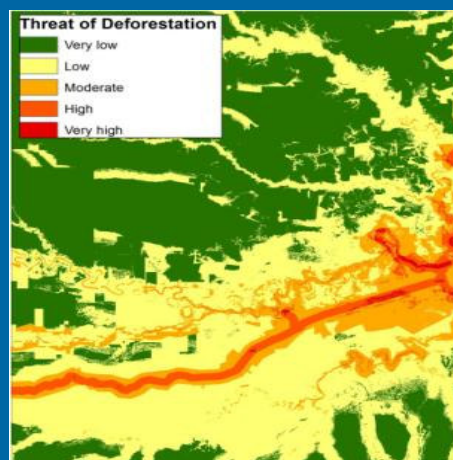


Guidance Document for the Use of Avoided Deforestation Partners VCS REDD Modular Methodology

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LIST OF ACRONYMS

A/R	Afforestation / Reforestation
ADP	Avoided Deforestation Partners
AFOLU	Agriculture, Forestry, and Other Land Use
APD	Avoiding Planned Deforestation
AUDD	Avoiding Unplanned Deforestation and Degradation
BL-DFW	Estimation of baseline emission from forest degradation caused by extraction of wood for fuel
BL-PL	Estimation of baseline carbon stock changes and greenhouse gas emissions from planned deforestation
BL-UP	Estimation of baseline carbon stock changes and greenhouse gas emissions from unplanned deforestation
CDM	Clean Development Mechanism
COP	Conference of the Parties
CP-AB	Estimation of carbon stocks in the above- and belowground biomass in live tree and non-tree pools
CP-D	Estimation of carbon stocks in the dead-wood pool
CP-L	Estimation of carbon stocks in the litter pool
CP-S	Estimation of stocks in the soil organic carbon pool
CP-W	Estimation of carbon stocks in the long-term wood products pool
E-BB	Estimation of greenhouse gas emissions from biomass burning
E-FFC	Estimation of emissions from fossil fuel combustion
E-NA	Estimation of direct N ₂ O emissions from nitrogen application
IFM	Improved Forest Management
LK-ASP	Estimation of emissions from activity shifting for avoided unplanned deforestation
LK-DFW	Estimation of emissions from displacement of fuelwood extraction
LK-ME	Estimation of emissions from market-effects
M-MON	Methods for monitoring of greenhouse gas emissions and removals
PD	Project documentation (project design documentation)
PRA	Participatory Rural Appraisal
REDD	Reduced Emissions from Deforestation and Forest Degradation
REDD-MF	REDD Methodology Framework

T-ADD	Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities
T-BAR	Tool for AFOLU non-permanence risk analysis and buffer determination
T-SIG	Tool for testing significance of GHG emissions in A/R CDM project activities
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standard
VCSA	Verified Carbon Standard Association
VCU	Verified Carbon Unit
X-STR	Methods for stratification of the project area
X-UNC	Estimation of uncertainty for REDD project activities

FOREWORD

by Robert O'Sullivan, Climate Focus

[Avoided Deforestation Partners](#) sponsored the first coordinated effort to develop a set of "methodology modules" to estimate emission reductions from projects that Reduce Emissions from Deforestation and Forest Degradation (REDD projects). The modules were developed under the Verified Carbon Standard (VCS), and planned as the most comprehensive REDD methodology under the VCS and support the development of a wide range of REDD project activities.

The REDD Methodology Modules project is an effort to streamline methodology development for investors and project developers. Rather than developing unique and expensive methodologies on a project-by-project basis, under the modular approach each aspect of the project from baseline setting to measurement, and monitoring to leakage estimates, is treated in a discrete and independent module. Individual modules that are applicable to a specific project's circumstances can then be selected and applied under a framework module to generate a project specific methodology. This clears a major barrier for the development of REDD projects and promises to:

- Ensure environmental integrity and robustness of VCS REDD projects
- Prevent certification of poorly designed REDD demonstration activities
- Avoid a repetition of the fragmented development of project specific methodologies without general applicability as under the CDM Afforestation/Reforestation process.
- Accelerate the reduction of emissions from deforestation while international and domestic REDD frameworks continue to be developed

The Project was initially conceived in May 2008 and drafting began in September 2008. The VCS granted the final approval of the REDD Methodology Modules on December 3, 2010 during the UNFCCC COP 16 meetings in Cancun. The drafting team consisted of:

- Dr. Tim Pearson — Winrock International, USA (lead author)
- Dr. Sandra Brown — Winrock International, USA
- Dr. Lucio Pedroni — Carbon Decisions International, Costa Rica
- Dr. Iginio Emmer — Silvestrum, The Netherlands
- David Shoch — TerraCarbon, USA

Over 15 additional experts peer reviewed the first drafts of the modules. Robert O'Sullivan and Dr. Charlotte Streck of Climate Focus served as secretariat and facilitator of the Project. SQS and Rainforest Alliance performed the first and second assessments required by the VCS.

Thanks needs to go to SQS and Rainforest Alliance along with VCSA staff who all helped process the final steps to ensure VCSA approval in time for the COP. The modules were made possible by the generous contributions from the Sea Change Foundation, the David & Lucile Packard Foundation, Norad, Ecosystem Restoration Associates, and Equator LLC. Finally, thanks also need to go to Jeff Horowitz from Avoided Deforestation Partners - without his support the modules would not have been possible.

1.0 DESCRIPTION OF THE MODULAR STRUCTURE

The Avoided Deforestation Partners (ADP) REDD methodology can be used for project activities that reduce emissions from avoiding planned (APD) and unplanned (AUDD) deforestation, and for activities to reduce emissions from avoiding forest degradation caused by extraction of wood for fuel (also AUDD).

