METHODOLOGY FOR REDUCING EMISSIONS FROM DEFORESTATION AND FOREST DEGRADATION

Title	Methodology for Reducing Emissions from Deforestation and Forest Degradation
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1 SOURCES

This methodology is based on the VCS Jurisdictional and Nested REDD+ (JNR) Framework v4.0 and the following methodologies:

- *VM0006 Methodology for Carbon Accounting for Mosaic and Landscape-scale REDD Projects, v2.2*
- *VM0007 REDD+ Methodology Framework (REDD+MF), v1.6*
- *VM0009 Methodology for Avoided Ecosystem Conversion, v3.0*
- *VM0015 Methodology for Avoided Unplanned Deforestation, v1.1*
- *VM0037 Methodology for Implementation of REDD+ Activities in Landscapes Affected by Mosaic Deforestation and Degradation, v1.0*

This methodology uses the latest versions of the following modules and tools:

- Activity-type accounting modules:
  - *MD0OXX Estimation of Emissions Reductions from Avoiding Unplanned Deforestation (AUDef)*
  - Other activity-type accounting modules covering planned deforestation and unplanned degradation or other REDD activities not covered in *AUDef* (e.g., Avoiding Planned Deforestation, APDef, and Avoiding Unplanned Forest Degradation, AUDeg)
- Carbon pool modules:
  - *VMD0001 Estimation of Carbon Stocks in the Above- and Belowground Biomass in Live Tree and Non-tree Pools (CP-AB)*
  - *VMD0002 Estimation of Carbon Stocks in the Dead-wood Pool (CP-D)*
  - *VMD0003 Estimation of Carbon Stocks in the Litter Pool (CP-L)*
  - *VMD0004 Estimation of Carbon Stocks in the Soil Organic Carbon Pool (CP-S)*
  - *VMD0005 Estimation of Carbon Stocks in the Long-term Wood Products Pool (CP-W)*
- Leakage module:
  - *VMD0011 Estimation of Emissions from Market-Effects (LK-ME)*
- Emissions modules (applicable to baseline, project scenario and leakage):
  - *VMD0013 Estimation of Greenhouse Gas Emissions from Biomass and Peat Burning (E–BPB)*

- *VMD0014 Estimation of Emissions from Fossil Fuel Combustion (E-FFC)*
- *VMD0016 Methods for Stratification of the Project Area (X-STR)*

- Monitoring module:
  - *VMD0015 Methods for Monitoring Greenhouse Gas Emissions and Removals (M-REDD)*

- Tools:
  - *VT0001 Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities*
  - VCS *AFOLU Non-Permanence Risk Tool*
  - CDM *Methodological Tool: Estimation of Direct N_2O Emission from Nitrogen Fertilization (E-NA)*
  - CDM *Tool for Testing Significance of GHG Emissions in A/R CDM Project Activities (T-SIG)*

2 SUMMARY DESCRIPTION OF THE METHODOLOGY

Additionality and Crediting Method	
Additionality	Project Method
Crediting Baseline	Project Method

This methodology framework document, together with the modules and tools it calls upon, constitutes a complete REDD methodology. The project proponent must justify their choice of modules in the project description (PD).

The modules and tools referenced in this document apply to project activities that reduce emissions from unplanned deforestation (UDef). In the future, modules will be added to address activities that reduce emissions from planned deforestation (PDef) and unplanned forest degradation (UDeg). Project proponents may choose to apply other approved VCS methodologies to activities in this same project to account for emission reductions and removals from project activities not currently covered by this methodology (e.g., for avoiding planned forest degradation, see the improved forest management category of methodologies). See the *VCS Standard* for more detail on applying more than one methodology per project.

Note – A forthcoming update to VM0033 Methodology for Tidal Wetland and Seagrass Restoration *will incorporate a jurisdictional approach to accounting for avoided unplanned and planned deforestation in tidal wetlands. Once the update to VM00033 is approved, an applicability condition will exclude tidal wetlands from this methodology. Until then, this methodology may be used with areas of tidal wetlands, the entire national extent of which must be defined as an additional jurisdiction, and soil carbon calculations, where relevant, must follow* BL-TW *and* M-TW *(VMD0050 and VMD0051).*

The reference to this methodology and the modules used to construct the project-specific methodology must be given in the PD.

