CLEAN DEVELOPMENT MECHANISM

CDM-ARWG41-A02

Information note

Implications of allowing the use of sampling methods as an additional cost-effective approach for demonstrating the eligibility of land for A/R CDM project activities

Version 01.0

United Nations
Framework Convention on
Climate Change

COVER NOTE

1. Procedural background

1. The Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP) at its tenth session requested the Executive Board of the clean development mechanism (the Board) to "explore additional cost-effective approaches to demonstrating the eligibility of land to qualify as a clean development mechanism (CDM) afforestation or reforestation (A/R) project activity", and to report back on this matter to the CMP at CMP 11 for its consideration.

2. The Board, at its eighty-third meeting (EB 83) considered a concept note on additional cost-effective approaches to demonstrating the eligibility of land for A/R CDM project activities and requested the A/R Working Group (A/R WG) to prepare a recommendation on this matter to be considered by the Board at its eighty-fifth meeting.

3. The A/R WG, at its fortieth meeting, considered the request of the Board and agreed to provide its recommendation to the Board as contained in this draft recommendation.

4. The Board, at its eighty-fifth meeting (EB 85), considered the recommendation by the A/R WG and requested the A/R WG to consider this matter further and analyse in detail the implications of allowing the use of sampling methods as an additional cost-effective approach for demonstrating the eligibility of land. The Board also identified certain specific questions and requested the A/R WG to address these.

5. The present document contains an analysis of the implications of allowing the use of sampling methods as an additional cost-effective approach for demonstrating the eligibility of land. The document also addresses the specific questions identified by the Board.

2. Purpose

6. This annex contains the response of the A/R WG to the request of the Board (CDM-EB85, paragraph 59) on the implications of allowing the use of sampling methods as an additional cost-effective approach for demonstrating the eligibility of land for A/R CDM project activities.

3. Key issues and proposed solutions

7. The key issue analysed in this information note is this: What are the implications of allowing the use of sampling methods for the purpose of demonstration of land eligibility in A/R CDM project activities?

8. The proposed solution is this: The following are the implications of use of sampling methods for the purpose of demonstration of land eligibility in A/R CDM project activities:

   (a) In certain situations, use of sampling methods can reduce the costs incurred by the project participants, while preserving the environmental integrity of the project activity;

(b) Allowing use of sampling methods will require revision of the relevant approved A/R CDM methodological tools, namely;

(i) The tool “Demonstration of eligibility of lands for A/R CDM project activities”;

(ii) The tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities”.

4. Impacts

9. Allowing sampling methods for demonstration of land eligibility can potentially reduce the cost of preparation of project design document and the cost of monitoring for projects activities implemented in areas containing scattered patches of remnant forest vegetation.

5. Subsequent work and timelines

10. This information note is intended to inform the consideration, by the Board, of the CMP request contained in decision 4/CMP.10, paragraph 8. The outcome of the Board’s consideration is expected to be a report to the CMP which is expected to be included in the annual report of the Board to the CMP for 2015.

6. Recommendations to the Board

11. The A/R WG recommends that the Board take into account this information note while considering their response to the request by the CMP contained in decision 4/CMP.10, paragraph 8.

7. References

12. The following sources were used for the purpose of the analysis contained in this document:

(a) CMP decisions: 16/CMP.1, 5/CMP.1, 4/CMP.10;

(b) IPCC reports and guidelines;

(i) IPCC (2003): Good Practice Guidance for Land Use, Land-Use Change and Forestry

(c) CDM documents including meeting reports of the Board: CDM-EB83, CDM-EB85, CDM Project standard V. 09.0, AR-TOOL14, AR-TOOL19.

TABLE OF CONTENTS **Page**

1. Introduction

1. The present document contains an analysis of the implications of allowing the use of sampling methods as an additional cost-effective approach for demonstrating the eligibility of land for A/R CDM project activities. The document also addresses the specific questions identified by the Board and contained in CDM-EB85, paragraph 59.

