Draft simplified baseline and monitoring methodology for small-scale A/R CDM project activities implemented on grasslands or croplands

AR-AMS000X

(Version 01)

I. DEFINITIONS AND APPLICABILITY

Definitions

1. For the purpose of this methodology, the following definitions apply:

Cropland. Arable and tillage land that contains annual and/or perennial crops and/or woody vegetation that does not impair its eligibility for A/R CDM project activities.

Grassland. Rangeland/pasture-land subjected to any kind of anthropogenic exploitation that may include systems with woody vegetation that does not impair eligibility of the land for A/R CDM project activities.

Applicability

2. This methodology may be applied if all of the following applicability conditions are met:

(a) The baseline land-use category is cropland or grassland as defined above;

(b) Any area of land included in the project boundary:

(i) Does not contain organic soils[1] (e.g. peat-land);

(ii) Does not fall into wetland[2] category;

(c) Litter remains on site and is not removed in the A/R CDM project activity; and

(d) Ploughing/ripping/scarification attributable to the A/R CDM project activity, if any, is:

(i) Done in accordance with appropriate soil conservation practices, e.g. follows the land contour;

(ii) Limited to the first five years from the year of initial site preparation;

(iii) Not repeated, if at all, within a period of 20 years.

3. This methodology refers to the latest approved versions of the following procedures, tools, guidelines and guidances:

(a) Procedures to demonstrate the eligibility of lands for afforestation and reforestation CDM project activities;

[1] "Organic soils" as defined e.g. in the *Good Practice Guidance for Land Use, Land-use Change and Forestry* (IPCC, 2003).

[2] "Wetlands", "settlements", "cropland" and "grassland" are land categories as defined in the *Good Practice Guidance for Land Use, Land-use Change and Forestry* (IPCC, 2003).

(b) Guidance on the application of the definition of project boundary to A/R CDM project activities;

(c) Estimation of GHG emissions due to clearing, burning and decay of existing vegetation attributable to a CDM A/R project activity;

(d) Guidelines on conditions under which increase in GHG emissions attributable to displacement of pre-project crop cultivation activities in A/R CDM project activity is insignificant;

(e) Guidelines on conditions under which increase in GHG emissions related to displacement of pre-project grazing activities in A/R CDM project activity is insignificant;

(f) Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity;

(g) Guidance on conditions under which the change in carbon stocks in existing live woody vegetation are insignificant;

(h) Tool on estimation of carbon stocks and change in carbon stocks of trees and shrubs in an A/R CDM project activity;

(i) Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities;

(j) Calculation of the number of sample plots for measurements within A/R CDM project activities;

(k) Guidelines on conservative choice and application of default data in estimation of the net anthropogenic GHG removals by sinks.

II. BASELINE METHODOLOGY PROCEDURE

Project boundary and eligibility of land

4. The project boundary geographically delineates the afforestation or reforestation project activity under the control of the project participants (PPs). The small-scale A/R CDM project activity may contain more than one discrete area of land. Each discrete area of land shall have a unique geographical identification. PPs may identify the areas of land to be included in the A/R CDM project activity using the latest version of the "Guidance on the application of the definition of project boundary to A/R CDM project activities".

5. PPs shall demonstrate that each discrete area of land to be included within the project boundary is eligible for an A/R CDM project activity using the current version of the "Procedures to demonstrate the eligibility of lands for afforestation and reforestation CDM project activities".

