary analysis of the CCMP aims to provide a frame of reference to start the analysis of activity data and the agents and causes of forest decline, for this analysis the holder of the initiative must:

- Establish a dialogue with the actors involved in the processes of deforestation and forest degradation, with the actors who can slow down the processes of forest decline or with potential restorers.

- Identify, based on secondary information and dialogues, CCMP areas and segments with potential for reducing GHG emissions from deforestation or forest degradation.
- Identify, based on secondary information and dialogue, non-forest areas with potential for CSE. The analysis of carbon enhancements in pools is not included in the baseline scenario and is discussed in ***Section 7.1.4***.
- Collect available secondary information on socio-economic variables and on historical processes of deforestation and forest degradation.
- Based on the above, assess the feasibility of changing deforestation or forest degradation trends through the implementation of a CCMP. This feasibility is determined if support and commitment for action is achieved from local governance structures and if likely sources of resources are identified, including revenues that can be generated from the sale of carbon credits.
- Determine the administration figures and modes of access to land tenure rights in the CCMP area, establishing a proposal for the interaction of the administration with the CCMP.
- Estimate an approximate output volume and compare the expected revenues with the possible costs of the CCMP, and thus determine its financial viability.

The results of the preliminary analysis should be the selection of REDD+ activities to be included in the CCMP and a proposed delimitation of their areas (reference, leakage potential, action implementation and project area).

5 CCMP delimitation and identification of REDD+ areas and activities

5.1 Temporary limits of the CCMP

The temporary limits of the CCMP must be explicitly defined in the PDD. Credits may only be earned for GHG removals or GHG emission reductions during the period determined by these limits.

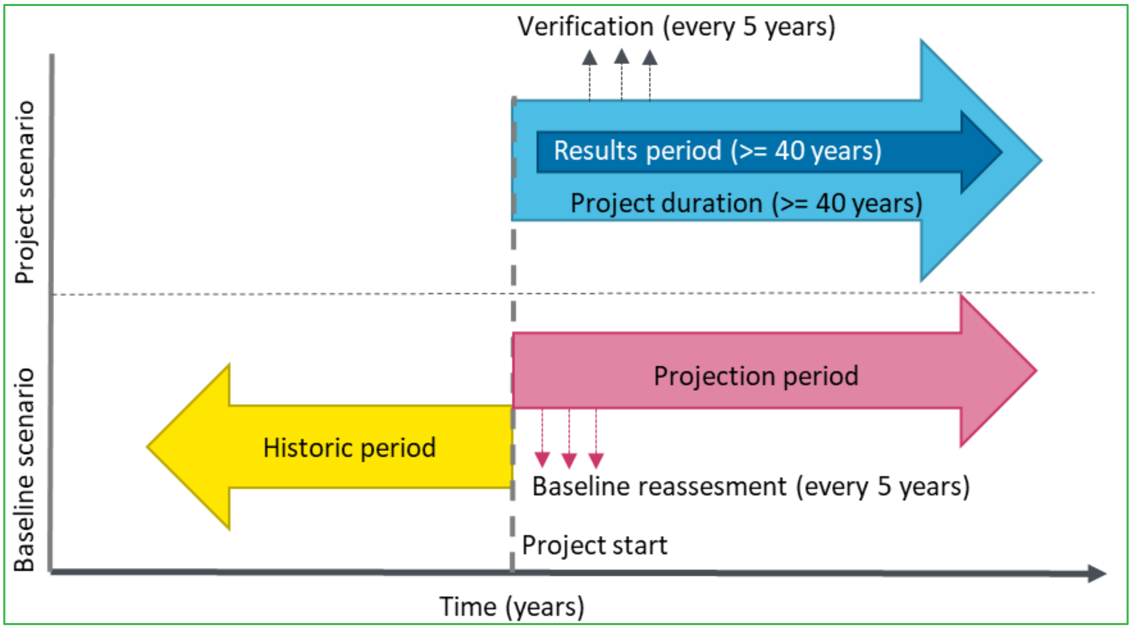
The temporary limits are the result of the diagnosis of agents and causes of forest decline and the monitoring of activity data.

The temporary limits of the CCMP are defined by six different periods (***Figure 4***) necessary to be considered in the design and implementation of the project, as described below:

- **CCMP start date**: date on which the first direct action is implemented in the programme or project area leading to mitigation results, i.e., the date on which GHG removals or GHG emission reductions from on-the-ground actions are initiated.
- **Historical period (of historical emissions analysis)[9]:** period (in years) for which a trend in drivers and drivers of deforestation (and forest degradation, if applicable) detectable in the activity data can be described and which is used to predict (estimate) the rate of deforestation (and forest degradation, if applicable) that would occur during the projection period. This period should not be less than ten years for the case of deforestation and be justified for the other REDD+ activities.
- **Projection period:** time range (in years) for which projections are made in the baseline scenario based on the historical period. Emissions from deforestation and forest degradation (if applicable) are projected during this period. The starting year of this period should coincide with the project start date where the first CCMP interventions are carried out in the territory, covering the entire project duration or beyond.
- **Results period:** range of time (in years) over which CCMP activities and the results of those actions are monitored in terms of GHG emission reductions from deforestation and forest carbon degradation or GHG removals due to carbon enhancements in the pools. The results period includes the verification periods in which monitoring of GHG removals or GHG emission reductions is carried out. The duration of this period is equal to the duration of the CCMP.
- **CCMP duration:** period (in years) between the initiation of project actions in the territory and the expected effect of these on REDD+ activities. The CCMP duration must be equal to or greater than 40 years (day.month.year to day.month.year).
- **Verification times:** are the periods of time within the results period in which the GHG removal or GHG emission reduction results are verified by an independent third party. A CCMP shall have a maximum interval of five years between successive verifications.

[9] It must be aligned with the national FREL/FRL.

Figure 4. Temporal delimitation of the CCMP.



5.2 Identification of REDD+ areas and activities

This methodology allows for the inclusion of activities related to reducing deforestation and forest degradation, sustainable forest management (SFM), and forest carbon stocks enhancement (CSE). A CCMP must include at least deforestation activity data (forest to non-forest change), in each year of the historical period and under subsequent monitoring events in each year of the projection period, depending on the REDD+ activity implemented.

The main input for identifying areas is activity data on deforestation. The activity data monitored in the historical period allows:

- Identify areas remaining as forest in the historical period where segments of deforestation and forest degradation will be confirmed.
- Identify areas that remain non-forest in the historical period where segments with potential for establishing restoration processes will be confirmed.
- Confirm the segments in which activities to remove GHG or reduce GHG emissions from avoided deforestation, degradation by avoided fragmentation or SFM may be monitored in areas that remain in the forest category in the historical period.
- Check the area that makes up the segments as it may change shape or size due to legal (local or national) land use corrections.

This will provide information for the historical calculation of GHG emissions for the establishment of the deforestation or forest degradation baseline scenario.

Annex c lists different sources of complementary information, useful for the estimation and calculation of some of the variables mentioned below.

5.2.1 Identification of forest and non-forest areas through analysis of deforestation activity data

It must be ensured that there is no double counting between REDD+ activities, which is why the project area for monitoring activity data must be segmented into areas under forest degradation processes and areas under actual or potential deforestation processes, determined according to the analysis of agents and causes of forest decline (***Section 6.1***). ***Annex c*** lists different sources of complementary information useful for the identification of forest and non-forest areas.

The first step in the segmentation of the area is the preliminary analysis, which allows the establishment of a region in which forest and non-forest changes are analysed over a period of ten years or more. This region is a transitional instrument that serves to confirm the areas and segments of the CCMP once the analysis of agents and causes has been carried out.

For the analysis of deforestation activity data, in case of overlap with a FREL/FRL, it is required to download processed images of forest/non-forest or other categories used from national forest monitoring systems (constituted according to 4/CP.15, 1/CP.16 and 11/CP.19), making the cut-off in each year. In case FREL/FRL or national forest monitoring systems do not report data for all years of the historical period in the CCMP area or detection in the project area does not allow annual monitoring of the project area, it is recommended to generate the missing information using the same methodological route as FREL/FRL.

In case there is no overlap between the project and a FREL/FRL, it is recommended to follow the forest cover change detection procedures included in the national forest monitoring systems.

Although the data are derived from the FREL/FRL or from national forest monitoring systems for the project area, to improve their quality at the local scale, it is recommended to repeat a thematic validation, but at the project level and make the resulting adjustments to the deforestation amounts.

In case coverage information is not available or FREL/FRL data are inadequate in the project area due to biophysical characteristics for the case of deforestation, it is recommended that quantification of activity data is carried out according to the steps established by the national forest monitoring system in the FREL/FRL of each country[10]. Some key elements for quantifying activity data are highlighted below:

1) Digital pre-processing of satellite imagery

In this phase, radiometric corrections, calibrations, and normalisations are applied to ensure accurate co-registration and reduction of atmospheric effects, thus allowing the

[10] The FREL/FRL submitted by country to the UNFCCC is available at: [Submissions - REDD+ (unfccc.int)](https://redd.unfccc.int/submissions.html).

images to be comparable and the changes detected are not due to such factors. The steps that are part of the pre-processing are highlighted below:

A. Image selection and download

For each year covered by the historical period, the image catalogue of the satellite programme used in each country is downloaded and all images with less than 90 % cloud cover and with a time window between 1 January and 31 December of the reference year are selected, ensuring that all images from the last quarter of the year are downloaded and processed. Through the generation of annual temporal composites of images, all "cloud" and "cloud shadows" pixels are excluded from each image. These composites allow the identification of the forest area and its changes in the reference year. When satellite data do not provide sufficient cloud-free coverage, images from sensors such as CBERS, RapidEye, ASTER and Sentinel 2 are used.

B. Belt stacking

Each image is reconstructed by merging all bands, discarding those corresponding to the thermal infrared wavelength. Optionally, algorithms developed by the national forest monitoring system can be used for manipulation and processing, available for download.

C. Geometrical correction

For the construction of the annual image composites, it is required to have an exact co-registration at the pixel level between all the images acquired for each scene. The L1T products provided by the Earth Resources Observation and Science Centre (EROS) usually have an exact correspondence of pixels, however, before the interpretation, a review of each image is performed and those that do not meet this condition are adjusted.

D. Cloud masking and shadowing

It allows for masking and removal of areas of clouds, banding, shadows, or haze, before a semi-automated procedure that combines the results of masks produced with different tools is run before the change analysis is performed.

E. Radiometric standardisation

A process of relative radiometric standardisation of the images is carried out, in which the radiometric values are adjusted to reduce the variability between images due to atmospheric differences, illumination, sensor calibration, geometric distortions, among others, so that the images from different years are comparable and the changes detected are not due to these factors (Olthof *et al*., 2005). Optionally, scripts developed by the national forest monitoring system can be used for this purpose.

F. Obtaining the image composite

All the images available for the CCMP area in each year of the historical period are used, so that, for each observation unit (pixel), an annual time series with all the reflectance surface data valid for that year is available. The main metric generated is the annual median of each spectral band, a statistic that has shown good results for change detection. In this way, for each observation unit, a single annual radiometric reflectance surface value is obtained for each of the radiometric bands used (Red, NIR, SWIR-1 and SWIR-2).

2) Digital satellite image processing

This is the automated detection of changes in forest area, allowing direct detection of changes in spectral response that may correspond to a loss or gain of forest cover. This is followed by the work of technicians for direct visual verification of the changes on the images, thus minimising possible errors and false detections. The result of this phase is the identification of forest cover change classes. The steps recommended to be considered in this process are highlighted below:

A. Detection of change

A legend (after reclassification) must be obtained that includes at least the categories of: 1. Stable Forest 2. No Stable Forest 3. Deforestation 4. Regeneration 5. No Information (corresponds to masked data due to the occurrence of clouds and cloud shadows).

To identify forest cover change, a principal component analysis (PCA) is used on the correlation matrix of the pixel values of the temporal composite of medians generated in the previous step, and then a reclassification of the pixel values to the corresponding class value is performed. To adjust the areas with no information detected for each reporting period, a time series analysis is applied to verify the temporal consistency. For this process, the information of the most recent reporting period is considered, and the missing areas are adjusted retrospectively for the other reporting periods.

B. Visual verification of detected changes by the interpreter

Once the processing phase has been completed, where the PCA process has been executed by scene or set of scenes, each interpreter codes each unit, thus obtaining a preliminary map of change that includes the following categories: 1. Stable Forest 2. No Stable Forest 3. Deforestation 4. Regeneration 5. No Information.

C. Quality control and in-process adjustments

The quality control process involves the monitoring of all implementation activities, from the downloading of satellite images, intermediate products to the results of the forest change map and forest area map.

3) Assessment of thematic accuracy

The assessment of the thematic accuracy of the forest area change map allows for generating metrics of reliability of the generated figures and adjusting accordingly. The steps of the thematic accuracy assessment are summarised below:

1. Sampling design.
2. Interpretation of sampling points.
3. Error matrix and confidence intervals.
4. Calculations and reporting.

To calculate the area deforested between two analysis periods, only the areas for which there is information in the two analysis periods are considered, so that there is certainty that the event occurred in the period analysed.

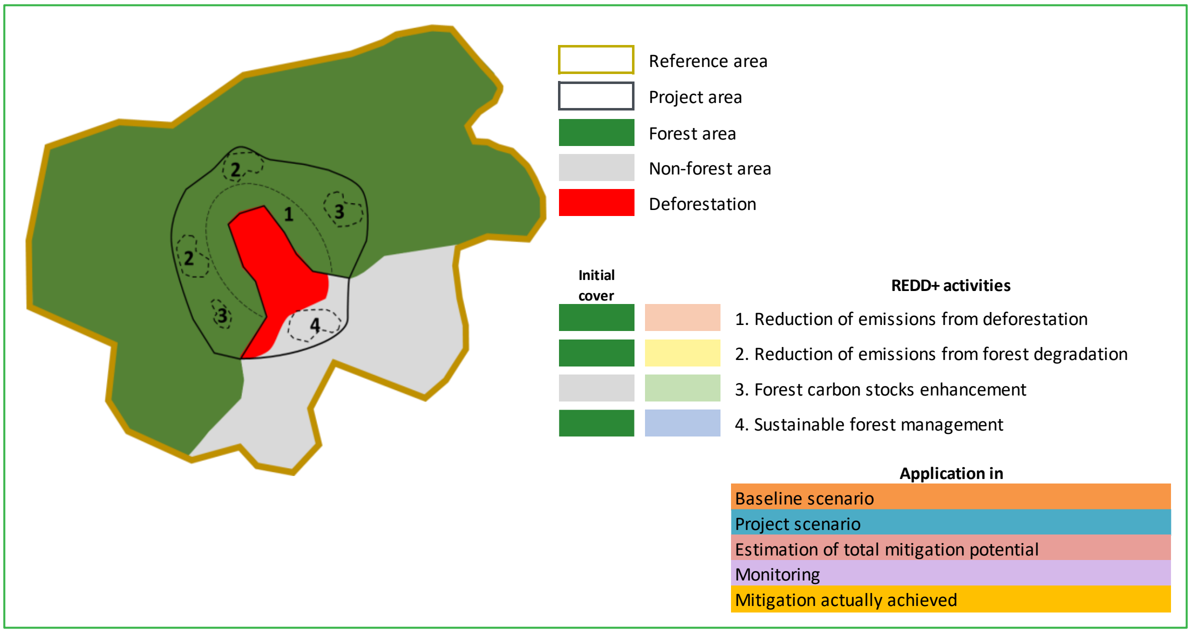
Forest losses detected after one or several dates without information should not be included in the calculation, to avoid overestimated rates in periods when areas without information increase due to different factors (e.g., high cloud cover).

5.2.2 Confirmation of segment delimitation

To confirm the delimitation of the segments (***Figure 5***), following the results of the activity data:

1- Starting from the proposed segments established in the preliminary analysis, which in turn will be finally adjusted following the analysis of agents and causes of forest decline (***Section 6.1***), which allows confirming the segments in which the reduction of deforestation and forest degradation can be achieved based on the capacity to implement cultural or productive change.
2- Confirm and delimit the segment of deforestation within the forest area that remained as such during the historical period and without overlap with segments of other activities.
3- Confirm and delimit segments of forest degradation, within the area of forest that remained as such during the historical period.
4- Confirm and delimit the segments of carbon increases in pools within the non-forest area that remain as such during the historical period.

Figure 5. Example of segmentation of the project area for independent but complementary implementation of REDD+ activities.



Note 1. In the list of REDD+ activities, the colour palette on the left corresponds to the colour of the segments for each REDD+ activity represented here in the forest/non-forest areas and the colour palette on the right corresponds to the colours implemented in the sequencing and calculations per REDD+ activity: presented in the baseline (***Section 6.9***) and project scenarios (***Sections 7.8*** and ***7.9***), in the total mitigation estimate (***Section 8***) and in monitoring (***Section 13***).

Note 2. Some areas by type of activity may or may not be contiguous.

Confirmation of the delimited segments allows monitoring of the areas deforested in each year of the deforestation segment and the areas remaining as stable forest and non-forest during the historical period. It is possible that the area of the avoided deforestation segment coincides with the entire forest area of the project in case it is the only activity included in the CCMP and the entire forest is susceptible to deforestation. The deforestation segment should be the area of forest with the greatest potential for deforestation. This can be obtained through the analysis of a risk map or under a justification that accounts for the deforestation trend. In any scenario the deforestation segment shall have a maximum size corresponding to the forest cover in the accounting area minus the area of the segments where forest degradation control will take place.

5.3 Spatial limits of the CCMP

The spatial limits of the CCMP must be explicitly defined in the PDD. A CCMP must contain three spatial typologies: areas, segments, and strata:

- The areas allow for the macro division of the CCMP, to separate the areas to be monitored.
- Segments, as regions where REDD+ activities will take place, must be identified to avoid double counting in the results. The segment is the result of its probable identification in the analysis of agents and causes of forest decline and its confirmation in the analysis of activity data. Any segment must be in the CCMP area and in turn may contain one or more strata.
- The strata are the forest types that exist in the CCMP area or the potential forest types that can be restored in the non-forest area.

