



**Approved VCS Module VMD0010**  
**Version 1.0**  
**REDD Methodological Module:**  
**Estimation of emissions from activity shifting for avoided**  
**unplanned deforestation (LK-ASU)**  
**Sectoral Scope 14**

**I. SCOPE, APPLICABILITY AND OUTPUT PARAMETERS**

**Scope**

This module provides methods for estimating emissions from displacement of unplanned deforestation (leakage due to activity shifting).

**Applicability**

The module is applicable for estimating carbon stock changes and greenhouse gas emissions related to the displacement of activities that cause deforestation of lands outside the project area due to the avoided unplanned deforestation in the project area.

Activities subject to potential displacement are: conversion of forest land to grazing lands, crop lands, and other land uses.

The module is mandatory if **BL-UP** has been used to define the baseline and the applicability criteria in **BL-UP** must be complied with in full.

**Parameter**

This module provides methods to determine the following parameter:

Parameter	SI Unit	Description
$\Delta C_{LK-AS,unplanned}$	t CO <sub>2</sub> -e	Net greenhouse gas emissions due to activity shifting leakage for projects preventing unplanned deforestation



## II. PROCEDURE

Activities that deforestation agents would implement inside the project area in the absence of the REDD project activity could be displaced outside the project boundary as a consequence of the implementation of the REDD project activity.

Where this displacement of activities increases the rate of deforestation, the related carbon stock changes and non-CO<sub>2</sub> emissions must be estimated and counted as leakage.

Two different groups of deforestation agents may be displaced:

- a. **Local deforestation agents** obtaining their livelihood inside or near the project area since the start of the REDD project activity. This will be the main agent group in most cases of mosaic deforestation. This group will also be present in some cases of frontier deforestation.

The risk of displacing activities of local agent groups must be addressed in the design of the REDD project activity using one or both of the following two approaches:

- Exclusion from the project area of the forest locations that are likely to be deforested by these groups during the implementation of the REDD project activity. Changes in the rate of deforestation in these areas, compared to the baseline case, must be counted as leakage;

and

- Implementation of leakage prevention measures to maintain or increase the agents' livelihoods, such as, but not limited to, the creation of alternative sources of fuelwood, improved crop or animal production systems, and employment<sup>1</sup>.

- b. **Immigrant deforestation agents** expected to encroach into the project area in future periods. This will be the main agent group in most cases of frontier deforestation. This group will also be present in some cases of mosaic deforestation.

Influencing the land-use decisions of this deforestation agent groups will not be possible in most cases, particularly if the agents are coming from distant locations and are driven by economic reasons. Leakage prevention measures may not be sufficient to avoid some level of activity displacement from happening.

### Definition of the boundary of the Leakage Belt

A Leakage Belt is a critical component of the analysis of leakage for unplanned deforestation. The module **BL-UP** must be used to establish the boundary of the Leakage Belt.

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<sup>1</sup> Note applicability condition above precluding leakage prevention activities that cause greater than de minimis increases in emissions

## STEPS

The basic steps to estimate displacement of unplanned deforestation are:

- STEP 1. Estimation of baseline carbon stock changes and greenhouse gas emissions in the Leakage Belt
- STEP 2. Estimation of the proportions of area deforested by immigrant and local deforestation agents in the baseline
- STEP 3. Estimation of unplanned deforestation displaced from the project area to the Leakage Belt
- STEP 4. Estimation of unplanned deforestation displaced from the project area to outside the Leakage Belt
- STEP 5. Emissions from leakage prevention activities
- STEP 6. Estimation of total leakage due to the displacement of unplanned deforestation

### **STEP 1. Estimation of baseline carbon stock changes and greenhouse gas emissions in the Leakage Belt**

A baseline for the Leakage Belt must be estimated in order to assess leakage due to displacement of unplanned deforestation.

For methods to define the baseline of the Leakage Belt refer to Module **BL-UP**.

### **STEP 2. Estimation of the proportions of area deforested by immigrant and local deforestation agents in the baseline**

Randomly sample communities living within 2km of the boundaries of the Leakage Belt and project area (defined in **BL-UP** – Part 1). At least 10% of communities shall be sampled. If 10% of communities is less than 10 communities then the sample size shall be set as 10 (or 100% of the communities). If 10% is more than 30 communities then the sample size shall be set as 30.

