

## REDD Methodological Module

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

Version 1.0 – June 2010

#### I. SCOPE, APPLICABILITY AND PARAMETERS

##### Scope

This module allows for *ex ante* estimation of carbon stocks in forest litter in the baseline case (for both pre- and post-deforestation stocks) and project case. Uncertainty of estimates is treated in module X-UNC. Identification of baseline (post-deforestation) land-uses is treated in modules BL-UP and BL-PL.

##### Applicability

This module is applicable to all forest types and age classes. The litter pool is considered an insignificant source in REDD projects, in conformance with T-SIG, and inclusion of the litter pool as part of the project boundary is optional, as per applicability criteria in the framework module REDD-MF.

##### Parameters

This methodology produces the following parameter:

Parameter	SI Unit	Description
$C_{L,i,t}$	t CO <sub>2</sub> -e ha <sup>-1</sup>	Carbon stock in litter in strata <i>i</i> at time <i>t</i>

#### II. PROCEDURES

##### Frequency of measurement for baseline litter stocks

Measurements of initial stocks employed in the baseline must take place within ±5 years from the project start date, for simplicity referred to here as stocks at t=0.

Litter stock estimates are valid in the baseline (i.e. treated as constant) for 10 years, after which they must be re-estimated from new field measurements. For each strata, where the re-measured estimate is within the 90% confidence interval of the t=0 estimate, the t=0 stock estimate takes precedence and is re-employed, and where the re-measured estimate is outside (i.e. greater than or less than) the 90% confidence interval of the t=0 estimate, the new stock estimate takes precedence and is used for the subsequent period.

**Part 1. Ex ante estimation of carbon stocks in litter**

To estimate the mean carbon stock per unit area in litter for each project area stratum:

$$C_{L,i,t} = \frac{10}{A_{sp,i}} * \sum_{sp=1}^{P_i} B_{L,sp,i,t} * CF * \frac{44}{12} \tag{1}$$

Where:

- $C_{L,i,t}$  Mean carbon stock in litter for stratum  $i$ , at time  $t$ ; t CO<sub>2</sub>-e ha<sup>-1</sup>
- $B_{L,sp,i,t}$  Biomass of litter in sample plot  $sp$  in stratum  $i$  at time  $t$ ; kg d.m.
- $CF$  Carbon fraction; t C t<sup>-1</sup> d.m.
- $Asp_i$  Total area of all sample plots in stratum  $i$ ; m<sup>-2</sup>
- $sp$  1, 2, 3 ...  $P_i$  sample plots in stratum  $i$
- $i$  1, 2, 3 ...  $M$  strata
- $t$  0, 1, 2, 3 ...  $t$  years elapsed since the start of the project activity
- 44/12 Ratio of molecular weight of CO<sub>2</sub> to carbon, t CO<sub>2</sub>-e t C<sup>-1</sup>

**III. DATA AND PARAMETERS NOT MONITORED (DEFAULT OR POSSIBLY MEASURED ONE TIME FOR BASELINE TIMEFRAME)**

Data / parameter:	$CF$
Data unit:	t C t <sup>-1</sup> d.m.
Used in equations:	1
Description:	Carbon fraction of dry matter
Source of data:	Default value 0.37 t C t <sup>-1</sup> d.m. can be used, or species specific values from the literature (e.g. IPCC Chapter 3.2: LUCF Sector Good Practice Guidance).
Measurement procedures (if any):	
Any comment:	

#### IV. DATA AND PARAMETERS MONITORED

<b>Data / parameter:</b>	$Asp$
Data unit:	$m^{-2}$
Used in equations:	1
Description:	Total area of all sample plots
Source of data:	Recording and archiving of number and size of sample plots
Measurement procedures (if any):	
Monitoring frequency:	Where litter is an included pool monitoring must occur at least every ten years for baseline renewal.  Where carbon stock enhancement is included and litter is an included pool monitoring shall occur at least every five years
QA/QC procedures:	
Any comment:	

<b>Data / parameter:</b>	$B_{Ll,sp,i,t}$
Data unit:	kg d.m.
Used in equations:	1
Description:	Biomass of litter in sample plot $sp$ in stratum $i$ at time $t$
Source of data:	Field sampling and laboratory determination
Measurement procedures (if any):	Litter (dead organic surface material < 10 cm diameter) is collected from within fixed area sampling frames, harvested at ground level and dried at 70°C to a constant weight to determine dry weight biomass. In cases where sample bulk is excessive, the green weight of the total sample and of a representative sub-sample are recorded in the field and the sub-sample taken for moisture content determination in the lab (i.e. oven dry weight:green weight ratio), from which the dry weight biomass of the total green weight recorded in the field can be estimated.  Further guidance is provided in the IPCC 2003 GPG-LULUCF.
Monitoring frequency:	Where litter is an included pool monitoring must occur at least every ten years for baseline renewal.  Where carbon stock enhancement is included and litter is an included pool monitoring shall occur at least every five years

QA/QC procedures:	
Any comment:	