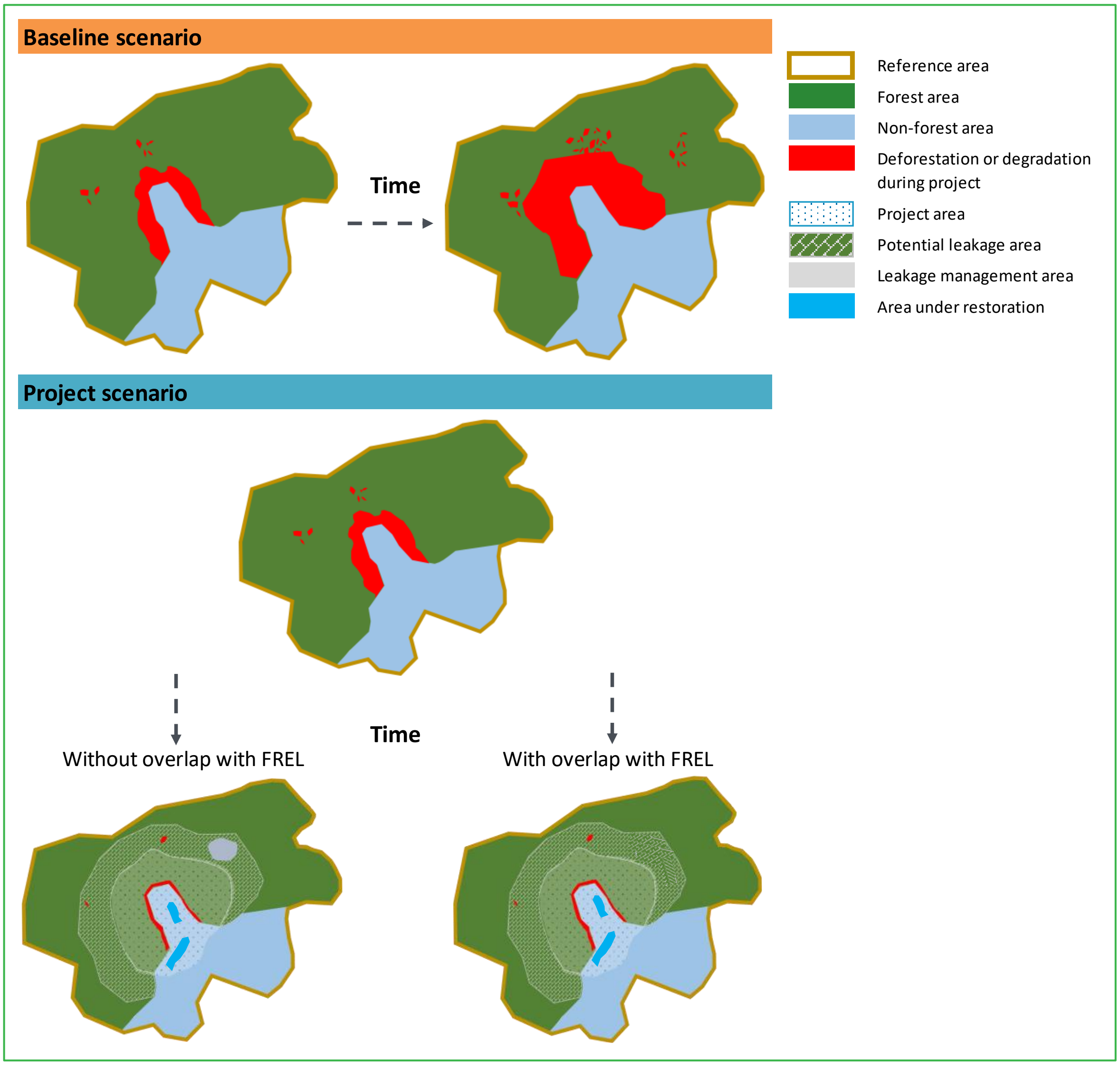
Where the CCMP interacts with other methodologies for CSE for non-REDD+ forestry activities, for the shaping of forest landscapes, it shall identify the segments where these activities are implemented and avoid double counting.

The CCMP must identify and delimit its areas, segments, and strata. Areas are classified as: the reference area, the potential leakage area, the activity implementation areas and the project area, which are described below and exemplified in ***Figure 6***.

- **Reference area:** this is the geographical region where the analysis of agents and causes of deforestation and forest degradation is carried out; it is the broadest region of the CCMP, delimited from the preliminary analysis and includes the other areas. The reference area must be defined in a geographic information system. It must include forest areas and may or may not include non-forest areas. The reference area is not subject to monitoring but must be re-evaluated in case of a revalidation of the baseline scenario. Its delimitation is based on the identification of micro-watersheds overlapping or adjacent to the CCMP area.
- **Potential leakage area:** as a result of the analysis of agents and causes of deforestation and forest degradation, the potential distribution of actors associated with deforestation and forest degradation is defined, based on which a potential leakage area (***Section 7.4.1***) and a leakage management area are determined. The potential leakage area must be covered by forest at the start of the CCMP, must be within the reference area and must not overlap anywhere with the project area, for the identification of leakage emissions and their respective discounting. This area is subject to activity data monitoring. Meanwhile, the leakage management area must be within the reference area, surrounding the project area, where leakage control activities are established.
- **Project action implementation area:** area in which sustainable production systems, payments for environmental services or strengthening of local governance, directly affecting the land or associated resources and in which GHG removals or GHG emission reductions are carried out. Corresponds to the polygons where each of the project activities is classified (***Section 7.1***) and may or may not be inscribed in the project area. When they are inscribed in the project area they must be differentiated and delimited as segments, for the reduction of deforestation, forest degradation, SFM or CSE.
- **Project area:** is the area in which the estimation of GHG removals or GHG emission reductions that would have occurred both in the absence of the project (baseline scenario) and those that will occur due to project implementation (project scenario) is carried out.

The GHG emission factors (***Sections 6.4*** and ***7.5***) and activity data (***Section 7.6***) should be representative of this area in each of the forest strata identified in the baseline and project scenario.

Figure 6. Spatial delimitation of the CCMP.



The function of the potential leakage area of the overlapping scenario changes, to denote the need for articulation of these measures with those provided in the FREL/FRL.

5.4 Segment stratification

When there is considerable heterogeneity in the segments (deforestation, forest degradation, CSE, and SFM), e.g., different forest types, different logging, and timber harvesting systems or cover, in the case of non-forest areas, it is advisable to stratify these areas.

The **SFM** segment is identified as the areas that will be under management during the project, with the limit coinciding with the management units or a defined cutting unit.

The strata may or may not be the same in the baseline and project scenarios in the **deforestation** and **forest degradation** segments but will most likely be different in the implementation of activities.

In the case of the **SFM** segment, the strata are likely to be the same in all three cases (baseline, project, and activity implementation), while in the **CSE** segment, the strata of the baseline scenario, the project scenario and the activity implementation scenario are likely to be different.

In any case where stratification is required, it will be necessary to define the coverage of each stratum in each segment. If, in any of the segments, no subdivision of areas is required in the baseline, project or activity implementation scenarios, a single stratum will be considered to exist (and therefore the corresponding sub-index will have a single value equal to one).

6 Baseline scenario

The baseline scenario in this methodology consists of estimating the amount of carbon in the pools (***Section 6.2***) and emissions by sources (***Section 6.3***), which would occur within the limits of the CCMP in the absence of CCMP activities. Possible pools and sources of GHG emissions to be considered in a CCMP are listed in ***Table 6*** and ***Table 7***, respectively.

The calculation of GHG emissions of the baseline scenario is the result of the change in GHG emission sources and pools selected based on the change in the behaviour of the agents and causes of deforestation, forest degradation, or the feasibility of initiating restoration processes, for which the following steps should be followed:

1- Determine the adjusted REDD+ activity segments in forest and non-forest areas by analysing agents and causes of forest decline (***Section 6.1***).

2- Establish the historical period where activity data and GHG emission factors are measured for the calculation of historical emissions for each REDD+ activity (***Section 5.1***).

3- Design and implement sampling for representative measurement of GHG emission factors (***Section 7.5***).

4- Make trend projection of deforestation, forest degradation, CSE or SFM from the baseline scenario (***Section 6.7***).

6.1 Analysis of agents and causes of forest decline

The analysis of agents and causes of forest decline builds on the preliminary analysis (***Section 4.7***) and is supported by secondary information collected on socio-economic variables of historical processes of deforestation and forest degradation. The agents and causes included are those that are associated with unsustainable uses of the forest, but also those that show the potential for sustainable management or leverage conservation processes including ethnic factors, cultural conservation, and livelihoods.

The analysis of agents and causes should be an iterative process as good and updated information becomes available to improve the effectiveness of CCMP actions. In its first iteration the main results should provide the territorial information inputs to generate:

- A first portfolio of REDD+ activities (a framework of possible activities is included in ***Annex b***).
- The spatial delimitation of the CCMP areas.
- The temporal delimitation of the CCMP.
- The definition of the final location of the segments of REDD+ activities.

It is recommended that the remaining iterations are carried out on an annual basis according to the circumstances of the CCMP. This means that the first diagnosis of causes and actors is done in the consolidation of the PDD. Once the first verification has been carried out, one calendar year should be counted and the dialogues at the local level should be conducted and the information on socio-economic factors should be reprocessed to analyse the new behaviours of the agents and causes.

In a CCMP that includes avoided forest degradation activities, a specific analysis of the agents and causes of forest degradation must be carried out in a similar way (with respect to deforestation), supported by reliable information (see principle of reliability). For the development of this diagnosis, the guidelines of Armenteras *et al*. (2018) are recommended, which should include:

- An analysis of existing processes associated with selective logging (and its extraction systems), firewood extraction, forest fires, grazing in forests, expansion of the agricultural frontier or illicit crops.
- A description of indirect causes due to technological and economic factors (markets, illegal economies, and state incentives, among others), political and institutional factors (sectoral and territorial development policies, land use, distribution, and property rights), cultural factors (vision of the forest, ancestral practices, and education), demographic factors (population growth), and biophysical factors (presence of fine woods).
- An assessment and trend of the causes of natural forest degradation obtained through representative surveys in the CCMP area.

The CCMP should describe the drivers and causes of direct deforestation, as well as the associated underlying causes that will determine the dynamics of REDD+ activities (***Figure 7***). It is recommended to use a variety of information (e.g., expert consultation, participatory social assessments, literature review, etc.).

This is in addition to the knowledge of future conditions that directly or indirectly influence the decision of the different agents (e.g., new policies that encourage the production of a certain crop, policies around land use, etc.).

Underlying causes are classified as those related to social, economic, demographic, technological, political, and institutional and cultural factors. The behaviour of the underlying and direct causes should be described at the project level.

Figure 7. Direct and underlying causes of deforestation.

Direct causes

Infrastructure
Transport (roads, railways, etc.).
Settlements (rural and urban).
Utilities (aqueducts, energy, sanitation, etc.).
Private enterprise (mining, oil, etc.).

Agriculture
Permanent agriculture (subsistence, small-scale and large-scale).
Shifting cultivation.
Livestock.
Colonisation and land grabbing for agricultural purposes.

Wood
Timber trade.
Firewood extraction and consumption.
Construction.
Charcoal production.

Illegal activities
Illegal hoarding.
Drug trafficking.
Illegal mining.
Illegal use of territory.
Criminal structures.

Underlying causes

Demographic factors
Population growth.
Migration.
Population density.
Life cycle characteristics.

Cultural factors
Attitudes, values, beliefs.
Individual and family behaviours (disinterest in forests, perception of forests as obstacles to development).

Political and institutional factors
Formal policies (economic development and infrastructure).
Aspects of political deterioration (corruption, inefficiency).
Land ownership rights.

Technological factors
In agricultural production.
In timber production.
In the production of non-timber products.

Economic factors
Market and commercialisation.
Urbanisation and industrialisation.
Price behaviour.
Comparative advantages of production.

Other factors
Environmental (droughts, floods, natural disasters).
Social problems (conflicts, economic crises, political changes, etc.).

Source: Adapted from Geist & Lambin (2002).

For the description of the agents and causes of deforestation present in the CCMP area, the combination of remotely sensed information with field-corroborated social dynamics data is recommended. For spatial analysis, mappable indicators associated with economic activities can be used. ***Table 3*** provides a framework of variables that can be considered and measured in an analysis of agents and causes of deforestation.

The delimitation of the analysis of drivers and drivers of deforestation is based on the identification of micro-watersheds overlapping or adjacent to the project area or a smaller area, in case a restricted distribution of drivers and drivers operating in the project area is demonstrated, which constitutes the reference area (***Section 5.3***).The delimitation of micro-watersheds should follow the guidelines available at the national level (this methodology uses the micro-watershed as the unit of analysis, however, other similar elements that apply in a given country can be integrated). In cases where micro-watersheds do not represent a logical unit of analysis of drivers and drivers of deforestation (e.g., because there are external factors that influence drivers and drivers, such as administrative divisions or infrastructure elements that generate specific conditions in each sector), the CCMP may use, with due justification, a different spatial delimitation for the analysis of drivers and drivers of deforestation.

Table 3. Mapping indicators and data sources for main activities associated with deforestation (drivers).

Activity/driver of deforestation	Mapping indicator	Common data sources (national level)	Common data sources for GHG emissions estimation (national level)	Examples of other indirect data
Commercial agriculture	Large areas logged, post-harvest land use.	Historical satellite imagery (e.g., Landsat).	Traditional forest inventories / field measurements.	Commodity prices, agricultural censuses, share of gross domestic product, exports, among others.
Subsistence farming, smaller crops, and rotational crops	Small, logged areas, usually associated with rotation cycles.	Historical satellite images with high temporal density or high resolution to determine rotation pattern.	Traditional forest inventories / field measurements and targeted surveys.	Population growth in rural and urban areas, agricultural imports and exports, land use practices, among others.
Expansion of infrastructure	Road network, new mines, and built-up areas.	Historical satellite images.	Traditional forest inventories / field measurements.	Growth in urban and rural population, infrastructure development programmes, import and export prices of raw materials (mining).

Activity/driver of deforestation	Mapping indicator	Common data sources (national level)	Common data sources for GHG emissions estimation (national level)	Examples of other indirect data
Industrial or commercial harvesting of forest products	Small-scale canopy damage, logging roads and associated infrastructure.	Historical satellite imagery analysed in conjunction with concession areas. Direct analysis for recent years.	Traditional forest inventories / field measurements and harvest estimates from commercial forestry activities. GHG emission factors can be measured consistently over each historical period.	Rural and urban population growth, percentage of energy users and sources of energy, consumption patterns and their changes.
Extraction of forest products for subsistence, local and regional markets	Very small-scale canopy damage, understorey impacts, footpaths.	- Limited historical data. - Information from local studies or national *proxies*. - Only long-term cumulative changes can be observed by satellite imagery.	- Limited historical data. - Information from local scale studies. - Community-based monitoring has a key role. - Other indirect methods of measuring carbon stock changes can be employed.	Land use practices (e.g., agricultural burning), links to other activity data attributable to burning, fire prevention and natural fires.
Other disturbances (e.g., uncontrolled fires)	Burn scars and associated impacts.	Historical fire-related satellite data, analysed in conjunction with Landsat-type data.	Regular estimation of emissions can be measured consistently for different periods depending on data availability.	

Source: Adapted from Kissinger *et al*., 2012.

6.1.1 Additional CCMP analysis factors

In addition to the behaviour of the economic activities described above and summarised in ***Table 3***, the following factors should be analysed in the CCMP:

Biophysical factors

Climate, soils, lithology, topography, relief, hydrology, and vegetation, which show spatial-temporal variation.

Economic and technological factors

Consider, for example, the commercialisation and growth of international timber markets or economic variables with low domestic costs (land, labour, fuel, etc.), increased product prices and the demands of remote urban and industrial centres.

Production factors

Analyse production systems and their influence on deforestation and forest degradation, whether they are in forest areas, legally or illegally established in the project reference area. For example: extractive industries, legal timber extraction, illegal timber extraction, cattle ranching, illicit crops, among others.

For the definition of the probable SFM segments, the natural stands subject to selective extraction and those that will be harvested during the project projection period must be identified. The productive factors of sustainable forest management should include a description of the technologies and logistical operations for timber harvesting.

Demographic factors

The composition and distribution of the population, as well as the context in which the population interacts with other factors, are the most important demographic aspects for understanding the pressure on land use and land cover changes, as well as the analysis of migration processes, which in turn are linked to other non-demographic factors, such as government policies, changes in consumption patterns and globalisation, which is clearly facilitated by the construction of infrastructure (e.g. access roads).

Institutional factors

Government policies play a major role in forest cover transformations, either directly or indirectly, mediating and interacting with demographic, economic, biophysical, and other factors. For example, access to land, capital, technology, and information are structured and often limited by national policies and institutions.

For the identification of the likely segments for the CSE, the available information on areas susceptible to restoration considered in national plans will be included in the analysis of agents and causes.

Territorial analysis

A product of the spatial information associated with the agents and causes is a map indicating how the different sources of pressure on the forest operate. This map should be easy to read and illustrative, as with this input it is recommended that participatory social mapping processes are carried out by means of a broad convocation of actors in the CCMP area. This process is achieved through the establishment of working groups in which it is confirmed whether what is detected in the mappable inputs is happening. This last step is what determines the diagnosis of the agents and causes of deforestation. It is also recommended to have as input the construction of timelines that include motivations, memories, histories, attitudes, values, perceptions, as well as personal and collective beliefs that affect decision-making.

With the socio-economic information compiled, a summary timeline of the factors that have generated the processes of deforestation and forest degradation must be constructed. In addition, correlations of events and trend analysis of these variables will be carried out for the most effective design of CCMP actions, a reference framework of actions is included in ***Annex b***.

If, for example, the relationship between the analysis of agents and causes shows that the main agent of deforestation is the illegal occupants of extensions of land for the establishment of livestock in an indigenous reservation, and this is confirmed by the information on land use change, community testimonies and secondary information that describes historical processes of occupation of the reservation, after corroborating this process, actions should be generated from the CCMP such as those included in the table below.

Table 4. Examples of actions to reduce deforestation and forest degradation in an indigenous reservation by improving local governance.

Possible actions to reduce deforestation and forest degradation	
Administration measures	Formulate and implement an ethnic-territorial planning instrument.
	Strengthen the governance of indigenous people in their reservation through funding for their organisational structures and administrative capacity building for the design and implementation of projects.
Control measures	- Implement a local early warning system for deforestation and forest degradation.
	- Co-finance an agreement with the environmental authority to strengthen control processes in the reservation. - Support the development of command-and-control measures, so that complaints about logging processes can be enforced without putting the community at risk.
Planning measures	Design and implement a roadmap for accessing financial mechanisms such as PES for forest cultural services.

One tool that can be included for the analysis of the current and future behaviour of the agents and causes of deforestation is the construction of risk maps of forest loss, based on the variables analysed. If this alternative is implemented, the cartographic inputs and sources used must be traceable, for which it is recommended to consider ***Table 5***.

Table 5. List of cartographic inputs and sources used.

Mapping factor	**Source**	**Variable that represents**	**Analysis of variable**	**Data evaluation range**	**Criteria**	**Algorithm or equation used**	**Comments**
ID	**File name**	**Unit**	**Description**				

In the framework of this methodology, risk maps are complementary tools for the analysis of agents and causes and, therefore, for the design of territorial actions to avoid deforestation or forest degradation; however, they do not replace projection systems and the inclusion of activities other than deforestation in the baseline scenario.

6.2 Carbon pools

The carbon pools included in a CCMP are those that can be measured to assess the carbon content in the baseline scenario and whose changes are assessed in the project scenario associated with REDD+ activities.

The pools included in the baseline scenario correspond to:

1- At a minimum those significant pools that contain the carbon in the forest area and are therefore likely to generate GHG emission reductions in the project scenario.
2- At least the significant pools that are part of the non-forest area with forest suitability during the historical period and with potential to initiate restoration processes.

The pools included in the project scenario are detailed in the table below.

Table 6. Pools that can be included in a CCMP.

Pool	Segment inclusion				Explanation
	Def	Deg	Cse	Sfm	
Above-ground bio-mass	Yes	Yes	Yes	Opt.	Pool subject to project activities. Covers arboreal and non-arboreal woody biomass (trees, shrubs and herbaceous). Includes stems, stumps, branches, bark, seeds, and foliage. Carbon content in above-ground biomass is expected to be maintained due to forest management on forest land that is maintained as forest and is expected to increase due to restoration practices in non-forest areas.
Below-ground bio-mass	Yes	Yes	Yes	No	Pool subject to project activities. Includes live root biomass greater than 2 mm in diameter. Carbon content in below-ground biomass is expected to be maintained due to forest management on forest land maintained as forest and is expected to increase due to restoration practices in non-forest areas.
Dead wood and coarse and fine lit-ter	Opt.	Opt.	Opt.	No	A pool that may be subject to project activities in cases where it is identified as a key pool and monitoring is feasible or improved accuracy of measurement of its removals is considered. Includes aboveground non-living wood, whether standing or fallen such as dead roots and stumps greater than 10 cm in diameter.
Timber prod-ucts	No	No	No	Yes	Pool to be included if Sustainable Forest Management activity is included. It cannot be included in any of the other activities. Covers timber products because of harvesting, extraction, transport, and processing.
Soil organic carbon (SOC)	Opt.	Opt.	Opt.	No	Pool subject to project activities. Soil organic carbon content is expected to be maintained, due to avoided cover changes (deforestation or forest degradation). Includes organic carbon from

Pool	Segment inclusion				Explanation
	Def	Deg	Cse	Sfm	
					mineral and organic soils at a minimum depth of 30 cm and roots less than 2 mm in diameter.