Using a participatory rural appraisal (PRA) approach, existing studies and other verifiable sources of information, determine the proportion of area deforested by the population that has been resident in and around the Leakage Belt and project area for  $\geq 5$  years ( $PROP_{RES}$ ) and the proportion of area deforested by population that has migrated into the area in the last 5 years ( $PROP_{IMM}$ ).

This assessment shall be repeated at least every 5 years and the estimated proportions will be assumed to be representative for up to five future years.

### STEP 3. Estimation of unplanned deforestation displaced from the project area to the Leakage Belt

#### a. *Ex ante* assessment

Based on the expected effectiveness of the proposed REDD project activities, conservatively estimate the carbon stock changes and greenhouse gas emissions in the Leakage Belt that are expected to occur due to the implementation of the REDD project activity and that would not occur in the baseline case. This shall be done by multiplying the estimated baseline carbon stock changes and greenhouse gas emissions for the project area by a factor < 1.0 representing the % of deforestation expected to be displaced into the Leakage Belt<sup>2</sup>.

The result is added to the estimated baseline for the Leakage Belt (Step 1) to estimate carbon stock changes and greenhouse gas emissions in the Leakage Belt under the project scenario. The difference between project and baseline carbon stock changes and greenhouse gas emissions in the Leakage Belt is the *ex ante* estimated leakage due to displacement of unplanned deforestation from the project area to the Leakage Belt.

#### b. *Ex post* assessment

Measure the area deforested in the project area ( $A_{PA,unplanned,t}$ ) and Leakage Belt ( $A_{LK,unplanned,t}$ ). Follow instructions and guidance in Module **M-MON**.

Leakage in the Leakage Belt is estimated as follows:

$$\Delta C_{LK-ASU-LB} = \Delta C_{P,LB} - \Delta C_{BSL,LK,unplanned} \quad (1)$$

Where:

$\Delta C_{LK-ASU-LB}$	Net CO <sub>2</sub> emissions due to unplanned deforestation displaced from the project area to the Leakage Belt; t CO <sub>2</sub> -e
$\Delta C_{BSL,LK,unplanned}$	Net CO <sub>2</sub> emissions in the baseline from unplanned deforestation in the leakage belt; t CO <sub>2</sub> -e
$\Delta C_{P,LB}$	Net greenhouse gas emissions within the leakage belt in the project case t CO <sub>2</sub> -e

If  $\Delta C_{LK-ASU-LB}$  as calculated is <0 then  $\Delta C_{LK-ASU-LB}$  shall be set equal to 0 (to prevent positive leakage).

<sup>2</sup> If no leakage prevention activities are planned the factor shall be equal to 1. Where leakage prevention activities are implemented the factor shall be equal to the proportion of the baseline agents estimated to be given the opportunity to participate in leakage prevention activities. Leakage prevention activities must be planned to fully replace income, product generation and livelihood.

#### STEP 4. Estimation of unplanned deforestation displaced from the project area to outside the Leakage Belt

Immigrants prevented from migrating into and deforesting the project area are conservatively assumed to migrate to an alternative forest area and to cause deforestation in the alternative area. The alternative forest area could be within the Leakage Belt or it could be elsewhere in the country.

The proportion migrating to the Leakage Belt is calculated as the area of the Leakage Belt as a proportion of the total available forest area nationally.

- a. Define the total available national forest area (*TOTFOR*). This can be assessed with a coarse-scale imagery (e.g. using MODIS imagery or similar), or with official government statistics on forest area. The total national forest area should be reduced to just the area of forest within 5km of a road<sup>3</sup> or river<sup>4</sup> that is suitable for conversion to agriculture or raising livestock. If boundaries are available then area of protected forests<sup>5</sup> (*PROTFOR*) and the area of managed forests<sup>6</sup> (*MANFOR*) may be excluded from the total forest area calculated in this step.

$$AVFOR = TOTFOR - PROTFOR - MANFOR \quad (2)$$

Where:

