

# Manual for Monitoring

of CDM Afforestation and Reforestation Projects

## Part III - Preparation of Monitoring Report



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THE WORLD BANK



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## Disclaimer

This Manual is intended to promote knowledge sharing on monitoring of afforestation and reforestation projects implemented under the CDM. The views expressed in this Manual are those of the authors and do not necessarily reflect the views of the World Bank.

The World Bank does not accept the liability for the consequences of actions taken on the basis of information presented in this document. The users of this Manual are responsible for interpretation and application of the information presented in this document.

## Evolving Document

The goal of the BioCarbon Fund is to present up to date information pertaining to climate change mitigation activities in land use sector. In this context, this document seeks to provide guidance on regulatory and operational aspects of afforestation and reforestation activities implemented under the clean development mechanism. The guidance presented in this document is also relevant for monitoring of afforestation and reforestation project activities implemented under the voluntary market regimes.

This document is intended for knowledge sharing and the information presented in the document may not necessarily be comprehensive in covering all regulatory requirements. Periodic updates will be made to the Manual. The users are expected to refer to the most recent version of this Manual.

We hope that this document is useful in providing relevant information for monitoring of afforestation and reforestation projects. We look forward to your inputs for improving the document.

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## Abbreviations and Acronyms

<b>A/R</b>	Afforestation and Reforestation
<b>AFOLU</b>	Agriculture, Forestry and Other Land Uses
<b>BEF</b>	Biomass Expansion Factor
<b>CDM</b>	Clean Development Mechanism
<b>CER</b>	Certified Emission Reduction (of greenhouse gases)
<b>CPA-DD</b>	CDM Program Activity
<b>DBH</b>	Diameter at Breast Height (of a tree)
<b>DOE</b>	Designated Operational Entity
<b>DOP</b>	Dilution of Precision (of a GPS receiver)
<b>EB</b>	Executive Board (of the CDM)
<b>GHG</b>	Greenhouse gas
<b>GIS</b>	Geographical Information System
<b>GPS</b>	Global Positioning System
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>LULUCF</b>	Land Use, Land-Use Change and Forestry
<b>PDD</b>	Project Design Document
<b>PDOP</b>	Positional Dilution Of Precision (of a GPS receiver)
<b>PoA-DD</b>	Program of Activities Design Document
<b>QA/QC</b>	Quality Assurance/Quality Control
<b>SOP</b>	Standard Operational Procedure
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change

## Organization of the Manual

This Manual is designed for personnel involved in monitoring and verification of afforestation and reforestation (A/R) projects implemented under CDM. The information presented in the Manual is also relevant for the projects implemented under the voluntary market regimes. The Manual is divided into three parts.

**Part I** - focuses on monitoring of afforestation and reforestation projects. It is organized into ten sections. Section 1 presents an overview of the CDM A/R project cycle with focus on monitoring and verification, Section 2 focuses on standard operating procedures, Section 3 covers the monitoring of project boundary. Section 4 outlines the procedures in the collection of species data. Section 5 focuses on project implementation. Section 6 covers procedures on monitoring of carbon stocks. Section 7 outlines procedures on monitoring of project emissions. Section 8 describes procedures on monitoring of leakage. Section 9 covers other important monitoring elements and, finally, Section 10 presents some references and links relevant to monitoring of afforestation and reforestation projects.

**Part II** – covers the procedures to be followed in collection of data, its organization, and archival in secure format; and calculations to be implemented with the data collected using simplified monitoring afforestation and reforestation tool (SMART), a web based tool for monitoring and calculation of GHG removals by sinks for projects in BioCarbon Fund Portfolio.

**Part III** – focuses on the guidance for preparation of monitoring report for the purpose of conducting verification of the project activity and for issuance of CERs.

# 1 Introduction

The monitoring report is the base for the verification of a CDM activity and the issuance of CERs. Therefore it should be ensured that the report and other supporting documents provided are complete, verifiable and in accordance with applicable CDM requirements.

The CDM Executive Board provided a standardized format for monitoring report<sup>1</sup> to improve consistency in reporting of the implementation and monitoring of the project activity by project participants. It must be noted that at the time of writing this Manual, there is only a general template for all CDM projects and it is not specific for CDM A/R projects. Hence some interpretation is required when this template is used for A/R projects. The following section will discuss the requirements of the monitoring report template in more detail.