1.1 The Concept of Modules

A standard methodology usually contains all parts in a single document. This is the most common form for methodologies under the VCS, but it leads to very large unwieldy documents that do not efficiently facilitate simple modifications or revisions to adjust for varying local conditions. The advantages of the modular structure is that the modules can be put together in different ways to meet the needs of local conditions, and revisions or modifications can readily be made—particular modules could be changed or even whole modules could be disregarded if not applicable or not elected for a particular project. Approved modules can also be used by other proposed methodologies simplifying the process of extending the scope of methodologies and the process of making changes across methodologies.

The modular concept originated under the CDM where, for example, consolidated afforestation/reforestation methodology 1 (AR-ACM001) is now just 12 pages long but refers to 11 tools/modules. This compares with pre-modularization methodologies that were 100 or more pages long. As might be expected the complications of REDD versus A/R would lead to significantly longer REDD methodologies than A/R methodologies.

1.2 Methodology Structure

At the center of the entire methodology is the Framework module – REDD-MF—that ties the 17 other modules and 3 tools together and from which the ultimate calculation estimation of VCUs is derived. The REDD-MF leads users through the steps needed to:

1. Select the appropriate modules to produce a methodology for a specific REDD-eligible project type,
2. Bring together all the calculations from selected modules into the estimation of total net greenhouse gas emissions reductions (i.e. project minus baseline and leakage),
3. Calculate the number of credits to be held in the VCS permanence risk buffer, and
4. Calculate the number of Verified Carbon Units (VCUs) for a given monitoring period.

1.3 Structure of the Modules

All modules follow a similar structure. Each module is divided into three key sections:

1. Scope, Applicability and Output Parameters

At the beginning of each module the aim is to give users sufficient information to know the purpose and output parameters of the module and to evaluate whether the module can be applied by the specific project.

2. Procedure

The methodological steps and calculations needed to achieve the aim of each module are found in this section.

3. Parameters

At the end of each module is a list of parameters with information about how the parameter is derived, such as from another module, from measurement, or from a provided list of default values. The parameters used by the methodology

are listed alongside the source and requirements where user decisions or process are needed. Parameters may be fixed, monitored through time, or derived from another module.

Parameters are the key terms used by a module, such as the diameter at breast height of trees, or are estimated in a module such as the carbon stock in pool A or the net greenhouse gas emissions in the baseline. For each module one or more parameters are listed in the first key section of the module. These parameters are calculated in the module and are the subsequently used in other modules.

1.4 Modules and Tools

For a project using the ADP methodology, a specific combination of the 18 modules and three tools would be used. In any particular project some of the modules would be mandatory, some would be non-applicable and some would be optional, depending on local project conditions. The various aspects of the methodology are tied together as shown in Figure 1.

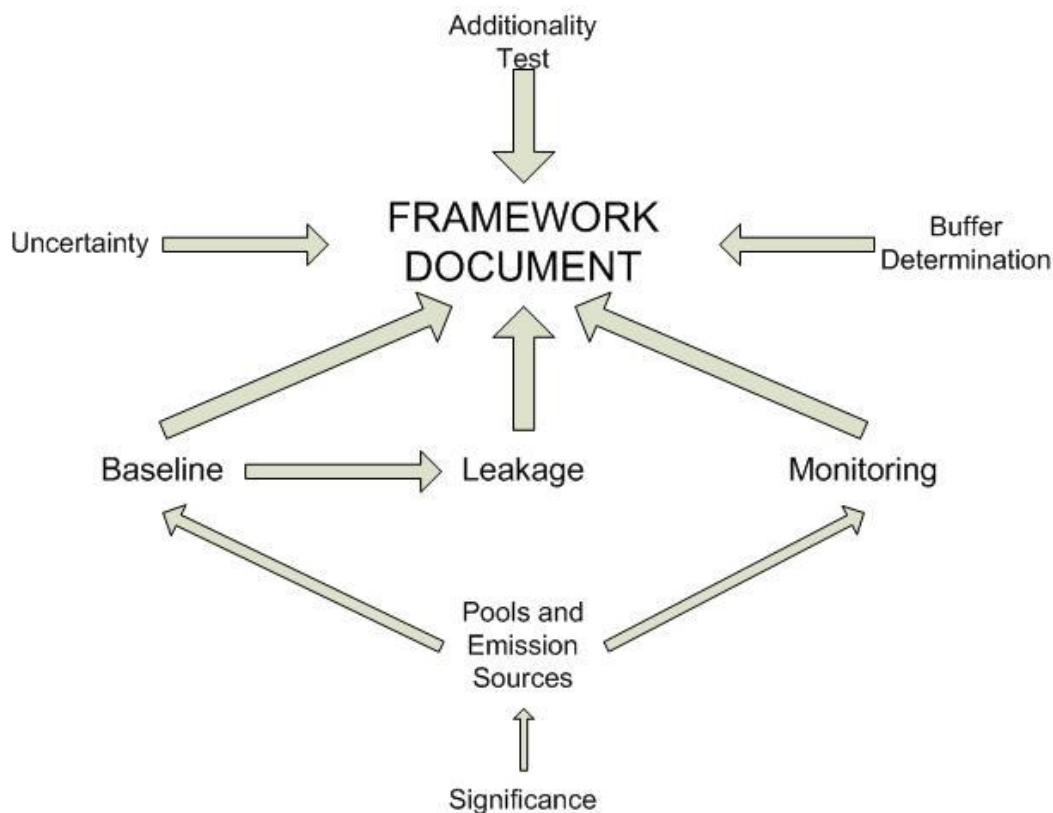


Figure 1. The structure of the modules methodology

The REDD-MF lists all the modules and tools:

