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Report on the technical assessment of the proposed forest reference emission level of Ecuador submitted in 2014

Summary

This report covers the technical assessment of the submission of Ecuador, on a voluntary basis, on its proposed forest reference emission level (FREL), in accordance with decision 13/CP.19 and in the context of results-based payments. The FREL proposed by Ecuador covers the activity "reducing emissions from deforestation", which is one of the activities included in decision 1/CP.16, paragraph 70. In its submission, Ecuador has developed a national FREL. The assessment team notes that the data and information used by Ecuador in constructing its FREL are transparent and complete, and are in overall accordance with the guidelines contained in the annex to decision 12/CP.17. This report contains the assessed FREL and a few areas identified for further technical improvement by the assessment team, according to the scope of the technical assessment in the annex to decision 13/CP.19.

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Contents

I. Introduction and summary

A. Overview

1. This report covers the technical assessment (TA) of the submission of Ecuador on its proposed forest reference emission level (FREL),[1] submitted on 8 December 2014 in accordance with decisions 12/CP.17 and 13/CP.19. The TA took place (as a centralized activity) from 16 to 21 February 2015 in Bonn, Germany, and was coordinated by the secretariat.[2] The TA was conducted by two land use, land-use change and forestry experts from the UNFCCC roster of experts[3] (hereinafter referred to as the assessment team (AT)): Mr. Giacomo Grassi (European Union) and Mr. Lucio Santos (Colombia). In accordance with decision 13/CP.19, annex, paragraph 9, the Consultative Group of Experts on National Communications from Parties not included in Annex I to the Convention (CGE) was invited to participate in the TA as an observer. However, no representative of the CGE was able to participate at this TA session.

2. In response to the invitation by the Conference of the Parties (COP) and in accordance with the provisions of decision 12/CP.17, paragraphs 7–15, and its annex, Ecuador submitted, on a voluntary basis, its proposed FREL. This proposed FREL is one of the elements[4] to be developed in the implementation of the activities referred to in decision 1/CP.16, paragraph 70. The COP decided that each submission of a proposed FREL and/or forest reference level (FRL), as referred to in decision 12/CP.17, paragraph 13, shall be subject to a TA in the context of results-based payments, pursuant to decisions 13/CP.19, paragraphs 1 and 2, and 14/CP.19, paragraphs 7 and 8.

3. In this context, Ecuador underlined that its submission does not prejudge any nationally appropriate mitigation action in the land and forestry sectors undertaken by Ecuador pursuant to the Bali Action Plan, nor does it prejudge any nationally determined contribution by Ecuador in the context of a protocol, another legal instrument or an agreed outcome with legal force under the Convention currently being negotiated under the Ad Hoc Working Group on the Durban Platform for Enhanced Action.

4. The objective of this TA was to assess the degree to which information provided by Ecuador was in accordance with the guidelines for submissions of information on FRELs[5] and to offer a facilitative, non-intrusive, technical exchange of information on the construction of the FREL, with a view to supporting the capacity of Ecuador for the construction and future improvement of FRELs, as appropriate.[6]

5. The TA of the FREL submitted by Ecuador was undertaken in accordance with the guidelines and procedures for the TA of submissions from Parties on proposed FRELs and/or FRLs as contained in the annex to decision 13/CP.19. This report on the TA was prepared by the AT following the guidelines and procedures in the same decision.

6. Following the process contained in the guidelines and procedures of the same decision, a draft version of this report was communicated to the Government of Ecuador. The facilitative exchange during the TA allowed Ecuador to provide clarifications and

[1] The submission of Ecuador is available at <http://unfccc.int/8414>.
[2] Decision 13/CP.19, annex, paragraph 7.
[3] Decision 13/CP.19, annex, paragraphs 7 and 9.
[4] Decision 1/CP.16, paragraph 71(b).
[5] Decision 12/CP.17, annex.
[6] Decision 13/CP.19, annex, paragraph 1(a) and (b).

information that were considered by the AT in the preparation of this report.[7] As a result of the facilitative interactions with the AT during the TA session, Ecuador submitted a modified version on 28 April 2015, which took into consideration the technical input by the AT. The modifications improved the clarity and transparency of the submitted FREL. This TA report was prepared based on the context of the modified FREL submission. The modified submission, which contains the assessed FREL, and the original submission are available on the UNFCCC website.[8]