2. Key issues and proposed solutions

2.1. Land eligibility and its demonstration

2. Eligibility of land for an A/R CDM project activity is defined by the following two criteria:

   (a) The land should not have contained forest on 31 December 1989 (Rationale: to rule out the perverse incentive for deforesting an area of land in order to accommodate an A/R CDM project activity);[1]

   (b) The land should not contain forest at the start of the project (Rationale: by definition, if the land already contains forest, it cannot be afforested or reforested).[2]

3. Under the approved A/R CDM methodologies, demonstration of eligibility of land is carried out by applying the A/R methodological tool "Demonstration of eligibility of lands for A/R CDM project activities".[3] The tool requires the project participants to provide evidence to show that:

   (a) The land does not contain forest at the start of the project activity;

   (b) The land did not contain forest on 31 December 1989.

4. To show that an area of land does not contain forest at a given point of time, the following criteria are to be met by the land:

   (a) Vegetation on the land is below the forest threshold values applicable to the host Party;

   (b) The young natural stands and plantations on the land, if existing at the start of the project activity, are not expected to reach or exceed the forest threshold values applicable to the host Party;

   (c) The land is not a part of forest area that is temporarily unstocked as a result of human intervention (e.g. harvesting) or natural causes, and the land is not expected to revert to forest.

5. The permissible types of evidence to demonstrate that the above criteria are met by the land are as follows:

[1] This requirement is contained in decision 16/CMP.1, annex, paragraph 1(c).

[2] This requirement is implied in the definitions of "afforestation" and "reforestation" contained in decision 16/CMP.1, annex, paragraphs 1(b) and 1(c).

[3] EB 75, annex 25.

(a) Aerial photographs or satellite imagery complemented by ground reference data;

(b) Land-use or land-cover information from maps or digital spatial datasets;

(c) Ground-based surveys (e.g. land-use or land-cover information from permits or plans, information from local registers such as cadastre or owner registers).

2.2. Requirement for geographical delineation of individual discrete areas

6. The A/R CDM modalities procedures define "project boundary" as follows:[4]

> The "project boundary" geographically delineates the afforestation or reforestation project activity under the control of the project participants. The project activity may contain more than one discrete area of land.

7. The above definition of project boundary only requires "geographical delineation" of the A/R project activity. Whether, in the case where a project activity contains more than one discrete area of land, geographical delineation of the boundaries of the individual discrete areas is required or not, is not clear from the text of the definition.

The interpretation of the definition of "project boundary" agreed by the Board is that the geographical boundary of each "discrete area of land" must be delineated. This interpretation is implied in the following requirement contained in the *CDM Project Standard*:

"Project participants shall define the project boundary that geographically delineates the proposed A/R CDM project activity under the control of the project participants, including information allowing the unique identification(s) of the project activity. If the proposed A/R CDM project activity contains more than one discrete area of land, each discrete area of land shall have a unique identification."[5]

8. In view of the above requirement, it becomes necessary to provide the evidence mentioned in paragraph 5 above for each discrete area of land within the project boundary of a proposed project activity.

2.3. Cost-constraint in geographical delineation of individual discrete areas

9. The requirement of geographical delineation of the boundaries of individual discrete areas of land can be met cost-effectively when a proposed project activity is to be implemented in homogeneously deforested areas of land. Such 'block deforestation' can result, for example, from planned forest harvest operations where it was decided to put the land to a non-forest use after the harvest.

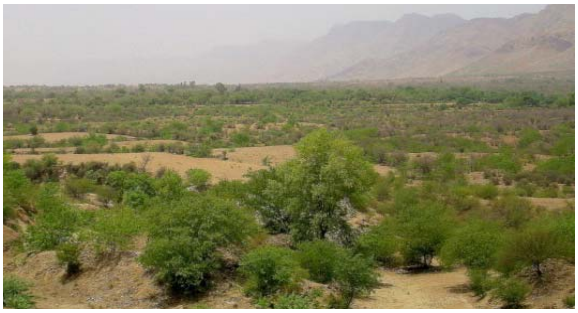
10. However, the requirement of delineation of the geographic boundaries of individual discrete areas of land may result in high costs when a proposed project activity is to be implemented, partly or entirely, in land that is largely deforested but contains large

[4] Annex to decision 5/CMP.1, paragraph 1(b).