- CP-AB Estimation of carbon stocks in the above- and belowground biomass in live tree and non-tree pools
- CP-D Estimation of carbon stocks in the dead-wood pool”
- CP-L Estimation of carbon stocks in the litter pool”
- CP-S Estimation of stocks in the soil organic carbon pool”
- CP-W Estimation of carbon stocks in the long-term wood products pool”
- BL-PL Estimation of baseline carbon stock changes and greenhouse gas emissions from planned deforestation”
- BL-UP Estimation of baseline carbon stock changes and greenhouse gas emissions from unplanned deforestation
- BL-DFW Estimation of baseline emission from forest degradation caused by extraction of wood for fuel”
- LK-ASP Estimation of emissions from activity shifting for avoided unplanned deforestation”
- LK-ME Estimation of emissions from market-effects”
- LK-DFW Estimation of emissions from displacement of fuelwood extraction”
- E-BB Estimation of greenhouse gas emissions from biomass burning”
- E-FFC Estimation of emissions from fossil fuel combustion”
- E-NA Estimation of direct N2O emissions from nitrogen application” – latest CDM-EB approved version
- M-MON Methods for monitoring of greenhouse gas emissions and removals”
- X-STR Methods for stratification of the project area”
- X-UNC Estimation of uncertainty for REDD project activities”
- T-SIG Tool for testing significance of GHG emissions in A/R CDM project activities
- T-ADD Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities
- T-BAR “Tool for AFOLU non-permanence risk analysis and buffer determination

Which modules and tools are mandatory and which ones are optional for a given REDD project type is shown in Section 2.2 of REDD-MF.

1.3 Description of forms of baseline included

Three forms of baseline are included under the methodology modules:

- Planned deforestation
- Unplanned deforestation
- Degradation through fuelwood extraction

At this time there is no module for degradation through illegal logging.

Degradation through legal timber extraction falls under the VCS category IFM not REDD and is not covered under this methodology.

1.4 Description of forms of leakage included

Two forms of leakage are included under the methodology modules:

- Activity shifting
- Market effects

For activity shifting separate modules exists for each of the three baseline types.

For market effects, following VCS requirements only the market impacts of decreased supply of timber and of decreased supply of fuelwood and charcoal are considered.

2.0 GUIDANCE FOR PROJECT DEVELOPERS

2.1 Can my project use the REDD modules?

If you have a project seeking to prevent or slow deforestation and/or degradation caused by extraction of wood for fuel and it meets the eligible VCS REDD activities, then your situation will be covered by the modules.

The exceptions under the current version of the modules are:

- Avoided deforestation and forest degradation projects located on peatlands (e.g. peat swamp forests). However, most of the modules would still be useful. The major change would be the need for a baseline module related to emissions from draining and burning the peat. This could be obtained from the VCS NM-0004 methodology for avoided planned land use conversion in peat swamp forests but would necessitate a new methodology submission pulling the peat aspects from NM-0004 into this methodology;
- Projects seeking to prevent illegal logging.

You will also have problems applying the modules for AUDD projects if your project area is currently under no deforestation pressure. The threat of a road being built sometime in the future, even with evidence that such a road is being planned (e.g. existence of permit, maps of construction plans, construction contracts, open tenders), is not sufficient for development of a project under this methodology. Instead, you must be able to already demonstrate some deforestation in your reference region.

2.2 How do I determine which modules I need to use?

There are modules which everyone has to use such as the Framework document, the monitoring, uncertainty and stratification modules and the tools for additionality and buffer determination. In addition, every project must apply at least one of the baseline modules and one or more of the leakage modules. The aboveground biomass and biomass burning modules are also mandatory for all projects. Table 1 details the required, conditional and optional modules for each baseline type.

Table 1. The required, conditional and optional modules for REDD projects

		Unplanned Deforestation	Planned Deforestation	Degradation (Fuelwood / Charcoal)
Always Mandatory	REDD-MF	M	M	M
	M-MON	M	M	M
	T-ADD†	M	M	M
	T-BAR†	M	M	M
	X-UNC	M	M	M
	X-STR	M	M	M
Baselines	BL-UP	M	-	-
	BL-PL	-	M	-
	BL-DFW	-	-	M
Leakage	LK-ASU	M	-	-
	LK-ASP	-	M	-
	LK-DFW	-	-	M
	LK-ME	(m) ¹	(m) ¹	(m) ²
Pools*	CP-AB	M	M	M
	CP-D	(m) ³	(m) ³	(m) ³
	CP-L	O	O	O

	CP-S	O	O	O
	CP-W	(m) ¹	(m) ¹	-
Emissions*	E-BB	M	M	M
	E-FFC	O	O	O
	E-NA†‡	(m) ⁴	O	O

See Annex for the full title associated with module codes

- M Modules marked with an M are fully mandatory: the indicated modules and tools must be used
- O Modules marked with an O are fully optional: the indicated pools and sources can be included or excluded as decided by the project but if included in the baseline they must also be included in the with-project scenario
- (m)¹ Mandatory where the process of deforestation involves timber harvesting for commercial markets
- (m)² Mandatory where fuelwood or charcoal is harvested for commercial markets
- (m)³ Mandatory if this carbon pool is greater in baseline (post-deforestation/degradation) than project scenario and significant; otherwise can be conservatively omitted
- (m)⁴ Mandatory where leakage prevention activities include increases in the use of fertilizers
- * VCS requirements and the tool **T-SIG** shall be used to justify the omission of carbon pools and emission sources
- † **T-ADD** and **T-BAR** are VCS tools. **T-ADD** available at: http://v-c-s.org/tool_VT0001.html; **T-BAR** available at: <http://v-c-s.org/docs/Tool%20for%20AFOLU%20Non-Permanence%20Risk%20Analysis%20and%20Buffer%20Determination.pdf>
- ‡ **E-NA** is a CDM tool available at: http://cdm.unfccc.int/methodologies/ARmethodologies/tools/ar-am-tool-07-v1.pdf/history_view

2.3 How can I use the modules to plan my project?

The modules can and should be used both for estimating ultimate emission reductions (VCUs) and for planning your project:

- Application of the baseline and leakage modules will assist projects in developing a design that will maximize offsets and minimize leakage;
- Application of the uncertainty module is important to assure low uncertainty across the project and avoid uncertainty deductions;
- Application of the buffer tool is important for assessing project risk and the likely buffer discount, and thus actions to reduce risks can be better addressed up front.