Def = Deforestation (avoided from project scenario); **Deg** = Forest degradation (avoided from project scenario); **Cse** = Forest carbon stocks enhancement (from the baseline and project scenarios); **Sfm** = Sustainable Forest Management (from baseline and project scenarios); **Opt.** = Optional[11].

In this methodology, the inclusion of above-ground and below-ground biomass pools is mandatory as a minimum and gross estimation of their emissions is allowed.

6.2.1 Specific considerations for deforestation and forest degradation segments

In the deforestation and forest degradation segments, the carbon content in the pools that are part of the area of forest that remains as forest (during the historical period) will not be included in the baseline scenario, as the carbon contents of these pools are included in the project scenario and indirectly within the expected (projected) emissions in the deforestation or forest degradation events and these are part of the emission sources presented below in ***Section 6.3***.

6.2.2 Specific considerations for the CSE segment

In the case of the CSE segment, in the baseline scenario, a non-forest area with different cover and dynamics of carbon stock growth and decline is expected to be found. In this case, contrary to the other segments, the carbon stocks in the pools are not considered static with respect to tree growth, but linked to time, so they must be defined (the stocks) for all the pools considered in the project scenario (following the principle of internal consistency), for all strata as a function of time for the whole duration of the CCMP.

In the specific case of **soil organic carbon**, existing soil organic carbon in the baseline scenario is conserved and is estimated to accumulate at a rate of 0.52 t CO_2/ha/year in tropical dry forests and 0.67 t CO_2/ha/year in tropical moist forests in a linear fashion from the year of planting/restoration until reaching measured value for standing forests in the project area and there is no accumulation after that period (Form International, 2014).

6.3 Sources of GHG emissions

The potential GHG emission sources included in the baseline scenario of a CCMP are due to deforestation or forest degradation, which correspond accordingly to the GHG emissions avoided by these actions in the project scenario due to the implementation of REDD+ activities.

GHG emission sources identified in the baseline scenario are to be monitored in the project scenario.

[11] Acronyms presented in this table in combination of upper and lower case letters according to the variables and equations presented below.

After examining the sources of GHG emissions and taking into account the preliminary analysis (***Section 4.7***) and the diagnosis of drivers and causes of forest decline (***Section 6.1***), the REDD+ activities (deforestation or forest degradation) for which the baseline scenario will be constructed must be determined.

Table 7. GHG emission sources that can be included in a CCMP.

Source	GHG	Included	Explanation
Biomass removal or burning by deforestation processes (including the possible intermediate step of burning).	CO_2	Yes	Gas emitted by this source.
	CH_4	Optional	Gas emitted by this source.
	N_2O	Optional	Gas emitted by this source.
Removal or burning of biomass due to forest degradation processes (fragmentation).	CO_2	Yes	Gas emitted by this source.
	CH_4	No	Conservatively excluded.
	N_2O	No	Conservatively excluded.
Biomass removal due to forest degradation processes (timber extraction).	CO_2	Yes	Gas emitted by this source.
	CH_4	No	Conservatively excluded.
	N_2O	No	Conservatively excluded.

6.3.1 Emissions from burning

This section applies to land remaining forest and land converted to forest. According to IPCC (2006) guidelines, it is recognised that it is essential to identify the main sources of GHG emissions, to understand the nature of fires to classify them as anthropogenic and their calculation corresponds to the carbon fraction of the available fuel mass (biomass).

To make an estimate in a consistent manner, one must:

- Obtain estimates of the area burnt.
- Estimate the mass of fuel available for combustion; this includes biomass, litter, and dead wood.
- Select combustion factor.
- Select GHG emission factors

6.4 GHG emission factors

GHG emission factors should be representative of the forest strata of the CCMP area (***Section 5.4***) and should demonstrate internal consistency with the area where activity data are monitored and the project area.

Quantification should be performed on pools affected by significant sources (accumulating 90 % of carbon) and with measurement feasibility. For these pools, GHG emission factors are calculated based on forest inventories.

For field measurement it is recommended to follow the national forest inventory manuals, these inventories, and other processes of compiling information on GHG emission sources and carbon pools should have a representative number of samples to determine in each area, for each segment and for each stratum, the variables necessary in the calculation of carbon content in all affected pools and for all selected sources.

To classify a source as significant, information on potentially significant GHG emission sources and their estimation is recorded, arranged in a table in ascending order according to the total amount of carbon emitted in the historical period in the CCMP area, and all activities below or equal to the 90th percentile are classified as significant. As definitive emission factors are often not available at the time of this calculation, they can be used from secondary information.

GHG emission factors are calculated on the pools that may be affected by the changes highlighted in green and yellow as indicated in ***Table 8*** and assume gross emissions (post deforestation cover values are disregarded). Carbon enhancement factors for the pools are assigned following ***Sections 7.5*** and ***7.8***.

As mentioned above, above-ground and below-ground biomass pools should be included. If a GHG emission source or carbon pool is not estimated, the reasons for this should be duly explained. Similarly, it is possible that information gaps may occur in the activity data. For these cases it is proposed to use the notation NA (not applicable) or NE (not estimated).

Field sampling (inventory) allows the compilation of data on forest structure and composition that feed allometric equations to estimate the carbon contained in the selected pools.

The rationale for the selection of the allometric equations must be clearly documented. The selection of its parameters must be consistent with what is shown in ***Figure 2***. In case the CCMP does not advance own developments, it is recommended to consider the process described in the reliability principle and a sub-criterion of taxonomic and ecological relevance, whereby equations are chosen according to their availability at species, genus, family, or forest type scale, in that order of choice.

In ***Table 8***, the matrix includes possible changes in land use according to IPCC (2006); it is common for the CCMP to report changes in forest/non-forest categories. Both options are valid, if they are justified.

Table 8. Matrix of land use changes that may occur in the CCMP intervention area.

Land use	Forest land (x_1)	Agricultural land (x_1)	Grassland (x_1)	Settlements (x_1)	Secondary vegetation (x_1)	Other Land (x_1)	Total (ha)
Forest land (x_2)							
Agricultural land (x_2)							
Grassland (x_2)							
Settlements (x_2)							
Secondary vegetation (x_2)							
Other Land (x_2)							
Total (ha)							

Note: The letter x represents the time variable, x_1 represents the historical period and x_2 the projection period. In green the changes (x_1 a x_2) that generate GHG emissions, in blue the removals potentially included in the CCMP and in yellow the areas susceptible to forest degradation monitoring.

The selected allometric equations should be used in the range of data in which they were constructed and follow the quantification recommendations of their authors (e.g., corrections for heteroscedasticity).

Individuals should be identified taxonomically, with herbarium support according to the allometric equations used and should preferably correspond to species scale. In case the allometric equations used are designed for ecosystems or forest types, identification of all species is not necessary.

Individuals not fully identified or without information at species level are recommended to be assigned the parameter values of the average by genus or family or the average for the species recorded in each plot, in that order. In the absence of attributable data by taxonomic category, default data may be used as recommended in ***Figure 2***.

The data in the field forms are evidence of monitoring and should be documented and available for verification and use in subsequent calculations.

6.4.1 Specific considerations for the deforestation segment

If in the CCMP, deforestation is defined as gross and immediately emitted, it is assumed that all carbon contained in above-ground and below-ground biomass pools is emitted in the same year in which the deforestation event occurs. In the case of the inclusion of a definition of net deforestation, the estimate of the statistically representative carbon content of the cover that has replaced the forest will have to be included in the calculation.

The **below-ground biomass** is considered to degrade linearly, over a period of 20 years from the time of deforestation; therefore, the annual factor corresponds to 5 % of the total below-ground biomass of the respective forest. These values are accounted for annually for 20 years, starting from the year after the deforestation/forest degradation. In the case of estimating emissions from deforestation in the **soil organic carbon** pool (optional to include), the carbon content is emitted in equal proportions over an oxidation period (recommended twenty years) after the deforestation event occurs, so each annual estimate should include the expected portion of soil emissions for the year in which the estimate is made.

The emission factors calculated for this segment are the same for the baseline scenario and the project scenario.

6.4.2 Specific considerations for the segment on forest degradation by fragmentation

The inclusion of **soil organic carbon** is optional. In any case, if included in the deforestation segment, it should be included in the deforestation segment.

Although the segment should be designed under the assumption that activities take place independently in the geographical space of the project, in case deforestation occurs, the corresponding areas should be excluded from this segment and added to the deforestation segment and emissions should be calculated with the factors of the forest degradation segment. If the same factors are applied as for the deforestation segment, they should be justified, considering that they could hardly be the same, as these are areas where forest degradation occurs.

Emission factors for this segment may be homologous to those for stable forest.

6.4.3 Specific considerations for the CSE segment

The inclusion of the **soil organic carbon** pool is optional, regardless of whether it has been included in the deforestation segment. This pool is not included in the baseline scenario, as it is assumed that all existing CO_2 will be conserved by the implementation of the CSE activities, in which case only the additional amount from the project scenario is estimated and this value is also used for the estimation of the effective removal.

6.4.4 Specific considerations for the SFM segment

The SFM emission factor is the amount of CO_2e emitted from forest harvesting, including three components:

- The degradation over time of harvested timber products.
- Emissions associated with harvesting waste.
- Impacts on the ecosystem (other trees) in the harvesting process.

If deforestation occurs in this segment, the corresponding areas should be excluded from this segment and added to the deforestation segment and emissions should be calculated with factors appropriate to this segment. These cannot be the same factors as for the deforestation segment, as these are areas where timber harvesting occurs.

The CCMP should develop the factors to be able to monitor forest harvesting by calculating impacts and wastage of timber harvesting practices in the project reference area.

6.5 GHG removal factors of the baseline scenario of the CSE segment

In this segment and scenario, a non-forest area with different cover and dynamics of carbon stock growth and decline is expected to be found. In this case, contrary to the other segments, carbon stocks in the pools are not considered static, but time-linked, so they must be defined for all the pools considered, for all the strata and on an annual basis, for the whole duration of the CCMP.

6.6 Baseline scenario activity data

The selection of activities and the procedures for the calculation of activity data should be internally consistent with the baseline scenario. If new emission sources are identified, they should be included in the project scenario and the baseline scenario re-evaluated.

6.7 System and projection period

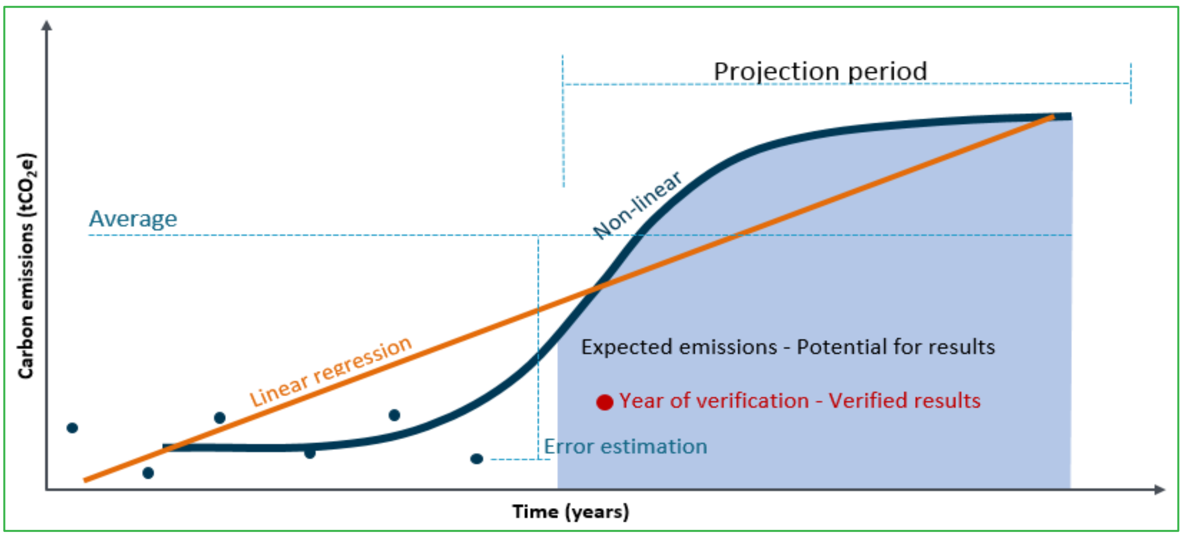
The choice of projection system in a CCMP for both deforestation and forest degradation should be a function of accuracy and relevance. To assess accuracy, the one that demonstrates the least error between model and actual data should be selected. Projections can be linear (trends or imputations of constant rates of deforestation), non-linear (e.g., logistic models) or models based on the probability of forest loss as a function of socio-economic or biophysical variables.

The relevance of the projection method is assessed in terms of choosing a reliable method (demonstrating its suitability through scientific references).

Figure 8 exemplifies the theoretical choice of method, where the total amount of emissions and potential GHG emission mitigation outcomes is the area under the curve (highlighted in blue).

The projection should include information from the historical period (annual emissions) that allows estimating the most realistic trend possible. For linear trends, all annual data from the historical series should be included. For models that partially require information from the historical series (e.g., deforestation rate from a logistic model, calculated from two years), the choice of method and years of projection should be conservative.

Figure 8. Example of projection period.



In any scenario, the same FREL projection method and calculation steps and assumptions should be used in the overlap event. Using the same projection method includes:

- Use the same calculation equations, but check that each of the assumptions are met, e.g., if at the national level a deforestation rate is calculated using the two years with the lowest rates, at the project level the years with the lowest rates in the CCMP area should be selected, not the same years as at the national level.
- Use the same period of historical data analysis.
- If there are assumptions that are not applicable to the CCMP area, justify their non-inclusion.
- Check that each of the applicable and non-applicable assumptions of the national level are met. It should be argued how they are excluded or adapted at the project level. For

example, if the national baseline scenario excludes protected areas from the potential of deforested forest, if there are no protected areas in the CCMP area, there are two options: either the exclusion criterion is justified as not applicable or the areas that will not be deforested are identified under land management, distribution or planning figures that are not included in the national baseline scenario.

6.7.1 Segment-specific analysis of deforestation

A cut-off of the activity data monitored in ***Section 13.6.1*** (avoided deforestation segment) and over the historical period should be made. This will be the base information for the projection.

Possible equations for estimating the annual deforestation projection are averages, linear projections, or non-linear projections, such as logistic or models that correlate socio-economic and biophysical variables with the probability of deforestation. Two examples are given below:

Logistic model:

$$AdefBL_x = \frac{Adef}{1 + e^{a+bx}} \quad \text{(Eq. 1)}$$

Variable	Name	Unit
$AdefBL_x$	Deforested area of the baseline scenario in year x (over the historical period).	ha
Adef	Area of forest susceptible to deforestation.	ha
e	Euler's constant.	
a	Model constant.	
bx	Annual deforestation rate for the last couple of years of the historical period.	

The imputation of a fixed annual deforestation rate, e.g., as proposed by Puyravaud (2003):

$$FDR = \left(\frac{1}{(x_2 - x_1)} \times Ln\frac{A_2}{A_1}\right) \cdot 100 \quad \text{(Eq. 2)}$$

Variable	Name	Unit
FDR	Fixed annual deforestation rate.	
X_1	Starting year of the period of analysis.	
X_2	Year-end of analysis period.	
A_1	Forest areas in the first year of the deforestation period analysed.	ha
A_2	Forest areas in the last year of the deforestation period analysed.	ha

In this case, the annual deforested area of the baseline scenario of the deforestation segment ($AdefBL_t$) would be calculated as:

$$AdefBL_t = FDR \times Adef \quad \text{(Eq. 3)}$$

Variable	Name	Unit
$AdefBL_t$	Annual deforested area of the baseline scenario of the deforestation segment.	ha
FDR	Fixed annual deforestation rate.	
Adef	Area of forest susceptible to deforestation.	ha

6.7.2 Segment-specific analysis of forest degradation

A CCMP may include forest degradation activity, where emissions from this activity are identified as significant in the project area.

Forest degradation has multiple definitions and monitoring approaches, the most common of which are its measurement as the loss of an area less than that defined as forest or by selective timber harvesting (which is assessed under SFM), both of which are relevant to this methodology.

For a segment of CCMP area to be considered under forest degradation, it must be:

- Remain under the forest category in the historical period.
- Ensure that no double counting is generated by monitoring deforestation, for which the forest degradation management segment shall be delimited and maintain separate accounting.
- Present changes in cover in areas smaller than the forest definition (fragmentation), changes in carbon content (due to selective logging) or both conditions.

In the case of monitoring forest degradation due to fragmentation, a baseline scenario should be established from the trend in emissions over the historical monitoring period for forest degradation. This period may differ from that used for deforestation but should be composed of annual data. The annual data are the product of remote sensing at a detailed scale (1:100,000). This sensing must comply with the steps described in ***Section 5.2.1*** for pre-processing and digital processing of satellite images, adjusted based on a fixed forest degradation definition.

For the construction of a baseline forest degradation scenario, activity-specific emission factors should be developed.

For the construction of a baseline forest degradation scenario, emission factors shall be constructed following reliable benchmarks, designed with suitable supports for use in measuring forest degradation, obtained by meaningful sampling and following the definition to be set in the CCMP. For a project that includes monitoring of both forest and degraded forest, the emission factor for degraded forest shall be lower when extrapolated to the same unit area than for non-degraded forest.

The definition of the historical period and the projection of forest degradation must be supported by reliable methods developed specifically for this activity. In the case of forest degradation due to fragmentation, the number of hectares of forest cover that would be fragmented without project activities during the projection period should be estimated.

As a result of the analysis of activity data and emission factors for forest degradation due to fragmentation, annual monitoring of emissions in each forest stratum is obtained, which, according to a projection system, establishes its baseline scenario.

In the case of monitoring forest degradation by changes in carbon content in areas remaining as unfragmented forests, it is recommended that this activity be approached as SFM.

6.7.3 Specific analysis of the CSE segment

The likely CSE segment generated in the area analysis must be confirmed with the results of the activity data (***Section 6.6***), such that the areas eligible for this activity are in areas that remained non-forest throughout the historical period.

In addition, the areas should correspond to the susceptibility of forest restoration that may be proposed in national restoration plans or any type of justified restoration strategy at the local scale.

In the baseline scenario, the carbon content of the pools in the areas eligible for restoration should be estimated, including when the report is zero.

6.7.4 Specific analysis of the SFM segment

A CCMP may include forest management activity from a sustainable approach when emissions from this activity are identified as significant in the project area or when it is included as part of actions to reduce forest degradation.

The areas under SFM must be areas that remain in the forest category during the historical period of the project and show reductions in their carbon content due to the extraction of timber products, their waste and associated impacts on the carbon pools. The areas may be one or several core areas, depending on the harvesting techniques and therefore harvesting areas.

The baseline SFM scenario should be constructed from information on activity over the historical period, not necessarily on an annual basis, but should demonstrate a trend in the change in carbon content per unit area. Sources of information to measure changes in carbon content can be from remote sensing over an area that maintains continuous forest cover (otherwise use a fragmentation approach) or data on forest harvesting in timber volumes. Remote sensing data should be at a detailed scale (=<1:100,000). This sensing must comply with the steps described in ***Section 5.2.1***.

Areas under SFM and forest degradation activities should develop emission factors representative of these activities. An emission factor for the same forest type under SFM or forest degradation processes is expected to be lower than that for forests of the same type without these activities.

The baseline scenario for degradation activity for forest management of timber products is the carbon emitted in the production of each cubic metre of timber due to harvesting techniques.