## 2 The monitoring report

### 2.1 General information

At the start of the monitoring report, the following information should be provided:

- **Version number of this monitoring report and the date it was completed (in dd/mm/yyyy format).** Usually the first version of the report submitted to the DOE will be marked as version 1 with any changes made to the report as a consequence of the issues raised by the DOE resulting in subsequent version numbers
- **Title of the project activity.** This should match the project title as contained in section A.1 of the registered PDD.
- **Reference number:** this is the official UNFCCC reference number that was assigned to the project when it was registered
- **Monitoring period:** The number of the monitoring period (first, second etc) along with the start date and end date of the monitoring period covered by this report (dd/mm/yyyy - dd/mm/yyyy) should be identified.

### 2.2 SECTION A: General description of the project activity

Section A consists of several sub-sections.

**Sub-section A.1** should provide a brief summary of the implementation status of the project activity (a more detailed description should be provided in section B.1 of the monitoring report). It should address the following:

1. *Purpose of the project activity and the measures implemented through the project to reduce greenhouse gas emissions:* this can be based on information presented in Section A.2 of the registered PDD taking into account the modifications made during project implementation.
2. *Brief description of the installed technology and equipments:* summary of the description presented in section A.4 of the monitoring report.
3. *Relevant dates for the project activity:* Overview and general description of the important project activities such as planting, thinning, harvesting and the dates these activities were

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<sup>1</sup> Available at [http://cdm.unfccc.int/Reference/PDDs\\_Forms/Issuance/index.html](http://cdm.unfccc.int/Reference/PDDs_Forms/Issuance/index.html)

performed (if activities are performed at different dates for different plots, provide a general description of the activities and the period of their implementation. Additional details could be presented in section B.1 of the monitoring report).

4. *Total emission reductions achieved in this monitoring period.*

**Sub-section A.2** should list the Project Participants. This can be copied from section A.3 of the registered PDD, however, if there have been any changes in the project participants since the registration, this section should reflect the current Project Participants.

**Sub-section A.3** should present the complete description of the location of the project activity such as town, city, and country. This information can be copied from the registered PDD. This section (or a separate annex to the report) should also contain the geographic coordinates of all the project areas. Coordinates can be provided as GIS .shape files or as a list of GPS coordinates of all the corner points of the area. If an A/R CDM project activity contains more than one discrete areas of land:

- Each discrete area should have a unique geographical identification;
- The boundary should be defined for each discrete area and should not include the areas in between these discrete areas of land.

**Sub-section A.4** should provide a technical description of the project covering the species planted and technology applied in the project activity. It should provide an update of the information presented in section A.5.4 of the registered PDD.

**Sub-section A.5** should provide the title, reference and version of the baseline and monitoring methodology applied to the project activity. This section should also list the title, reference and version of any approved CDM tools used, when applicable.

**Sub-section A.6** should list the registration date of the project activity as provided by the UNFCCC (<http://cdm.unfccc.int/Projects/registered.html>).

**Sub-section A.7** should provide the crediting period of the project activity and related information (starting date and choice of crediting period). This can be copied from the PDD however, when applicable, the description shall also include changes to the start date of the crediting period post-registration that have been accepted by the Board

**Sub-section A.8** should provide contact information of the person(s)/entity(ies) responsible for completing the monitoring report.

## 2.3 SECTION B: Implementation of the project activity

**Sub-section B.1** should provide a description of the project implementation during the monitoring period covered by the report. This description should include inter alia:

1. The starting date of operation<sup>2</sup> of the project activity. For A/R projects this can be interpreted as date of site preparation and/or planting, including information on site preparation activities and species used. For project activities that consist of more than one site, the report shall clearly describe the status of implementation and starting date of

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<sup>2</sup> It must be noted that this is not necessarily the same date as the starting date of the CDM project as contained in the registered PDD. The starting date contained in the PDD is defined as the date when implementation or real action of a project activity begins.

- operation for each site (for projects with many sites, consider adding the list as an annex to the report).
2. Information regarding the implementation of the project activity during this monitoring period, including information on special events. In case of A/R projects this can include information on forest management activities that might impact carbon stocks (such as thinning, harvesting, coppicing etc) and disturbances such as fires and floods.
  3. A brief description of: (i) events or situations that occurred during the monitoring period, which may impact the applicability of the methodology, and (ii) how the issues resulting from these events or situations are being addressed.

The modalities and procedures for the CDM allow project participants to revise monitoring plans in order improve its accuracy and/or completeness of information, subject to the revision being validated by a Designated Operational Entity and approved by the CDM Executive Board. **Sub-section B.2** should indicate whether the monitoring plan of the project has been revised, and if so, the date of approval of the revised plan.