3.0 DESIGNING A METHODOLOGY

3.1 Planned deforestation

3.1.1 Modules for planned deforestation

The following represents the list of modules required, conditionally required and optional for planned deforestation projects:

Baseline	BL-PL	Required
Leakage	LK-ASP	Required
	LK-ME	<i>Conditional</i>
Monitoring	M-MON	Required
Uncertainty	X-UNC	Required
Additionality	T-ADD	Required
Buffer	T-BAR	Required
Stratification	X-STR	Required
Pools	CP-AB	Required
	CP-D	<i>Conditional</i>
	CP-L	Optional
	CP-S	Optional
	CP-W	<i>Conditional</i>
Emissions Sources	E-BB	Required
	E-FFC	Optional
	E-NA	Optional

3.1.2 Expertise needed to complete planned deforestation PD

Planned deforestation projects do not require any specific expertise with regard to modeling land use or land use change. However, diligent study and record keeping is required to derive proof that deforestation will occur in the absence of the project and the rate at which deforestation will occur.

In the project case where there is an established agent of deforestation, the land use patterns of the agent must be followed through time to determine potential leakage.

Within the project boundaries, remote sensing and ground analyses are necessary to capture deforestation and/or degradation that occurs.

3.2 Unplanned deforestation

3.2.1 Modules for unplanned deforestation

The following represents the list of modules required, conditionally required and optional for unplanned deforestation projects:

Baseline	BL-UP	Required
Leakage	LK-ASU	Required
	LK-ME	<i>Conditional</i>
Monitoring	M-MON	Required

Uncertainty	X-UNC	Required
Additionality	T-ADD	Required
Buffer	T-BAR	Required
Stratification	X-STR	Required
Pools	CP-AB	Required
	CP-D	<i>Conditional</i>
	CP-L	Optional
	CP-S	Optional
	CP-W	<i>Conditional</i>
Emissions Sources	E-BB	Required
	E-FFC	Optional
	E-NA	<i>Conditional</i>

3.2.2 Expertise needed to complete unplanned deforestation PD

Unplanned deforestation projects need a broad range of expertise including remote sensing analysis of deforestation across the reference region(s), leakage belt and project area. Where location of deforestation is projected, then expertise is required in the modeling of future land use and land use change patterns.

Within the project boundaries remote sensing and ground analyses are necessary to capture deforestation and/or degradation that occurs.

3.3 Degradation (fuelwood/charcoal)

3.3.1 Modules for degradation (fuelwood/charcoal)

The following represents the list of modules required, conditionally required and optional for degradation (fuelwood/charcoal) projects:

Baseline	BL-DFW	Required
Leakage	LK-DFW	Required
	LK-ME	<i>Conditional</i>
Monitoring	M-MON	Required
Uncertainty	X-UNC	Required
Additionality	T-ADD	Required
Buffer	T-BAR	Required
Stratification	X-STR	Required
Pools	CP-AB	Required
	CP-D	<i>Conditional</i>
	CP-L	Optional
	CP-S	Optional
	Emissions Sources	E-BB
	E-FFC	Optional
	E-NA	Optional

3.3.2 Expertise needed to complete degradation PD

Degradation projects require the highest level of capacity in social studies and social analyses of the three baseline types. On the ground interviews and assessments are needed to determine rate of fuelwood collection and use and leakage when replaced fuelwood is not sustainable.

Within the project boundaries remote sensing and ground analyses are necessary to capture deforestation and/or degradation that occurs.

3.4 Hybrid projects

3.4.1 Modules for hybrid projects

Any and all project could be needed and used in hybrid projects. See the separate components of the hybrid project (i.e. planned deforestation/unplanned deforestation/degradation (fuelwood-charcoal)) for details of required modules.

3.4.2 Expertise needed to complete hybrid project PD

Hybrid projects require the expertise appropriate to the included baselines (see above).

4.0 DETAILED GUIDANCE ON EACH MODULE

Here we provide detailed guidance on the modules. For each is given the modules that both input and receive parameters to/from the module.

4.1 The Framework

Modules:	
Parameters output to:	VCUs to Registry; X-UNC
Parameters input from:	T-ADD, T-BUF, BL-PL, BL-UP, BL-DFW, LK-ASP, LK-ASU, LK-DFW, LK-ME, M-MON, X-UNC, E-FFC, E-NA

The framework is the key central document in the methodology. The framework is where VCUs are calculated. Users follow the framework during the completion of the PD and calculation of ex-ante estimates.

Key Decisions

1. Geographic boundaries – The project boundaries shall delineate areas of forest. Any areas of non-forest shall be excluded even where it leads to highly complex boundaries including islands of non-project within the project.

It would be good practice for project developers to exclude areas of forest that are at no discernable risk of deforestation/degradation for the foreseeable future (20-30 years). These areas represent a potential liability as well as serving to increase the requirements with regard to reference areas and leakage.

For hybrid projects with multiple baselines such as planned and unplanned deforestation, or unplanned deforestation and degradation, the boundaries of each baseline may not overlap¹.