*AVFOR* Total available national forest area for unplanned deforestation; ha

*TOTFOR* Total available national forest area; ha

*PROTFOR* Total area of fully protected forests nationally; ha

*MANFOR* Total area of forests under active management nationally; ha

- b. Calculate the area of forest in the Leakage Belt as a proportion of the total available national forest area. Note that if areas of protected forests and/or areas of managed forests are excluded from the total available national forest area they must also be excluded from the Leakage Belt forest area (*LBFOR*).

$$PROP_{LB} = LBFOR / AVFOR \quad (3)$$

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<sup>3</sup> Road defined as “a maintained open public way for the passage of vehicles, people and animals”

<sup>4</sup> River defined as “a waterway flowing along a definite course, usually into the sea, fed by tributary streams and navigable by vessels able to transport people and animals”

<sup>5</sup> Protected forests should be defined as forests with active protection in place including forest guards and policies to evict squatters. The effectiveness of protection must be demonstrable for areas to be excluded from total available forest area

<sup>6</sup> Active management should be defined as under a specific ownership which has management plans and actively defends lands against invasion by squatters. The effectiveness of active management for preventing deforestation must be demonstrable for areas to be excluded from total available forest area

Where:

$PROP_{LB}$  Area of forest available in the Leakage Belt for unplanned deforestation as a proportion of the total national forest area available for unplanned deforestation; proportion

$LBFOR$  Total available forest area for unplanned deforestation in the Leakage Belt; ha (calculated from the *Leakage Belt Forest Cover Benchmark Map*)

$AVFOR$  Total available national forest area for unplanned deforestation; ha

- c. Stratify  $AVFOR$  by carbon stock. The stratification shall use peer-reviewed assessments of forest carbon stocks across the country in combination with coarse forest type maps. An initial stratification should be derived from biophysical parameters (e.g. soil type, elevation, precipitation regime, temperature, slope and aspect, tree species composition, age class/disturbance history). Carbon stocks data shall be associated with each of the strata either through limited field measurements or through values derived from the peer-reviewed literature. Carbon stock shall include only live above-ground tree biomass ( $C_{AB\_tree}$  – see Module **CP-AB**).  $AVFOR$  shall be separated into different strata where contiguous areas of at least 100 ha differ in stocks by  $\geq 20\%$ .<sup>7</sup> Take the area weighted average carbon stock across the Leakage Belt ( $C_{LB}$ ) and the area weighted average carbon stock for all available forest area outside the Leakage Belt ( $C_{OLB}$ ). The proportional difference in stocks is calculated by dividing the stock outside the Leakage Belt by the stock inside the Leakage Belt.

$$PROP_{CS} = C_{OLB} / C_{LB} \quad (4)$$

Where:

$PROP_{CS}$  The proportional difference in carbon stocks between areas of forest available for unplanned deforestation both inside and outside the Leakage Belt; proportion

$C_{OLB}$  Area weighted average aboveground tree carbon stock for forests available for unplanned deforestation outside the Leakage Belt; t CO<sub>2</sub>-e ha<sup>-1</sup>

$C_{LB}$  Area weighted average aboveground tree carbon stock for forests available for unplanned deforestation inside the Leakage Belt; t CO<sub>2</sub>-e ha<sup>-1</sup>

- d. The proportional leakage for areas with immigrating populations would then be equal to the immigrating proportion multiplied by the proportion of available national forest area outside the Leakage Belt multiplied by the proportional difference in stocks between forests inside and outside the Leakage Belt.

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<sup>7</sup> At validation the source national datasets/maps shall be presented alongside the stratification of  $AVFOR$  and any divergence shall be explained

$$LK_{PROP} = PROP_{IMM} * (1 - PROP_{LB}) * PROP_{CS} \quad (5)$$

Where:

- $LK_{PROP}$  Proportional leakage for areas with immigrating populations; proportion
- $PROP_{IMM}$  Estimated proportion of baseline deforestation caused by immigrating population; proportion
- $PROP_{LB}$  Area of forest available for unplanned deforestation as a proportion of the total national forest area available for unplanned deforestation; proportion
- $PROP_{CS}$  The proportional difference in stocks between areas of forest available for unplanned deforestation both inside and outside the Leakage Belt; proportion