6.8 Baseline scenario for the SFM segment

In this segment, estimates are not made based on the usual pools associated with forests or other land uses but based on wood removals and their effects on direct and indirect carbon emissions. In this segment, for the baseline scenario, a projection is made of the wood that will be harvested annually, harvest residues, consequential damage from harvesting and timber extraction, sawmill waste and the carbon degradation period in the resulting forest products.

The required activity data basically refer to the number of cubic metres extracted from the forest annually and the amount that is processed in the sawmill.

6.9 Estimated GHG emissions and removals from the baseline scenario

The total GHG emissions and removals of the baseline scenario is the sum of the annual emissions of the projection period over the REDD+ activities included in the CCMP. The baseline scenario for the deforestation activity is described in ***Sections 6.2.1***, ***6.4.1*** and ***6.7.1***, for forest degradation in ***Sections 6.2.1***, ***6.4.2*** and ***6.7.2***, for CSE in ***Sections 6.2.2***, ***6.4.3*** and ***6.7.3*** and for SFM in ***Sections 6.4.4***, ***6.7.4*** and ***6.8***. ***Annex c*** lists different sources of supplementary information useful for the estimation and calculation of some of the variables mentioned below. The sequence and calculations of the segments that generate GHG emissions and removals from the baseline scenario are summarised below.

6.9.1 Deforestation segment sequence and calculations

Process	Variable and calculation	Data source
Baseline scenario (estimated future GHG emissions in the absence of the project)		
Analysis of drivers and causes of deforestation.		Done by developer.
Temporal delimitation.	t = CCMP year index. T = Total CCMP duration, in years.	Defined by developer.
Area delimitation.		
Reference area.		GIS layers defined by the developer based on the possibilities and analysis of actors and causes.
Potential leakage area.		
Leakage management area.		
Define the potential deforestation forest segment.		
The index of the baseline scenario stratum of the deforestation segment is defined.	f	Defined by methodology.

Process	Variable and calculation	Data source
Define the total number of strata of the baseline scenario for the segment.	TSdefBL	Defined by the developer according to the characteristics of the forest.
Define the area of each stratum f of the segment baseline scenario.	$AdefBL_f$	
Determine the above-ground biomass per unit area of each stratum f of the segment's baseline scenario.	$Abdef_f$	Acceptable inventories or references.
Determine the below-ground biomass per unit area of each stratum f of the segment's baseline scenario.	$Bbdef_f$	Field measurement or supported allometric model.
Determine the dead wood and litter per unit area of each stratum f of the segment's baseline scenario.	$Dwdef_f$	Acceptable inventories or references.
Determine soil organic carbon per unit area of each stratum f of the segment's baseline scenario.	$Socdef_f$	Field measurement or acceptable references.
Define emission sources.		CO_2 only.
Calculate emission factors for above-ground biomass and dead wood and litter (if included) for each stratum f of the segment's baseline scenario.	$EFdef_f = Abdef_f + Dwdef_f$ (Eq. 4)	Calculation.
Calculate annual below-ground biomass emission factors for each stratum f of the segment's baseline scenario.	$BBEFdef_f = \frac{Bbdef_f}{20}$ until t = 20. (Eq. 5)	Calculation.
Calculate annual soil organic carbon emission factors for each stratum f of the segment's baseline scenario.	$SOCEFdef_f = \frac{Socdef_f}{20}$ until t = 20. (Eq. 6)	Calculation.
Estimate annual deforestation activity data for each stratum f of the segment's baseline scenario.	$AdefBL_{t,f}$	Projection based on the analysis of drivers and causes of deforestation.
Estimate emissions from deforestation in each year t and each stratum f of the segment's baseline scenario.	$CO2EdefBL_{t,f} = AdefBL_{t,f} * (EFdef_f + BBEFdef_f + SOCEFdef_f)$ (Eq. 7)	Calculation.
Estimate cumulative emissions from deforestation in all strata of the segment's baseline scenario.	$CO2EdefBL = \sum_{t=1}^{T} \sum_{f=1}^{TSdefBL} CO2EdefBL_{t,f}$ (Eq. 8)	Calculation.

6.9.2 Forest degradation segment sequence and calculations

Process	Variable and calculation	Data source
Baseline scenario (estimated future GHG emissions in the absence of the project)		
Analysis of agents and causes of forest degradation.		Done by developer.
Temporal delimitation.	t = CCMP year index. T = Total CCMP duration, in years.	Defined by developer.
Area delimitation.		
Reference area.		GIS layers defined by the developer based on the possibilities and analysis of actors and causes.
Potential leakage area.		
Leakage management area.		
Define the potential forest segment for forest degradation.		
The index of the baseline scenario stratum of the forest degradation segment is defined.	i	Defined by methodology.
Define the total number of strata of the baseline scenario for the segment.	TSdegBL	Defined by the developer according to the characteristics of the forest.
Define the area of each stratum i of the segment's baseline scenario.	$AdegBL_i$	
Determine the above-ground biomass per unit area of each stratum i of the segment's baseline scenario.	$Abdeg_i$	Acceptable inventories or references.
Determine the below-ground biomass per unit area of each stratum i of the segment's baseline scenario.	$Bbdeg_i$	Field measurement or supported allometric model.
Determine the dead wood and litter per unit area of each stratum i of the segment's baseline scenario.	$Dwdeg_i$	Acceptable inventories or references.
Determine the soil organic carbon per unit area of each stratum i of the segment's baseline scenario.	$Socdeg_i$	Field measurement or acceptable references.
Define emission sources.		CO_2 only.
Calculate emission factors for above-ground biomass and dead wood and litter (if included) for each stratum i of the segment's baseline scenario.	$EFdeg_i = Abdeg_i + Dwdeg_i$ (Eq. 9)	Calculation.
Calculate annual below-ground biomass emission factors for each stratum i of the segment's baseline scenario.	$BBEFdeg_i = \frac{Bbdeg_i}{20}$ until t = 20. (Eq. 10)	Calculation.

Process	Variable and calculation	Data source
Calculate annual soil organic carbon emission factors for each stratum i of the segment's baseline scenario.	$SOCEFdeg_i = \frac{Socdeg_i}{20}$ until t = 20. (Eq. 11)	Calculation.
Estimate annual forest degradation activity data for each stratum i of the segment's baseline scenario.	$AdegBL_{t,i}$	Projection based on the analysis of actors and causes.
Estimate emissions from forest degradation in each year t and each stratum i of the segment's baseline scenario.	$CO2EdegBL_{t,i} = AdegBL_{t,i} * (EFdeg_i + BBEFdeg_i + SOCEFdeg_i)$ (Eq. 12)	Calculation.
Estimate cumulative emissions from forest degradation in all strata of the segment's baseline scenario.	$CO2EdegBL = \sum_{t=1}^{T} \sum_{i=1}^{TSdegBL} CO2EdegBL_{t,i}$ (Eq. 13)	Calculation.

6.9.3 CSE segment sequence and calculations

Process	Variable and calculation	Data source
Baseline scenario (estimated future GHG removals in the absence of the project)		
Temporal delimitation.	t = CCMP year index. T = Total CCMP duration, in years.	Defined by developer.
Area delimitation.		
Define the non-forest segment to be subject to CSE.		Developer-defined GIS layer.
The index of the baseline scenario stratum of the carbon stock enhancement segment is defined.	m	Defined by methodology.
Define the total number of strata of the baseline scenario for the segment.	TScseBL	Defined by the developer based on the coverage of non-forest areas.
Define the area of each stratum m of the segment baseline scenario.	$AcseBL_m$	
Determine the above-ground biomass per unit area in each year t and each stratum m of the segment's baseline scenario.	$AbcseBL_{t,m}$ (Assigned values).	Acceptable inventories or references.
Determine the root-to-shoot ratio for each stratum m of the segment's baseline scenario.	RSR_m (Assigned values).	Acceptable inventories or references.
Determine the below-ground biomass per unit area in each year t and each stratum m of the segment's baseline scenario.	$BbcseBL_{t,m} = AbcseBL_{t,m} * (1 - RSR_m)$ (Eq. 14)	Calculation with factor provided by the developer.

Process	Variable and calculation	Data source
Determine dead wood and litter per unit area in each year t and each stratum m of the segment's baseline scenario.	$DwcseBL_{t,m}$ (Assigned values).	Acceptable inventories or references.
Define emission sources.		CO_2 only.
Estimate removals per CSE in each year t and each stratum m of the segment's baseline scenario.	$CO2RcseBL_{t,m} = AcseBL_m * (AbcseBL_{t,m} + DwcseBL_{t,m} + BbcseBL_{t,m})$ (Eq. 15)	Calculation.
Estimate removals by CSE in all strata of the segment's baseline scenario.	$CO2RcseBL = \sum_{t=1}^{T} \sum_{m=1}^{TScseBL} CO2RcseBL_{t,m}$ (Eq. 16)	Calculation.

6.9.4 SFM segment sequence and calculations

Process	Variable and calculation	Data source
Baseline scenario (estimated future GHG emissions in the absence of a project)		
Temporal delimitation.	t = CCMP year index. T = Total CCMP duration, in years.	Defined by developer.
Area delimitation.		
Define the segment to be subject to sustainable forest management.		Developer-defined GIS layer.
Define the stratum index of the baseline scenario of the sustainable forest management segment.	q	Defined by methodology.
Define the total number of strata of the baseline scenario for the segment.	TSsfmBL	Defined by the developer based on the characteristics of the areas from which timber is harvested.
Estimate the CO_2 in wood removed in each year t and each stratum q of the segment's baseline scenario.	$WRsfmBL_{t,q}$	Estimation based on solid information (harvest data, sawmill consumption, studies, etc.).
Estimate CO_2 in harvested tree wastes and consequential harvest damages in each year t and each stratum q of the segment's baseline scenario.	$WAsfmBL_{t,q}$	Estimation based on solid information (harvest data, sawmill consumption, allometric models, etc.).

Process	Variable and calculation	Data source
Determine the sawmill waste factor for the segment's baseline scenario.	WFsfmBL	Estimation based on solid information (sawmilling efficiency studies).
Calculate CO_2 in sawmill waste in each year t and each stratum q of the segment's baseline scenario.	$SWsfmBL_{t,q} = WRsfmBL_{t,q} * WFsfmBL$ (Eq. 17)	Calculation.
Calculate the CO_2 transformed into timber products in each year t and each stratum q of the segment's baseline scenario.	$TCsfmBL_{t,q} = WRsfmBL_{t,q} - SWsfmBL_{t,q}$ (Eq. 18)	Calculation.
Define the average total degradation period (in years) of the timber products in the segment's baseline scenario.	DPBL	Defined by the developer with solid support.
Calculate the total CO_2 emitted per timber harvest in each year t and each stratum q of the segment's baseline scenario.	$TECsfmBL_{t,q} = \sum_{q=1}^{\mathrm{TSsfmBL}} \frac{TCsfmBL_{t,q} * (t-1)}{DPBL}$ (Eq. 19)	Calculation.
Calculate the total CO_2 emissions as a result of timber harvesting from the segment's baseline scenario since the start of the project.	$CO2EmfsBL = \sum_{t=1}^{T} \sum_{q=1}^{TSsfmBL} (WAsfmBL_{t,q} + SWsfmBL_{t,q} + TECsfmBL_{t,q})$ (Eq. 20)	Calculation.

7 Project scenario

The project scenario depends mainly on the activities carried out on the territory and their effect on deforestation or forest degradation. The calculation of GHG emissions should correspond to the result of the change in GHG emission sources and the selected carbon pools for which the following general steps should be followed:

1. Calculation of total and annual baseline scenario emissions expected for the projection period (***Section 6.7***).
2. Implementation of project actions in the territory (***Section 7.1***).
3. Quantification of results (***Sections 7.8*** and ***7.9***).

In addition, leakage (***Section 7.10***) and compliance with safeguards and Sustainable Development Goals (SDGs) (***Sections 9*** and ***11***) in the CCMP project area must be analysed and described.

GHG emission reductions directly resulting from non-REDD+ activities implemented as part of the CCMP (e.g., by the implementation of efficient cookstoves) shall be excluded from the calculations and only their indirect effects on the included segments shall be considered.

7.1 Mitigation actions

Once the REDD+ activity data has been estimated and the drivers and causes of deforestation or forest degradation in the CCMP area have been identified, the actions to be contained in the REDD+ project are determined, initiated, and documented.

In the implementation of REDD+ projects, actions should be territorial, i.e., not exclusively focused on policy changes, although if they exist, they should be reported.

Territorial actions must be supported by the commitment of landowners and landholders to cooperate in the project's actions.

Actions can be developed exclusively with communities, in partnership with government institutions or with private actors. In each case, the starting date of the activity and the period in which deforestation reduction is generated due to its implementation should be specified.

Note 1: The wider range of time over which any project activity is generating change in REDD+ activity determines the duration of the CCMP.

Note 2: The point at which the generation of changes in REDD+ activities by CCMP activities starts determines the end point of the historical period and the beginning of the projection period (without and with project scenarios).

7.1.1 Specific avoided deforestation considerations

Actions to reduce deforestation must be aligned with the forest policy in force in the country where the CCMP is implemented. Possible actions for reducing deforestation at project level are included in ***Annex b***.

Actions to reduce deforestation can be synergistic, complementary, or identical to those undertaken to achieve avoided forest degradation.

The avoided deforestation of the project scenario arises from the comparison of the expected deforestation of the corresponding segment and the annual data during the result period.

7.1.2 Specific considerations on avoided forest degradation

To report results in areas under avoided forest degradation, in terms of maintenance of forest cover (forest remaining forest), specific emission factors must be developed for each type of management or degradation process.

The avoided forest degradation of the project scenario arises from the comparison of the expected degradation of the corresponding segment and the annual data during the result period, obtained by territorial actions and synergy with local and national policy actions.

7.1.3 Specific considerations on SFM

SFM can be part of actions to reduce deforestation and forest degradation, i.e., as part of the measures implemented by the CCMP to change forest loss trends, therefore it can be included in two ways, as an action or as an activity that seeks to generate additional results.

In case of including SFM as a REDD+ activity generating mitigation outcomes, a detailed description shall be provided on how changes in the sub-processes of timber management, harvesting, mobilisation, industrialisation, and marketing are generating GHG emission reductions or additional removals.

When included as a REDD+ activity, the SFM must establish a baseline scenario and a project scenario, the latter ensuring lower emissions on managed forest areas by strengthening the management, management, harvesting, mobilisation, industrialisation, and commercialisation of forest resources.

SFM actions must be carried out within the framework of the permits required by the forest harvesting regimes (laws, decrees, resolutions, or agreements) in each country and according to land use planning.

Actions supporting SFM should promote the permanence of forest areas in terms of their extent, composition, and characteristics, as well as the efficient use of wood.

Monitoring of GHG emission reductions or GHG removals by SFM should ensure no double counting with deforestation reduction, so that areas under SFM should not be included in the accounting of deforestation reduction; thus, in areas under SFM the effect on maintenance of forest cover and efficiency in the production of timber forest products can be accounted for.

To report results in areas under SFM in terms of maintenance of forest cover (forest remaining forest), specific emission factors must be developed for each management type.

To report results for the maintenance of forest cover (forest remaining as forest) in areas under SFM, areas must demonstrate the probability of loss under the No Management scenario.

The following are indicative questions for assessing the SFM process, where affirmative answers increase feasibility and negative answers guide the development of enabling conditions:

- Are the CCMP forests productive in terms of timber?
- Is there reliable information on current harvesting systems?
- Is traceability, measurement, and monitoring of harvesting processes feasible?
- Are there forest management processes?
- Are there forest management processes in the CCMP area?
- Are there reliable censuses of harvesting units?
- Is there reliable information on the volume of timber moved?
- Is there information on the volume of timber industrialised and marketed?

In cases where industrialisation improvement processes are generated, it must be ensured that these results are not being counted for certification and carbon trading purposes in other CCMPs.

If the project wishes to credit carbon sequestered in wood products, it shall know and report the products and destination of wood harvested from forestry activities, to consider the estimated degradation times of the products. At a minimum, the CCMP shall report the following variables and include them in the calculation of GHG removals:

- Inclusion of timber forest products with a life of more than 20 years. Difference between the useful life of products in the historical period and in the project scenario.
- Forest products in the historical period and in the crediting results period.
- Annual carbon in processed solid wood, chipboard, roundwood, paper and other products.
- Number of residues per type of solid wood, chipboard, roundwood, paper and other products.
- Oxidation rate (or degradation patterns) of processed solid wood, chipboard, roundwood, paper, etc. products.
- Oxidation rate (or degradation patterns) of waste.

The SFM of the project scenario arises from the comparison of GHG emissions with the expected management of the corresponding segment and annual data during the result period, obtained by territorial actions and synergy with local and national policy actions.

7.1.4 CSE-specific considerations

The GHG removals achieved by the CCMP are represented by the carbon sequestered during the project results period in the CSE segment because of CCMP actions.

Forest restoration processes should be implemented under areas of forest suitability. The layer for the identification of areas with forest suitability for restoration processes corresponds to the identification of susceptible areas in national restoration plans. The CCMP shall identify the susceptible areas in the CSE segment on which planting processes can be carried out.

If the scale of representation of the map of susceptible areas (1:100,000) does not allow the correct identification of the areas susceptible to restoration of the segment, planting may be carried out in areas that have been deforested (10 years prior to the implementation of the CCMP) or that by mandate of the country's territorial planning are areas earmarked for restoration.

- **Quantifying methodologies**

The use of methodologies relevant to each CSE activity as reported by the Clean Development Mechanism (CDM), those used in subcategories 3A - 3B and 3C, according to the IPCC GPG categories or those proposed in national forest monitoring systems but implemented in a representative manner in the project area and including the concept of dynamic equilibrium, shall be preferred. Other reliable methods (according to the reliability principle) can be implemented in case the CCMP includes an activity whose quantification method is not reported in the CDM, national forest monitoring systems or IPCC GPG.

- **GHG removal calculation including the concept of dynamic equilibrium**

The calculation of the potential removal per hectare should be the product of a dynamic equilibrium analysis. The dynamic equilibrium is established as a function of the period over which CSE actions take effect, the rate of tree growth (and carbon accumulation in other compartments) and of harvesting and disturbance events.

Steps for building a clearance potential

Step 1. Identify growth rates by species or cover under CSE activities.

Step 2. Justify and fit a forest species growth model, based on the growth rate, e.g., logistic (linear trends are also valid), considering that the maximum possible accumulation corresponds to the dynamic equilibrium.

Step 3. Generate a growth model as a function of the variables time and total biomass (or carbon), as a minimum.

As it is common for field data and growth models to be a function of diameter at breast height (among other variables), there are two options for estimating carbon from these data. The first is the use of allometric equations for the conversion of diameter and diameter growth to biomass (carbon). The second option is the use of expansion factors if you want to follow the conversion path from commercial volumes to total volume and calculate biomass using a basic density (green volume/anhydrous weight). Both ways are valid, if their use is justified.

Step 4. Consolidate a table with Annual Running Increments for the set of species, in which removals are quantified for each year of restoration initiation and for each stratum of the restoration system. These diameter increments are transformed into the estimated carbon sequestration according to the model obtained in Step 3.

In carrying out the above steps bear in mind that:

For the conversion of biomass to carbon you can use the default content reported per species from a reliable source or the internationally recognised default of 0.47. For carbon to CO_2 removals use the factor 44/12.

The rationale for the selection of the allometric equations must be clearly documented. Their parameters should be consistent with ***Figure 2*** and their selection. In case the CCMP does not advance own developments, this should be done additionally through the sub-criterion of taxonomic and ecological relevance, i.e., equations designed for the same species, genera, families, or forest types are chosen, in that order of choice.

