

AR-AMS0003

A/R Small-scale Methodology

Afforestation and reforestation project activities implemented on wetlands

Version 03.0

Sectoral scope(s): 14



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1. Introduction

1. This methodology allows afforestation and reforestation of wetlands through small-scale afforestation and reforestation (A/R) project activities under the clean development mechanism (CDM). The methodology restricts the extent of soil disturbance in the project to be no more than 10 per cent. Lands containing peat soils are not allowed under this methodology.

2. Scope, applicability, and entry into force

2.1. Scope

2. This methodology is applicable to small-scale A/R CDM project activities. 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 afforestation or reforestation project activities as listed in appendix B of the annex to decision 6/CMP.1, paragraph 4:
 - (c) Wetland to forested land.
4. Small-scale afforestation or reforestation project activities implemented on other lands, including those mentioned under paragraphs 4(a), 4(b), and 4(d) of the appendix B, are covered by the simplified baseline and monitoring methodology “AR-AMS0007: Small-scale A/R CDM project activities implemented on lands other than wetlands”.

2.3. Applicability

5. This methodology is applicable under the following conditions:
 - (a) The land subject to the project activity falls under one of the following wetland categories:
 - (i) Intertidal wetlands (e.g. mangrove habitats) with a tree crown cover that is less than 20 per cent of the minimum tree crown cover adopted by the host party for the purpose of definition of forest under the CDM;
 - (ii) Flood plain areas on inorganic soils;
 - (iii) Seasonally flooded areas on margin of water bodies/reservoirs;
 - (b) The project activity does not lead to alteration of the water regime¹ of the project area or areas hydrologically connected to the project area;
 - (c) Soil disturbance attributable to the A/R CDM project activity does not exceed 10 per cent of the project area²;

¹ For the purpose of this methodology any change in water regime in the project area resulting from changes in the carbon pools due to the A/R CDM project activity is not considered a change in water regime.

- (d) The land subject to the project activity does not contain peat³ soils (histosols).

2.4. Entry into force

6. 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

7. The following documents are indispensable for application of this methodology:⁴

- (a) Clean development mechanism project standard;
- (b) A/R methodological tools:
 - (i) “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities”;
 - (ii) “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities”;
 - (iii) “Estimation of non-CO₂ GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity”;
 - (iv) “Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity”.

4. Definitions

8. The definitions contained in the following documents shall apply:⁵

- (a) “Glossary of CDM terms”;
- (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”.

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

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

³ Peat soil as defined in “Annex A: Glossary” of the IPCC GPG LULUCF 2003.

⁴ These documents are available online at: <http://cdm.unfccc.int/Reference/index.html>

⁵ 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>>.

- (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. Selection of carbon pools and greenhouse gases accounted

10. 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
Litter	No	Litter biomass is subjected to high turnover and displacement due to tidal currents. It is a conservative choice to exclude the pool from accounting because the project activity will not decrease the rate of accumulation of litter
Dead wood and Soil organic carbon	Optional	Carbon stock in these pools may increase due to implementation of the project activity

11. The emission sources and associated greenhouse gases (GHGs) selected for accounting are shown in table 2.

Table 2. Emission sources and GHGs selected for accounting of GHG emissions

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

12. The baseline scenario of a small-scale A/R CDM project activity implemented under this methodology shall be the continuation of the pre-project land use.

13. 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

14. 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

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

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

Where:

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

5.5. Actual net GHG removals by sinks

16. 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.

17. The actual net GHG removals by sinks shall be 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 CO ₂ -e
$\Delta C_{P,t}$	= Change in the carbon stocks in project, occurring in the selected carbon pools, in year t ; t CO ₂ -e
$GHG_{E,t}$	= Increase in non-CO ₂ GHG emissions within the project boundary as a result of the implementation of the A/R CDM project activity, in year t , as estimated in the tool "Estimation of non-CO ₂ GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity"; t CO ₂ -e

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

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

Where:

$\Delta C_{P,t}$	= Change in the carbon stocks in project, occurring in the selected carbon pools, in year t ; t CO ₂ -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 CO ₂ -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 CO ₂ -e
$\Delta C_{DW_PROJ,t}$	= Change in carbon stock in dead wood 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 CO ₂ -e
$\Delta C_{SOC_PROJ,t}$	= Change in carbon stock in the soil organic carbon (SOC) pool within the project boundary, in year t ; t CO ₂ -e

19. The change in carbon stock in the SOC pool within the project boundary, in year t , is estimated as:

$$\Delta SOC_{PROJ,t} = \frac{44}{12} \times \sum_{t=1}^t A_{PLANT,t} \times dSOC_t \times 1\text{year} \quad \text{Equation (4)}$$

Where:

- $\Delta SOC_{PROJ,t}$ = Change in SOC stock within the project boundary, in year t ; t CO₂-e
 - $A_{PLANT,t}$ = Area planted in year t , ha
 - $dSOC_t$ = The rate of change in SOC stocks within the project boundary, in year t ; t C ha⁻¹ yr⁻¹
- The following default value of $dSOC_t$ is used, unless transparent and verifiable information can be provided to justify a different value:
- (a) $dSOC_t = 0.50$ t C ha⁻¹ yr⁻¹ for $t = t_{PLANT}$ to $t = t_{PLANT} + 20$ years, where t_{PLANT} is the year in which planting takes place;
 - (b) $dSOC_t = 0$ t C ha⁻¹ yr⁻¹ for $t > t_{PLANT} + 20$

5.6. Leakage

20. Under applicability conditions of this methodology the only leakage emissions that can occur are the GHG emissions due to displacement of pre-project activities.
21. Leakage emissions are therefore estimated as follows:

$$LK_t = LK_{AGRIC,t} \quad \text{Equation (5)}$$

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:

$$\Delta C_{AR-CDM,t} = \Delta C_{ACTUAL,t} - \Delta C_{BSL,t} - LK_t \quad \text{Equation (6)}$$

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:

$$tCER_{t_2} = \sum_1^{t_2} \Delta C_{AR-CDM,t} \quad \text{Equation (7)}$$

$$lCER_{t_2} = \sum_{t_1+1}^{t_2} \Delta C_{AR-CDM,t} \quad \text{Equation (8)}$$

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 (ICERs) issuable in year t_2

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

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 ICERs that are replaced because of a reversal of net anthropogenic greenhouse gas 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:

- (a) Verification that the applicability conditions listed under paragraphs 3 and 4 have been met;
- (b) Verification of changes in carbon stocks in the pools selected;
- (c) 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.

Appendix 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. landslides, 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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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
03.0	4 October 2013	<p>EB 75, Annex 31</p> <p>This revision:</p> <ul style="list-style-type: none"> • Allows projects to use approved standardized baselines when applicable; • Uses a revised template and thus enhances readability and consistency; • Changes the title from “AR-AMS0003: Simplified baseline and monitoring methodology for small scale CDM afforestation and reforestation project activities implemented on wetlands” to “AR-AMS0003: Afforestation and reforestation project activities implemented on wetlands”
02.0.0	20 July 2012	<p>EB 68, Annex 30</p> <p>The revision:</p> <ul style="list-style-type: none"> (i) incorporates the use of the approved A/R methodological tools; (ii) allows project participants a broader range of options to account for carbon stock changes in carbon pools; and (iii) makes the methodology modular in its structure. Due to the overall modification of the document, no highlights of the changes are provided.
01	19 October 2007	<p>EB 35, Annex 16</p> <p>Initial adoption.</p>

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