- e. *Ex ante*, leakage due to the proportion of the baseline deforestation actors who are displaced to areas outside the Leakage Belt would therefore be equal to the change in stocks in the baseline scenario minus the change in stocks in the project scenario multiplied by the proportional leakage factor for areas with immigrating populations:

$$\Delta C_{LK-ASU,OLB} = (\Delta C_{BSL,LK,unplanned} - \Delta C_{P,LB}) * LK_{PROP} \quad (6)$$

Where:

- $\Delta C_{LK-ASU,OLB}$  Net CO<sub>2</sub> emissions due to unplanned deforestation displaced outside the Leakage Belt ; t CO<sub>2</sub>-e
- $\Delta C_{BSL,LK,unplanned}$  Net CO<sub>2</sub> equivalent emissions in the baseline from unplanned deforestation in the leakage belt; t CO<sub>2</sub>-e
- $\Delta C_{P,LB}$  Net CO<sub>2</sub> equivalent emissions within the leakage belt in the project case; t CO<sub>2</sub>-e
- $LK_{PROP}$  Proportional leakage for areas with immigrating populations; proportion

- f. In each monitoring period, measure the area deforested in the project area ( $A_{DefPA,i,t}$ ) and Leakage Belt ( $A_{DefLB,i,t}$ ). Use Module **M-MON**.
- g. *Ex post*, as deforestation in the project area and Leakage Belt will be measured,  $\Delta C_{LK-ASU,INM-OLB}$  will be estimated as follows:
- *Ex post*, the proportion of the total area deforested by immigrant agents in the project scenario shall be determined from the same proportion calculated in the

baseline data. The proportional area deforested by immigrant agents in the baseline and project scenarios is assumed to remain the same.

$$A_{LK-IMM,t} = PROP_{IMM} * A_{BSL,PA,unplanned,t} \quad (7)$$

Where:

$A_{LK-IMM,t}$  Total area deforested by immigrant agents in the baseline and project scenario at time  $t$ ; ha

$PROP_{IMM}$  Proportion of area deforested by immigrant agents in the Leakage Belt and project area; proportion

$A_{BSL,PA,unplanned,t}$  Projected area of unplanned baseline deforestation in the project area at time  $t$ ; ha

$t$  1, 2, 3 ... $t^*$  years elapsed since the start of the REDD VCS project activity

- Calculate the area deforested by immigrants in the project area and Leakage Belt under the project scenario as follow:

$$A_{LK-ACT-IMM,t} = PROP_{IMM} * \left( \sum_{i=1}^M A_{DefPA,i,t} + A_{DefLB,i,t} \right) \quad (8)$$

Where:

$A_{LK-ACT-IMM,t}$  Area deforested by immigrants in the project area and Leakage Belt under the project scenario at time  $t$ ; ha

$PROP_{IMM}$  Proportion of area deforested by immigrant agents in the Leakage Belt and project area; proportion

Note: This proportion is estimated at least every 5 years.

$A_{DefPA,i,t}$  Area of recorded deforestation in the project area in the project case in stratum  $i$  at time  $t$ ; ha

$A_{DefLB,i,t}$  Area of recorded deforestation in the leakage belt in the project case in stratum  $i$  at time  $t$ ; ha

$i$  1, 2, 3 ... $M$  strata

$t$  1, 2, 3 ... $t^*$  years elapsed since the start of the REDD VCS project activity

- Calculate the area deforested by immigrants outside the Leakage Belt and project area:

$$A_{LK-OLB,t} = A_{LK-IMM,t} - A_{LK-ACT-IMM,t} \quad (9)$$

Where:

$A_{LK-OLB,t}$  Area deforested by immigrants outside the Leakage Belt and project area under the project scenario at time  $t$ ; ha



$A_{LK-IMM,t}$	Total area deforested by immigrant agents in the baseline and project scenario at time $t$ ; ha
$A_{LK-ACT-IMM,t}$	Area deforested by immigrants in the project area and Leakage Belt under the project scenario at time $t$ ; ha
$t$	1, 2, 3 ... $t^*$ years elapsed since the start of the REDD VCS project activity

- Determine whether leakage outside the Leakage Belt has occurred:  
If:  $A_{LK-OLB,t} \leq 0 \rightarrow$  Leakage outside the Leakage Belt has not occurred.  
If:  $A_{LK-OLB,t} > 0 \rightarrow$  leakage outside the Leakage Belt has occurred.