Allometric equations should be used in the range of data they were constructed and follow the quantification recommendations of their authors (e.g., corrections for heteroscedasticity).

Where allometric equations are at species level, species should be identified with herbarium support.

For individuals not fully identified or without developed information at species scale, it is recommended to assign as parameter values the average per species, genus, or family of the average for the species recorded in each plot, in that order. In the absence of imputable data by taxonomic category, default data may be used as recommended in ***Figure 2***.

Carbon should be quantified in the period in which GHG removal actions influence land, and the results of biotic component offset actions should not be counted. The projection period for carbon accumulation shall not exceed the time in which dynamic equilibrium is reached for the above-ground and below-ground biomass compartments.

CSE activities may include the establishment of new trees or the maintenance of previously established trees as part of compensation for impacts to the biotic component or other reasons for establishment. However, only the carbon obtained between the state in which the CSE activities were left and included in the CCMP activities at the time of completion of the offset activities and until the time when dynamic equilibrium is achieved can be certified.

For the detection of established or maintained areas of CSE activities, inventories with a geostatistical framework, remote sensing processes or verifiable cadastral surveys can be carried out. Documentation should also be provided to verify the timing of establishment and maintenance actions, such as invoices or contracts.

Carbon pool enhancement activities may not be established or counted in terms of mitigation outcomes when implemented in deforested areas ten years before the start of the CCMP.

The holder of the CCMP must ensure that the carbon enhancement activities and thus the mitigation results achieved have not been credited under another mitigation project.

As part of the activity data collection, the holder of a CCMP that includes CSEs must describe disturbance events and their impacts on the carbon pools, such as flood damage, fire, pest attacks or others, if they occur in the historical period, as well as realised wood harvests. This information must be considered in the calculation of the dynamic equilibrium and thus in the baseline and project scenarios.

7.2 Stratification of the project scenario

Where segments (deforestation, forest degradation, CSE and SFM) have different stratification criteria or classes in the stratification criteria compared to the baseline scenario, a different stratification than the baseline scenario will be necessary.

As in the baseline scenario, in any case where stratification is necessary, it will be necessary to define the coverage of each stratum in each segment. If, in any of the segments, scenarios or in the implementation of activities, no subdivision of areas is required, a single stratum will be considered to exist (and therefore the corresponding sub-index will have a single value equal to one).

7.3 Carbon pools

All pools covered by the CCMP in the baseline scenario must be considered in the project scenario and in the same segments (following the principle of internal consistency). Furthermore, no pools may be added or removed during the duration of the CCMP (***Section 6.2***).

In the framework of this methodology, the inclusion of above-ground and below-ground biomass pools is mandatory as a minimum.

7.3.1 Specific consideration for avoided deforestation and avoided forest degradation segments

In these segments, all selected pools are assumed to remain constant in areas that remain as forest, and therefore the values defined for each pool remain static for the duration of the CCMP.

7.3.2 Specific consideration for the CSE segment

In this segment, the carbon pools are considered dynamic in the baseline and project scenarios, as well as during the implementation of the CCMP, as these pools have not reached a dynamic equilibrium and therefore need to be calculated annually for both scenarios and measured in the field or calculated by allometric models at the time of monitoring.

7.3.3 Specific considerations for the SFM segment

In this segment, we do not use a classical ecosystem pool approach, but instead track the timber products extracted and processed from the forest and the consequential damage caused by this activity.

7.4 Sources of GHG emissions

The GHG emission sources that can be included or excluded from the project activity are shown in ***Table 7***. Their selection should demonstrate internal consistency with the emission sources included in the baseline scenario.

7.4.1 Potential leakage area

Based on the characterisation of agents and causes of deforestation and forest degradation, a potential area of leakage is defined, outside the CCMP monitoring area, based on four criteria:

1) Areas where the same productive activities associated with the agents and causes of deforestation or forest degradation are present.
2) Ecosystem equivalence with the project area.
3) Micro-watersheds adjacent to the project monitoring area (if in the reference area).
4) Areas of stable forest.

Where demonstrable evidence can be collected that deforestation in the potential leakage area is attributable to deforestation agents that are not linked to the CCMP area, the detected deforestation may not be attributable to the project activity and may be considered leakage.

Over this potential leakage area, a leakage management area (define in ***Section 5.3***) is delimited.

The possible sources of GHG emissions due to leakage that can be included or excluded from the project activity are shown in ***Table 9***.

Table 9. Leakage covered by a CCMP.

Source	GHG	Included	Explanation
Displacement by grazing and livestock production	CO_2	Optional	It will be considered if it is significant in the potential leakage area.

Source	GHG	Included	Explanation
	CH_4	Optional	It will be considered if it is significant in the potential leakage area.
	N_2O	No	Excluded (manure management is not included in the scope of this methodology).
Displacement due to agricultural activities	CO_2	Optional	It will be considered if it is significant in the potential leakage area.
	CH_4	Optional	It will be considered if it is significant in the potential leakage area.
	N_2O	No	Excluded.
Increased use of fertilisers	CO_2	No	Excluded.
	CH_4	No	Excluded.
	N_2O	Optional	It will be considered if it is significant in the potential leakage area.
Wood harvesting	CO_2	Optional	It will be considered if it is significant in the potential leakage area.
	CH_4	Optional	It will be considered if it is significant in the potential leakage area.
	N_2O	No	Excluded.
Deforestation	CO_2	Yes	It will be considered if it is significant in the potential leakage area.
	CH_4	Optional	It will be considered if it is significant in the potential leakage area.
	N_2O	No	Excluded.

The relevance of the inclusion of leakage in the CCMP is defined by entering the monitoring area in the CCMP. If the project is in overlap with a reference level, leakage is not accounted for.

7.5 Project scenario GHG emission and removal factors

All GHG emission factors considered by the CCMP in the baseline scenario must be considered in the project scenario.

CO_2 removals come from the relatively continuous increase of carbon stocks in the different pools considered in the baseline scenario, due to restoration processes. In this segment no factors are used per se, but it is necessary to use annual current increment data (or duly justified equivalent models) to establish the project scenario.

7.6 Project scenario activity data

The selection of activities and the procedures for the calculation of activity data should be internally consistent with the baseline scenario. If new emission sources are identified, they should be included in the project scenario and the baseline scenario re-evaluated.

Monitoring of activity data should be carried out over the years of the results period, in the monitoring area and in the leakage area.

For avoided deforestation, avoided degradation by fragmentation and CSE, monitoring is done annually; for avoided degradation by SFM, monitoring may be done over longer periods depending on information on volumes of timber harvested.

7.7 Project scenario for the SFM segment

Like the baseline scenario for this segment, estimates are made for timber harvesting and its effects on direct and indirect carbon emissions and a projection of the timber that will be harvested annually under a higher efficiency scenario, in terms of the production of harvest residues, consequential damage from harvesting and timber extraction, as well as a possible improvement in sawmill waste and the carbon degradation period of the resulting forest products.

The improvement of the listed processes leads to a reduction of CO_2 emissions that can be monitored in projects using this methodology for crediting.

The required activity data basically refer to the amount of cubic metres extracted from the forest annually and the amount that is processed in the sawmill, which allow the estimation of the scenario based on optimised emission factors for harvesting and consequential damage, sawmill losses and duration of final products.

7.8 Estimated removals from the implementation of CCMP activities

The sequence and calculations of the CSE segment that achieve the GHG removal of the project scenario are summarised below. ***Annex c*** lists different sources of complementary information useful for the estimation and calculation of some variables mentioned below.

7.8.1 CSE segment sequence and calculations

Process	Variable and calculation	Data source
Project scenario (estimated future GHG removals if the project were to be implemented)		
Define actions to increase the segment's carbon stock.		Defined by developer.
The index of the project scenario stratum of the carbon stocks enhancement segment is defined.	n	Defined by methodology.
Define the total number of layers of the project scenario for the segment.	TScseP	Defined by the developer according

Process	Variable and calculation	Data source
		to the characteristics of the forest.
Define the area of each stratum n of the segment project scenario.	$AcseP_n$	Defined by the developer according to the CSE systems he plans to implement.
Estimate the annual CSE activity data for each stratum n of the segment project scenario.	$AcseP_{t,n}$	Delimitation by the developer according to the planned restoration activity.
Determine the above-ground biomass per unit area in year t and stratum n of the project scenario of the carbon stocks enhancement segment.	$AbcseP_{t,n}$ (Assigned values).	Well-substantiated growth models or current annual growth data.
Determine the root-to-shoot ratio for each stratum n of the segment project scenario.	RSR_n (Assigned values).	Acceptable inventories or references.
Determine the below-ground biomass per unit area in each year t and each stratum n of the segment project scenario.	$BbcseP_{t,n} = AbcseP_{t,n} * (1 - RSR_n)$ (Eq. 21)	Calculation with factor provided by developer.
Determine dead wood and litter per unit area in each year t and each stratum n of the segment project scenario.	$DwcseP_{t,n}$ (Assigned values).	Acceptable inventories or references.
Determine the additional soil organic carbon per unit area in each year t and each stratum n of the segment project scenario.	$SoccseP_{t,n}$	Field measurement or acceptable references.
Estimate removals per CSE in each year t and each stratum n of the segment project scenario.	$CO2RcseP_{t,n} = AcseP_{t,n} * (AbcseP_{t,n} + DwcseP_{t,n} + BbcseP_{t,n} + SoccseP_{t,n})$ (Eq. 22)	Calculation.
Calculate the removals by CSE in all strata of the project scenario for the segment.	$CO2RcseP = \sum_{t=1}^{T} \sum_{n=1}^{TScseP} CO2RcseP_{t,n}$ (Eq. 23)	Calculation.

7.9 Estimated avoided emissions from the implementation of CCMP activities

The sequence and calculations of the avoided deforestation, avoided forest degradation and SFM segment that achieve the GHG emission reduction of the project scenario are summarised below. ***Annex c*** lists different sources of complementary information useful for the estimation and calculation of some variables mentioned below.

7.9.1 Avoided deforestation segment sequence and calculations

Process	Variable and calculation	Data source
Project scenario (estimated future GHG removals if the project were to be implemented)		
Define actions to reduce deforestation in the segment.		Defined by developer.
Defines the index of the project scenario stratum of the deforestation segment.	g	Defined by methodology.
Define the total number of strata in the project scenario of the deforestation segment.	TSdefP	Defined by the developer, depending on the characteristics of the forest.
Define the area of stratum g of the project scenario of the deforestation segment.	$AdefP_g$	Determined by developer.
Estimate the projected deforested area in year t and stratum g of the deforestation segment project scenario.	$AdefP_{t,g}$	Projection based on the overlap condition with a FREL or on the analysis of agents and causes and the effectiveness of planned activities.
Determine the above-ground biomass per unit area of stratum g of the deforestation segment project scenario.	$Abdef_g$	Acceptable inventories or references.
Determine the below-ground biomass per unit area of stratum g of the project scenario of the deforestation segment.	$Bbdef_g$	Field measurement or supported allometric model.
Determine the dead wood and litter per unit area of stratum g of the deforestation segment project scenario.	$Dwdef_g$	Acceptable inventories or references.
Determine the soil organic carbon per unit area of stratum g of the project scenario of the deforestation segment.	$Socdef_g$	Field measurement or acceptable references.

Process	Variable and calculation	Data source
Calculate the above-ground biomass and dead wood and debris (if included) emission factors for deforestation for each stratum g of the segment project scenario.	$EFdef_g = Abdef_g + Dwdef_g$ (Eq. 24)	Calculation.
Calculate the annual below-ground biomass emission factors for each stratum g of the segment project scenario.	$BBEFdef_g = \frac{Bbdef_g}{20}$ until t = 20. (Eq. 25)	Calculation.
Calculate annual soil organic carbon emission factors for each stratum g of the segment project scenario.	$SOCEFdef_g = \frac{Socdef_g}{20}$ until t = 20. (Eq. 26)	Calculation.
Calculate emissions from deforestation in each year t and each stratum g of the segment project scenario.	$CO2EdefP_{t,g} = AdefP_{t,g} * (EFdef_g + BBEFdef_g + SOCEFdef_g)$ (Eq. 27)	Calculation.
Calculate emissions from deforestation for all strata of the segment's project scenario.	$CO2EdefP = \sum_{t=1}^{T} \sum_{g=1}^{TSdefP} CO2EdefP_{t,g}$ (Eq. 28)	Calculation.

7.9.2 Sequence and calculations of avoided forest degradation segment

Process	Variable and calculation	Data source
Project scenario (estimated future GHG emissions if the project were to be implemented)		
Define actions to reduce forest degradation in the segment.		Defined by developer.
Define the degradation segment project scenario stratum index.	j	Defined by methodology.
Define the total number of strata in the project scenario of the degradation segment.	TSdegP	Defined by the developer according to the characteristics of the forest.
Area of stratum j of the project scenario of the degradation segment.	$AdegP_j$	Determine by developer.
Projected area of degradation in year t and stratum j of the degradation segment project scenario.	$AdegP_{t,j}$	Projection based on the analysis of agents and causes and the effectiveness of planned activities.
Determine the Above-ground biomass per unit area of stratum j	$Abdeg_j$	Acceptable inventories or references.

Process	Variable and calculation	Data source
of the degradation segment project scenario.		
Determine the belowground biomass per unit area of stratum j of the project scenario of the degradation segment.	$Bbdeg_j$	Field measurement or supported allometric model.
Determine the dead wood and litter per unit area of stratum j of the degradation segment project scenario.	$Dwdeg_j$	Acceptable inventories or references.
Determine the soil organic carbon per unit area of stratum j of the degradation segment project scenario.	$Socdeg_j$	Field measurement or acceptable references.
Calculate the above-ground biomass and dead wood and litter (if included) emission factors for forest degradation for each stratum j of the segment project scenario.	$EFdeg_j = Abdeg_j + Dwdeg_j$ (Eq. 29)	Calculation.
Calculate the annual belowground biomass emission factors for each stratum j of the segment project scenario.	$BBEFdeg_j = \frac{Bbdeg_j}{20}$ until t = 20. (Eq. 30)	Calculation.
Calculate annual soil organic carbon emission factors for each stratum j of the segment project scenario.	$SOCEFdeg_j = \frac{Socdeg_j}{20}$ until t = 20. (Eq. 31)	Calculation.
Calculate emissions from forest degradation in each year t and each stratum j of the segment project scenario.	$CO2EdegP_{t,j} = AdegP_{t,j} * (EFdeg_j + BBEFdeg_j + SOCEFdeg_j)$ (Eq. 32)	Calculation.
Calculate emissions from forest degradation in all strata of the segment project scenario.	$CO2EdegP = \sum_{t=1}^{T} \sum_{j=1}^{TSdegP} CO2EdegP_{t,j}$ (Eq. 33)	Calculation.

7.9.3 SFM segment sequence and calculations

Process	Variable and calculation	Data source
Project scenario (estimated future GHG emissions if the project were to be implemented)		
Define the stratum index of the project scenario stratum of the sustainable forest management segment.	r	Define by methodology.
Define the total number of strata in the project scenario of the sustainable forest management segment.	TSsfmP	Defined by the developer based on the characteristics of the areas from

Process	Variable and calculation	Data source
		which timber is harvested.
Estimate CO_2 in wood removed in year t and stratum r of the project scenario of the sustainable forest management segment.	$WRsfmP_{t,r}$	Estimation based on solid information (harvest data, sawmill consumption, studies, etc.).
Estimate CO_2 in harvested tree waste and consequential harvesting damage in year t and stratum r of the project scenario of the sustainable forest management segment.	$WAsfmP_{t,r}$	Estimation based on solid information (harvest data, sawmill consumption, allometric models, etc.).
Determine the sawmill waste factor for the project scenario of the sustainable forest management segment.	WFsfmP	Estimation based on solid information (sawmilling efficiency studies).
Calculate CO_2 in sawmill waste in each year t and each stratum r of the segment project scenario.	$SWsfmP_{t,r} = WRsfmP_{t,r} * WFsfmP$ (Eq. 34)	Calculation.
Calculate the CO_2 transformed into timber products in each year t and each stratum r of the segment project scenario.	$TCsfmP_{t,r} = WRsfmP_{t,r} - SWsfmP_{t,r}$ (Eq. 35)	Calculation.
Define the average total degradation period (in years) of the timber products in the segment's project scenario.	DPP	Defined by the developer with solid support.
Calculate the total CO_2 emitted per timber harvest in each year t and each stratum r of the segment project scenario.	$TECsfmP_{t,r} = \frac{TCsfmP_{t,r} * (t-1)}{\mathrm{DPP}}$ (Eq. 36)	Calculation.
Calculate the total CO_2 emissions as a result of sustainable forest management of the segment project scenario from the start of the project.	$CO2EmfsP = \sum_{t=1}^{T} \sum_{r=1}^{TSsfmP} \left(WAsfmP_{t,r} + SWsfmP_{t,r} + TECsfmP_{t,r}\right)$ (Eq. 37)	Calculation.

7.10 Leakage estimation

For the potential leakage area, estimates of potential leakage emissions resulting from the CCMP (for both the deforestation and forest degradation segments) shall be made based on percentage increases in deforestation and forest degradation over the estimated annual deforestation projection for the project area and applying the same factors and calculation methods used for the project area. The values resulting from such estimation will be represented by **LEdefP** (total CO_2 emissions from leakage from the project scenario of the deforestation segment) and **LEdegP** (total CO_2 emissions from leakage from the project scenario of the forest degradation segment).

Annex c lists different sources of complementary information useful for the estimation and calculation of leakage emissions.

8 Estimated total projected *ex-ante* GHG emissions and removals

Using the same method used to estimate activity data and emission factors, the volume of results is calculated for each year by comparing the expected data from the baseline scenario with that obtained because of the implementation of the project's actions. ***Table 10*** below summarises the quantification of total GHG emissions and removals generated and avoided by the scope of the CCMP.

Table 10. Summary of quantification of results.

Year	CO2RcseP		$CO2EP_{Tx}$		CO2RcseBL		$CO2EBL_{Tx}$		LEdefM + LEdegM		Buffer		REDD+	
	tCO_2e Annual	*tCO_2e Accum*	*tCO_2e Annual*	*tCO_2e Accum*	*tCO_2e Annual*	*tCO_2e Accum*	*tCO_2e Annual*	*tCO_2e Accum*	*tCO_2e Annual*	*tCO_2e Accum*	*tCO_2e Annual*	*tCO_2e Accum*	*tCO_2e Annual*	*tCO_2e Accum*
Total														

CO2RcseP = Removal in all strata of the CSE segment under the project scenario; $CO2EP_{Tx}$ = Avoided GHG emissions in all strata of the deforestation, forest degradation and SFM segments under the project scenario; CO2RcseBL = Removal in all strata of the CSE segment under the baseline scenario; $CO2EBL_{Tx}$ = Avoided GHG emissions in all strata of the deforestation, forest degradation and SFM segments under the baseline scenario. Annual removals and avoided emissions are summed under the project scenario and annual removals and emissions under the baseline scenario are subtracted. In addition, annual allowances are made for risks and uncertainty (Buffer) and leakage (LEdefM + LEdegM = Emissions due to leakage in the deforestation and forest degradation segments respectively, under the project scenario) to obtain the annual output value, the summation of which over the crediting period results in the project output volume.

Based on ***Table 8*** and ***Figure 4*** the point at which the historical period ends and the results period (projection period) begins is identified, which corresponds to the point at which CCMP actions have an effect on REDD+ activities.

Using the same methods and procedures with which activity data and emission factors are estimated in the historical period, during the crediting period, the volume of results is calculated for each year by comparing the expected (projected) data with that obtained because of the implementation of the CCMP actions.

The results are expressed annually, in tonnes of carbon dioxide (tCO_2) over the entire crediting period.

