

CDM-ARWG40-A03

Draft A/R Small-scale Methodology

Afforestation and reforestation project activities implemented on lands other than wetlands

Version 03.0

Sectoral scope(s): 14

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1. Introduction

1. This methodology allows afforestation and reforestation of any land that does not fall into the category of wetland. Where the land in its baseline land-use has soil organic carbon (SOC) content that is expected to be higher than that under the land-use of “forestry”, the methodology restricts the extent of soil disturbance in the project to be no more than 10 per cent. The higher SOC content in the baseline may result either because of the nature of the soils (e.g. the soils are organic soils) or because of anthropogenic activities (e.g. soils are not tilled and external organic matter is added as inputs). Apart from this restriction on the extent of soil disturbance in certain types of soils and land-use practices, the methodology has a broad scope of application¹.

2. Scope, applicability, and entry into force

2.1. Scope

2. This methodology is applicable to small-scale afforestation and reforestation (A/R) project activities under the clean development mechanism (CDM). It does not apply to large-scale A/R CDM project activities.

2.2. Land-use types covered under appendix B of annex to decision 6/CMP.1

3. This methodology allows the following types of small-scale A/R project activities as listed in appendix B of annex to decision 6/CMP.1, paragraph 4:
 - (a) Grassland to forested land;
 - (b) Cropland to forested land;
 - (d) Settlement to forested land.
4. This methodology also applies to small-scale A/R project activities implemented on any other type of land except wetland.
5. Small-scale A/R project activities implemented on wetlands, as provided under paragraph 4(c) of appendix B, are covered by the methodology “AR-AMS0003: Afforestation and reforestation project activities implemented on wetlands”.

2.3. Applicability

6. This methodology is applicable under the following conditions:
 - (a) The land subject to the project activity does not fall in wetland category;
 - (b) Soil disturbance attributable to the project activity does not cover more than 10 per cent of area² in each of the following types of land, when these lands are included within the project boundary:

¹ For example, the land to be afforested or reforested does not have to be degraded land.

² For example, digging pits of size 0.50 m × 0.50 m (length × width) at a spacing of 3 m × 3 m is equal to a coverage of 2.78 per cent; continuous ploughing of land is equal to a coverage of 100 per cent.

- (i) Land containing organic soils;
- (ii) Land which, in the baseline, is subjected to land-use and management practices and receives inputs listed in appendices 2 and 3 to this methodology.

7. A project activity applying this methodology shall also comply with the applicability conditions of the tools contained within the methodology and applied by the project activity.

2.4. Entry into force

8. The date of entry into force of the revision is the date of the publication of the EB 75 meeting report on 4 October 2013.

3. Normative references

9. The following documents are indispensable for application of this methodology.³

- (a) Clean development mechanism project standard;
- (b) A/R methodological tools:
 - (i) ~~“Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities”;~~
 - (ii) “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities”;
 - (iii) “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities”;
 - (iv) “Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities”;
 - (v) “Estimation of non-CO₂ greenhouse gas (GHG) emissions resulting from burning of biomass attributable to an A/R CDM project activity”;
 - (vi) “Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity”.

4. Definitions

10. The definitions contained in the following documents shall apply.⁴

- (a) “Glossary of CDM terms”;

³ These documents are available online at: <<http://cdm.unfccc.int/Reference/index.html>>.

⁴ These documents are available online at the following URLs:

- (a) <<http://cdm.unfccc.int/Reference/index.html>>;
- (b) <<http://cdm.unfccc.int/Reference/COPMOP/index.html>>;
- (c) <<http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.html>>.

- (b) “Modalities and procedures for afforestation and reforestation project activities under the clean development mechanism (A/R CDM modalities and procedures) as contained in the annex to decision 5/CMP.1”;
- (c) “IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry, 2003.”

11. For the purpose of this methodology, the following definition shall apply:

- (a) **Soil disturbance** - refers to any activity that results in a decrease in soil organic carbon (SOC), for example ploughing, ripping, scarification, digging of pits and trenches, stump removal, etc.