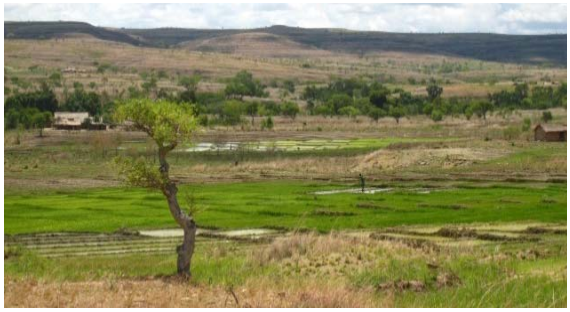
[5] CDM Project standard V 09.0, paragraph 117.

number of small patches of forest vegetation.[6] In such cases it may be more efficient to treat the area containing scattered patches of forest vegetation as a separate stratum.

Figure 1. Illustrative examples of situations where requirement of geographical delineation of boundaries of individual patches of forested areas can result in high costs

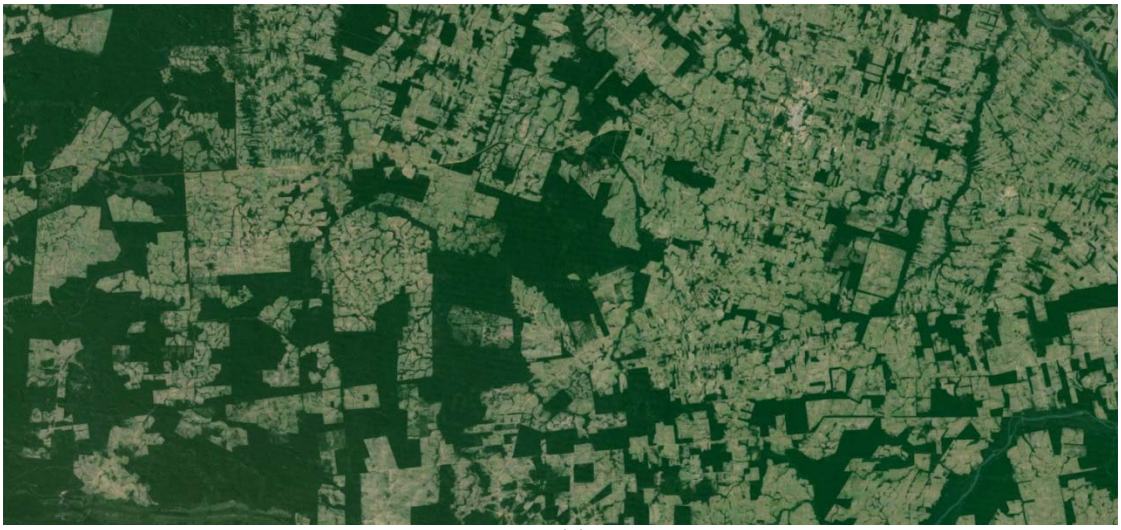


(a)



(b)

Case 1. These lands, located in host Party X with threshold values for land area and tree crown cover of 0.05 ha and 15 per cent respectively, were subjected to uncontrolled grazing and fuel wood collection and consequently were turned into non-forested land in the 1980s. However, there still remain innumerable patches of vegetation larger than 0.05 ha that have a tree crown cover of 15 per cent or more. The requirement of geographical delineation of boundaries of individual patches in such a case can result in high costs.