If a CCMP overlaps with a FREL that includes national circumstances, these will be subject to methodological reconstruction and therefore quantifiable at the project level, provided that the project area meets the assumptions underlying the assignment of such circumstances.

8.1 Avoided deforestation segment sequence and calculations

Process	Variable and calculation	Data source
Estimación del potencial total de mitigación del segmento de deforestación		
Calculate the total mitigation in each year t of the segment.	$TMdef_t = \sum_{f=1}^{TSdefBL} CO2EdefBL_{t,f} - \sum_{g=1}^{TSdefP} CO2EdefP_{t,g}$ (Eq. 38)	Calculation.
Calculate the total mitigation of the segment.	$TMdef = \sum_{t=1}^{T} TMdef_t$ (Eq. 39)	Calculation.

8.2 Sequence and calculations of avoided forest degradation segment

Process	Variable and calculation	Data source
Estimation of the total mitigation potential of the forest degradation segment		
Calculate the total mitigation in each year t of the segment.	$TMdeg_t = \sum_{i=1}^{TSdegBL} CO2EdegBL_{t,i} - \sum_{j=1}^{TSdegP} CO2EdegP_{t,j}$ (Eq. 40)	Calculation.
Calculate the total mitigation of the segment.	$TMdeg = \sum_{t=1}^{T} TMdeg_t$ (Eq. 41)	Calculation.

8.3 CSE segment sequence and calculations

Process	Variable and calculation	Data source
Estimation of the total mitigation potential of the CSE segment		
Calculate the total mitigation of the segment.	$TMcse = \sum_{n=1}^{TScseP} CO2RcseP_{t,n} - \sum_{m=1}^{TScseBL} CO2RcseBL_{t,m}$ (Eq. 42)	Calculation.

8.4 SFM segment sequence and calculations

Process	Variable and calculation	Data source
Estimation of the total mitigation potential of the SFM segment		
Calculate the total mitigation of the segment.	$TMsfm = CO2EmfsBL - CO2EmfsP$ (Eq. 43)	Calculation.

8.5 Calculation of the total CCMP mitigation potential

The estimate of the total mitigation potential of the CCMP in the four segments (TPM) is calculated as:

$$TPM = TMdef + TMdeg + TMcse + TMsfm \qquad \text{(Eq. 44)}$$

Variable	Name	Unit
TPM	Total project mitigation in all four segments.	tCO_2
TMdef	Total mitigation of the deforestation segment.	tCO_2
TMdeg	Total mitigation of the degradation segment.	tCO_2
MTcse	Total mitigation of the carbon stocks enhancement segment.	tCO_2
TMsfm	Total mitigation of the sustainable forest management segment.	tCO_2

For verification, certification, and credit registration purposes, CCMP shall disaggregate the annual mitigation, by pool and segment, achieved during each verification period, as shown in ***Table 11***.

Table 11. Disaggregation of annual mitigation achieved during each verification period.

Carbon pool	Included?	Year	Segment				Total
			Def	Deg	Cse	Sfm	
Above-ground bio-mass							**0**
							0
							0
Belowground bio-mass						NA	**0**
						NA	**0**
						NA	**0**
						NA	
						NA	
Dead wood and coarse and fine lit-ter						NA	**0**
						NA	
						NA	
						NA	
						NA	
Wood products			NA	NA	NA		**0**
			NA	NA	NA		
			NA	NA	NA		
			NA	NA	NA		
			NA	NA	NA		

Carbon pool	Included?	Year	Segment				Total
			Def	Deg	Cse	Sfm	
Soil organic carbon						NA	**0**
						NA	**0**
						NA	**0**
						NA	
						NA	
Total			**0**	**0**	**0**	**0**	**0**

9 Safeguards

It is recommended that the definitions and monitoring systems for safeguards considered in the CCMP follow the guidelines that each country includes in their reports, in accordance with UNFCCC decision 12/CP19, as shown in ***Annex a***. In addition, the CCMP should be implemented following the participation protocol set out in ***Section 4.4***.

The implementation of activities and benefit sharing should be transparent and known to the communities and local governance structures in the CCMP area. Most project benefits and monetised funding (+50 %) from the gross (undiscounted) sale of carbon credits should reach communities through sustainable productive enterprises, payments for environmental services or actions to strengthen local forest governance.

In the case of contracts between technical intermediaries and communities, it is recommended that these should not exceed ten years, which can be renewed according to the will of the communities.

In addition, the CCMP must comply with the following:

- It should be based on transparency of information between technical partners and communities, where the costs of implementing mitigation actions in the territory, the procedures for generating CCMP documents, validation, verification and sale of certified carbon units and other transactional costs should be openly known. The information will be made transparent through the effective participation process.
- Agreements and contracts to demonstrate the administrative capacity of the CCMP holder over its monitoring area should not include changes in holdership, possession, or occupation by communities, nor should they establish concession processes between communities and technical partners.
- It must have a strategy for empowering local communities to manage the CCMP. No longer than fifteen years.
- CCMP actions should be complementary to national forest objectives. The project should cite which of the national and public policy goals it contributes to through the implementation of its activities.
- CCMP activities shall be governed within the framework of national laws and human rights standards and international agreements ratified by the country.
- It must identify and report on measures to prevent corruption processes, in accordance with national laws and international agreements ratified by the country.
- It should ensure and report on measures to avoid infringing land tenure and land use rights. The CCMP should be based on the documented will of communities and landowners.
- It must report on measures for the maintenance and promotion of the knowledge, practices, and techniques of ethnic communities.
- It must avoid the conversion of any wild ecosystem for the purpose of implementing any CCMP activity. It must also avoid the detriment of alpha, beta, and gamma biodiversity indicators in the project area.

- It must avoid the use of invasive species or species with invasive potential in the execution of its activities.

10 Risks, uncertainty, and non-permanence

Under this methodology, non-permanence is controlled by buffering a percentage of the credits earned by CCMPs, in proportion to their identified risks. This percentage is calculated using ***Cercarbono's Tool to Estimate Carbon Buffer in Initiatives to Mitigate Climate Change in the Land Use Sector***. The rules for its calculation and subsequent return are detailed in the Tool's Guidelines, both available at www.cercarbono.com, section: Documentation.

The CCMP should include the quantification of the aggregate uncertainty of the mitigation results, i.e., the product of the uncertainties in each of its components: activity data, emission factors, projection method and all subsequent factors in these calculations.

It is recommended to include at least the following sources of uncertainty:

- Uncertainty due to measurement errors and bias: error in observed quantities such as catch or dasometric parameters.
- Uncertainty in the calculation process: probability of making errors in typing, arithmetic, or interpretation of results.
- Model uncertainty: misspecification of the structure or interpretation of models.
- Estimation uncertainty: the uncertainty that can result from anyone, or a combination, of the uncertainties described above and is the inaccuracy and imprecision in the annual volume of CCMP results.
- Implementation uncertainty is the consequence of variability resulting from a management policy, e.g., the inability to exactly achieve the objective of a mitigation strategy. Sources of uncertainty include not only statistical error in detecting population status and environmental trends or errors in population analysis, but also erroneous decisions and an inefficient management framework.

11 Contributions to the United Nations Sustainable Development Goals

Under the Cercarbono programme, CCMPs are required to report contributions to the SDGs using the ***Cercarbono's Tool to Report Contributions from Climate Change Mitigation Initiatives to the Sustainable Development Goals***, which is available at www.cercarbono.com, section: Documentation. The review of the application of this tool will be part of the verification process. **The SDG Tool Rubric** must be duly signed by the VVB in charge of the verification.

12 Grouped projects

Grouped projects are those designed as such, which have a pre-defined binding factor, which allows for the addition of new participants or operational units (instances) that are not known at the time of their design or at the beginning of their implementation. Grouped projects must be defined as such from the beginning. A non-grouped project that has already been validated cannot be converted into a grouped project at a later stage.

For the implementation of each instance, it must be demonstrated that it meets all eligibility requirements.

Only instances may be grouped together:

- Which are in the same FREL reference region.
- Whose agents and drivers of deforestation (and if applicable degradation) are the same as those in the project area defined prior to the inclusion of the instance.
- Whose areas do not include previously excluded segments.
- All areas to be grouped must include the same pools.

Grouped projects require the implementation of greater effort in monitoring activity data, due to the dispersed nature of the activities in the territory. If the sites are located at a maximum distance of 500 m from each other, a baseline scenario can be developed in a single polygon that groups them all together. Otherwise, each nucleus will have to develop its own independent measurement.

The project area, in the case of a grouped project, is the sum of all the areas of the instances.

Monitoring between all instances must be internally consistent.

Leakage monitoring in a clustered project should be done in each instance but does not necessarily need to be spatially explicit. For example, it can be replaced by farm-level agreements that make explicit the non-implementation of actions that lead to increases in GHG emissions outside each hub. The use of instance-level monitoring technologies, such as drones, is also feasible.

The monitoring activity data that can be tracked in each instance should be appropriate to the minimum units of REDD+ activity mapping. In this regard, review the minimum monitoring area, as some countries do not accept units smaller than 1.0 ha.

13 Monitoring and quantifying results

The CCMP shall monitor the activities defined as a project to control the agents and drivers of deforestation and periodically evaluate the agents and drivers of deforestation and the effectiveness of the measures in place to control them and provide evidence that GHG emission reductions or GHG removals do not occur due to external factors unrelated to CCMP activities.

Activity data should be monitored over the years of the results period, in the CCMP area and in the potential leakage and leakage management areas.

For deforestation, degradation by fragmentation and CSE activities, monitoring should be done annually. For degradation activity avoided by SFM, monitoring can be done over longer periods, depending on information on volumes of timber harvested.

If it is evident that there is no significant change in emission factors in the monitored categories in the baseline scenario, the emission factors used in the project scenario should be the same and a repeat forest inventory is not necessary.

The elements to be monitored are outlined below:

13.1 Implementation of the CCMP

The CCMP activities implemented within the project area must be consistent with the project area management plans and the PDD. The CCMP shall include, in the monitoring report, a summary of the activities carried out during each verification period and their effectiveness in terms of GHG emission reductions and GHG removals (if applicable).

13.2 Monitoring changes in forest carbon stocks and GHG emissions for periodic verifications

For the quantification of GHG removals and actual GHG emission reductions achieved by the CCMP, it is necessary to monitor changes in carbon stocks and GHG emissions within the project area by monitoring the following components:

- **Land use and land cover change within the CCMP area**. It is necessary to monitor all forest areas that are converted to non-forest areas. Monitoring results must be presented in *ex-post* tables of activity data by stratum. It is mandatory that this monitoring is carried out throughout the duration of the CCMP.
- **Changes in carbon stocks**. In most cases, emission factors by land use or land cover category will not change during a fixed reference period and monitoring of these factors will not be required. However, monitoring of carbon stocks is mandatory within the CCMP area for areas subject to a significant decrease in project scenario carbon stocks according to the initial assessment. These will be areas subject to controlled deforestation and planned harvesting activities, such as logging, fuelwood collection and charcoal production. In these areas, changes in carbon stocks should be estimated at least once after each harvesting event.

- **Impacts of natural disturbances and other catastrophic events**. Decreases in carbon stocks and increases in GHG emissions are subject to monitoring and must be accounted for under the project scenario, where significant, even if such decreases are due to natural causes, e.g., in the case of forest fires or natural disturbances such as hurricanes, earthquakes, volcanic eruptions, tsunamis, floods, droughts and the like, or human-induced events, including those over which the project proponent has no control (such as fires, acts of terrorism and war). In the case of forest fires, non- CO_2 emissions from such fires must also be accounted for.
- **Estimated total changes of actual net carbon stocks and emissions (including leakage) of GHG in the CCMP area.** Considering the above elements, the estimated total changes of actual net carbon stocks and GHG emissions in the project area should be calculated and summarised in a table.

13.3 Stratification of the segments

As in the case of the project scenario, when during the implementation of the activity's different stratification criteria or different classes in the stratification criteria than in the baseline scenario occur, a different stratification than in the baseline scenario (and possibly also different than in the project scenario) will be necessary.

As in the baseline and project scenarios, in any case where stratification is required, the coverage of each stratum in each segment must be defined. If, in any of the segments, scenarios or in the implementation of activities, no subdivision of areas is required, a single stratum will be considered to exist (and therefore the corresponding sub-index will have a single value equal to one).

13.4 Monitoring of leakage management areas

The potential leakage area is an area covered by forest at the start of the CCMP, where the same agents and drivers that generate emissions from REDD+ activities in the project area may operate, while the leakage management area is a precise limit where leakage action has been identified and must be controlled. Evidence for identifying leakage includes:

- Deforestation processes outside the avoided deforestation segment.
- Forest degradation processes outside the avoided forest degradation segment.
- Displacement of livestock or land grabbing activities.
- Displacement of other productive activities associated with deforestation or forest degradation.

Activity data to be determined using the same methods applied to monitor deforestation activity data in the CCMP area is monitored over this area.

In the operation of the project and as a product of monitoring and information management, a process of constant control over leakage must be established, including:

- A geographical delimitation of the areas where monitoring takes place.

- Changes in carbon stocks and GHG emissions associated with leakage prevention activities.
- The decrease in carbon stocks and increase in GHG emissions due to leakage displacement activity.

Based on the above elements, it is necessary to calculate the total estimated actual leakage associated with the CCMP.

In the case of CCMPs that do not fully overlap with a FREL, increases in deforestation in the leakage management area, following a control process, will be deducted from project accounting up to the buffer cap. In the case of overlap with a FREL, no discounts are made in the accounting, but leakage reduction actions are formulated from the project.

The result of the *ex-post* estimates of carbon stock changes should be reported using the same table formats used in the *ex-ante* assessment of reference carbon stock changes in the potential leakage area.

The operational entity verifying the monitoring data will determine whether the documentation provided by the CCMP proponent represents sufficient evidence to consider that the detected deforestation is not attributable to the project activity and is therefore not a leakage.

13.5 Monitoring of increases in GHG emissions

Increases should only be estimated and accounted for if GHG emissions from forest fires (burning) are included in the baseline scenario.

To estimate the increase in GHG emissions due to forest fires in the potential leakage area, it must be assumed that forest clearing is done by burning the forest. The parameter values used to estimate emissions will be the same as those used to estimate forest fires in the baseline scenario, except for the initial carbon stocks, which will be those of the initial forest classes burned in the potential leakage area.

The result of the estimates should be reported using the same table formats used in the *ex-ante* assessment of baseline GHG emissions from forest fires in the CCMP area.

13.6 Net anthropogenic GHG emission reductions and removals and *ex-post* GHG emission reductions

Ex-post estimated net anthropogenic GHG emissions should be reported using the same table format used for the *ex-ante* assessment. ***Annex c*** lists different sources of supplementary information useful for the estimation and calculation of some variables that are mentioned in the following sections. The considerations for each segment to obtain the net GHG removal and net GHG emission reduction achieved by the CCMP are presented below.

13.6.1 Specific considerations for avoided deforestation segment monitoring

Process	Variable and calculation	Data source
Monitoring and quantification of results (calculation of actual reductions achieved)		
Index of the effectively implemented stratum of the deforestation segment.	h	Define by methodology.
Define the total number of strata existing in the deforestation segment.	TSdefE	Defined by the developer according to the characteristics of the forest.
Define the area of stratum h effectively existing in the deforestation segment.	$AdefE_h$	Determine by developer.
Monitor and determine the area effectively deforested in year t and stratum h of the deforestation segment.	$AdefE_{t,h}$	Monitoring.
Monitor and determine the emissions from deforestation leakage that occurred in each year t in the potential leakage area.	$LEdefM_t$	Monitoring and calculation.
Define the number of years from the start of the project until the time of monitoring corresponding to reporting period x (x is the ordinal of the reporting period).	Tx	Define by developer.
Estimate emissions from deforestation in all strata up to the monitoring time Tx of the segment's baseline scenario.	$CO2EdefBL_{Tx} = \sum_{t=1}^{Tx} \sum_{f=1}^{TSdefBL} CO2EdefBL_{t,f}$ (Eq. 45)	Calculation.
Quantify emissions from deforestation that have occurred in all strata up to the time of monitoring Tx.	$CO2EdefE_{Tx} = \sum_{t=1}^{Tx} \sum_{f=1}^{TSdefBL} \sum_{h=1}^{TSdefE} \left(AdefE_{t,h} * \left(EFdef_f + BBEFdef_f + SOCEFdef_f\right) + LEdefM_t\right)$ (Eq. 46)	Calculation.
Calculation of mitigation actually achieved during the reporting period		
Quantify the annual effective mitigation of emissions during reporting period x of the segment.	$AEMdef_{Tx} = CO2EdefBL_{Tx} - CO2EdefE_{Tx} - AEMdef_{T(x-1)}$ * (Eq. 47)	Calculation.

*Where $AEMdef_{T(x-1)}$ is the effectively achieved mitigation of the deforestation segment, during the previous reporting period.

13.6.2 Specific considerations for monitoring of the avoided forest degradation segment

Monitoring forest degradation, as a REDD+ activity, is a less standardised process than avoided deforestation or carbon pool enhancements. It thus requires an even more detailed verification process and includes justifications for any assumptions that are included. Any process for measuring activities and emission factors should be supported by procedures implemented in research published in indexed journals.

The monitoring of emission reductions from avoided forest degradation should ensure no double counting with the reduction from deforestation, for this reason, in case of the inclusion of the activity, areas under avoided forest degradation should not be included in the accounting of the reduction from deforestation.

Although the areas included in this segment should remain as forest for the duration of the CCMP, it is possible that deforestation may occur in some areas, in which case it will be necessary to quantify the carbon stocks in the selected pools and transfer the deforested areas definitively to the avoided deforestation segment, making the necessary adjustments.

Process	Variable and calculation	Data source
Monitoring and quantification of results (calculation of actual reductions achieved)		
Index of the effectively implemented stratum of the degradation segment.	k	Defined by methodology.
Define the total number of strata existing in the degradation segment.	TSdegE	Defined by the developer according to the characteristics of the forest.
Define the area of stratum k existing in the degradation segment.	$AdegE_{k}$	Determined by developer.
Monitor and determine the area effectively degraded in year t and stratum k of the degradation segment.	$AdegE_{t,k}$	Monitoring.
Monitor and determine the emissions from degradation leakage that occurred in each year t in the potential leakage area.	$LEdegM_{t}$	Monitoring and calculation.
Define the number of years from the start of the project until the time of monitoring corresponding to reporting period x 8 x is the ordinal of the reporting period).	Tx	Defined by developer.

Process	Variable and calculation	Data source
Estimate degradation emissions in all strata up to the monitoring time Tx of the segment's baseline scenario.	$CO2EdegBL_{Tx} = \sum_{t=1}^{Tx} \sum_{i=1}^{TSdegBL} CO2EdegBL_{t,i}$ (Eq. 48)	Calculation.
Quantify degradation emissions occurring in all strata of the segment up to the time of Tx monitoring.	$CO2EdegE_{Tx} = \sum_{t=1}^{Tx} \sum_{i=1}^{TSdegBL} \sum_{k=1}^{TSdegE} \left(AdegE_{t,k} * (EFdeg_i + BBEFdeg_i + SOCEFdeg_i\right) + LEdegM_t$ (Eq. 49)	Calculation.
Calculation of mitigation achieved during the reporting period		
Quantify the annual effective mitigation of emissions during reporting period x of the segment.	$AEMdeg_{Tx} = CO2EdegBL_{Tx} - CO2EdegE_{Tx} - AEMdeg_{T(x-1)}$ * (Eq. 50)	Calculation.

*Where $AEMdeg_{T(x-1)}$ is the mitigation achieved from the degradation segment, during the previous reporting period.