6. The carbon pools accounted for in the project boundary are shown in Table 1.

Table 1: Carbon pools accounted for in the project boundary

Carbon Pools	Accounted for	Justification / Explanation
Above-ground biomass	Yes	Major carbon pool affected by the project activity
Below-ground biomass	Yes	Major carbon pool affected by the project activity
Dead wood	No	Considering the applicability conditions of this methodology, the carbon stock in the pool is likely to increase less, or decrease more, in the baseline scenario compared to the project scenario. Therefore, excluding the pool from accounting will lead to a conservative estimation of net anthropogenic GHG removal by sinks
Litter	No	Considering the applicability conditions of this methodology, the carbon stock in the pool is likely to increase less, or decrease more, in the baseline scenario compared to the project scenario. Therefore, excluding the pool from accounting will lead to a conservative estimation of net anthropogenic GHG removal by sinks
Soil organic carbon	Yes	Carbon stock in this pool can possibly decrease initially because of soil disturbance during site preparation. Hence accounting of this pool is required

Identification of the baseline scenario and demonstration of additionality

7. The most plausible baseline scenario of a small-scale A/R CDM project activity implemented on grasslands or croplands is continuation of pre-project land use.

8. PPs shall demonstrate that the project activity is additional using the barrier analysis outline contained in Annex I to this methodology.

Stratification

9. Stratification of the planned project area for baseline estimation is not required but may be carried out if it improves the accuracy and precision of biomass estimation.

10. Strata for biomass estimation may be defined on the basis of parameters that are key entry variables in the method (e.g. growth models or yield curves/tables) used to estimate changes in biomass stocks:

(a) **For baseline net GHG removals by sinks.** It will usually be sufficient to stratify the areas on the basis of tree/shrub crown cover;

(b) **For actual net GHG removals by sinks.** The stratification for *ex ante* estimations shall be based on the project planting/management plan. The stratification for *ex post* estimations shall be based on the actual implementation of the project planting/management plan. If natural or anthropogenic impacts (e.g. local fires) or other

factors (e.g. soil type) add variability to the growth pattern of the biomass in the project area, then the *ex post* stratification shall be revised accordingly.

11. PPs may use remotely sensed data acquired close to the time of project commencement and/or the occurrence of natural or anthropogenic impacts for *ex ante* and *ex post* stratification.

Baseline net GHG removals by sinks

12. Baseline net GHG removals by sinks is the sum of changes in carbon stocks in the selected carbon pools within the project boundary that would have occurred in absence of the A/R CDM project activity.

13. Since carbon stock in soil organic carbon (SOC) is unlikely to increase in the baseline, the change in carbon stock in SOC may be conservatively assumed to be zero for all strata in the baseline scenario.

14. If application of the "Guidance on conditions under which the change in carbon stocks in existing live woody vegetation are insignificant" does not lead to a conclusion that the change in carbon stocks in the existing live woody vegetation in the baseline is insignificant, then the change in carbon stock of tree and shrub biomass in the baseline is estimated as follows:

$$\Delta C_{BSL} = \sum_{t} (\Delta C_{TREE\_BSL,t} + \Delta C_{SHRUB\_BSL,t}) \quad \textbf{(1)}$$

where:

ΔC_{BSL}	Baseline net GHG removals by sinks; t CO_2-e
$\Delta C_{TREE\_BSL,t}$	Change in carbon stock in tree biomass within the project boundary in year *t,* as estimated in the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in an A/R CDM project activity"; t CO_2-e
$\Delta C_{SHRUB\_BSL,t}$	Change in carbon stock in shrub biomass within the project boundary in year *t*, as estimated in the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in an A/R CDM project activity"; t CO_2-e

15. The baseline net GHG removals by sinks shall be estimated until steady state is reached under the baseline conditions. Under steady state the growth of the living trees in the baseline becomes negligible and therefore baseline removals by sinks shall be accounted as zero. PPs may, on a project specific basis, assess when a steady state is reached during the crediting period. This assessment shall be based on transparent and verifiable information originating as appropriate from available literature, data from comparable areas, from field measurements in the planned project area, or from other sources relevant to the baseline circumstances. If no data is available, a default period of 20 years since the start of the CDM project activity will be applied.

Actual net GHG removals by sinks

16. For *ex ante* calculation of actual net GHG removals by sinks and net anthropogenic GHG removals by sinks, PPs shall provide approximate values of those data and parameters that are not available before the commencement of the monitoring activities.