Table 1 lists the modules and tools, indicating where the use of modules/tools is mandatory, optional or not applicable. *VCS AFOLU Requirements* and the tool *T-SIG* must be used to justify the omission of carbon pools and emission sources.

Table 1: Determination of where module/tool use is mandatory (M) or optional (O) for all project activities covered by this methodology

Module/Tool	*AUDef*	*APDef*	*AUDeg*
AUDef	M	O	O
PDef	O	M	O
UDeg	O	O	M
VT0001	M	TBD	TBD
AFOLU Non-Permanence Risk Tool	M	TBD	TBD
X-STR	M	TBD	TBD
LK-ME	(m)[1]	TBD	TBD
CP-AB	M	TBD	TBD
CP-D	(m)[2]	TBD	TBD
CP-L	O	TBD	TBD
CP-S	O	TBD	TBD
CP-W	(m)[1]	TBD	TBD
E-BPB	M	TBD	TBD

Module/Tool	*AUDef*	*APDef*	*AUDeg*
E-FFC	O	TBD	TBD
E-NA	(m)[3]	TBD	TBD

TABLE NOTES:

AUDef	*MD0OXX Estimation of Emissions from Avoiding Unplanned Deforestation*
PDef	*MD0OXX Estimation of Emissions from Avoiding Planned Deforestation (under development)*
UDeg	*MD0OXX Estimation of Emissions from Avoiding Unplanned Forest Degradation (under development)*
M	Fully mandatory for the given project activity (i.e., the indicated modules and tools must be used)
O	Fully optional for the given project activity (i.e., the indicated pools and sources may be included or excluded as decided by the project, but where they are included in the baseline, they must also be included in the project scenario)
(m)[1]	Mandatory for the given project activity where the process of deforestation involves timber harvesting, fuel wood collection and/or charcoal production for commercial markets
(m)[2]	Mandatory for the given project activity where this carbon pool is greater in baseline (post-deforestation/degradation) than project scenario and significant; otherwise may be conservatively omitted
(m)[3]	Mandatory for the given project activity where leakage prevention activities include increases in the use of fertilizers

3 DEFINITIONS

In addition to the definitions set out in the VCS Program document *Program Definitions* and additional definitions in specific modules, the following definitions apply to this methodology and any of the modules used with it.

Forest (For)

In addition to the definition set out in the *VCS Program Definitions* and the requirements of the *VCS Methodology Requirements*, for this methodology "forest" must include woody vegetation with a canopy cover of between 10 and 30 percent, as used in the relevant country's international reporting to the UNFCCC, or as otherwise officially elected as an applicable definition for use by climate change mitigation projects and programs. Where a country's national

forest definition excludes specific land use/land management types and/or vegetative classes, stratification should identify these areas to enable future inclusion/exclusion in nested accounting.

Historical reference period (HRP)
The period over which factors must be considered to make future projections of deforestation; refer to the latest version of the *VCS Methodology Requirements* for the duration of this period.

Mangrove forest
A subset of forests dominated by mangrove plant species (shrubs and trees that grow in coastal saline or brackish water)

Planned deforestation (PDef)
Deforestation on forest lands that are legally authorized and documented for conversion.

Unplanned deforestation (UDef)
Deforestation of degraded to mature forests not legally authorized and documented for conversion.

For definitions of VCS AFOLU project categories, refer to the *VCS Standard*.

4 APPLICABILITY CONDITIONS

All land areas registered by another project under any GHG program (both voluntary and compliance-oriented) must be transparently reported and excluded from the project area. The exclusion of land in the project area from any GHG program must be monitored over time and reported in the monitoring reports.

In addition to the conditions set out here, applicability conditions for each activity type set out in the relevant accounting modules must also be met.