It is possible to seek a deviation from the approved methodology during the monitoring period<sup>3</sup>. In that case, the DOE shall submit the documentation for approval of deviation and only proceed with the verification after receipt of guidance from the Board. If this has occurred for the project, **Sub-section B.3** should specify the reference number of the deviation applied to the monitoring period.

If at verification, a DOE identifies that the implementation or operation of a CDM project activity does not conform to the description contained in the registered PDD, the DOE should determine if these changes raise concerns regarding:

- Additionality of the project activity;
- Scale of CDM project activity;
- Applicability and approved methodology under which the project activity has been registered<sup>4</sup>.

If the DOE determines that the changes do not raise concerns on these issues, the DOE shall submit a notification of the changes with relevant documentation. If the DOE determines that the changes do raise concerns, the DOE shall not conclude the verification/certification of the emission reductions, and shall notify and seek guidance from the Executive Board on the acceptability of these changes. If this applies to the project, **Sub-section B.4** should indicate the notification or request of approval of changes from the project activity, including the date of approval.

## 2.4 SECTION C: Description of the monitoring system

This section should describe the project's monitoring system and procedures. This may include data collection procedures (field measurements, aggregation, recording, calculation and reporting), organizational structure, roles and responsibilities of personnel, and emergency procedures for the monitoring system.

This section should further describe the quality assurance and quality control system employed by the project activity.

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<sup>3</sup> Refer to [http://cdm.unfccc.int/Reference/Procedures/iss\\_proc07.pdf](http://cdm.unfccc.int/Reference/Procedures/iss_proc07.pdf) for the procedure to do this

<sup>4</sup> Refer to [http://cdm.unfccc.int/Reference/Guidclarif/iss/iss\\_guid03.pdf](http://cdm.unfccc.int/Reference/Guidclarif/iss/iss_guid03.pdf)

This section should be based on the monitoring plan in the PDD and other supporting project documentation (such as the quality management system).

## 2.5 SECTION D: Data and parameters

Based on the methodology applied and the registered PDD, this section shall include the parameters used to calculate baseline net GHG removals by sinks, actual net GHG removals by sinks (including both the sum of the changes in the carbon pools and the project emissions), leakage, and the estimated amount of net anthropogenic GHG removals by sinks in the period covered by the monitoring report. Furthermore, this section shall contain information on other relevant parameters required by the approved methodology and the monitoring plan; and specific information on how data and parameters have been monitored during the monitoring period.

This section is divided in 2 sub-sections:

1. **Sub-section D.1** contains data that is determined only once for the crediting period but are used after registration of the project activity. Depending on the methodology and the registered monitoring plan, this can include default values such as carbon fraction, biomass expansion factors (BEF), wood density etc if these values are fixed for the crediting period.
2. **Sub-section D.2** contains the data that are actually monitored. Depending on the methodology and the registered monitoring plan, this can include measured values such as diameter at breast height (dbh) and height, and parameters monitored to calculate project emissions and leakage. This might also include parameters that are estimated/ calculated themselves using methods not provided in the PDD or methodology (e.g. tree or area volumes might be calculated using volume tables or other tools).

Project should carefully review the approved methodology and the monitoring plan as contained in the registered PDD to determine in which sub-section each parameter belongs. Some methodologies include variables that are calculated using the equations contained in the PDD, as part of the monitoring data. If this applies, the guidance of respective methodologies needs to be followed and these parameters have to be included in this section as well.

Parameters should be reported using the tables provided as part of the monitoring report template. These tables should be copied for each data and parameter. To report multiple values, a table or spreadsheet may be used.

Please note that sub-section D.1 and D.2 use different tables. For **sub-section D.1**, the format of table is as follows:

Table entry	Explanation
Data / Parameter:	<i>Provide name of the parameter</i>
Data unit:	<i>Unit in which the parameters is expressed</i>
Description:	<i>Definition / description of the parameter (this can be taken from the methodology)</i>
Source of data used:	<i>Provide reference to the source of the data</i>

Value(s) :	<i>Value of monitored parameter in the period for the purpose of calculating emission reductions. Multiple values (e.g., species specific values) can be included here or a table may be included as annex to the monitoring report. For default value (such as an IPCC value), where it is ex-post confirmed, the most recent value shall be applied</i>
Indicate what the data are used for	<i>Indicate the data used in the calculation of baseline net GHG removals by sinks, actual net GHG removals by sinks and/or leakage</i>
Additional comment:	