5. Baseline and monitoring methodology

5.1. Project boundary and eligibility of land

12. The carbon pools selected for accounting of carbon stock changes are shown in table 1.

Table 1. Carbon pools selected for accounting of carbon stock changes

Carbon pool	Whether selected	Justification/Explanation
Above-ground biomass	Yes	This is the major carbon pool subjected to project activity
Below-ground biomass	Yes	Carbon stock in this pool is expected to increase due to the implementation of the project activity
Dead wood Litter and Soil organic carbon	Optional	Carbon stock in these pools may increase due to implementation of the project activity

13. The emission sources and associated GHGs selected for accounting are shown in table 2.

Table 2. Emission sources and GHGs selected for accounting

Sources	Gas	Whether Selected	Justification/Explanation
Burning of woody biomass	CO ₂	No	CO ₂ emissions due to burning of biomass are accounted as a change in carbon stock
	CH ₄	Yes	Burning of woody biomass for the purpose of site preparation, or as part of forest management, is allowed under this methodology
	N ₂ O	Yes	Burning of woody biomass for the purpose of site preparation, or as part of forest management, is allowed under this methodology

5.2. Identification of the baseline scenario and demonstration of additionality

14. The baseline scenario of a small-scale A/R CDM project activity implemented under this methodology is continuation of the pre-project land use.
15. Project participants (PPs) shall demonstrate that the project activity is additional by selecting one of the following options:
 - (a) Using the barrier analysis outline contained in appendix 1 of this methodology; or
 - (b) Using an approved standardized baseline applicable to their project.

5.3. Stratification

16. If biomass distribution over the project area is not homogeneous, stratification should be carried out to improve the precision of biomass estimation. Different stratifications may be appropriate for the baseline and project scenarios in order to achieve optimal precision of estimation of net GHG removals by sinks. In particular:
 - (a) For baseline net GHG removals by sinks, it is usually sufficient to stratify the area according to major vegetation types and their crown cover and/or land use types;
 - (b) For actual net GHG removals by sinks the stratification for ex ante estimations is based on the project planting/management plan and the stratification for ex post estimations is 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) significantly alter the pattern of biomass distribution in the project area, then the ex post stratification is revised accordingly.

5.4. Baseline net GHG removals by sinks

17. The baseline net GHG removals by sinks shall be calculated as follows:

$$\Delta C_{BSL,t} = \Delta C_{TREE_BSL,t} + \Delta C_{SHRUB_BSL,t} + \Delta C_{DW_BSL,t} + \Delta C_{LI_BSL,t} \quad \text{Equation (1)}$$

Where:

- | | | |
|---------------------------|---|--|
| $\Delta C_{BSL,t}$ | = | Baseline net GHG removals by sinks in year t ; t CO ₂ -e |
| $\Delta C_{TREE_BSL,t}$ | = | Change in carbon stock in baseline 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 A/R CDM project activities”; t CO ₂ -e |
| $\Delta C_{SHRUB_BSL,t}$ | = | Change in carbon stock in baseline 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 A/R CDM project activities”; t CO ₂ -e |
| $\Delta C_{DW_BSL,t}$ | = | Change in carbon stock in baseline dead-wood biomass within the project boundary, in year t , as estimated in the tool “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities”; t CO ₂ -e |

$\Delta C_{LI_BSL,t}$ = Change in carbon stock in baseline litter biomass within the project boundary, in year t , as estimated in the tool “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities”; t CO₂-e

5.5. Actual net GHG removals by sinks

18. GHG emissions resulting from removal of herbaceous vegetation, combustion of fossil fuel, fertilizer application, use of wood, decomposition of litter and fine roots of N-fixing trees, construction of access roads within the project boundary, and transportation attributable to the project activity shall be considered insignificant and therefore accounted as zero

19. The actual net GHG removals by sinks is calculated as follows:

$$\Delta C_{ACTUAL,t} = \Delta C_{P,t} - GHG_{E,t} \quad \text{Equation (2)}$$

Where:

$\Delta C_{ACTUAL,t}$ = Actual net GHG removals by sinks, in year t ; t CO₂-e

$\Delta C_{P,t}$ = Change in the carbon stocks in project, occurring in the selected carbon pools, in year t ; t CO₂-e

$GHG_{E,t}$ = Increase in non-CO₂ GHG emissions within the project boundary as a result of the implementation of the A/R CDM project activity, in year t , as calculated in the tool “Estimation of non-CO₂ GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity”; t CO₂-e

20. Change in the carbon stocks in project, occurring in the selected carbon pools, in year t is calculated as follows:

$$\Delta C_{P,t} = \Delta C_{TREE_PROJ,t} + \Delta C_{SHRUB_PROJ,t} + \Delta C_{DW_PROJ,t} + \Delta C_{LI_PROJ,t} + \Delta SOC_{AL,t} \quad \text{Equation (3)}$$

Where:

$\Delta C_{P,t}$ = Change in the carbon stocks in project, occurring in the selected carbon pools, in year t ; t CO₂-e

$\Delta C_{TREE_PROJ,t}$ = Change in carbon stock in tree biomass in project in year t , as estimated in the tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities”; t CO₂-e

$\Delta C_{SHRUB_PROJ,t}$ = Change in carbon stock in shrub biomass in project in year t , as estimated in the tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities”; t CO₂-e