B. Proposed forest reference emission level

7. The national FREL proposed by Ecuador for the historical reference period 2000–2008 is the annual average of the carbon dioxide (CO_2) emissions associated with "gross deforestation", defined as the conversion of natural forest to other land-use categories. The FREL includes only the gross emissions from deforestation that are associated with clear-cuts and excludes any subsequent emissions and removals from the deforested areas. The proposed FREL excludes the conversion of forest plantations to other land-use categories and the conversion of natural forest to natural wetlands. The information on activity data used in constructing the FREL was extracted from a historical time series of land-use maps developed by the Ministry of Environment for the years 1990, 2000 and 2008. The information on emission factors was obtained from Ecuador's national forest inventory. The FREL presented in the modified submission, with the aim of accessing results-based payments for REDD-plus[9] activities from 2009 to 2020, corresponds to 43,418,126 tonnes of carbon dioxide equivalent per year (t CO_2 eq/year).[10]

8. In decision 1/CP.16, paragraph 70, the COP encourages developing country Parties to contribute to mitigation actions in the forest sector by undertaking a number of activities, as deemed appropriate by each Party and in accordance with their respective capabilities and national circumstances, in the context of the provision of adequate and predictable support. The FREL proposed by Ecuador for a TA in the context of results-based payments, covers the activity "reducing emissions from deforestation", which is one of the five activities included in paragraph 70 of this decision. Pursuant to paragraph 71(b) of the same decision, Ecuador has developed a national FREL.

9. Ecuador pointed out that deforestation as defined for the FREL includes conversion of natural forests to forest plantations. However, in response to a question raised by the AT, Ecuador clarified that this type of conversion represents less than 1 per cent of the total deforested area, and for such a reason, the area corresponding to this classification is not reported independently.

10. In its submission, Ecuador applies a step-wise approach to development of the FREL, in accordance with decision 12/CP.17, paragraph 10. The step-wise approach enables Parties to further improve the FREL by incorporating better data, improved methodologies and, where appropriate, additional pools.

[7] Decision 13/CP.19, annex, paragraphs 1(b), 13 and 14.

[8] <http://unfccc.int/8414>.

[9] In decision 1/CP.16, paragraph 70, the COP encourages developing country Parties to contribute to mitigation actions in the forest sector by undertaking the following activities: reducing emissions from deforestation; reducing emissions from forest degradation; conservation of forest carbon stocks; sustainable management of forests; and enhancement of forest carbon stocks.

[10] In its original submission, Ecuador proposed a national FREL of 34,044,101 t CO_2 eq/year for the period 2000–2008. The difference between the original and modified submissions is mostly due to the inclusion of forest area conversions less than 10 years old in the revised FREL. See details in paragraphs 21 and 22 below.

11. The proposed FREL includes the following pools: aboveground biomass of trees and non-trees, belowground biomass of trees and non-trees, dead wood and litter. Soil organic carbon (SOC) is not included. With regard to greenhouse gases (GHGs), the submission includes CO_2 only.

II. Data, methodologies and procedures used in the construction of the proposed forest reference emission level

How each element in the annex to decision 12/CP.17 was taken into account in the construction of the forest reference emission level

1. Information that was used by the Party in the construction of the forest reference emission level

12. For the construction of the national FREL, Ecuador used the methodology provided in the 2003 Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF) as a basis for estimating changes in carbon stocks in forest land converted to other land-use categories. Accordingly, the gross emissions from deforestation were estimated from 2000 to 2008 by combining activity data (i.e. the area of annual deforestation) with the appropriate emission factors (i.e. CO_2 emissions associated with the corresponding forest type).

13. The activity data used for the construction of Ecuador's FREL were extracted from a historical time series of land-use maps developed by the Ministry of Environment for the years 1990, 2000 and 2008. Each land-cover map was produced by analysing Landsat and ASTER satellite images acquired over a period of several months (up to ± 24 months) on a wall-to-wall basis, with a minimum mapping unit of 1 ha. In response to technical input by the AT, Ecuador clarified that the Ministry of Environment carried out an exercise to normalize images at a national level. However, due to the variety of images used (more than four images were used in order to fill in information gaps due to cloud coverage), normalization of the images used, as well as standardization of the results of this exercise, proved difficult.