(c)

Case 2. These land areas, located in host Party Y, are private forest holdings. Most of the land-holders converted their holdings to non-forest use during the 1980s because of economic incentives available at that time. However, some land-holders decided to retain the forest, at least in part of their land holdings. Major part of the land (for example, up to 80 per cent of the land in right half in the picture) is non-forest land but the number of forested parcels is large. The requirement of delineation of the geographical boundaries of individual patches in such a case can result in high costs.

[6] Such a 'mosaic deforestation' can result, for example, from unplanned harvest (e.g. uncontrolled grazing and fuel wood collection), or from patchy regrowth of vegetation following a planned harvest where replanting of the areas did not take place. This situation can also arise where afforestation of land containing savannah vegetation is to be carried out, since savannah vegetation can contain pockets of vegetation that meet the threshold tree crown cover selected for defining forest.

11. In a stratum containing scattered patches of forest vegetation, there could be continuity of tree crown cover values ranging from below the threshold tree crown cover selected by the host Party to above the threshold tree crown cover. There could be continuity, also, of vegetated patch sizes ranging from smaller than the threshold area selected by the host Party to above the threshold area. A given patch of vegetation can be categorized as a forested patch only when it meets both the thresholds.

12. In such a stratum, delineating the boundaries of individual forested patches may be costly as the number of such patches can be very large, even though the total area of the forested patches is a small fraction of the total area of a stratum. The number of forested patches can be particularly large in a case where the threshold area selected by the host Party is small (e.g. 0.05 ha).

13. Figure 1 shows illustrative cases where the requirement of geographical delineation of individual forested and non-forested discrete areas can result in high project preparation and monitoring costs.

14. Thus the presence of scattered patches of forest vegetation may prevent an area of land from being taken up for reforestation under an A/R CDM project activity because of the high cost resulting from the requirement of geographic delineation of the boundaries of the individual forested patches, even though a major part of the area is deforested and thus eligible for an A/R CDM project activity.[7]

2.4. Applying sampling methods to determine eligible area

15. In order to reduce the cost incurred in delineation of the boundaries of individual forested patches in land areas that contain scattered patches of forest vegetation as described above, a sampling method, such as the method of “area estimation via proportions” described in IPCC-GPG-LULUCF 2003[8], can be used to estimate the area of forested land in a stratum, instead of geographically/spatially delineating individual forested patches.

16. The sampling method can only be applied in the pre-project scenario where it is possible to conduct field measurements. It cannot be applied to estimate the area of forested patches, if there were any, in the scenario dating 31 December 1989 or earlier, since field measurements relevant to that scenario would not be accessible at the time of project preparation.[9]

17. The following subsections describe how a sampling method can be applied to estimate the forested and non-forested area in a stratum containing scattered patches of forest vegetation and how the carbon stocks and changes in carbon stocks can be accounted in such a stratum.

[7] This cost-constraint is also to be encountered during monitoring of the carbon stocks in the project, although the present analysis is limited to cost-effectiveness of demonstration of land eligibility.

[8] IPCC (2003): Good Practice Guidance for Land Use, Land-Use Change and Forestry (p. 5.24).

[9] It is unlikely that the vegetation remained exactly in the same configuration between 1989 and today. Note, however, that a non-sampling approach, such as estimation of the area of a block of homogeneously deforested land, can be applied in the scenario dating 31 December 1989 or earlier, provided that relevant satellite data of requisite resolution are available.

2.4.1. Estimation of forested area

18. To apply the sampling method in a given stratum, the a map of the stratum delineating its outer boundary is overlaid with a regular grid of sample points spaced at a distance corresponding to the minimum area selected by the host Party for the purpose of defining forest.[10] A probabilistic sample is then drawn from the sampling frame defined by all the points that fall within the stratum boundary. Each point location contained in the sample drawn is visited on the ground and a determination is made whether the point falls in a forested patch.[11] In order to estimate the tree crown cover at a sample point, a sample plot centred at the sample point is constructed and the average tree crown cover within the plot is estimated. If the average tree crown cover so estimated is equal to or greater than the threshold tree crown cover selected by the host Party for the purpose of defining forest, then the point is determined as falling in forested area.