For **sub-section D.2**, the format of table is as follows:

<b>Table entry</b>	<b>Explanation</b>
<b>Data / Parameter:</b>	<i>Provide name of the parameter</i>
Data unit:	<i>Unit in which the parameters is expressed</i>
Description:	<i>Definition / description of the parameter (this can be taken from the methodology)</i>
Measured /Calculated /Default:	<i>Indicate if the parameter is Measured /Calculated /Default</i>
Source of data:	<i>Provide reference to the source of the data. This might include field measurements, daily records, surveys, etc. If applicable, describe the measuring and recording method (i.e. how the parameters are measured/calculated)</i>
Value(s) of monitored parameter:	<i>Value of monitored parameter in the period for the purpose of calculating emission reductions. To report multiple values, a table or spreadsheet may be attached to the monitoring report. For default value (such as an IPCC value), where it is ex-post confirmed, the most recent value shall be applied.</i>
Indicate what the data are used for	<i>Indicate is the data are used in the calculation of baseline net GHG removals by sinks, actual net GHG removals by sinks and/or leakage</i>
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<i>If applicable, description of the equipment used to monitor the parameter. If applicable, description should include details on accuracy and calibration information (frequency, date of calibration and validity).</i>
Measuring/ Reading/	<i>Specify the measurement and recording frequency</i>

Table entry	Explanation
Recording frequency:	
Calculation method (if applicable):	<i>Where relevant, a description of the calculation method of the parameter</i>
QA/QC procedures applied	<i>The QA/QC procedures applied (if applicable per monitoring plan).</i>

With exception of the remarks section, it should be ensured that each row of the table is completed.

## 2.6 SECTION E: Emission reductions calculation

**Sub-section E.1** should contain the ex-post calculation of the baseline net GHG removals by sinks where required by the methodology and/or the monitoring plan. If the baseline net GHG removals are fixed ex-ante, this should be noted here and no further information is required.

If the baseline net GHG removals are calculated ex-post, this section shall include all formulae used and description to calculate the baseline emissions applying actual values. A table may be used and included in the monitoring report or references to spreadsheet may be included.

**Sub-section E.2** is entitled “Project emissions calculation”, but in the case of CDM A/R projects should contain the calculations of the actual net GHG removals by sinks which covers both the sum of the changes in the carbon pools and the project emissions. This section shall include all formulae used and a description of the calculation applying actual values. A table may be used and included in the monitoring report or references to a spreadsheet might be included.

**Sub-section E.3** should contain the leakage calculation. This section shall include all formulae used and description to calculate the leakage applying actual values. A table may be used or references to the spreadsheet may be included to report multiple values.

**Sub-section E.4** should contain the calculation of the net anthropogenic GHG removals by sinks in the period covered by the monitoring report. This section shall include the formulae used to calculate the net anthropogenic GHG removals by sinks achieved during the monitoring period.

**Sub-section E.5** shall provide a comparison of net anthropogenic GHG removals by sinks calculated for the monitoring period with the ex-ante estimates in the registered PDD. Projects should use the table provided in the monitoring report template for this comparison.

Differences noted in sub-section E.5 shall be explained in sub-section E.6. Lower than expected emission reductions can be explained, if applicable, by referring to events discussed in section B. Any significant increase in the actual emission reductions achieved during the current monitoring period compared to the estimates in the PDD should be explained by discussing factors that have influenced this difference (e.g. favorable weather leading to higher growth or lower mortality). It should be explained how these factors have affected assumptions for data and/or parameters as contained in the registered CDM-PDD.

## 2.7 Supporting information

During the verification the DOE will want to see the evidence and supporting information to support the statements made in the monitoring report and the emission reductions provided. The exact nature of these documents will depend on the project but is likely to include:

- Spreadsheets etc that support all the calculations discussed in section E of the monitoring report;
- Cartography: .shp files of the project area, stands or plots in the area and the inventory plots or equivalent
- Inventory plots: all the information of the inventory plots including data collected from measurements;
- Any references to sources for default values or other third information quoted in the monitoring report.

## 3 SMART and the monitoring report

The Simplified Monitoring of Afforestation and Reforestation Tool (SMART) has been designed to facilitate data collection and processing in conformity with the approved A/R CDM methodologies. The reporting function in SMART presents a summary of the information for some sections of the monitoring report and allows for the creation of files containing all monitored and calculated values that can be attached to the report as an Annex.



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