14. With regard to the emission factors, the carbon stock of the different forest types was estimated by combining individual tree information (e.g. diameter at breast height) from the national forest inventory with the allometric equations of Chave et al. (2005)[11] that assign the equations to data per stratum. Through this method, the carbon stock at plot level, the average carbon stock at cluster level and the average carbon stock by forest stratum were estimated.[12] For the reported pools (aboveground biomass, belowground biomass, dead wood and litter), immediate oxidation is assumed following deforestation.

[11] Chave J, Andalo C, Brown S, Cairns J, Chambers Q, Eamus D, Fölster H, Fromard F, Higuchi N, Kira T, Lescure J, Nelson B, Ogawa H, Puig H, Riéra B and Yamakura T. 2005. Tree allometry and improved estimation of carbon stocks and balance in tropical forests. *Oecologia*. 145: pp.87–99.

[12] Ministry of Environment. 2014. *Evaluación Nacional Forestal – Resultados*. (2.3.11. Procedimientos para la estimación de biomasa y carbono en los distintos componentes del bosque.)

2. Transparency, completeness, consistency and accuracy of the information used in the construction of the forest reference emission level

Methodological information, including description of data sets, approaches and methods

15. Activity data for the construction of Ecuador's FREL were estimated following approach 3 as described in the IPCC good practice guidance for LULUCF. Following this approach, three wall-to-wall maps were generated independently for the entire country by analysing remotely sensed data to represent land-use categories in Ecuador for the reference years 1990, 2000 and 2008 (see also para. 13 above). The detection of land-use changes was made by comparing the results of these three independent land-use maps.

16. According to Ecuador's FREL, the overall accuracy of the maps was estimated at 69 per cent for the 1990 land-use map, 73 per cent for the 2000 land-use map and 76 per cent for the 2008 land-use map. An independent accuracy assessment of the 2000 and 2008 land-use maps was carried out after collapsing all non-forest categories into one single category termed "non-forest". The overall accuracy was then estimated at 95.5 per cent for the 2000 map and 94.0 per cent for the 2008 map. However, the AT considers that in the context of REDD-plus, the accuracy of the land-use changes is more important than the land use itself. The AT notes that an explicit assessment of the accuracy of land-use change is an area for future technical improvement pursuant to a step-wise approach in accordance with decision 12/CP.17, paragraph 10.

17. In assessing the extent to which the information used in the construction of the FREL is accurate, the AT compared the country-specific estimates of deforestation with the estimates of tree-cover changes from global analyses (e.g. Hansen et al., 2013[13]) and found some differences. The AT acknowledges that the global product estimates are often not fully comparable with the country data (e.g. forest plantations may be treated differently), and therefore such a comparison does not necessarily mean a judgement of the quality of either the country-specific data or the global data. Nevertheless, the AT considers that further improvement in activity data estimation methodologies could potentially be achieved by taking into consideration, when appropriate, global data sets (e.g. the comparison of country data and global data sets could be appropriate for developing activity data for dense humid forests). Furthermore, in relation to the approach used by Ecuador to detect land-use changes (see para. 15 above), the AT notes that another possible approach to detect forest land-use changes is to compare multi-temporal composite images (direct classification of changes).[14]

18. In response to the observations made by the AT on the methodology used and on the accuracy of the forest land-use changes, Ecuador, in its modified FREL submission, provided additional information. Firstly, Ecuador acknowledged that overestimation of land-use changes is a potential risk when estimating deforestation by comparing maps. For such reasons, a visual quality control of the generated transitions was carried out in order to remove potential inconsistencies among different coverages and reduce errors caused by the methodology. In addition, Ecuador identified potential improvements in the methodological approach, including:

(a) Assessing options to improve the accuracy of land-use maps, for example, by enhancing the thematic coherence of the land-use and land-cover change maps, by improving the satellite image automatic classification procedures and by improving the

[13] Hansen MC, Potapov PV, Moore R, Hancher M, Turubanova SA, Tuykavina A, Thau D, Stehman SV, Goetz SJ, Loveland TR, Kommareddy A, Egorov A, Chini L, Justice CO and Townshen JRG. 2013. High-resolution global maps of 21st-century forest cover change. *Science*. 342: pp.850–853.