19. The total forested area and the associated standard error is then estimated as follows:

$$A_F = p * A_T \qquad \text{Equation (1)}$$

$$p = \frac{n_F}{n}$$

$$SE(A_F) = A_T * \sqrt{\frac{p * (1-p)}{n-1}}$$

Where

A_F	=	Estimated forest area within the project boundary; ha
p	=	Proportion of sample points falling in forest area; dimensionless
A_T	=	Total area within the project boundary; ha
n_F	=	Number of sample points falling in forest area; dimensionless
n	=	Total number of sample points (i.e. the sample size); dimensionless
$SE(A_F)$	=	Standard error of estimated forest area within the project boundary; ha

2.4.2. Accounting of carbon stocks

20. For each stratum in which eligible land area is estimated by applying a sampling method, two options can be allowed for accounting of the carbon stocks and changes in carbon stocks occurring in forested and non-forested areas:

[10] For example, if the minimum area selected is 0.05 ha, the points in the grid can be spaced at 22.36 m in either direction.

[11] Assumed for the illustrative purpose only. In practice, a different sampling design could be used. For example, a double sampling design could be applied wherein the first-phase sample values are obtained from satellite imagery of the area and the second-phase sample values are obtained from field measurements.

(a) Carbon stocks in forested and non-forested areas are estimated separately in baseline and monitoring;

(b) Carbon stocks in forested and non-forested areas are estimated separately in the baseline but a combined estimate of carbon stocks in forested and non-forested areas is made during monitoring.

2.4.2.1. Separate estimation of carbon stocks in baseline and during monitoring in forested and non-forested areas

21. Under this option, carbon stocks in forested and non-forested areas can be estimated separately by using the sample point locations as the locations of permanent sample plots. A sub-sample of these points can also be used as permanent sample plots if sufficient accuracy in carbon stocks estimation can be achieved with such a sub-sample.[12]

22. The permanent sample plots are measured at the time of project start and then again at the time of monitoring. The mean change in per hectare carbon stocks is then estimated by applying the relevant equations contained in the approved tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities".

23. The mean changes in per hectare carbon stocks in non-forested and forested areas is multiplied by the respective values of areas, estimated through sampling at project start, to obtain the changes in total carbon stocks in the forested and non-forested areas (i.e. the carbon stock change in the stratum). The change in carbon stocks in the non-forested area is accounted under the project activity, but the change in carbon stocks in forested area is conservatively excluded from accounting, except in the case where this change is negative. In the latter case, the amount of decrease in carbon stocks is accounted as project emissions.

24. Although use of permanent sample plots is an efficient method for estimation of changes in carbon stocks, the use of permanent plots requires precise documentation of plot locations and precise methods for navigation to the same locations at the time of monitoring. It is also important to ensure that the location of the sample plots is not known to the personnel responsible for establishment and management of forest plantations. The location of these sample plots should be known only to the personnel responsible for conducting forest carbon inventory for the purpose of monitoring. This requirement of confidentiality of the locations of the permanent sample plots is crucial to avoid possible bias arising from differential treatment of areas around locations of the sample plots.

2.4.2.2. Separate estimation of carbon stocks for baseline and common estimation of carbon stocks for monitoring in forested and non-forested areas

25. Under this option, the baseline carbon stocks and changes in carbon stocks are estimated separately in forested and non-forested areas, but the estimation of carbon stocks for monitoring is carried out through a common set of sample plots. This method allows establishment of new sample plots that are efficient for carbon stock estimation at

[12] Note however, that the number of sample plots used for monitoring cannot exceed the number of sample points used for area estimation. If large uncertainty results in even while measuring all the sample plots possible, applying the uncertainty discount may be the only option.

the time of monitoring (e.g. the sample size and their allocation reflects the actual distribution of biomass).