13.6.3 Specific considerations for CSE segment monitoring

Process	Variable and calculation	Data source
Monitoring and quantification of results (calculation of actual removals achieved)		
Index of the effectively implemented stratum of the carbon stocks enhancement segment.	p	Defined by methodology.
Define the total number of strata effectively existing in the carbon stocks enhancement segment.	TScseE	Defined by the developer according to the characteristics of the forest.
Define the area of stratum p effectively existing in the carbon stocks enhancement segment.	$AcseE_p$	Defined by the developer according to the CSE systems he plans to implement.
Define the number of years from the start of the project until the time of monitoring corresponding to reporting period x (x is ordinal of the reporting period).	Tx	Defined by developer.
Monitor and determine the Area effectively dedicated to carbon stocks enhancement at the time of monitoring Tx of stratum p of the carbon stocks enhancement segment.	$AcseE_{Tx,p}$	Monitoring.

Process	Variable and calculation	Data source
Measure and calculate the above-ground biomass at monitoring time Tx of effectively implemented stratum p of the carbon stocks enhancement segment.	$AbcseE_{Tx,p}$ (Measured and calculated values).	Well-substantiated growth models or current annual growth data.
Root-to-stem ratio of each effectively implemented stratum p of the carbon stocks enhancement segment.	RSR_p (Assigned values).	Acceptable inventories or references.
Calculate the belowground biomass at the monitoring time Tx of each effectively implemented stratum p of the segment.	$BbcseE_{Tx,p} = AbcseE_{Tx,p} * (1 - RSR_p)$ (Eq. 51)	Calculation with factor provided by developer.
Measure and calculate the dead wood and litter at monitoring time Tx of effectively implemented stratum p of the carbon stocks enhancement segment.	$DwcseE_{Tx,p}$ (Measured and calculated values).	Field measurement.
Calculate the additional soil organic carbon at monitoring time Tx of effectively implemented stratum p of the carbon stocks enhancement segment.	$SoccseE_{Tx,p}$	Soil organic carbon is estimated to accumulate at a rate of 1.83 tCO_2/ha from the year of planting/restoration to year 20 and no accumulation after this period.
Estimate removals by CSE in all strata up to the Tx monitoring time of the segment's baseline scenario.	$CO2RcseBL_{Tx} = \sum_{t=1}^{Tx} \sum_{m=1}^{TScseBL} CO2RcseBL_{t,m}$ (Eq. 52)	Calculation.
Quantify the removals by CSE that actually occurred in all strata up to the time of Tx monitoring.	$CO2RcseE_{Tx} = \sum_{p=1}^{TScseE} \left(AcseE_{Tx,p} * \left(AbcseE_{Tx,p} + BbcseE_{Tx,p} + DwcseE_{Tx,p} + SoccseE_{Tx,p}\right)\right)$ (Eq. 53)	Calculation.
Calculation of mitigation actually achieved during the reporting period		
Quantify the annual effective mitigation of emissions during reporting period x of the segment.	$AEMcse_{Tx} = CO2RcseE_{Tx} - CO2RcseBL_{Tx} - AEMcse_{T(x-1)}$ * (Eq. 54)	Calculation.

*Where $AEMcse_{T(x-1)}$ is the mitigation actually achieved from the CSE segment, during the previous reporting period.

13.6.4 Specific considerations for the monitoring of the SFM segment

Monitoring SFM or sustainable forest management, in terms of monitoring as a REDD+ activity, is a less standardised process with respect to avoided deforestation or carbon pool enhancements. It therefore requires an even more detailed verification process and includes justifications for any assumptions made. Any process for measuring activities and emission factors should be supported by procedures implemented in research published in indexed journals.

Although this segment does not use a classic ecosystem pool approach, but rather tracks the timber products extracted and processed from the forest and the consequential damage caused by this activity, it is possible that deforestation may occur in some areas in this segment, in which case it will be necessary to quantify the carbon stocks in the selected pools and transfer the deforested areas definitively to the avoided deforestation segment, making the necessary adjustments.

Process	Variable and calculation	Data source
Monitoring and quantification of results of the sustainable forest management segment		
Index of the effectively implemented stratum of the sustainable forest management segment.	s	Defined by methodology.
Define the total number of strata effectively existing in the sustainable forest management segment.	TSsfmE	Defined by the developer based on the characteristics of the areas from which timber is harvested.
Monitor and calculate the CO_2 in wood removed in year t and stratum s of the sustainable forest management segment.	$WRsfmE_{t,s}$	Monitoring, sampling/inventory (annual) and calculations based on sound and substantiated procedures.
Monitor and calculate the CO_2 in harvested tree waste and consequential harvesting damage occurred in year t and stratum s of the sustainable forest management segment.	$WAsfmE_{t,s}$	Monitoring, sampling/inventory (annual) and calculations based on sound and substantiated procedures.
Corroborate/determine the actual sawmill waste factor for trees harvested from the sustainable forest management segment.	WFsfmE	Monitoring, sampling and calculation based on sound and supported procedures.

Process	Variable and calculation	Data source
Calculate CO_2 in effective sawlog wastage in each year t and each stratum s of the segment.	$SWsfmE_{t,s} = WRsfmE_{t,s} * WFsfmE$ (Eq. 55)	Calculation.
Calculate the CO_2 effectively transformed into timber products in each year t and each stratum s of the segment.	$TCsfmE_{t,s} = WRsfmE_{t,s} - SWsfmE_{t,s}$ (Eq. 56)	Calculation.
Define the average total degradation period (in years) of the effectively achieved timber products of the sustainable forest management segment.	DPE	Defined by the developer based on sound and substantiated information.
Calculate the total CO_2 emitted by timber harvesting in each year t and each stratum s of the segment.	$TECsfmE_{t,s} = \frac{TCsfmE_{t,s} * (t-1)}{DPE}$ (Eq. 57)	Calculation.
Number of years from the start of the project until the time of monitoring corresponding to reporting period x (x is the ordinal of the reporting period).	Tx	Defined by developer.
Calculate the total CO_2 emissions because of timber harvesting from the baseline scenario of the sustainable forest management segment from the start of the project to the monitoring time Tx.	$CO2EsfmBL_{Tx} = \sum_{t=1}^{Tx} \sum_{q=1}^{TSsfmBL} (WAsfmBL_{t,q} + SWsfmBL_{t,q} + TECsfmBL_{t,q})$ (Eq. 58)	Calculation.
Calculate the total effective CO_2 emissions because of sustainable forest management from the start of the project until the time of Tx monitoring.	$CO2EsfmE_{Tx} = \sum_{t=1}^{Tx} \sum_{s=1}^{TSsfmE} (WAsfmE_{t,s} + SWsfmE_{t,s} + TECsfmE_{t,s})$ (Eq. 59)	Calculation.
Calculation of mitigation achieved during the reporting period		
Calculate the annual effective emissions mitigation during reporting period x for the segment.	$AEMsfm_{Tx} = CO2EsfmBL_{Tx} - CO2EsfmE_{Tx} - AEMsfm_{T(x-1)}$ * (Eq. 60)	Calculation.

*Where $AEMsfm_{T(x-1)}$ is the mitigation effectively achieved by the SFM, during the previous reporting period.

13.6.5 Calculation of the mitigation achieved by the CCMP during the reporting period

The carbon buffer for reporting period x is calculated as:

$$Bf_{Tx} = PCBf * [(AEMdef_{Tx} + AEMdeg_{Tx} + AEMcse_{Tx} + AEMsfm_{Tx}) - (LEdefP + LEdegP)]$$

(Eq. 61)

The quantification of the mitigation achieved by the CCMP during reporting period x (AEM_{Tx}), net of the buffer is calculated as:

$$AEM_{Tx} = [AEMdef_{Tx} + AEMdeg_{Tx} + AEMcse_{Tx} + AEMsfm_{Tx} - (LEdefP + LEdegP)] - Bf_{Tx}$$

(Eq. 62)

Variable	Name	Unit
AEM_{Tx}	Annual effective mitigation achieved by the project during reporting period x.	tCO_2
$AEMdef_{Tx}$	Annual effective mitigation of emissions during reporting period x from the deforestation segment.	tCO_2
$AEMdeg_{Tx}$	Annual effective mitigation of emissions during reporting period x from the degradation segment.	tCO_2
$AEMcse_{Tx}$	Annual effective mitigation of emissions during reporting period x from the carbon stocks enhancement segment.	tCO_2
$AEMsfm_{Tx}$	Annual effective mitigation of emissions during reporting period x of the sustainable forest management segment.	tCO_2
LEdefP	Total CO_2 emissions from leakage in the project scenario of the deforestation segment.	tCO_2
LEdegP	Total CO_2 emissions from leakage in the project scenario of the degradation segment.	tCO_2
Bf_{Tx}	Carbon buffer for period Tx.	tCO_2
PCBf	Percentage of carbon buffer (as defined in the ***Cercarbono's Tool to Estimate Carbon Buffer in Initiatives to Mitigate Climate Change in the Land Use Sector***).	

13.7 Summary of results during the monitoring period

The mitigation achieved by the CCMP during reporting period x (**AEM_{Tx}**), minus the buffer should be segregated and presented according to ***Table 12***. If required, additional rows can be added for the monitoring years in the respective pools.

Table 12. Disaggregation of mitigation results achieved during the monitoring period.

Carbon pool	Included	Year	Segment				Total
			Def	Deg	Cse	Sfm	
Aboveground biomass							

Carbon pool	Included	Year	Segment				Total
			Def	Deg	Cse	Sfm	
Belowground biomass						NA	
						NA	
Dead wood						NA	
						NA	
Wood products			NA	NA	NA		
			NA	NA	NA		
Soil organic carbon						NA	
						NA	
Total							

13.8 Monitoring and revalidation of the baseline scenario

Baseline scenarios, regardless of the approach chosen to establish them, need to be revised over time because the drivers, agents and underlying causes of deforestation change dynamically. Frequent and unplanned updating of the baseline scenario can create serious market uncertainties. Therefore, the baseline scenario should be reviewed every five years, choosing historical and projection periods that do not generate inconsistencies and inconsistencies with already verified periods and thus with the results obtained and credited. Where an applicable jurisdictional, subnational, or national baseline scenario is available, baseline scenarios may be reassessed earlier, in accordance with the elements below. The tasks involved in the review of the baseline scenario are:

- Update information on agents, drivers, and underlying causes of deforestation.
- Periodically collect information on the agents, drivers, and underlying causes of deforestation in the reference area as these are essential to improve future deforestation projections and project activity design. Information should be collected that is relevant to understanding the agents of deforestation, drivers, and underlying causes. When a spatial model is used to locate future deforestation, new data on the spatial driving variables used to model deforestation risk should be collected as they become available. They should be used to create updated spatial datasets and new "Driver Maps" for the subsequent fixed reference period.
- Adjust the land use and land cover change component of the baseline scenario.
- Adjust the annual reference deforestation areas.
- Adjust the location of projected reference deforestation.
- Adjust the carbon component of the baseline scenario.

13.9 Verifiable requirements in the implementation of the CCMP

The calculations of emission factors, activity data, historical period and projection method are performed by means of a verifiable methodological reconstruction, based on the execution of the baseline and project scenario building steps of this methodology in the CCMP area, and consistent with the official procedures reported in the FRELs. In case this reference is not available in the country, other academically based procedures can be followed.

In line with the principle of transparency, all information necessary for the reconstruction of the CCMP results should be documented.

13.10 Data and monitoring parameters

Variable/parameter/data		Units
$AbcseE_{Tx,p}$	Above-ground biomass at monitoring time **Tx** of effectively implemented stratum **p** of the carbon stocks enhancement segment.	tCO_2
$AcseE_{Tx,p}$	Area dedicated to carbon stocks enhancement at the time of monitoring **Tx** of stratum **p** of the carbon stocks enhancement segment.	ha
$AdefE_{t,h}$	Area effectively deforested in year **t** and stratum **h** of the deforestation segment.	ha
$AdegE_{t,k}$	Area effectively degraded in year **t** and stratum **k** of the degradation segment.	ha
AEM_{Tx}	Annual effective mitigation achieved by the project during reporting period **x**.	tCO_2
$AEMcse_{Tx}$	Annual effective mitigation of emissions during reporting period **x** from the carbon stocks enhancement segment.	tCO_2
$AEMdef_{Tx}$	Annual effective mitigation of emissions during reporting period **x** from the deforestation segment.	tCO_2
$AEMdeg_{Tx}$	Annual effective mitigation of emissions during reporting period **x** from the degradation segment.	tCO_2
$AEMsfm_{Tx}$	Annual effective mitigation of emissions during reporting period **x** of the sustainable forest management segment.	tCO_2
$BbcseE_{Tx,p}$	Belowground biomass at monitoring time **Tx** of effectively implemented stratum **p** of the carbon stocks enhancement segment.	tCO_2
$CO2EdefBL_{Tx}$	Deforestation emissions in all strata up to monitoring time **Tx** of the baseline scenario of the deforestation segment.	tCO_2
$CO2EdefE_{Tx}$	Emissions from deforestation occurred in all strata of the deforestation segment up to monitoring time **Tx**.	tCO_2
$CO2EsfmE_{Tx}$	Total actual CO_2 emissions because of sustainable forest management from the start of the project until the time of monitoring **Tx**.	tCO_2
$CO2RcseE_{Tx}$	Removals occurred in all strata up to monitoring time **Tx** of the carbon stocks enhancement segment.	tCO_2
DPE	Average period of total degradation (in years) of the effectively achieved timber products of the sustainable forest management segment.	
$DwcseE_{Tx,p}$	Dead wood and litter at monitoring time **Tx** of effectively implemented stratum **p** of the carbon stocks enhancement segment.	tCO_2
$LEdefM_t$	Emissions from deforestation leakage occurred in each year **t** in the potential leakage area.	tCO_2
$LEdegM_t$	Emissions from degradation leakage occurred in each year **t** in the potential leakage area.	tCO_2
$SoccseE_{Tx,p}$	Additional soil organic carbon at monitoring time **Tx** of effectively implemented stratum **p** of the carbon stocks enhancement segment.	tCO_2
$SWsfmE_{t,s}$	CO_2 in actual sawmill waste in year **t** and stratum **s** of the sustainable forest management segment.	tCO_2
$TCsfmE_{t,s}$	CO_2 transformed into timber products in year **t** and stratum **s** of the sustainable forest management segment.	tCO_2

Variable/parameter/data		Units
$TECsfmE_{t,s}$	Total CO_2 emitted from timber harvesting in year **t** and stratum **s** of the sustainable forest management segment.	tCO_2
$WAsfmE_{t,s}$	CO_2 in harvested tree waste and consequential harvesting damage occurred in year **t** and stratum **s** of the sustainable forest management segment.	tCO_2
WFsfmE	Actual sawmill waste factor for trees harvested from the sustainable forest management segment.	
$WRsfmE_{t,s}$	CO_2 in wood harvested in year **t** and stratum **s** of the sustainable forest management segment.	tCO_2
GIS01	GIS layer with polygon(s) of the area effectively dedicated to buffer enhancement at the time of **Tx** monitoring of the effectively implemented strata of the buffer enhancement segment.	
GIS02	GIS layer with the areas deforested during the reporting period (between **Tx-1** and **Tx**) of the avoided deforestation segment.	
GIS03	GIS layer with the areas effectively degraded during the reporting period (between **Tx-1** and **Tx**) of the avoided forest degradation segment.	
GIS04	GIS layer with the areas effectively dedicated to sustainable forest management during the reporting period (between **Tx-1** and **Tx**).	

13.11 Description of the monitoring plan

The CCMP proponent must establish and maintain a monitoring and quality management plan that includes procedures for measuring or otherwise obtaining, recording, collecting, and analysing relevant data and information to quantify and report GHG emissions and removals relevant to the project and the baseline scenario. The monitoring plan should include the following aspects, as applicable:

- Purpose of monitoring.
- List of parameters to be measured and monitored.
- Types of data and information to be reported, including units of measurement.
- Source of data.
- Monitoring methodologies, including estimation, modelling, measurement, calculation approaches, and uncertainty.
- Frequency of monitoring, considering the needs of the CCMP holder.
- Monitoring roles and responsibilities, including procedures for authorising, approving and documenting changes to recorded data.
- Controls including internal checking of data, in terms of input, transformation and output elements, and procedures for corrective actions.
- GHG information management systems, including the location and retention of stored data, and data management including a procedure for transferring data between different forms of systems or documentation.

[Taken from the guidelines *ISO 14064-2:2019* Standard]

14 Information management

The CCMP proponent shall establish and implement quality management procedures, in accordance with the principles of this methodology, for receiving, managing, and controlling data, database and information, including uncertainty assessment, relevant to the CCMP and the baseline scenario.

The CCMP proponent should reduce, to the extent possible, uncertainties related to the quantification of GHG removals or GHG emission reductions. Identify and address any errors or omissions detected.

The CCMP proponent must apply monitoring criteria and procedures, in which consistent reviews or audits are carried out to ensure the accuracy of the quantification of GHG removal or GHG emission reductions, in accordance with the monitoring plan.

Where measuring and monitoring equipment is used, the CCMP proponent must ensure that calibrated or verified monitoring and measuring equipment is used and maintained, as appropriate.

All data and information related to the monitoring of the CCMP shall be recorded and documented.

[Taken from the guidelines *ISO 14064-2:2019* Standard]

NOTE: The CCMP proponent may apply the principles of *ISO 9001:2015* and *ISO 14033:2019* Standards for data quality management.

15 CCMP documentation

All documentation and records generated need to be retained to demonstrate that the CCMP activity has been implemented as designed. Any deviation of the implementation from the design shall be solidly justified.

The CCMP proponent must have documentation demonstrating compliance of the GHG project with the requirements of this document. This documentation must be consistent with the validation and verification needs of the Cercarbono programme.

[Detailed from the guidelines of the *ISO 14064-2:2019* Standard]

16 Transitional regime for the use of other methodologies

In the case of CCMPs that have been developed under other methodologies, because the Cercarbono certification programme allows the use of methodologies available under other carbon standards or programmes (if they are free-to-use methodologies or the CCMPs are authorised for use them under Cercarbono), a transition regime between the REDD+ methodology initially used and this methodology must be considered, as established in the Cercarbono's Protocol.

17 Validation and verification of the CCMP

The requirements for validation and verification processes in addition to the technical guidelines of this methodology are set out in the Cercarbono's Protocol.

18 CCMP report

The holder or developer of the CCMP must prepare and make available to society at large a GHG report which must:

- Identify the CCMP use and holder of the GHG report.
- Use a format and include content consistent with the needs of the CCMP holder.

If the CCMP proponent makes a public GHG statement setting out compliance with this document, it must make it publicly available:

a) An independent third-party validation or verification statement, prepared in accordance with *ISO 14064-3* Standard; or
b) A GHG report that includes as a minimum:
   1) The name and identification of the CCMP proponent.
   2) The identification and roles of CCMP participants.
   3) A brief description of the CCMP including size, location (geographic coordinates), objective, duration, and types of activities.
   4) Identification of environmental authority(ies) with jurisdiction in the CCMP intervention area.
   5) The socio-environmental conditions where the CCMP is developed.
   6) One or more GHG statements, including a statement of GHG emission reductions and increases in GHG removals in units of CO_2e, e.g., tonnes of CO_2e.
   7) A statement describing whether the GHG statement has been validated or verified, including the type of validation or verification and the level of assurance achieved.
   8) A list of the relevant GHG sources and sinks that are controlled by the CCMP, as well as those affected by the project, including the defined criteria for their selection for inclusion in the quantification.
   9) A statement of the aggregated GHG emissions or removals by GHG emission sources or carbon pools for the CCMP, stated in units of CO_2e, e.g., tonnes of CO_2e, for the relevant period (e.g., annual, cumulative to date, total).
   10) A statement of the aggregated GHG emissions or removals by GHG emission sources or carbon pools for the baseline scenario, stated in units of CO_2e, e.g., tonnes of CO_2e, for the relevant period.
   11) A description of the baseline scenario and demonstration that GHG emission reductions or increases in GHG removals are not overestimated.
   12) A general description of the criteria, procedures or good practice guidance used as a basis for the calculation of GHG emission reductions and enhancements of GHG removals.
   13) A statement on uncertainty, how it affects GHG reporting and how it has been addressed to minimise misrepresentations.
   14) The date of the report and the period covered.
   15) An assessment of permanence, as applicable.
   16) Evidence of the designation of the authorised representative on behalf of the CCMP proponent, if other than the proponent itself.