5 PROJECT BOUNDARY

Geographic boundaries related to project activities must be detailed in the PD. The PD should also set out the carbon pools that the project proponent will account for and the sources and associated types of greenhouse gas emissions that the project will affect.

5.1 Geographical Boundaries

The spatial boundaries of the project area must be clearly defined to facilitate accurate measuring, monitoring, accounting and verification of the project's emissions reductions and removals. The project activity may encompass more than one discrete area of land. When

describing physical project boundaries, the following information must be provided for each discrete area:

1) Name of the project area (e.g., compartment number, allotment number, local name), giving a unique ID for each discrete parcel of land;

2) Map(s) of the area (in digital format);

3) Geographic coordinates of each polygon vertex along with the documentation of their accuracy (from a geo-referenced digital map – data must be provided in the format specified in the *VCS Standard*);

4) Total land area; and

5) Details of landholder and user rights.

The forested project area (within each discrete area of project activity) must be continuous without arbitrary exclusions of forests in the same geography (e.g., excluding forests next to villages around which deforestation is likely to occur).

The boundary of the REDD activity must be clearly delineated and defined and include only land qualifying as forest for a minimum of 10 years before the project start date.

Specific boundaries exist for specific activity types with REDD – details and requirements are provided in the appropriate accounting modules (e.g., *AUDef*).

For projects where multiple AFOLU project activities are being implemented within the project boundary, the discrete areas where each activity is implemented must be spatially delineated.

5.2 Carbon Pools

Any significant decreases in carbon stock in the project scenario and any significant increases in carbon stock in the baseline scenario must be accounted for. In addition, decreases in the baseline scenario and increases in the project scenario may be accounted for. Where REDD activities take place in wetlands, the project must account for expected emissions from the soil organic carbon pool or changes in the soil organic carbon pool in the project scenario unless deemed de minimis. The significance of pools may be determined by using the tool *T-SIG*.

The carbon pools (and corresponding methodology modules) included in or excluded from the boundary of REDD project activities are shown in Table 2.

Where the carbon pool in harvested wood products and dead wood increases more or decreases less in the baseline case than in the project case, the tool *T-SIG* must be used to determine whether the change is significant and, therefore, must be accounted for. In all other cases, only aboveground biomass is mandatory. Where a carbon pool is included in the baseline accounting, it must also be included in the project scenario and leakage accounting.

The selection of carbon pools and the appropriate justification must be presented in the PD.

5.3 Sources of GHG Emissions

The project must account for any significant increases in emissions of carbon dioxide (CO_2), nitrous oxide (N_2O) and methane (CH_4) relative to the baseline that are reasonably attributable to the project activity.

The GHG emission sources included in or excluded from the boundary of the REDD project activity are shown in Table 2. The selection of sources and the appropriate justification must be provided in the PD.

T-SIG may be used to determine whether an emissions source is significant. Where a source is included in estimating baseline emissions,[1] it must also be included in calculating project and leakage emissions.

Table 2: GHG sources included in or excluded from the REDD project boundary

Source		Gas	Included?	Justification/Explanation
Baseline	Burning of woody biomass	CO_2	Included	Carbon stock decreases due to burning are accounted as a carbon stock change.
		CH_4	Included	Non-CO_2 gases emitted from woody biomass burning - it is conservative to exclude.
		N_2O	Included	
	Combustion of fossil fuels	CO_2	Optional	May be excluded if determined negligible.
		CH_4	Excluded	Potential emissions are negligible.
		N_2O	Excluded	Potential emissions are negligible.
	Use of fertilizers	CO_2	Excluded	Potential emissions are negligible.
		CH_4	Excluded	Potential emissions are negligible.
		N_2O	Optional	May be excluded if determined negligible.
Project	Burning of woody biomass	CO_2	Included	Carbon stock decreases due to burning are accounted as a carbon stock change.
		CH_4	Included	Non-CO_2 gases emitted from woody biomass burning - must be included where fire occurs.
		N_2O	Included	

[1] For example, CH_4 or N_2O emissions from agriculture resulting from deforestation or fire to clear forest.