- If leakage outside the Leakage Belt has not occurred:

$$\Delta C_{LK-ASU,OLB} = 0 \quad (10)$$

Where:

$\Delta C_{LK-ASU,OLB}$  Sum of carbon stock changes and greenhouse gas emissions due to unplanned deforestation displaced outside the Leakage Belt; t CO<sub>2</sub>-e

- If leakage outside the Leakage Belt has occurred:

$$\Delta C_{LK-ASU,OLB} = PROP_{CS} * \left( \sum_{t=1}^{t^*} A_{LK-OLB,t} \right) \quad (11)$$

Where:

$\Delta C_{LK-ASU,OLB}$  Net CO<sub>2</sub> emissions due to unplanned deforestation displaced outside the Leakage Belt; t CO<sub>2</sub>-e

$PROP_{CS}$  The proportional difference in stocks between areas of forest available for unplanned deforestation both inside and outside the Leakage Belt; proportion

$A_{LK-OLB,t}$  Area deforested by immigrants outside the Leakage Belt and project area under the project scenario at year  $t$ ; ha

$t$  1, 2, 3 ... $t^*$  years elapsed since the start of the REDD VCS project activity

## STEP 5. Emissions from leakage prevention activities

Where leakage prevention activities are implemented the emissions from biomass burning and fertilizer usage shall be counted and conservatively included in their entirety as emissions

caused by project implementation. Stratification of leakage prevention activities shall be on the basis of biophysical parameters<sup>8</sup>.

$$GHG_{LK,E} = \sum_{t=1}^{t^*} \sum_{i=1}^M (E_{BiomassBurn,i,t} + N_2O_{direct-N,i,t}) \quad (12)$$

Where:

$GHG_{LK,E}$	Greenhouse gas emissions as a result of leakage of avoided deforestation activities; t CO <sub>2</sub> -e
$E_{FC,i,t}$	CO <sub>2</sub> emission from fossil fuel combustion in stratum $i$ in year $t$ ; t CO <sub>2</sub> -e
$E_{BiomassBurn,i,t}$	Non-CO <sub>2</sub> emissions due to biomass burning in stratum $i$ in year $t$ ; t CO <sub>2</sub> -e
$N_2O_{direct-N,i,t}$	Direct N <sub>2</sub> O emission as a result of nitrogen application on the alternative land use in stratum $i$ in year $t$ ; t CO <sub>2</sub> -e
$i$	1, 2, 3 ... $M$ strata
$t$	1, 2, 3 ... $t^*$ years elapsed since the start of the REDD VCS project activity

#### STEP 6. Estimation of total leakage due to the displacement of unplanned deforestation

$$\Delta C_{LK-AS,unplanned} = \Delta C_{LK-A\ SU-LB} + \Delta C_{LK-ASU-OLB} + GHG_{LK,E} \quad (13)$$

Where:

$\Delta C_{LK-AS,unplanned}$	Net greenhouse gas emissions due to activity shifting leakage for projects preventing unplanned deforestation Net CO <sub>2</sub> emissions ; t CO <sub>2</sub> -e
$\Delta C_{LK-ASU-OLB}$	Net CO <sub>2</sub> emissions due to unplanned deforestation displaced outside the Leakage Belt; t CO <sub>2</sub> -e
$\Delta C_{LK-ASU-LB}$	Net CO <sub>2</sub> emissions due to unplanned deforestation displaced from the project area to the Leakage Belt; t CO <sub>2</sub> -e
$GHG_{LK,E}$	Greenhouse gas emissions as a result of leakage of avoided deforestation activities; t CO <sub>2</sub> -e

### III. DATA AND PARAMETERS NOT MONITORED (DEFAULT OR MEASURED ONE TIME)

<sup>8</sup> e.g. soil type, elevation, precipitation regime, temperature, slope and aspect

<b>Data / parameter:</b>	$C_{LB}$
<b>Data unit:</b>	t CO <sub>2</sub> -e ha <sup>-1</sup>
<b>Used in equations:</b>	4
<b>Description:</b>	Area weighted average aboveground tree carbon stock for forests available for unplanned deforestation inside the Leakage Belt
<b>Source of data:</b>	Literature, field surveys
<b>Measurement procedures (if any):</b>	Calculate from field measurements using Module CP-AB
<b>Any comment:</b>	As forests in the leakage belt are deforested, the area weighted average must be recalculated at each monitoring period.