17. The actual net GHG removals by sinks shall be estimated using the following equation:

$$\Delta C_{ACTUAL} = \Delta C_P - GHG_E \quad \textbf{(2)}$$

where:

ΔC_{ACTUAL}	Actual net GHG removals by sinks; t CO_2-e
ΔC_P	Change in the C stocks in all selected carbon pools in project scenario, since the start of the project activity; t CO_2-e
GHG_E	Increase in non-CO_2 GHG emissions as a result of the implementation of the A/R CDM project activity within the project boundary, since the start of the project activity; t CO_2-e

Estimation of change in the carbon stocks

18. The change in carbon stocks in selected carbon pools in each stratum within the project boundary is calculated using the following equation:

$$\Delta C_P = \sum_{t=1}^{t^*} (\Delta C_{TREE\_PROJ,t} + \frac{44}{12} * \Delta SOC_{AL,t}) \quad \textbf{(3)}$$

where:

ΔC_P	Change in carbon stock in all selected carbon pools, during the period from year *t=1* to year *t=t** when verification is carried out; t CO_2-e
$\Delta C_{TREE\_PROJ,t}$	Change in carbon stock in tree biomass within the project boundary in year *t* as estimated in the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in an A/R CDM project activity"; t CO_2-e
$\Delta SOC_{AL,t}$	Change in carbon stock in the SOC pool within the project boundary in year *t,* as estimated in the tool "Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities"; t C

Estimation of GHG emissions within the project boundary

19. The only increase in GHG emissions within the project boundary which results from the implementation of the A/R CDM project activity and which is required to be accounted for is the non-CO_2 GHG emission from burning of biomass for site preparation and/or forest management. It is estimated as:

$$GHG_E = \sum_{t=1}^{t^*} E_{BIOMASS\_BURN,t} \quad \textbf{(4)}$$

where:

GHG_E	Increase in non-CO_2 GHG emissions within the project boundary as a result of the implementation of the proposed A/R CDM project activity; t CO_2-e
$E_{BIOMASS\_BURN,t}$	Increase in non-CO_2 GHG emissions due to burning of biomass of existing vegetation as part of site preparation and/or forest management in year *t,* as estimated in the tool "Estimation of GHG emissions due to clearing, burning and decay of existing vegetation attributable to a CDM A/R project activity"; t CO_2-e

20. The monitoring of emissions by sources is only required if significant; if insignificant, evidence should be provided (e.g. in the relevant part of the monitoring plan of project implementation) that the assumptions for the exclusion made in the *ex ante* assessment still hold in the *ex post* situation.

Leakage

21. Leakage due to displacement of pre-project activity from the project area to an area outside the project boundary is estimated using the following approach.

22. If the application of the "Guidelines on conditions under which increase in GHG emissions attributable to displacement of pre-project crop cultivation activities in A/R CDM project activity is insignificant" and/or the "Guidelines on conditions under which increase in GHG emissions related to displacement of pre-project grazing activities in A/R CDM project activity is insignificant" does not lead to the conclusion that the applicable increase in GHG emissions is insignificant, then leakage from displacement of agricultural activities shall be estimated as:

$$LK = \sum_{t=1}^{t^*} LK_{AGRIC,t} \quad \textbf{(5)}$$

where:

LK	Total GHG emissions due to leakage; t CO_2-e
$LK_{AGRIC,t}$	Leakage due to displacement of agricultural activities in year t as estimated in the tool "Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity"; t CO_2-e

Net anthropogenic GHG removals by sinks

23. The net anthropogenic GHG removals by sinks is the actual net GHG removals by sinks *minus* the baseline net GHG removals by sinks *minus* leakage. Therefore, the following general equation can be used to calculate the net anthropogenic GHG removals by sinks under the project:

$$C_{AR-CDM} = \Delta C_{ACTUAL} - \Delta C_{BSL} - LK \quad \textbf{(6)}$$

where:

C_{AR-CDM}	Net anthropogenic GHG removals by sinks; t CO_2-e
ΔC_{ACTUAL}	Actual net GHG removals by sinks; t CO_2-e
ΔC_{BSL}	Baseline net GHG removals by sinks; t CO_2-e
LK	Total GHG emissions due to leakage; t CO_2-e

Calculation of tCERs and lCERs

24. To estimate the CERs at time $t^* = t_2$ (the date of verification) for the verification period $T = t_2 - t_1$, this methodology uses the most recent version of the equations approved by the Board,[3] which produce the same estimates as the following:

[3] See <http://cdm.unfccc.int/Reference/Guidclarif/>.

$$tCERs = C_{AR-CDM,t_2} \quad \textbf{(7)}$$

$$lCERs = C_{AR-CDM,t_2} - C_{AR-CDM,t_1} \quad \textbf{(8)}$$

where:

$tCERs$	Number of units of temporary Certified Emission Reductions
$lCERs$	Number of units of long-term Certified Emission Reductions
C_{AR-CDM,t_2}	Net anthropogenic GHG removals by sinks since start of the project crediting period, at time $t = t_2$; t CO_2-e
C_{AR-CDM,t_1}	Net anthropogenic GHG removals by sinks since start of the project crediting period, at time $t = t_1$; t CO_2-e

III. MONITORING METHODOLOGY

25. All data collected as part of monitoring should be archived electronically and be kept for at least two years after the end of the last crediting period. All measurements should be conducted according to relevant standards. In addition, the monitoring provisions contained in the tools referred to in this methodology apply.

Monitoring of project implementation

26. Information shall be provided, and recorded in the project design document (PDD), to establish that:

(a) The geographic coordinates of the project boundary (and any stratification inside the boundary) are established, recorded and archived;

(b) Commonly accepted principles of forest inventory and management in the host country are implemented. In absence of these, standard operating procedures (SOPs) and quality control/quality assurance (QA/QC) procedures for inventory operations, including field data collection and data management, shall be identified, recorded and applied. Use or adaptation of SOPs available from published handbooks, or from the IPCC GPG LULUCF 2003, is recommended;

(c) The forest planting and management plan, together with a record of the plan as actually implemented during the project, shall be available for validation and/or verification.

Sampling design and stratification

27. Stratification of the project area into relatively homogeneous units can either increase the precision of biomass estimation without increasing the cost unduly or reduce the cost without reducing the precision of biomass estimation because of the lower variance within each homogeneous unit. PPs should present in the AR-CDM-PDD an *ex ante* stratification of the project area or justify the lack of it. The number and boundaries of the strata defined *ex ante* may change during the crediting period (*ex post*).

Updating of strata

28. The *ex post* stratification shall be updated for the following reasons:

(a) Unexpected disturbances occurring during the crediting period (e.g. due to fire, pests or disease outbreaks) that have differing impacts on various parts of an originally homogeneous stratum;

(b) Forest management activities (cleaning, planting, thinning, harvesting, re-replanting) that are implemented in a way that affects the existing stratification.

29. Established strata may be merged if reasons for their establishing have disappeared.

Precision requirements

30. The targeted precision level for biomass estimation shall be ± 10% of the mean at a 90% confidence level. PPs may use the latest version of the approved tool for "Calculation of the number of sample plots for measurements within A/R CDM project activities" to determine the sample size and allocation of sample plots among strata.

Conservative approach and uncertainties

31. While applying this methodology the PPs shall ensure that the "Guidelines on conservative choice and application of default data in estimation of the net anthropogenic GHG removals by sinks" are followed for addressing uncertainty.