[14] For example, see the *Methods and Guidance from the Global Forest Observation Initiative*, section 3.6. Available at: <http://www.gfoi.org/wp-content/uploads/2015/03/MGD_copyedited06082014.pdf>.

spatial and temporal coverage of the data used to characterize deforestation (especially in areas with a continuous presence of clouds or in ecosystems with considerable phenological variations);

(b) Carrying out tests in different regions of the country in order to determine whether the direct classification of changes (i.e. by comparing multi-temporal composite images) is suitable for the country's conditions. Preliminary tests suggest that this methodology is challenging, especially in areas with complex land-cover mosaics. However, this methodology could work in areas with homogeneous environmental conditions (e.g. in the Amazon);

(c) Implementing a methodology that not only evaluates the accuracy of the maps in an independent manner, but also evaluates the accuracy of the land-use changes.

19. The AT notes that the additional information provided by Ecuador in the modified submission (see para. 18 above) considerably increases the transparency of the proposed FREL. Furthermore, the modified submission corrects a calculation mistake identified during the assessment session and clarifies the areas for future technical improvement, for example, in the detection of forest land-use changes and in the explicit assessment of the land-use change accuracy. The AT commends Ecuador for correcting the calculation mistake and for providing this additional information.

20. During the assessment session, Ecuador clarified that the carbon stock values per forest type used in constructing the FREL refer to a combination of mature and secondary forests (taken from the national forest inventory). Ecuador also noted that, while existing information on successional stages may also be used in the future to adjust the results of the inventory and estimate the carbon contents for primary and secondary forests, the representativeness of the sampling size may be a challenge. The AT notes that an area for possible future technical improvement could be differentiating the values of carbon stock as a function of successional stages.

21. Ecuador's original FREL submission explained that forests less than 10 years old converted to other land uses were excluded from the construction of the FREL because these areas were considered to be "temporarily stocked and will most likely be maintained in other land-use categories in the long-term". During the assessment session, the AT noted that little information was provided on the dynamics of forest regrowth/pasture/shifting agriculture after deforestation events, including deforestation of secondary forests. The AT also noted that the exclusion of young forest areas may raise issues of consistency if the future frequency of assessment of forest land-use change will differ from the one used to set the FREL. Taking into account this technical input by the AT, Ecuador, in the modified FREL submission, included all of these forest area conversions less than 10 years old into the revised FREL, increasing the FREL value by 27.5 per cent.[15]

22. The AT notes that Ecuador estimated the emissions from deforestation of young forest areas (less than 10 years) using the same carbon density (in t C/ha) that was used for more mature forests in the original FREL submission. This would lead to a likely overestimation of emissions due to the expected lower carbon stocks of these young forest areas compared with the carbon stocks of more mature forests. No information was provided in the modified FREL submission on this possible overestimation of emissions from deforestation of the young forests. In addition, no information was provided on the criteria used to assign forest areas less than 10 years old to different categories of forest lands. In this regard, Ecuador replied that no distinction of age was considered in the national forest inventory; hence, the carbon density used represented forests in different

[15] Furthermore, the modified FREL submission corrected a mistake in the data for "forest plantations converted to non-forest land" (i.e. those areas not considered as "deforestation").

successional stages. The AT considers that the limited information on this may not be completely transparent. It further considers that Ecuador could provide estimates of the emissions from the deforestation of young forests using more conservative emission factors (e.g. using the IPCC factors for the growth of secondary tropical forests) and an explanation on the criteria used to assign forest areas less than 10 years to different categories of forest lands. The AT considers the estimation of the carbon densities across successional stages to be an area for future improvement in the context of a step-wise approach.

23. In reference to decision 13/CP.19, annex, paragraph 2(a), the AT did not have sufficient information to assess the consistency of the data used in the construction of the FREL with those used in the GHG inventory. Ecuador explained that since the submission of its second national communication,[16] the activity data used in the construction of the FREL have undergone significant improvements and the methods have been updated from those given in the *Revised 1996 IPCC Guidelines for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the Revised 1996 IPCC Guidelines) to those given in the IPCC good practice guidance for LULUCF. Hence, consistency should be expected in the data to be used in the third national communication with those used in the construction of the FREL. Ecuador further assured the AT that all data and methods used in the construction of Ecuador's FREL are being taken into account to ensure consistency with the calculations of the next submission of its national GHG inventory currently under preparation and which will be presented in Ecuador's first biennial update report (BUR).