Source		Gas	Included?	Justification/Explanation
	Combustion of fossil fuels	CO_2	Included	May be neglected where excluded from baseline accounting
		CH_4	Excluded	Potential emissions are negligible.
		N_2O	Excluded	Potential emissions are negligible.
	Use of fertilizers	CO_2	Excluded	Potential emissions are negligible.
		CH_4	Excluded	Potential emissions are negligible.
		N_2O	Included	May be excluded where excluded from baseline accounting except when fertilizer use is increased through project activities (e.g., as a leakage avoidance mechanism).

6 BASELINE SCENARIO

The most plausible baseline scenario must be determined using the relevant activity type module. For avoiding UDef, the only eligible module is *MD00XX (AUDef)*.

Projects that are implemented within a JNR registered REDD program shall nest according to the requirements set out by the VCS-JNR Program.

REDD projects that are implemented within a non-JNR REDD jurisdictional program should follow the relevant jurisdictional program's requirements, but they must be registered and monitored under VCS following this methodology.

If the baseline estimated using the baseline activity data allocated to the project through this methodology is higher than the nested one (i.e., the one allocated through the jurisdictional program), a project proponent may elect to limit the amount of VCUs it issues to the amount that would be issued based on this lower baseline. If supported by local regulation, such limitation is mandatory.

Baseline projections beyond the baseline validity period are not required for REDD project activities.

The project baseline must be reassessed per the *VCS Standard* except for projects avoiding UDef, which must instead follow the requirements set out in *AUDef*. The date of the next scheduled baseline reassessment must be specified in the PD.

7 ADDITIONALITY

VT0001 must be used to demonstrate the project's additionality.

Default factors and standards used to ascertain GHG emission data and any supporting data for demonstrating additionality must be publicly available from recognized, credible sources and must have been reviewed for publication by an appropriately qualified, independent organization or appropriate peer review group, or be published by a government agency. Examples include the latest versions of the *IPCC 2006 Guidelines for National GHG Inventories* (including *2019 Refinement*) or the *IPCC 2003 Good Practice Guidelines for Land Use, Land-Use Change and Forestry*.

8 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

8.1 Baseline Emissions

The same procedure for quantifying emissions and carbon stocks must be followed *ex ante* and *ex post*. For parameters monitored after project initiation, guidance is given in the parameter tables of the relevant modules for the values that must be used in *ex ante* calculations.

The baseline of the project activity is estimated *ex ante. Ex ante* baseline estimations are used in the *ex ante* and *ex post* estimation of net carbon stock changes and greenhouse gas emission reductions.

The relevant activity modules (e.g., *AUDef*) provide methods for estimating net baseline carbon stock changes and greenhouse gas emissions.

8.2 Project Emissions

The same procedure must be followed *ex ante* and *ex post*. For parameters monitored after project initiation, guidance is given in the parameter tables of the relevant modules for *ex ante* calculations.

Methods for estimating net carbon stock changes and GHG emissions in the project scenario are provided in the relevant activity modules (e.g., *AUDef*).

8.3 Leakage

The relevant activity modules (e.g., *AUDef*) provide methods for estimating net carbon stock changes and GHG emissions due to activity shifting leakage.

The significance of leakage and carbon pools may be determined using *T-SIG*. Where applicable, leakage due to market effects must be considered using *LK-ME*. Market effects must be considered where the project leads to a decrease in timber, fuelwood or charcoal production.

Where leakage prevention activities include tree planting, aquacultural intensification, agricultural intensification, fertilization, fodder production, other measures to enhance cropland and/or grazing land areas, leakage management zones or a combination of these, then any increase in GHG emissions associated with these activities must be accounted for, unless deemed de minimis, as determined using *T-SIG*.

Leakage prevention activities may lead to an increase in the combustion of fossil fuels; however, any increase in emissions because of the increased combustion of fossil fuels is considered insignificant.

Where leakage prevention leads to a significant increase in fertilizer use, module *E-NA* must be used. *T-SIG* may be used to determine significance.