2. Carbon pools – In the framework users define which pools shall be included in project accounting.

¹ This is to avoid double-counting. In particular if in the baseline an area would have been deforested it is wrong for offsets to continue accruing for ongoing avoided degradation.

>Aboveground biomass shall always be included. However, where biomass is herbaceous such as grasses or non-woody crops no assessment is required.

>Wood products must be included if timber is harvested in significant quantities as part of deforestation in the baseline.

>The other conditional pool is dead wood and must be included if higher in the baseline than the project – this might occur for example if fuelwood harvesting leads to significantly higher baseline dead wood stocks than in the project case.

> In all situations litter, belowground biomass and soil organic carbon are optional, and can be included or excluded at the discretion of the project. The choice would be made based on the scale of potential benefit and the costs of inclusion. For belowground biomass and in some cases for soil carbon, cost will be minimal as inclusion involves calculation rather than measurement – so there is little disincentive to inclusion.

3. Greenhouse gas emissions – Three sources of emissions are included: biomass burning, fossil fuel combustion and fertilizer use.

>Emissions from biomass burning must always be included where significant;

>Fertilizer use must be calculated where fertilizers are used in the with-project case to prevent leakage (only applicable for unplanned deforestation baselines);

>In all other cases fertilizer use can be excluded and fossil fuel combustion (e.g. from vehicles used on the project) can always be excluded. Almost invariably emission will be higher in the baseline so projects will just have to determine if the costs of calculating baseline emissions and of tracking use of fossil fuels and fertilizer in the project case is worth the additional emission reductions that can be claimed.

Timing

Calculations must be completed and presented at each verification.

Additional guidance

Calculation of buffer – The equations for calculation of buffer deductions look very complicated. This is unavoidable because the proportional buffer value (calculated in **T-BAR**) is not applied to the total net greenhouse emission reductions. Instead, buffer deduction must be calculated not including deductions for leakage emissions and also not including emission reductions from fertilizer use or fossil fuel burning.

4.2 Baselines

All projects using the REDD modules methodology have to use one or more than one of the three baseline modules.

4.2.1 Planned deforestation

Modules:	
Parameters output to:	REDD-MF, LK-ASP, M-MON
Parameters input from:	CP-AB, CP-D, CP-L, CP-S, CP-W, E-BB, E-FFC, E-NA, X-UNC

Key Decisions

1. Applicability – Where there is fuelwood collection in the baseline, there is the possibility that degradation could be displaced leading to leakage of project benefits. The module has two approaches to this issue. First, the issue can be disregarded if fuelwood collection in the baseline is sustainable – in particular involving a sustainable management plan. If unsustainable, then the fuelwood degradation modules must be applied. Application of these modules can not achieve an emission reduction in this case as project boundaries for different baselines can not overlap. Instead, the sole purpose is to calculate the leakage parameter - $\Delta C_{LK-AS,degrad-FW/C}$ - that is subsequently applied in the framework document – REDD-MF.

2. Division between agents and classes of agents – this division is very important to the methodology with implications for both the baseline and leakage. At its simplest, planned deforestation projects have an identified entity who will deforest for a specified purpose with a specific area due to be deforested at a set time and rate.

However, this situation does not always occur. Projects may start with a change of ownership where the alternate owner is not easily established, or the project may start with the purchase of a concession from the Government.

In these situations a class of agent must be defined. Guidance is given on how this is done. In general, it is easier to have a defined agent than a class of agent.

Timing

The baseline must be reassessed every ten years.

Specific guidance

1. Calculation of net greenhouse gas emissions in the baseline – the equation appears complex however it is merely summing the following components:

- a. The rate of deforestation – the proportion of the total project area deforested each year; multiplied by
- b. The project area; multiplied by
- c. The likelihood of deforestation – for areas under governmental control before the start of the project the methodology looks at similar areas projected for deforestation and records the proportion that were deforested. For areas under other forms of control this factor is set to be equal to one; multiplied by
- d. The carbon stock change from conversion of forest to non-forest; plus
- e. The summed greenhouse gas emissions associated with conversion – biomass burning, fertilizer use and fossil fuel use.

2. Annual deforestation in proxy areas – this is calculated as the average across proxies of the % of the total area deforested divided by the number of years for the deforestation to occur.

3. Risk of abandonment – an exclusionary criterion that should be carefully considered at an early stage is the risk of abandonment (which would result in forest regeneration). The criterion does not ask whether any similar areas have been abandoned but whether projects can find five similar areas that have not been abandoned.

4. Carbon stock change – This equation sets up the pre-deforestation stock as the total emission from deforestation then subtracts any stocks in the post deforestation land use and any of the tree biomass that instead of being emitted is converted to long-term storage in wood products.

4.2.2 Unplanned deforestation

Modules:	
Parameters output to:	REDD-MF, LK-ASU, M-MON
Parameters input from:	CP-AB, CP-D, CP-L, CP-S, CP-W, E-BB, E-FFC, E-NA, M-MON, X-UNC

Key Decisions

1. Applicability – The method excludes [conversion to] large-scale industrial agriculture which is deemed to fall under planned deforestation. The projects themselves are responsible for defining and justifying the definition of large-scale industrial agriculture.

Where there is fuelwood collection in the baseline, there is the possibility that degradation could be displaced leading to leakage of project benefits. The module has two approaches to this issue. First, the issue can be disregarded if fuelwood collection in the baseline is sustainable – in particular involving a sustainable management plan. If unsustainable, then the fuelwood degradation modules must be applied. Application of these modules can not achieve an emission reduction in this case as project boundaries for different baselines can not overlap. Instead, the sole purpose is to calculate the leakage parameter - $\Delta C_{LK-AS,degrad-FW/C}$ - that is subsequently applied in the framework document – **REDD-MF**.