Description of relevant policies and plans, as appropriate

24. Ecuador presented a description of enabling policies and actions for the implementation of REDD-plus activities. Ecuador explained that since 2009, in accordance with the provisions established by the country's new Constitution from 2008, it has started to implement new policies and programmes to reinforce forest governance, reduce deforestation and improve forest control and management. As the proposed FREL is based entirely on historical data, no assumptions about future changes to domestic policies have been included in the present FREL submission.

3. Pools, gases and activities included in the construction of the forest reference emission level

25. According to decision 12/CP.17, annex, subparagraph (c), reasons for omitting a pool and/or activity from the construction of the FREL should be provided, noting that significant pools and/or activities should not be excluded.

26. The pools included in the FREL are: aboveground biomass of trees and non-trees, belowground biomass of trees and non-trees, dead wood and litter. SOC is not included.

27. Ecuador explained in its submission that SOC was excluded from the proposed FREL owing to a lack of accurate data for estimating carbon stocks in this pool, and not due to its lack of significance. Ecuador recognizes that the inclusion of the SOC pool might be an area for future improvement under a step-wise approach; for this reason, country-specific data are currently under development. In addition, Ecuador considers that the exclusion of the SOC pool results in a conservative estimation of the FREL because it is reasonable to assume that SOC will behave in the same way as the biomass pool. In response to a question raised by the AT, Ecuador clarified that areas with organic soil/peatlands are mainly found in the Amazon region under the classification "Moretales", but these areas are not under pressure from deforestation. Overall, given the high uncertainty that typically characterizes forest SOC, the AT considers that the exclusion of SOC is adequately justified by Ecuador. The AT commends Ecuador's efforts to obtain

[16] Ecuador's second national communication (April 2012) is available at <http://unfccc.int/653>.

better information on this pool, with the aim of including this pool in future submissions as part of the step-wise approach.

28. With regard to GHGs, the FREL submitted by Ecuador included only CO_2. The submission explains that the process of slash-and-burn is the most common deforestation practice in Ecuador, resulting in the emission of methane and nitrous oxide. However, there are insufficient data on the emissions of non-CO_2 gases to allow the inclusion of accurate estimates in the FREL. With a view to collecting data that are more accurate in the future, Ecuador included in its submission an estimate of the potential maximum contribution of non-CO_2 gases to annual GHG emissions, using the IPCC emission factors and assuming that all deforestation was associated with slash-and-burn processes. This calculation resulted in less than 5 per cent of the total annual GHG emissions in t CO_2 eq. Ecuador further explained that because it is expected that a reduction in deforestation will result in a reduction of fires (and the associated non-CO_2 emissions), the exclusion of non-CO_2 gases can be considered conservative. The AT commends Ecuador for the information provided. Overall, the AT considers that the exclusion of non-CO_2 gases is adequately justified, and welcomes the intention expressed by Ecuador to collect data that are more accurate, with a view to including all GHGs in future FREL submissions.

29. The only activity included in Ecuador's FREL is deforestation. The other activities, referred to in decision 1/CP.16, paragraph 70, have not been included at this time due to a lack of information. However, Ecuador clarified that more activities may be included in the future when information becomes available, as part of its step-wise approach.

30. During the assessment session, Ecuador clarified that, at the moment, it does not have an official definition of forest degradation. However, Ecuador is currently analysing its definition in order to commence a methodological approach for the detection and monitoring of forest degradation. Furthermore, in response to a request from the AT for data on areas with reduced canopy cover (i.e. those potentially associable with degradation) that are available from the Food and Agriculture Organization of the United Nations (FAO), Ecuador clarified that these data come from a global level estimation and have not been assessed through a formal process.

31. The AT notes that, due to a lack of any information on emissions from forest degradation, it is currently not possible to assess whether this activity is significant in terms of emissions. The AT commends Ecuador for initiating work on the definition of forest degradation, and acknowledges Ecuador's intention to include forest degradation in the construction of future FRELs when new, adequate data and better information become available. For this reason, the AT considers the collection of data on forest degradation as an important area for future technical improvement. While acknowledging the difficulty of this task, the AT notes that the analysis of potential proxies of forest degradation (e.g. road networks, harvest statistics, etc.) or the analysis of degradation at subnational scales could be considered by Ecuador as an interim step towards the estimation of emissions from forest degradation at the national level. This analysis could provide preliminary information on the current trends and facilitate understanding of the relationship between deforestation and degradation (including any risk of displacement of emissions among activities), as well as facilitate assessment of the significance of forest degradation in any future FREL submission.