$\Delta C_{DW_PROJ,t}$ = Change in carbon stock in dead-wood biomass in project in year t , as estimated in the tool “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities”; t CO₂-e

$\Delta C_{LI_PROJ,t}$ = Change in carbon stock in litter biomass in project in year t , as estimated in the tool “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities”; t CO₂-e

$\Delta SOC_{AL,t}$ = Change in carbon stock in SOC in project, 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 CO₂-e

5.6. Leakage

21. Leakage emissions shall be estimated as follows:

$$LK_t = LK_{AGRIC,t} \quad \text{Equation (4)}$$

Where:

LK_t = GHG emissions due to leakage, in year t ; t CO₂-e

$LK_{AGRIC,t}$ = Leakage due to the displacement of agricultural activities in year t , as calculated 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 CO₂-e

5.7. Net anthropogenic GHG removals by sinks

22. The net anthropogenic GHG removals by sinks is calculated as follows:

$$\Delta C_{AR-CDM,t} = \Delta C_{ACTUAL,t} - \Delta C_{BSL,t} - LK_t \quad \text{Equation (5)}$$

Where:

$\Delta C_{AR-CDM,t}$ = Net anthropogenic GHG removals by sinks, in year t ; t CO₂-e

$\Delta C_{ACTUAL,t}$ = Actual net GHG removals by sinks, in year t ; t CO₂-e

$\Delta C_{BSL,t}$ = Baseline net GHG removals by sinks, in year t ; t CO₂-e

LK_t = GHG emissions due to leakage, in year t ; t CO₂-e

5.8. Calculation of tCERs and ICERs

23. The *tCERs* and *ICERs* for a verification period $T = t_2 - t_1$, where t_1 and t_2 are the years of the start and the end, respectively, of the verification period, are calculated as follows:

$$tCER_{t_2} = \sum_1^{t_2} \Delta C_{AR-CDM,t} \quad \text{Equation (6)}$$

$$lCER_{t_2} = \sum_{t_1+1}^{t_2} \Delta C_{AR-CDM,t} \quad \text{Equation (7)}$$

Where:

- $tCER_{t_2}$ = Number of units of temporary certified emission reductions (tCERs) issuable in year t_2
- $lCER_{t_2}$ = Number of units of long-term certified emission reductions (lCERs) issuable in year t_2
- $\Delta C_{AR-CDM,t}$ = Net anthropogenic GHG removals by sinks, in year t ; t CO₂e
- t_1, t_2 = The years of the start and the end, respectively, of the verification period

24. If $lCER_{t_2} < 0$ then $lCER_{t_2}$ represents the number of lCERs that shall be replaced because of a reversal of net anthropogenic GHG removals by sinks since the previous certification.

6. Monitoring procedure

6.1. Monitoring plan

25. The monitoring plan shall provide for collection of all relevant data necessary for:
- Verification that the applicability conditions listed under paragraphs 3 and 4 have been met;
 - Verification of changes in carbon stocks in the pools selected;
 - Verification of project emissions and leakage emissions.
26. The data collected shall be archived for a period of at least two years after the end of the last crediting period of the project activity.

6.2. Monitoring of project implementation

27. Information shall be provided, and recorded in the project design document (PDD), to establish that the commonly accepted principles and practices of forest inventory and forest management in the host country are implemented. If such principles and practices are not known or available, 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 Good

Practice Guidance for Land Use, Land-Use Change and Forestry 2003”, is recommended.

6.3. Precision requirements

28. For this methodology, the precision requirements are those listed in the tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities”.

6.4. Data requirements under the methodology

29. Description of data and parameters can be found in the tools used in this methodology.
30. Data and parameters obtained from measurement shall be monitored as required in the tools.

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Appendix 1. Assessment of additionality

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

¹ For general approaches to demonstration of existence of barriers, project participants may draw upon the “Guidelines for objective demonstration and assessment of barriers”

- (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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Appendix 2. Cropland in which soil disturbance is restricted

1. Cropland which is subjected, in the baseline, to the land-use, land management practices, and inputs listed in the following table attracts the restriction on the extent of soil disturbance as described in paragraph 6(b) (ii) of this methodology.