2. Reference regions – The methodology defines two reference regions for unplanned deforestation. One for defining rate of deforestation, one for location. In the simple situation of deforestation in a mosaic configuration where the user elects to deforest strata consecutively in order of increasing carbon stocks only the reference region for rate is needed.

In all other situations two regions are required. The reference region for rate is looking **historically** to find an area that represents the project area today – allowing a calculation of what rate of deforestation is expected over the next ten years. Projects are allowed and encouraged to look at distant areas of the country for suitable areas for a reference region for rate. In contrast, the reference region for location is looking at the available forest surrounding the project **now** and over the next ten years and asking which pixels are most likely to be deforested. For location, the area must be contiguous with the project area so the model can track the movement of deforestation where deforestation of pixel a makes deforestation of pixel b more likely.

The region for rate must not contain the project area or leakage belt as these areas are impacted by the project and would not necessarily lead to a conservative re-estimation of the baseline.

Additional details on what is eligible for use as a reference region are found in **BL-UP**.

3. Whether or not to analyze locations – Location analysis with the resulting spatial modeling of future deforestation is not required where forests are in a mosaic configuration² or where it can be shown that $\geq 25\%$ of the project geographic

² Mosaic configurations are described as any landscape in which no patch of forest in the project area exceeds 1000 ha and the forest patches are surrounded by anthropogenically cleared land

boundary is within 50m of land that has been anthropogenically deforested within the 10 years prior to the project start date. Spatial modelling requires a relatively high level of expertise and therefore is accompanied by costs. However, not conducting spatial modelling requires the very conservative approach of deforestation of strata in order of carbon stocks from the lowest to the highest. If the project has strata with low carbon stocks that are no more likely to be deforested than other higher stock strata this will represent a reduction in offsets and therefore income for the project in the earliest years of the project. Equally the method applies the region wide deforestation rate to the entire region including the project area so that if the project is in an area of high risk then a higher number of pixels will be predicted for deforestation than would occur with a direct correlation between rate and area. Projects must therefore balance the costs of spatial modelling against the potentially foregone offsets.

Timing

The baselines must be reassessed every ten years. Reassessment is required if a baseline revision is triggered by forest scarcity. Forest scarcity occurs where the remaining forest in the reference region for location is less than 50 times the annual deforestation rate. In this case a revision is triggered immediately if five or more years have passed since the beginning of the baseline period. If less than five years have passed, the baseline revision shall be triggered to occur exactly five years after the start of the baseline period.

Specific guidance

1. Criteria for definition of boundaries – It is necessary to demonstrate that the identified reference regions and leakage belt conforms with the requirements correlating with the project area. For landscape factors and transportation factors note that the requirement is ‘the same ($\pm 20\%$)’, which means that the difference between areas can sum to as much as 40%. Requirements are relaxed further still when insufficient area is available to meet the minimum area criteria.
2. Carbon stock change – This equation sets up the pre-deforestation stock as the total emission from deforestation then subtracts any stocks in the post deforestation land use and any of the tree biomass that instead of being emitted is converted to long-term storage in wood products.

4.2.3 Degradation (fuelwood/charcoal)

Modules:	
Parameters output to:	REDD-MF, LK-DFW, M-MON
Parameters input from:	CP-AB, CP-D, CP-L, CP-S, CP-W, E-BB, E-FFC, X-UNC

Key Decisions

None.

Timing

The baseline must be reassessed every ten years.

Specific guidance

1. Fuelwood must be non-renewable – If renewable then there is no expectation of degradation and therefore there are no baseline emissions.

4.3 Leakage

Leakage is divided between activity shifting and market effects. There is a single module for market effects leakage while there are activity shifting leakage modules paired with each baseline module.

4.3.1 Activity shifting

4.3.1.1 Planned deforestation

Modules:	
Parameters output to:	REDD-MF
Parameters input from:	BL-PL, E-BB, E-NA

Key Decisions

None.

Timing

Leakage must be assessed at each verification.

Specific guidance

1. Peatland – Under the current version of the methodology projects are not permitted on peatlands. However, there is a risk that baseline activities will be displaced onto peatland giving an emission that far outweighs the avoided emissions achieved by the project. To avoid this situation, in countries with peatland where the activity could in theory be displaced onto peatland the agent must be known so that any leakage can be tracked. Where leakage is recorded on to peatlands the total emission is conservatively assumed to be five times the average carbon stock in the project.

2. Division between identified agent and identified class of agent – The module is divided in half with separate requirements for projects that have an identified agent and those with only a class of agent. Where the agent is known the methodology calculates the rate of deforestation by the agent across all actual and potential landholdings and subtracts the project (avoided) deforestation. Anything that exceeds this rate is leakage. For the class of agent standard leakage factors are used based on the productivity of the project lands (and therefore the relative area of new lands needed to replace the project hectares).

4.3.1.2 Unplanned deforestation

Modules:	
Parameters output to:	REDD-MF

Parameters input from:	BL-UP, M-MON, E-BB, E-NA
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Local agents vs immigrant agents – the methods are divided between those for local agents and those for agents immigrating into the project region. It is assumed that a leakage belt around the project will capture deforestation by displaced local agents. For immigrants, however, it is possible that displacement will occur to an area far distant from the project. The methodology calculates the likelihood of immigration still occurring to the project region (looking at the project region as a proportion of suitable area for immigration in the country) and assumes a conservative emission for all immigrants that will not be captured in the leakage belt.