4. Definition of forest

32. Ecuador provided in its submission the definition of forest used in the construction of the FREL. According to this definition, which is included in a ministerial legal instrument, all land units bearing "a single minimum tree crown cover value of 30%; a single minimum land area value of 1.00 hectare and a single minimum tree height value of 5.00 meters" are considered as forest. This definition is consistent with the definition of

forest land used in the national GHG inventory, but differs from the definition applied in the FAO Global Forest Resources Assessment 2010,[17] which applies a minimum tree cover of 10 per cent. The 10 per cent cover threshold is considered to be very low for Ecuador's natural vegetation and includes vegetation types that, according to Ecuadorian standards, would be considered to be other wooded land. The AT acknowledges the information provided by Ecuador on forest definition.

III. Conclusions

33. Overall, the information used by Ecuador, namely the activity data and emission factors at the level of forest type, in constructing its FREL for the activity on reducing emissions from deforestation at the national level is complete. In addition, the AT considers that this information is mostly in accordance with the guidelines for submissions of information on FRELs (as contained in the annex to decision 12/CP.17). Overall, the AT commends Ecuador because its FREL reflects the important steps taken by the country to improve the estimations of gross emissions from deforestation, for example, as compared to the estimates in the GHG inventory submitted in the second national communication or the estimates provided in the FAO Global Forest Resources Assessment 2010. Nevertheless, the AT noted some areas for future technical improvement, as well as areas that could facilitate better transparency, as described below.

34. As a result of the facilitative interactions with the AT during the TA session, Ecuador submitted a modified submission that took into consideration the technical input by the AT, including the correction of calculation mistakes identified during the assessment session, the provision of additional methodological information and the identification of a number of areas for potential future technical improvement. The AT commends Ecuador for this effort.

35. Ecuador explained that the FREL is not consistent with the GHG inventory provided in its second national communication because the activity data have undergone significant improvement and the methods have been updated from those given in the Revised 1996 IPCC Guidelines to those given in the IPCC good practice guidance for LULUCF. The AT acknowledges this explanation and highlights that consistency should be ensured in the next GHG inventory to be submitted with the first BUR (see also para. 23 above).

36. The AT notes that Ecuador included in its FREL the most significant pools and GHGs. Overall, the exclusion of SOC and non-CO_2 GHGs is adequately justified. The AT commends the intention expressed by Ecuador to obtain better information on SOC and non-CO_2 GHGs, with the aim of including them in future FRELs as part of its step-wise approach (see also paras. 26–28 above).

37. The modified FREL submission included the deforestation of young forest areas (less than 10 years), which was previously excluded from the original FREL submission. As a consequence, the new FREL value was 27.5 per cent higher than the original value. The AT notes that the emissions from the deforestation of the young forest areas were estimated using the carbon density originally used for more mature forests; this would lead to a likely overestimation of emissions in the FREL. In this regard, Ecuador replied that the carbon density used represents forests in different successional stages. For transparency reasons, the AT considers the provision of more information on this as a priority area for future improvement, with the aim of showing that there is no likely overestimation of emissions. Furthermore, in the context of a step-wise approach, the AT considers the estimation of the carbon densities across successional stages as an area for future

[17] <http://www.fao.org/forest-resources-assessment/past-assessments/fra-2010/en/>.

improvement. Alternatively, Ecuador could provide estimates of the emissions from the deforestation of young forest areas using more conservative emission factors (e.g. using the IPCC factors for the growth of secondary tropical forests) (see also paras. 21 and 22 above).

38. Ecuador did not include emissions from forest degradation in its FREL due to the lack of a definition for forest degradation and the associated data required. As Ecuador did not provide any information on emissions from forest degradation, it was not possible for the AT to assess the potential significance of this activity pursuant to decision 13/CP.19, annex, paragraph 2(f). For this reason, the AT considers the collection of data on forest degradation (possibly including, as interim steps, proxy or subnational data) as an important area for future technical improvement (see also paras. 30 and 31 above).