17) The GHG programmes to which the CCMP subscribes, as applicable.
18) And if required by the CCMP holder, changes to the project or monitoring system with respect to the project plan and assessment of its compliance with the criteria, applicability of methodologies and any other requirements.

[Detailed from the guidelines of the *ISO 14064-2:2019* Standard]

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20 Document history

Version	Date	Comments or changes
1.0	06.17.2020	Initial version of the document on public consultation from 06.17.2020 to 07.15.2020.
1.1	09.09.2020	Final version with integrated comments from the public consultation and additional missing elements.
1.2	02.07.2022	Version adapted to international applicability and context.
1.2.1	20.09.2022	Principles presented in Section 3 sorted alphabetically.

Annexes

a. Safeguards

The safeguards compliance detailed by the CCMPs must be integrated in the PDD and in the monitoring report prior to each verification event, and once the National Safeguards System (NSS) is operational in each country, such compliance will be reported to this system. The following is a description of each safeguard established by the UNFCCC under decision 1/COP.16 and its exemplified correspondence in the national context to achieve compliance at the project level:

Cancun Safeguard	Elements to consider at project level	Safeguard compliance
A. In line with national forest programmes and international agreements.	Description of CCMP contributions to mitigation and, if applicable, adaptation processes. Description of how the CCMP contributes to international agreements signed by the country. Where applicable, report compliance with objectives established in agreements (e.g., the Paris Agreement, both in its mitigation objective and its proposed actions for adaptation); conventions (such as the Convention on Wetlands, the Convention to Combat Desertification and the Convention on Trade in Endangered Species of Wild Fauna and Flora); conventions (such as the Climate Change, Diversity, and International Timber Conventions) or forums (such as the United Nations Forum on Forests). In line with: • ILO Convention 169. • International Tropical Timber Agreement. • Amazon Cooperation Treaty. • Warsaw Framework.	The CCMP holder shall describe each mitigation or adaptation action and the legal and national instruments with which it is aligned. The verifier shall confirm compliance or report inconsistencies, or findings identified.
B. Transparency and effectiveness of forest governance structures.	Compliance with available local and national laws and decrees, where applicable: • International Covenant on Economic, Social and Cultural Rights. • Declaration on the Rights of Indigenous Peoples.	The CCMP holder must report on all mechanisms used for the dissemination of full project information and this must be searchable and available on the EcoRegistry platform and on the NSS when available. The CCMP holder must report evidence of the socialisation of the project with communities

Cancun Safeguard	Elements to consider at project level	Safeguard compliance
	• Joint Declaration on the Right to Freedom of Peaceful Assembly and Democratic Governance. • Indigenous and Tribal Peoples Convention. • International Covenant on Civil and Political Rights of the United Nations (UN).	(peasant, indigenous, and other) or stakeholders, defining roles and responsibilities that each one will have. In addition, it must demonstrate the effective participation of these communities in any type of event developed.
		The CCMP holder must present the existing forest governance structure in the project area and its respective supports (empowerment strategy, land tenure documents, among others), publicly available.
		The CCMP holder must submit any evidence supporting the strengthening of technical, legal, and governance capacities enabled by the project.
C. Respect for the traditional knowledge and rights of communities.	Compliance with conventions, laws, and decrees, where applicable: • ILO Convention 169. • UN Declaration on IPs. • Inter-American Convention on Human Rights. • Andean Decision 391 of 1996. • UNESCO Convention: Convention on the Protection and Promotion of the Diversity of Cultural Expressions of October 2005.	The CCMP holder must submit the consent document, if applicable, signed by the representative of the group or community affected by the project.
		The CCMP holder must present and list the traditional knowledge that is respected and promoted by the CCMP holder, based on the national legislations that integrate and support it.
		The CCMP holder must report the project budget showing benefit sharing from the gross sales of certified carbon units and a specific allocation for communities of more than 50 %. This budget shall be public and especially accessible to the communities involved in the project.
		The CCMP holder must identify and enforce its rights over the territory in which the initiative takes place.
D. Full and effective participation.	Compliance with conventions, laws, and decrees, where applicable: • American Convention on Human Rights (Pact of San José). • Declaration on Principle 10 of 2012.	The CCMP holder shall report on participation processes and shall ensure that they are updated and reported in a publicly available online repository of information, in accordance with ***Section 4.4***.

Cancun Safeguard	Elements to consider at project level	Safeguard compliance
	• ILO Convention 169, prior consultation. • Joint Declaration on the Right to Freedom of Peaceful Assembly and Democratic Governance. • Public Hearings.	
E. Conservation and benefits.	National forest conservation or restoration plans where available, in line with the provisions of: • Convention on Biological Diversity. • Ramsar Convention.	The CCMP holder must report a description of the positive and negative impacts and measures to mitigate negative impacts for each of the project actions. In addition, it must include reporting on contributions to the SDGs as set out in the Cercarbono's Protocol.
F. Preventing risks of reversion.	Compliance with land-use or spatial planning where available.	The CCMP holder shall report on each REDD+ action under which land use or land-use planning it is carried out, in accordance with the provisions of ***Section 4.5***.
G. Avoid displacement of emissions.	Identification and control of leakage in the areas, normally included in the methodologies.	The CCMP holder shall report the leakage analysis resulting from the implementation of the project in accordance with ***Section 7.4.1***.

b. Summary of REDD+ actions to be carried out with communities, in alliances with State institutions or private actors

Category / Likely action from a REDD+ project	Sector					
	A	B	C	D	E	F
1. Environmental land-use planning.						
Support for the formulation and implementation of ethnic-territorial planning instruments in community territories and peasant groups.	X	X				
Support for the establishment of environmental determinants for territorial and sectoral planning that considers forest conservation.		X				
Identification of zones of high ecosystemic importance, including special management areas to exclude them from mining, infrastructure, agriculture, or other impacting activities. Determination of blasting or use regulations.	X	X		X		
Support the development of command and control measures that support environmental land-use planning, as well as community monitoring.	X					
productive entrepreneurship in accordance with the zoning and management of forest buffers (if available in the country).		X				
Strengthening the governance of indigenous and Afro-descendant peoples in their territories, through the design of programmes to support the formulation of instruments for the environmental management of their territories, within the framework of the system of traditional indigenous knowledge and life plans.		X				
Differential and specific programmes for the conservation of ecosystems designed and being implemented in indigenous, Afro-descendant or peasant territories, considering ancestral, traditional systems of territorial planning and use.		X				
Zoning of productive areas.	X					
Territorial planning.	X	X		X	X	X
Support to land tenure decision-making processes (formalisation, rural cadastre).	X					
Support to the formulation and implementation of Forest Management (if available in the country). Development of sustainable forest management units.		X				
Diagnosis of susceptible areas prioritised in Sustainable Forest Management processes (if available in the country).		X				
2. Strengthening the capacities of communities in forest conservation management.						
Development of measures for the protection of rights over collective and peasant territories. Community forestry, among others.		X				
Promotion and strengthening of the capacities of community organisations owning and possessing forests.		X				
Formal training programmes for local communities in the sustainable management of natural resources.		X				
Support for the protection of communities' traditional knowledge associated with the sustainable use and management of forests.		X				
Strengthening the institutional capacity of forest-dependent communities and ethnic groups so that they can participate effectively in discussions on climate change, forest management and REDD+.		X				
Establishment of working groups for interest groups, to ensure a differential approach and cultural diversity (Afro-descendant, indigenous, peasant and with a gender approach) to support the consolidation of REDD+ actions in the territory.		X				
Definition of investment prioritisation criteria applicable to indigenous, Afro-descendant or peasant territories with the participation of the different groups.		X				
Technical assistance for implementation - Strengthening of tree-based production systems.	X	X				
Dissemination and training on actions for forest conservation.		X				

Category / Likely action from a REDD+ project	Sector					
	A	B	C	D	E	F
Support for the participatory construction of Forest Development Plans.	X	X				
Strengthening the capacities of local organisations to carry out binding agreements to reduce deforestation in their territories and to implement measures.		X				
Formulation of internal regulations for forest use and management based on traditional knowledge.		X				
Application of forest management plans to guarantee the sustainable use of forest resources.		X				
Implementation of wood energy plantations to replace the use of natural firewood and to produce charcoal for sale.	X	X			X	
Implementation of forest fire prevention or control actions.		X				
Implementation of a local early warning system for deforestation and forest degradation.		X				
Analysis of the indirect and direct drivers of deforestation and forest degradation in the country, including logging, mining, agriculture, and infrastructure, with the participation of the local population and with an educational component on forest conservation.	X	X		X		X
Support for control actions against illegal logging.		X				
Development of forest inventories, with the participation of the local population and with an educational component on forest conservation.		X				
Implementation of actions to produce legal timber.		X				
Tree-based production systems - Forest plantations (including wood energy and protective plantations).	X	X				
Limitation of the growth of the agricultural frontier in forest areas.	X	X				
Species enrichment processes with the participation of the local population and with an educational component on forest conservation.		X				
Use of alternative energy - efficient cookers.		X			X	
Implementation of live fences for firewood (wood energy).	X	X				
Increasing the value of the forest - non-timber products (including beekeeping).		X				
Commercial plantations of native species.	X					
Implementation of biological corridors.		X				
3. Strengthening forest governance.						
Strengthening the management capacity of civil society for forest conservation.	X	X	X	X	X	X
Design and presentation of initiatives on sustainable forest management, with the participation of the local population and with an educational component on forest conservation.	X	X				
Promotion of the application of legislation for the conservation of natural forests.		X				
Promotion of responsible and sustainable consumption of forest resources.		X				
Design and implement a roadmap for accessing financial mechanisms such as PES.		X				
Implementation of strategies in the fight against forest fires.		X				
Implementation of incentives for the conservation of natural forests.		X				
Establishment of possible synergies between projects and the prevention and substitution of illicit crops.		X				
Development of strategies that encourage the sustainable use of natural resources such as: environmental certifications or green seals, fair trade programmes, strengthening of value chains, among others.	X	X	X			

Category / Likely action from a REDD+ project	Sector					
	A	B	C	D	E	F
Access to economic and financial instruments to promote forest conservation, provide incentives for the legal and sustainable use of forest products and improve forest governance.		X				
Establishment of 'zero net deforestation' agreements at the local level for the development of sustainable production chains.	X	X	X	X		
4. Promotion of sustainable practices in the development of sectoral activities (agriculture, livestock, mining, infrastructure, oil, and tourism).						
Reduction or elimination of incentives for extensive agricultural production, based on cross-sectoral negotiations.	X					
Adoption of best practices to limit the direct and indirect impacts of mining activities.		X		X		
Generation of timber products with higher added value and that make more efficient use of resources.		X				
Promotion of energy production technologies and best practices that reduce impacts on forests and their resources.		X		X		
Promotion of eco-efficient technologies that are applied to the design and construction of housing with forest resources of legal origin.		X			X	
Development of sustainable tourism programmes.		X	X			X
Establishment of public-private coalitions with companies committed to ambitious zero deforestation policies, focused on the design and implementation of sustainable agricultural production, improving the use of already deforested land, and avoiding new forest conversion for agricultural purposes.	X	X				
Establishment of a package of actions to reverse the expansion of pastureland, including tools to monitor their effective implementation.	X					
Tree-based production systems - Agroforestry systems.	X					
Tree-based production systems - Silvopastoral systems.	X					
Tree-based production systems - Livestock conversion in areas of soil conflict.	X					
Tree-based production systems - Climate-smart agriculture.	X	X				
Tree-based production systems - Family gardens.	X	X				
Good livestock practices - Forage gardens.	X					
Support for the marketing of forest products under sustainable forest management - Production chains.	X		X			
Early implementation of land use options that reduce deforestation in the territories of influence of producer organisations.	X	X				
Deforestation-free production chains - Establishment of multi-stakeholder platforms and definition of sectoral strategies for the cocoa, rubber, coffee, and dual-purpose livestock chains (among others), with a focus on sustainability.	X	X	X			
Sustainable alliances - Adaptation of procedures and instruments to support productive alliances for zero deforestation systems.	X	X	X			
5. Promoting management in protected areas and their buffer zones.						
Proposal of sustainable production alternatives for the population living in buffer zones and adjacent to national protected areas.	X	X				
Promote management in areas surrounding and adjacent to protected areas to develop their buffer function.		X				
Support the declaration of additional protected areas for *in situ* preservation.		X				

Economic sectors covered:

A. Agriculture and Rural Development.

B. Environment and Sustainable Development.

C. Trade, Industry and Tourism.
D. Mines and Energy.
E. Housing, City and Territory.
F. Transport.

c. Sources of complementary information

Element	Section	Data source	Unit	Application	Availability*
Segmentation of areas					
	5.2.2 5.3 6.1	Probable identification because of the analysis of agents and causes.	ha	In baseline scenario. In project scenario.	REDD+ methodology.
Stratification of forest segments					
	5.2.1 5.2.2 5.4 6.2.1	Procedures for coverage change detection or digital pre-processing of satellite images.	ha	In baseline scenario. In project scenario. In monitoring.	REDD+ methodology.
		Table 4.1: IPCC, 2006. Page 4.55.	ha		IPCC_Table 4.1.
Stratification of non-forest segments					
	5.2.1 5.2.2 5.4 6.2.2	Procedures for coverage change detection or digital pre-processing of satellite images.	ha	In baseline scenario. In project scenario. In monitoring.	REDD+ methodology.
Above-ground biomass pool					
In forests		Table 4.7: IPCC, 2006. Pages 4.62 - 4.63.	t-d.m./ha	In baseline scenario. In project scenario. In monitoring.	IPCC_Table 4.7.
Net growth in natural forests		Table 4.9: IPCC, 2006. Pages 4.66 - 4.67.	t-d.m./ha/year		IPCC_Table 4.9.
Carbon fraction of above-ground forest biomass	6.2 6.2.1 6.2.2 6.9.1 6.9.2 6.9.3 7.3 7.5 7.8 7.9.1 7.9.2 13.6	Table 4.3: IPCC, 2006. Chapter 4. Page 4.57.	t-C/d.m.		IPCC_Table 4.3.
Biomass conversion and expansion factors		Table 4.5: IPCC, 2006. Pages 4.59 - 4.61.	m^3		IPCC_Table 4.5.
Basic wood density (D) of tropical trees		Table 4.13: IPCC, 2006. Pages 4.73 - 4.79.	g/cm^3 o t/m^3		IPCC_Table 4.13.
Allometric equations according to forest type		Database On Greenhouse Gas Emission Factors (IPCC-EFDB). User Guide for Local Application.	t-C/ha		
In crops		Table 4.4: IPCC, 2006. Page 4.48.	t-d.m./ha		IPCC_Table 4.4, Vol 4, Ch 4.
Below-ground biomass pool					
Belowground Biomass to Above-ground Biomass Ratio	6.2 6.2.1 6.2.2 7.3 7.5 7.8 7.9.1 7.9.2 13.6	Table 4.4: IPCC, 2006. Chapter 4. Pages 4.58.	t-d.m. below-ground biomass /t-d.m. above-ground biomass	In baseline scenario. In project scenario. In monitoring.	IPCC_Table 4.4.
Belowground biomass/aboveground biomass ratio in natural regeneration		Table 3.A.1.8: IPCC, 2003. Chapter 3. Page 3.168.			IPCC_Table 3.A.1.8.
Dead wood and litter pool					
Carbon stocks in litter and dead wood	6.2 8.3	Table 2.2: IPCC, 2006. Page 2.31.	t-C/ha	In baseline scenario. In project scenario. In monitoring.	IPCC_Table 2.2.
Soil Organic Carbon Pool (SOC)					

Element	Section	Data source	Unit	Application	Availability*
Default values in mineral soils	6.2 6.2.1 6.2.2 6.4.3 7.3 7.3.1 7.3.2 7.3.3 7.8.1 7.9.1 7.9.2	Table 2.3: IPCC, 2006. Page 2.36.	t-C/ha (between 0-30 cm depth)	In baseline scenario. In project scenario. In monitoring.	IPCC_Table 2.3.
Estimation on mineral, organic and stony soils		FAO, 2017. Pages 39 - 41.	t-C/ha		FAO_Table 3.
Carbon loss from mineral soil management		Table 5.6.: IPCC, 2006. Page 5.22.	t-C/ha/year		IPCC_Table 5.6.
Emission sources and potential leakages					
Areas affected by disturbance of natural forest and forest plantations; areas of crops affected by disturbance; areas of grassland affected by disturbance.					
	6.3, 7.4, 7.4.1, 13.4	Table 5.7: IPCC, 2006.	ha	In baseline scenario. In monitoring.	IPCC_Table 5.7.
Fuel consumption values (dead organic matter plus live biomass) (Ton d.m.-1) caused by fires of different vegetation types.					
	6.3, 7.4, 7.4.1, 13.4	Table 2.4: IPCC, 2006. Pages 2.51 - 2.52.	t-d.m./ha	In baseline scenario. In monitoring.	IPCC_Table 2.4.
Emission factors (g kg-1 of d.m. burned) for different types of burning.					
	6.3, 7.4, 7.4.1, 13.4	Table 2.5: IPCC, 2006. Page 2.53.	g /kg d.m. burned	In baseline scenario. In monitoring.	IPCC_Table 2.5.
Combustion factors (proportion of pre-fire combustible biomass) for fires in different vegetation types.					
	6.3, 7.4, 7.4.1, 13.4	Table 2.6: IPCC, 2006. Page 2.54.		In baseline scenario. In monitoring.	IPCC_Table 2.6.
Cattle population by group: high production cows, low production cows, beef cows, bulls for breeding purposes, pre-weaned calves, replacement heifers, fattening cattle.					
	6.3, 7.4, 7.4.1, 13.4	Tables 10.A.1-10A.9: IPCC, 2006.	Various	In baseline scenario. In monitoring.	IPCC_ Tables 10.A.1-10A.9.
Carbon loss and annual accumulation rate of permanent crops in different climates.					
	6.3, 7.4, 7.4.1, 13.4	Table 5.1: IPCC, 2006. Vol. 4. Chapter. 5. Page 5.7.	t-C/ha/year	In baseline scenario. In monitoring.	IPCC_Table 5.1.
CH_4 emission factor for enteric fermentation of cattle.					
	6.3, 7.4, 7.4.1, 13.4	Table 10.10: IPCC, 2006. Page 10.30.	kg-CH_4/head/year	In project scenario. In monitoring.	IPCC_Table 10.10.
CH_4 emission factor for fermentation of other livestock.					
	6.3, 7.4, 7.4.1, 13.4	Table 10.14 a 10.16: IPCC, 2006. Vol. 4. Cap. 10. Pages 10.38 - 10.41.	kg-CH_4/head/year	In project scenario. In monitoring.	IPCC_Table 10.14 to 10.16.
Emission factor for direct N_2O emissions from managed soils.					
	6.3, 7.4, 7.4.1, 13.4	Table 11.1: IPCC, 2006. Page 11.12.	kg-N_2O/N-ha/year	In project scenario. In monitoring.	IPCC_Table 11.1.

*The tables listed in the **Availability** column will be provided to CCMP developers upon request.