Table. Cropland in which soil disturbance is restricted¹

Region	Land use	Management	Inputs
Boreal	Long-term cultivated cropland	Full tillage	High with manure
		Reduced tillage	High with manure
		No-till	High without manure High with manure
	Short-term or set aside cropland	Full tillage	High with manure
		Reduced tillage	High with manure
		No-till	High without manure High with manure
Temperate, cold, dry	Long-term cultivated cropland	Full tillage	High with manure
		Reduced tillage	High with manure
		No-till	High with manure
	Short-term or set aside cropland	Full tillage	High with manure
		Reduced tillage	High with manure
		No-till	Medium High without manure
Temperate, cold, moist	Long-term cultivated cropland	Reduced tillage	High with manure
		No-till	High with manure
	Short-term or set aside cropland	Full tillage	High with manure
		Reduced tillage	High with manure
		No-till	High without manure High with manure
		No-till	High without manure
Temperate, warm, dry	Long-term cultivated cropland	Full tillage	High with manure
		Reduced tillage	High with manure
		No-till	High with manure
	Short-term or set aside cropland	Full tillage	High with manure
		Reduced tillage	High with manure
		No-till	Medium High without manure

¹ Adapted from “2006 IPCC Guidelines for National Greenhouse Gas Inventories”. See table 5.5 on page 5.17 for a more complete description of the terms used in the table.

Region	Land use	Management	Inputs
Temperate, warm, moist	Long-term cultivated cropland	Reduced tillage	High with manure
		No-till	High with manure
	Short-term or set aside cropland	Full tillage	High with manure
		Reduced tillage	High with manure
		No-till	High without manure
			High with manure
Tropical, dry	Short-term or set aside cropland	Full tillage	High with manure
		Reduced tillage	Medium
			High without manure
			High with manure
	No-till	All	
Tropical, moist	Short-term or set aside cropland	Full tillage	High with manure
		Reduced tillage	High without manure
			High with manure
		No-till	High without manure
High with manure			
Tropical, montane	Long-term cultivated cropland	No-till	High with manure
	Short-term or set aside cropland	Full tillage	High with manure
		Reduced tillage	High without manure
			High with manure
		No-till	Medium
			High without manure
High with manure			
Tropical, wet	Short-term or set aside cropland	Full tillage	High with manure
		Reduced tillage	High without manure
			High with manure
		No-till	High without manure
	High with manure		

Appendix 3. Grasslands in which soil disturbance is restricted

1. Grassland which is subjected, in the baseline, to the land management practices and inputs listed in the following table attracts the restriction on the extent of soil disturbance as described in paragraph 6(b) (ii) of the methodology.

Table. Grasslands in which soil disturbance is restricted¹

Temperature/Moisture Regime	Management
Boreal	Improved
	Non-degraded
	Moderately degraded
Temperate, cold, dry	Improved
	Non-degraded
	Moderately degraded
Temperate, cold, moist	Improved
	Non-degraded
	Moderately degraded
Temperate, warm, dry	Improved
	Non-degraded
	Moderately degraded
Temperate, warm, moist	Improved
	Non-degraded
	Moderately degraded
Tropical, dry	Improved
	Non-degraded
Tropical, moist	Improved
	Non-degraded
	Moderately degraded
Tropical, montane	Improved
	Non-degraded
	Moderately degraded
Tropical, wet	Improved
	Non-degraded
	Moderately degraded

¹ Adapted from "2006 IPCC Guidelines for National Greenhouse Gas Inventories". See table 6.2 on page 6.16 for a more complete description of the terms used in the table.

Document information

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02.0.0	20 July 2012	EB 68, Annex 29 The revision: (a) Consolidates the small-scale A/R CDM methodologies: <ul style="list-style-type: none"> • AR-AMS0001 “Simplified baseline and monitoring methodologies for small-scale A/R CDM project activities implemented on grasslands or croplands with limited displacement of pre-project activities”; • AR-AMS0002 “Simplified baseline and monitoring methodologies for small-scale afforestation and reforestation project activities under the CDM implemented on settlements”; • AR-AMS0004 “Approved simplified baseline and monitoring methodology for small-scale agroforestry afforestation and reforestation project activities under the clean development mechanism”; • AR-AMS0005 “Approved simplified baseline and monitoring methodology for small-scale afforestation and reforestation project activities under the clean development mechanism implemented on lands having low inherent potential to support living biomass”; • AR-AMS0006 “Approved simplified baseline and monitoring methodology for small-scale silvopastoral afforestation and reforestation project activities under the clean development mechanism”; <p>(b) Incorporates the use of the approved tools to broaden the choice of carbon pools and to allow alternative approaches, including simplified approaches based on default values of parameters, for estimation of changes in carbon stocks in the pools;</p> <p>(c) Changes the title from AR-AMS0007 “Simplified baseline and monitoring methodology for small-scale A/R CDM project activities implemented on grasslands or croplands” to AR-AMS0007 “Simplified baseline and monitoring methodology for small scale CDM afforestation and reforestation project activities implemented on lands other than wetlands”.</p> <p>Due to overall modification of the document, no highlights of the changes are provided.</p>
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Draft A/R Small-scale Methodology: Afforestation and reforestation project activities implemented on lands other than wetlands

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