39. The AT welcomes the intention expressed by Ecuador to explore the following potential methodological improvements related to activity data by assessing the following areas (see also para. 18 above), considered by the AT as priorities for future technical improvements:

(a) The options to improve the accuracy of land-use maps;

(b) The feasibility of the direct classification of deforestation by comparing multi-temporal composite images (potentially more accurate than comparing maps estimated from images), at least in areas with homogeneous environmental conditions;

(c) The accuracy of land-cover change estimates, especially deforestation.

40. The AT notes that in the context of good practice for quality assurance of the data and estimates, Ecuador could consider applying the verification techniques and procedures for activity data recommended by the IPCC.[18] For instance, Ecuador could compare the results of global data sets of forest-cover changes with Ecuador's data for specific forest types (e.g. dense humid forest). This could potentially provide useful insights to help in further increasing the confidence in the data underlying the FREL (see also para. 17 above).

41. In conclusion, the AT commends Ecuador for showing a strong commitment to continuous improvement of its FREL estimates, in line with the step-wise approach. A number of areas for future technical improvement of Ecuador's FREL have been identified in this report. At the same time, the AT acknowledges that these improvements are subject to national capabilities and policies, and notes the importance of adequate and predictable support.[19] The AT also acknowledges that the assessment process was an opportunity for a rich, open, facilitative and constructive technical exchange of information with Ecuador.

42. The table in the annex summarizes the main characteristics of Ecuador's proposed FREL.

[18] As described in section 5.7 of the IPCC good practice guidance for LULUCF.

[19] Decision 13/CP.19, annex, paragraph 1(b), and decision 12/CP.17, paragraph 10.

Annex

Summary of main features of the proposed forest reference emission level based on information provided by the Party

Main features of the FREL		*Remarks*
Proposed FREL (in t CO_2 eq/yr)	43 418 126	The FREL includes gross emissions from deforestation (i.e. those associated with clear-cuts and excluding any subsequent emissions and removals from deforested areas) (para. 7)
Type and duration of FREL	FREL = historical emissions 2000–2008	Estimates of deforestation for 1990–2000 reported for information purposes (para. 7)
Adjustment for national circumstances	No	-
National/subnational[a]	National	-
Activities included[b]	Deforestation	Ecuador defines "gross deforestation" as the conversion of natural forest to other land-use categories, excluding the conversion of forest plantations to other land-use categories and the conversion of natural forest to natural wetlands. In addition, the FREL includes the conversion of natural forests to forest plantations (paras. 7 and 9) Forest degradation is not included due to lack of data
Pools included[b]	AB, BB, DW, L	For the reported pools, it is assumed that the carbon immediately after deforestation is zero. Soil organic carbon is not included due to a lack of accurate data (para. 26)
Gases included	CO_2	Preliminary estimates of non-CO_2 gases included for information purposes (para. 28)
Forest definition[c]	Included	Minimum tree crown cover of 30 per cent; minimum land area of 1 ha; minimum tree height of 5 m (para. 32)
Relationship with latest GHG inventory	Methods used for FREL differ from latest GHG inventory (2012)	Differences in methods are due to more recent data and Intergovernmental Panel on Climate Change guidance used in the FREL as compared to the GHG inventory. The GHG inventory in the first biennial update report is currently under preparation with an updated methodology (para. 23)
Description of relevant policies and plans[d]	Included	Brief summary information included for information purposes (para.24)

Main features of the FREL		*Remarks*
Description of assumptions on future changes in policies[d]	Not applicable	-
Descriptions of changes to previous FREL	Not applicable	-
Future improvements identified	Yes	Several areas for future technical improvements were identified (paras. 37–39)

Abbreviations: AB = aboveground biomass, BB = belowground biomass, DW = dead wood, FREL = Forest reference emission level, GHG = greenhouse gas, L = litter, t CO_2 eq/yr = tonnes of carbon dioxide equivalent per year.

[a] If subnational, comments should include information on the treatment of displacement of emissions.

[b] In the case of omitted pools or activities, comments should include the justification provided by the country.

[c] The forest definition should be summarized, and it should be stated if it differs from the definition used in the greenhouse gas inventory or in reporting to other international organizations.

[d] May be relevant to the description of national circumstances, which is required in the case of adjustment.