Key Decisions

Size of leakage belt and level of effort in analysis of available area for unplanned deforestation – A critical factor for all unplanned deforestation projects is the size of the default deduction resulting from leakage of immigrant deforestation agents. The size of this deduction will be related to the proportion of leakage assumed to be captured by the leakage belt. Projects can do more of the following three things to maximize capture by the leakage belt:

- Increase the size of the leakage belt – the larger the leakage belt the greater the proportion of leakage that will be captured.
- Decrease the estimates of available national forest area – the analysis looks at the size of the leakage belt as a proportion of the area available for immigrants to go to develop new lands for agriculture or grazing. The available forest area is calculated as the area of forest within 5km of maintained roads or navigable rivers and excludes forests with active protection and forests under active commercial management.
- Demonstrate that the carbon stocks in the leakage belt are higher than carbon stocks elsewhere in the country. Projects will have to determine level of effort in determining the carbon stocks of forests available for deforestation. If the stocks are lower elsewhere in the country then the leakage of a given area of deforestation will by extension lead to fewer emissions.

Clearly projects will have to weigh up the costs and benefits of the thoroughness of this analysis.

Timing

Leakage must be assessed at each verification.

Specific guidance

None.

4.3.1.3. Degradation (fuelwood/charcoal)

Modules:	
Parameters output to:	REDD-MF
Parameters input from:	BL-DFW

Key Decisions

None.

Timing

Leakage must be assessed at each verification.

Specific guidance

The leakage method relies on an assessment of the supply of demonstrably renewable fuels. The baseline fuel use is compared with the renewable supply and the difference is considered to be leakage.

4.3.2 Market effects

Modules:	
Parameters output to:	REDD-MF
Parameters input from:	BL-DFW, LK-DFW

Key Decisions

Market effects leakage is only applicable if timber is harvested during the process of deforestation in the baseline and/or fuel wood or charcoal was in the baseline harvested for commercial markets (sales >50km from the project area).

Even if timber is harvested or fuel wood/charcoal is for commercial markets projects can conduct an assessment using the significance tool – **T-SIG**. If potential leakage is insignificant then market effects leakage need not be considered for the remainder of the baseline period.

Timing

Leakage must be assessed at each verification.

Specific guidance

Leakage deduction factors are directly from market effects defaults developed by the VCS.

4.4 Monitoring (including timelines for data collection – what, where and when)

Modules:	
Parameters output to:	REDD-MF, BL-UP, LK-ASU, E-BB
Parameters input from:	BL-PL, BL-UP, BL-DFW, CP-AB, CP-D, CP-L, CP-S, CP-W, E-BB, E-FFC, E-NA

Key Decisions

1. Imagery accuracy - Required image accuracy is currently 90%. If it is not met then there is no other solution beside additional analysis and ground truthing where necessary.
2. Inclusion of carbon stock enhancement – For areas deforested in the baseline the atmosphere loses both the carbon stock in the trees and the ongoing growth of those trees. Under the methodology projects can define areas that would

have been deforested and claim the benefit of the ongoing sequestration in these areas. The decision for the project is determining whether the additional offsets accrued make the additional monitoring costs worthwhile.

Timing

Monitoring must occur more or less continuously. Monitoring for baseline renewal will be focused on the ten year renewal period and monitoring for verification will be focused on the dates of verification.

For baseline renewal for unplanned deforestation multiple points in time are needed for areas of forest and non-forest across the reference region(s). This analysis could occur continuously or alternatively historic images could be collected and all examined and analyzed immediately prior to baseline renewal.

For monitoring for verification:

- Assessment of degradation through at least a participatory rural appraisal (PRA) must occur every two years. If degradation is occurring a full assessment is only required every five years prior to verification;
- Areas of fires should be delineated immediately after fires have occurred;
- Where carbon stock enhancement is included then monitoring of carbon stocks must occur prior to verification;
- Where included, use of fertilizers and fossil fuels should be monitored continuously so that reporting can occur at verification.

Specific guidance

Monitoring of degradation - If an area would have been deforested or degraded in the absence of the project, any degradation in the project case is the responsibility of the project. The methodology provides detailed steps for identifying the areas at risk of degradation and conducting analyses of the emissions from any degradation occurring. To minimize costs the methodology first determines if degradation is possible through social surveys in local communities, followed by limited forest surveys only leading to detailed monitoring work if degradation is indicated at each step.

4.5 The Pools and Emission Sources

4.5.1 The pools

Key Decisions

>Aboveground biomass shall always be included. However, where biomass is herbaceous such as grasses or non-woody crops no assessment is required.

>Wood products must be included if timber is harvested in significant quantities as part of deforestation in the baseline.

>The other conditional pool is dead wood and must be included if higher in the baseline than the project – this might occur for example if fuelwood harvesting leads to significantly higher baseline dead wood stocks than in the project case.

> In all situations litter, belowground biomass and soil organic carbon are optional, and can be included or excluded at the discretion of the project. The choice would be made based on the scale of potential benefit and the costs of inclusion. For belowground biomass and in some cases for soil carbon, cost will be minimal as inclusion involves calculation rather than measurement – so there is little disincentive to inclusion.

Timing

Monitoring must occur prior to baseline renewal. Where carbon stock enhancement is claimed monitoring of applicable pools must occur prior to verification.

4.5.1.1 Above and belowground live biomass

Modules:	
Parameters output to:	BL-PL, BL-UP, BL-DFW, E-BB, M-MON, X-UNC
Parameters input from:	-

4.5.1.2 Dead wood

Modules:	
Parameters output to:	BL-PL, BL-UP, BL-DFW, E-BB, M-MON, X-UNC
Parameters input from:	-

4.5.1.3 Litter

Modules:	
Parameters output to:	BL-PL, BL-UP, BL-DFW, E-BB, M-MON, X-UNC
Parameters input from:	-

4.5.1.4 Soil organic carbon

Modules:	
Parameters output to:	BL-PL, BL-UP, BL-DFW, E-BB, M-MON, X-UNC
Parameters input from:	-

4.5.1.5 Wood products

Modules:	
Parameters output to:	BL-PL, BL-UP, BL-DFW, E-BB, M-MON, X-UNC
Parameters input from:	-

4.5.2 Emission sources

Key Decisions

- >Emissions from biomass burning must always be included where significant;
- >Fertilizer use must be calculated where fertilizers are used in the with-project case to prevent leakage (only applicable for unplanned deforestation baselines);
- >In all other cases fertilizer use can be excluded and fossil fuel combustion can always be excluded. Almost invariably emission will be higher in the baseline so projects will just have to determine if the costs of calculating baseline emissions and of tracking use of fossil fuels and fertilizer in the project case is worth the additional emission reductions that can be claimed.