Leakage prevention may not include the flooding of agricultural lands (e.g., for new rice paddies) nor the creation of livestock feedlots or manure lagoons. Leakage prevention may also not include the drainage of peatland.

The list of leakage sources with appropriate justification must be presented.

Per the *VCS Standard,* projects must not account for positive leakage.

8.4 Net GHG Emission Reductions and Removals

The project proponent must present conservative *ex ante* estimations of the project activity's total net GHG emissions reductions.

Refer to the parameter tables in the appropriate modules for *ex ante* estimations of specific parameters.

8.4.1 Calculation of Verified Carbon Units

To estimate the number of Verified Carbon Units (VCUs) for the monitoring period $t = t_2 - t_1$, this methodology uses the following equation:

$$\boldsymbol{VCU_t = VCU_{UDef} + VCU_{PDef} + VC_{AUDeg}} \quad (1)$$

Where:

VCU_t = Number of Verified Carbon Units at year $t = t_2 - t_1$ (VCU)

VCU_{UDef} = Number of Verified Carbon Units from unplanned deforestation at year $t = t_2 - t_1$ (VCU)

VCU_{PDef} = Number of Verified Carbon Units from planned deforestation at year $t = t_2 - t_1$ (VCU)

VCU_{UDeg} = Number of Verified Carbon Units from unplanned forest degradation at year $t = t_2 - t_1$ (VCU)

9 MONITORING

9.1 Data and Parameters Available at Validation

See specific parameters within accounting and other source modules.

9.2 Data and Parameters Monitored

See specific parameters within accounting and other source modules.

9.3 Description of the Monitoring Plan

9.3.1 Development of Monitoring Plan

General

The monitoring plan must address the following tasks:

- Monitoring of project implementation;
- Monitoring of actual carbon stock changes and greenhouse gas emissions;
- Monitoring of leakage carbon stock changes and greenhouse gas emissions; and
- Estimation of *ex post* net carbon stock changes and greenhouse gas emissions.

For each of these tasks, the monitoring plan must include the following information:

- Technical description of the monitoring task;
- Data to be collected (data and parameters to be collected must be listed in the PD);
- Overview of data collection procedures;
- Quality control and quality assurance procedures;
- Data archiving; and

- Organization and responsibilities of the parties involved in all of the above.

Uncertainty and Quality Management

As far as is practical, uncertainties related to the quantification of GHG emission reductions and removals by sinks should be reduced.

Uncertainties arising from input parameters would result in uncertainties in estimating baseline and project net GHG emissions – especially where global default factors are used. The project must identify critical parameters that would significantly influence the accuracy of estimates. Local values specific to the project circumstances must be obtained for these key parameters where possible. These values should be based on:

- Cited data from well-referenced peer-reviewed literature or other well-established published sources;
- National inventory data or default factors from IPCC literature that have, where possible and necessary, been checked for consistency against available local data specific to the project circumstances; or
- Expert opinion, in the absence of the above sources of information. Experts will often provide a range of data values and a proposed value for the data. The rationale for selecting a particular data value must be demonstrated.

In choosing key parameters or making important assumptions based on information not specific to the project circumstances, such as using default factors, the project proponent must select values that will lead to an accurate estimation of net GHG emission reductions, taking into account uncertainties.

Where uncertainty is significant, the project proponent must choose data that indisputably tends to under-estimating, rather than over-estimating, net GHG project benefits.

To ensure that GHG fluxes are estimated in a way that is accurate, verifiable, transparent and consistent across measurement periods, the project proponent must establish and document clear standard operating procedures and procedures for ensuring data quality. At a minimum, these procedures must include:

- Comprehensive documentation of all field measurements carried out in the project area. This documentation must be detailed enough to allow replication of sampling in the event of staff turnover between monitoring periods;
- Training procedures for all persons involved in field measurement or data analysis. The scope and date of all training must be documented;
- A protocol for assessing the accuracy of plot measurements using a check cruise and a plan for correcting the inventory where errors are discovered;

- Protocols for assessing data for outliers, transcription errors and consistency across measurement periods; and
- Safe archiving of data sheets for the life of the project. Data stored in electronic formats must be backed up.