Data requirements under the methodology

32. Table 2 provides a list of the data and parameters that are required in order to apply this methodology. PPs should refer to the tools used in this methodology for a complete list of data and parameters required for applying the respective tool. For *ex ante* calculation of net anthropogenic GHG removals by sinks, PPs shall provide transparent estimations for the parameters that are monitored during the crediting period. These estimations shall be based on existing published data where possible, using a conservative approach.

Table 2: Data and parameters required under the methodology

Data/Parameter	Description	Unit
A. Data and parameters to be obtained from existing sources		
$BEF_{2,j}$	Biomass expansion factor for conversion of stem biomass to above-ground biomass for tree species or group of species *j*	Dimensionless
CF_j	Carbon fraction of dry matter for species or group of species *j*	Dimensionless
D_j	Basic wood density for species or group of species *j*	t d.m. m^{-3}
R_j	Root-shoot ratio for species or group of species *j*	Dimensionless

Data/Parameter	Description	Unit
$f_j(DBH, H)$	Allometric function for species or group of species *j* linking a tree diameter (e.g. diameter at breast height), and possibly tree height (*H*), to above-ground biomass of living trees	t d.m. tree^{-1}
$V_{TREE,j}$	Stem volume of trees of species or group of species *j* for trees of given age/ diameter/ height	m^3
B. Data and parameters to be obtained from measurement		
A_i	Area of tree biomass stratum *i*	ha
A_i	Area of SOC stratum *i* of the land meeting the applicability conditions of the SOC tool	ha
$A_{SHRUB,i}$	Area of shrub crown cover stratum *i*	ha
$A_{p,i}$	Total area of sample plots in tree biomass stratum *i*	ha
$CC_{SHRUB,i}$	Crown cover of shrubs in lands within the project boundary	fraction
DBH	Tree diameter	cm
H	Tree height	m

All the data and parameters obtained from measurement shall be monitored every five years from the date of the initial verification.

References

33. All references are quoted in footnotes.

Annex 1

ASSESSMENT OF ADDITIONALITY

1. Project participants shall demonstrate that the project activity would not have occurred anyway due to at least one of the following barriers:

(a) Investment barriers, other than economic/financial barriers, *inter alia*:

(i) Debt funding not available for this type of project activity;

(ii) No access to international capital markets due to real or perceived risks associated with domestic or foreign direct investment in the country where the project activity is to be implemented.

(b) Institutional barriers, *inter alia*:

(i) Risk relating to changes in government policies or laws;

(ii) Lack of enforcement of legislation relating to forest or land-use.

(c) Technological barriers, *inter alia*:

(i) Lack of access to planting materials;

(ii) Lack of infrastructure for implementation of the technology.

(d) Barriers relating to local tradition, *inter alia*:

(i) Traditional knowledge or lack thereof, of laws and customs, market conditions, practices;

(ii) Traditional equipment and technology.

(e) Barriers due to prevailing practice, *inter alia*:

(i) The project activity is the "first of its kind". No project activity of this type is currently operational in the host country or region.

(f) Barriers due to local ecological conditions, *inter alia*:

(i) Degraded soil (e.g. water/wind erosion, salinization);

(ii) Catastrophic natural and/or human-induced events (e.g. land slides, fire);

(iii) Unfavourable meteorological conditions (e.g. early/late frost, drought);

(iv) Pervasive opportunistic species or group of species preventing regeneration of trees (e.g. grasses, weeds);

(v) Unfavourable course of ecological succession;

(vi) Biotic pressure in terms of grazing, fodder collection, etc.

(g) Barriers due to social conditions, *inter alia*:

(i) Demographic pressure on the land (e.g. increased demand on land due to population growth);

(ii) Social conflict among interest groups in the region where the project activity takes place;

(iii) Widespread illegal practices (e.g. illegal grazing, non-timber product extraction and tree felling);

(iv) Lack of skilled and/or properly trained labour force;

(v) Lack of organization of local communities.

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History of the document

Version	Date	Nature of revision(s)
01	EB 56, Annex # 17 September 2010	To be considered at EB 56.