<b>Data / parameter:</b>	$C_{OLB}$
<b>Data unit:</b>	t CO <sub>2</sub> -e ha <sup>-1</sup>
<b>Used in equations:</b>	4
<b>Description:</b>	Area-weighted average aboveground tree carbon stock for forests available for unplanned deforestation outside the Leakage Belt
<b>Source of data:</b>	
<b>Measurement procedures (if any):</b>	<p>Either:</p> <ol style="list-style-type: none"> <li>1. Calculate directly from field measurements using Module CP-AB</li> <li>2. Use numbers derived from peer-reviewed literature that are nationally or at least regionally appropriate</li> </ol>
<b>Any comment:</b>	<p>Areas included in the calculation of <math>C_{OLB}</math> shall be limited to areas demonstrated to be suitable for agriculture or livestock ranching. Demonstration shall be through existing areas of agriculture or livestock ranching on adjacent lands with the same soil type and climate. Areas unsuitable for agriculture or livestock such as areas that are excessively dry, flooded or nutrient poor shall be excluded.</p> <p>The available national forest area and MANFOR and PROTFOR will change over time. The area weighted average must be recalculated at least every 5 years.</p>

#### IV. DATA AND PARAMETERS MONITORED

<b>Data / parameter:</b>	<i>MANFOR</i>
Data unit:	Ha
Used in equations:	2
Description:	Total area of forests under active management nationally
Source of data:	Official data, peer reviewed publications and other verifiable sources
Measurement procedures (if any):	
Monitoring frequency:	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
QA/QC procedures:	
Any comment:	<p>A demonstration is required that areas will be protected against deforestation. Such a demonstration shall include the existence of forest guards in sufficient numbers to prevent illegal colonization and an active management plan detailing harvest plans and return intervals, and/or evidence that the concession owner has previously evicted illegal colonists/squatters from the forest areas.</p> <p><i>Ex-ante</i> it can be assumed that MANFOR shall remain constant.</p>

<b>Data / parameter:</b>	<i>PROP<sub>IMM</sub></i>
Data unit:	Proportion
Used in equations:	5, 7, 8
Description:	Estimated proportion of baseline deforestation caused by immigrating population
Source of data:	<p>The source of data shall be chosen with priority from higher to lower preference as follows:</p> <ol style="list-style-type: none"> <li>1. Official (government) data</li> <li>2. Peer-reviewed published sources</li> <li>3. Other verifiable sources</li> <li>4. PRA</li> </ol>
Measurement procedures (if	Estimated as proportion of the area deforested in the past 5 years by population that migrated into the Leakage Belt and project area in the

any):	past 5 years (all areas within 2km of the boundaries of the project area and the leakage belt shall be considered here)
Monitoring frequency:	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
QA/QC procedures:	
Any comment:	<i>Ex-ante</i> it can be assumed that $PROP_{IMM}$ will remain constant during the baseline period

<b>Data / parameter:</b>	$PROP_{RES}$
Data unit:	Proportion
Used in equations:	
Description:	Estimated proportion of baseline deforestation caused by population that has been resident for $\geq 5$ years
Source of data:	The source of data shall be chosen with priority from higher to lower preference as follows: <ol style="list-style-type: none"> <li>1. Official (government) data</li> <li>2. Peer-reviewed published sources</li> <li>3. Other verifiable sources</li> <li>4. PRA</li> </ol>
Measurement procedures (if any):	Estimated as proportion of the area deforested in the past 5 years by population resident in the Leakage Belt and project area for $\geq 5$ years (all areas within 2km of the boundaries of the project area and the leakage belt shall be considered here)
Monitoring frequency:	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
QA/QC procedures:	
Any comment:	<i>Ex-ante</i> it can be assumed that $PROP_{RES}$ will remain constant during the baseline period