Expert judgment

The use of expert judgment for selecting and interpreting methods, selecting input data to fill gaps in available data, and selecting data from a range of possible values or uncertainty ranges are all well defined in the *IPCC 2006 Good Practice Guidance*. The project proponent must use the guidance provided in Volume 1 Chapter 2 Approaches to Data Collection (in particular, Section 2.2 and Annex 2A.1) of the *IPCC 2006 Good Practice Guidance*.

Monitoring of Project Implementation

Information must be provided and recorded to establish the following:

1) The geographic position of the project boundary is recorded for all areas of land. The geographic coordinates of the project boundary (and any stratification or buffer zones inside the boundary) are established, recorded and archived. This may be achieved by field survey (e.g., GPS) or geo-referenced spatial data (e.g., maps, GIS datasets, orthorectified aerial photography or geo-referenced remote sensing images).

The above also applies to strata recording, including strata resulting from peatland fires in the project scenario.

2) Commonly accepted principles of land use inventory and management are implemented.

   a) Standard operating procedures (SOPs) and quality control/quality assurance (QA/QC) procedures for inventories, including field data collection and management, must be applied. Use or adaptation of SOPs already applied in national land use monitoring or available from published handbooks or the latest IPCC guidance documents is recommended.

   b) The project plan and a record of the plan as implemented during the project must be available for validation or verification, as appropriate.

3) The monitoring plan must use the methods given in *M-REDD* to monitor changes in forest cover and carbon stock changes. All relevant parameters from the modules are to be included in the monitoring plan.

9.3.2 Monitoring

Ex post monitoring must accomplish two key tasks:

1) Monitoring according to the monitoring plan; and

2) Revising the baseline for future project crediting periods.

TASK 1: Monitoring According to the Monitoring Plan

Monitoring of Key Baseline Variables

Information required to reassess the project baseline periodically must be collected during the entire project crediting period. Key variables to be measured are:

- Changes in forest cover as specified in the relevant accounting modules (e.g., *AUDef*)
- Spatial variable datasets used in modeling, as specified in relevant accounting modules (e.g., *AUDef*). As a minimum, the variables used in the first baseline assessment must be monitored during any reassessments.
- Where required, carbon stock data, as specified in the relevant accounting module

Monitoring of Leakage

All significant sources of leakage identified are subject to monitoring, following the procedures outlined in the monitoring plan. Such procedures must be consistent with the applicable leakage modules. The monitoring plan must include all relevant parameters in the leakage modules.

Reporting of Parameters in Each Monitoring Report

The following values must be reported using the unit in parentheses– each with an estimate of uncertainty, representing sampling error as a two-sided 90 percent confidence interval:

1) Aggregate annual deforestation area for the historical reference period in the reference region (hectares per year);
2) Aggregate annual planned deforestation for the historical reference period in the reference region (hectares per year);
3) Aggregate annual deforestation area for the verification period in the project area (hectares per year);
4) Aggregate annual deforestation area for the verification period in the leakage belt (hectares per year);
5) Average emission factor for deforestation over all years of the historical reference period and over the whole reference region (tonnes CO_2e per hectare);
6) Aggregate annual emission from deforestation for the reference period and reference region (tonnes CO_2e per year);
7) Aggregate annual emission from deforestation for the verification period and project area (tonnes CO_2e per year);

8) Aggregate annual emission from deforestation for the verification period and leakage belt (tonnes CO_2e per year);

9) Average emission factor for deforestation for the verification period and over the project area (tonnes CO_2e per hectare)

TASK 2: Revising the Baseline for Future Project Crediting Periods

The methodological procedure to update the baseline must be the same as in the first estimation.

10 REFERENCES

IPCC (2003). *Good Practice Guidance for Land Use, Land Use Change and Forestry*. Institute for Global Environmental Strategies (IGES).

IPCC (2006). *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Institute for Global Environmental Strategies (IGES).

Additional information may be found in the modules referenced throughout this methodology.

Document History

Version		Comment
v1.0	DD Month YYYY	Initial version