26. The weighted average of per hectare change in carbon stocks in forested and non-forested areas is multiplied by the total area of the stratum to obtain the total change in carbon stocks in the stratum. This value of total change in carbon stocks in the stratum is multiplied by the fraction of non-forested area to obtain the value of the change in carbon stocks to be accounted under the project activity.

27. While this method avoids the necessity of relocating the same sample plots used during estimation of eligible area within the stratum and the associated requirement for confidentiality of the locations of the sample plots, it provides a conservative estimate of the carbon stocks to be accounted under the project activity in cases where forested areas put on less biomass increment than non-forested areas.

2.4.3. Changes required in A/R methodological standards

28. If use of sampling methods is allowed for estimation of eligible area in a stratum of an A/R CDM project activity, the substantive changes will be required in the following approved A/R methodological standards:

    (a) The tool “Demonstration of eligibility of lands for A/R CDM project activities” will have to be revised to incorporate the sampling method and its use;

    (b) The tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities” will have to be revised to incorporate an equation for combining the uncertainty in estimated stratum area with the uncertainty in the estimated per hectare carbon stocks in the stratum.

3. Implications of applying sampling methods

29. This section discusses the implications of applying sampling methods, such as the one described above, for the purpose of demonstration of land eligibility.

3.1. Avoidance of the perverse incentive for deforestation

30. In situations such as those described in paragraph 11 and 12, and illustrated in Figure 1, it cannot be the case that some of the parcels were deforested with a view to earning carbon revenue from A/R projects and the rest were deforested for other reasons. In view of this, there does not appear be a concern of an A/R project activity creating perverse incentive for deforestation, even if the exact configuration of the forested patches has evolved since 31 December 1989.

3.2. Activity eligibility implications

31. The project activity is implemented in both the eligible areas (non-forested areas) and non-eligible areas (the forested areas) but the latter is not recognized for the purpose of credits. The activity of tree planting in the forested patches can be thought of as ‘forest management’ occurring in parallel with reforestation but not being rewarded with carbon credits. In view of this, the eligibility of the A/R activity remains beyond question.

3.3. Cost implications

32. In land areas that contain scattered patches of forest vegetation use of the sampling method may decrease costs.

3.4. Environmental integrity implications

33. The conservativeness of estimated net anthropogenic GHG removals is not adversely affected by applying the sampling method as described above. In addition, tree planting activities may also occur in the areas meeting the forest definition at the start of the project activity and the in-project removals occurring in these areas may be higher than in the baseline removals. Moreover, combined monitoring of non-forested and forested areas may address leakage concerns more effectively.

4. Conclusion

34. In view of the above analysis the specific questions contained in CDM-EB85, paragraph 59, are answered as follows:

> If a sampling method is allowed in the context of paragraph 8 (a) of the A/R methodological tool "Demonstration of eligibility of lands for A/R CDM project activities", the following text will have to be added at the end of paragraph 1(b) of the annex to decision 5/CMP.1:
>
> "Where the outer boundary of a project activity is geographically delineated, the delineation of the boundaries of the individual discrete areas contained within the project boundary is not required."

(a) New methodologies will not be required for estimation of net greenhouse gas emissions from all activities within the project boundary in order to address environmental integrity concerns if sampling is allowed under paragraph 8 (a) of the tool. There would be no environmental integrity concerns if the methods described above are followed properly.

(b) Sampling method cannot be implemented under paragraph 8(b) of the tool "Demonstration of eligibility of lands for A/R CDM project activities" because of non-availability of field measurements relevant to the scenario of 31 December 1989.

(c) Application of sampling methods under paragraph 8 (a) of the tool may result in higher cost if used in improper circumstances (e.g. in absence proper stratification, in the case of availability of low-cost remote sensing data that enable delineation of individual parcels, etc.)

(d) Allowing the use of sampling method is expected to be an option available to the project participants in addition to the existing methods allowed under the tool, and thus should not result in higher costs for project participants.

(e) Probabilistic sampling will be used to ensure that samples are unbiased. Probabilistic sampling is commonly used in the approved A/R CDM tools.

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Document information

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