<b>Data / parameter:</b>	$PROTFOR$
Data unit:	Ha

Used in equations:	2
Description:	Total area of fully protected forests nationally
Source of data:	Official data, peer reviewed publications and other verifiable sources
Measurement procedures (if any):	
Monitoring frequency:	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
QA/QC procedures:	
Any comment:	<p>A demonstration is required that areas will be protected against deforestation. Such a demonstration shall include either:</p> <ol style="list-style-type: none"> <li>1. Designation as a UNESCO World Heritage Site, or</li> <li>2. Management by an international NGO, or</li> <li>3. Evidence that the government has immediately acted to evict any and all illegal squatters</li> </ol> <p><i>Ex-ante</i> it can be assumed that PROTFOR shall remain constant.</p>

<b>Data / parameter:</b>	<i>TOTFOR</i>
Data unit:	Ha
Used in equations:	2
Description:	Total available national forest area
Source of data:	Official data, peer reviewed publications, remotely sensed imagery (coarse scale imagery is appropriate) or cadastral maps and other verifiable sources
Measurement procedures (if any):	
Monitoring frequency:	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
QA/QC procedures:	
Any comment:	Limited to forest areas within 5km of roads and rivers suitable for

	<p>conversion to agriculture / livestock</p> <p><i>Ex-ante</i> it can be conservatively be assumed that TOTFOR shall remain constant for the baseline period.</p>
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## V. TERMS ORIGINATING IN OTHER MODULES

<b>Data / parameter:</b>	$A_{BSL,PA-unplanned,t}$
Data unit:	Ha
Used in equations:	7
Description:	Projected area of unplanned baseline deforestation in the project area at time $t$
Module parameter originates in:	<b>BL-UP</b>
Any comment:	

<b>Data / parameter:</b>	$A_{DefLB,i,t}$
Data unit:	Ha
Used in equations:	8
Description:	Area of recorded deforestation in the leakage belt in the project case in stratum $i$ at time $t$
Module parameter originates in:	<b>M-MON</b>
Any comment:	

<b>Data / parameter:</b>	$A_{DefPA,i,t}$
Data unit:	Ha
Used in equations:	8
Description:	Area of recorded deforestation in the project area in the project case in stratum $i$ at time $t$
Module parameter originates in:	<b>M-MON</b>
Any comment:	

<b>Data / parameter:</b>	$\Delta C_{BSL,LK,unplanned}$
Data unit:	t CO <sub>2</sub> -e
Used in equations:	1, 6
Description:	Net CO <sub>2</sub> emissions in the baseline from unplanned deforestation in the leakage belt
Module parameter originates in:	BL-UP
Any comment:	

<b>Data / parameter:</b>	$\Delta C_{P,LB}$
Data unit:	t CO <sub>2</sub> -e
Used in equations:	1, 6
Description:	Net greenhouse gas emissions within the leakage belt in the project case
Module parameter originates in:	M-MON
Any comment:	

<b>Data / parameter:</b>	$E_{BiomassBurn,i,t}$
Data unit:	t CO <sub>2</sub> -e
Used in equations:	12
Description:	Non-CO <sub>2</sub> emissions due to biomass burning in stratum <i>i</i> in year <i>t</i>
Module parameter originates in:	E-BB
Any comment:	Corresponding information shall be included in the VCS PD

<b>Data / parameter:</b>	$N_2O_{direct-N,i,t}$
Data unit:	t CO <sub>2</sub> -e
Used in equations:	12
Description:	Direct N <sub>2</sub> O emission as a result of nitrogen application in stratum <i>i</i> in year <i>t</i>
Module parameter originates in:	E-NA



Any comment:	Corresponding information shall be included in the VCS PD
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<b>Data / parameter:</b>	<i>Leakage Belt Forest Cover Benchmark Map</i>
Data unit:	
Used in equations:	3
Description:	<u>Map</u> showing the location of forest land within the leakage belt area at the beginning of each monitoring period. Only applicable where leakage is to be monitored in a leakage belt
Module parameter originates in:	<b>M-MON</b>
Any comment:	