Timing

Monitoring of emissions must be continuous. Any area of fire should be delineated as soon as possible. Where included, use of fertilizers and fossil fuels should be monitored continuously so that reporting can occur at verification.

4.5.2.1 Biomass burning

Modules:	
Parameters output to:	BL-PL, BL-UP, BL-DFW, LK-ASP, LK-ASU, M-MON, X-UNC
Parameters input from:	M-MON, CP-AB, CP-D, CP-L

4.5.2.2 Fossil fuels

Modules:	
Parameters output to:	BL-PL, BL-UP, BL-DFW, M-MON, X-UNC
Parameters input from:	-

4.5.2.3 Fertilizers

Modules:	
Parameters output to:	BL-PL, BL-UP, LK-ASP, LK-ASU, M-MON, X-UNC
Parameters input from:	-

4.6 Uncertainty (clear guidance on what needs to be done and when)

Modules:	
Parameters output to:	REDD-MF
Parameters input from:	REDD-MF, BL-PL, BL-UP, CP-AB, CP-D, CP-L, CP-S, CP-W, E-BB, E-FFC, E-NA

Key Decisions

When to apply? – It is only mandated that the module be applied prior to verification in order to calculate the total uncertainty with any accompanying offset reductions as a result of the uncertainty. However, application during project planning and prior to reporting is recommended to avoid the risk of substantial offset reductions at verification.

Where to focus? – The methodology is designed such that the majority of the relevant sources of uncertainty are in the baseline analysis. Even more explicitly, uncertainty will likely be dominated by uncertainty in the rate of deforestation and uncertainty in aboveground tree biomass. Where projects are able to minimize these sources of uncertainty, through well planned monitoring and analyses, it is likely that total project uncertainty will also be low.

What to do if the precision target is missed? – Where initial pre-verification analyses reveal a total uncertainty that will lead to offset deductions, projects will have to conduct a cost-benefit analysis to determine whether the lost income through offset deductions justifies the cost of additional monitoring or imagery analysis to decrease uncertainty.

Timing

The module should be applied during project planning and implementation, and must be applied prior to each verification.

Specific Guidance

None.

4.7 Modules for which no additional guidance is provided

The following modules are either or both of very simple or were developed directly by the CDM or VCS.

4.7.1 Stratification X-STR

4.7.2 Additionality T-ADD

4.7.3 Buffer T-BAR

4.7.4 Significance T-SIG

ANNEX 1 – MODULE CODES AND TITLES

REDD-MF “REDD Methodology Framework”

Carbon Pool Modules:

CP-AB “Estimation of carbon stocks in the above- and belowground biomass in live tree and non-tree pools”

CP-D “Estimation of carbon stocks in the dead-wood pool”

CP-L “Estimation of carbon stocks in the litter pool”

CP-S “Estimation of stocks in the soil organic carbon pool”

CP-W “Estimation of carbon stocks in the long-term wood products pool”

Baseline Modules:

BL-PL “Estimation of baseline carbon stock changes and greenhouse gas emissions from planned deforestation”

BL-UP “Estimation of baseline carbon stock changes and greenhouse gas emissions from unplanned deforestation”

BL-DFW “Estimation of baseline emission from forest degradation caused by extraction of wood for fuel”

Leakage Modules:

LK-ASP “Estimation of emissions from activity shifting for avoided planned deforestation”

LK-ASU “Estimation of emissions from activity shifting for avoided unplanned deforestation”

LK-ME “Estimation of emissions from market-effects”

LK-DFW “Estimation of emissions from displacement of fuelwood extraction”

Emissions Modules (applicable to baseline, project scenario and leakage):

E-BB “Estimation of greenhouse gas emissions from biomass burning”

E-FFC “Estimation of emissions from fossil fuel combustion”

E-NA “Estimation of direct N₂O emissions from nitrogen application” – latest CDM-EB approved version

Monitoring Module:

M-MON “Methods for monitoring of greenhouse gas emissions and removals”

Miscellaneous Modules:

X-STR “Methods for stratification of the project area”

X-UNC “Estimation of uncertainty for REDD project activities”

Tools:

T-SIG “Tool for testing significance of GHG emissions in A/R CDM project activities” – latest CDM-EB approved version

T-ADD “VT0001 Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities” – latest VCS approved version

T-BAR “Tool for AFOLU non-permanence risk analysis and buffer determination” – latest VCS-approved version

ANNEX 2 – SOURCES OF ADDITIONAL GUIDANCE ON MRV

World Bank Sourcebook for BioCarbon Fund Projects:

Information on ground measurement and calculation techniques.

Available at: <http://www.winrock.org/Ecosystems/tools.asp>

GOFC-GOLD, A sourcebook of methods and procedures for monitoring, measuring and reporting anthropogenic greenhouse gas emissions and removals caused by deforestation, gains and losses of carbon stocks in forests remaining forests, and forestation.

Available at: <http://www.gofc-gold.uni-jena.de/redd/>

IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry

Available at: <http://www.ipcc-nggip.iges.or.jp/public/gpplulucf/gpplulucf.html>

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