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Report of the technical assessment of the proposed forest reference level of Nepal submitted in 2017

Summary

This report covers the technical assessment of the submission of Nepal, on a voluntary basis, on its proposed forest reference level (FRL), in accordance with decision 13/CP.19 and in the context of results-based payments. The FRL proposed by Nepal covers the activities "reducing emissions from deforestation", "reducing emissions from forest degradation" (from fuelwood harvesting) and "enhancement of forest carbon stocks" (from afforestation and/or reforestation), which are among the activities included in decision 1/CP.16, paragraph 70. In its submission, Nepal has developed a national FRL. The FRL presented in the submission for the reference period 2000–2010 includes emissions from deforestation and from forest degradation totalling 929,325 tonnes of carbon dioxide equivalent per year (t CO_2 eq/year) and 408,500 t CO_2 eq/year, respectively, and removals from enhancement of forest carbon stocks totalling 151,077 t CO_2 eq/year. The assessment team notes that the data and information used by Nepal in constructing its FRL are mostly transparent, partially complete and in overall accordance with the guidelines contained in the annex to decision 12/CP.17. This report contains the assessed FRL and a few areas identified by the assessment team for future technical improvement, 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 Nepal on its proposed forest reference level (FRL),[1] submitted on 8 January 2017 in accordance with decisions 12/CP.17 and 13/CP.19. The TA took place (as a centralized activity) from 13 to 17 March 2017 in Bonn, Germany, and was coordinated by the UNFCCC secretariat.[2] The TA was conducted by two land use, land-use change and forestry (LULUCF) experts from the UNFCCC roster of experts[3] (hereinafter referred to as the assessment team (AT)): Ms. Leticia Guimarães (Brazil) and Ms. Marina Vitullo (Italy). In addition, Mr. Khanyisa Brian Mantlana, an expert from the Consultative Group of Experts on National Communications from Parties not included in Annex I to the Convention, participated as an observer[4] during the centralized activity in Bonn.

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, Nepal submitted its proposed FRL on a voluntary basis. The proposed FRL is one of the elements[5] 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 forest reference emission level (FREL) and/or 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 decision 13/CP.19, paragraphs 1 and 2, and decision 14/CP.19, paragraphs 7 and 8.

3.   Nepal's submission is supported by nine annexes, which enhanced the transparency of the submission, covering information on: forest degradation due to grazing (annex 1); restoration through Nepal's community forestry programme (annex 2); Landsat Thematic Mapper (TM) tiles used for land-cover classification for 2000 and 2010 (annex 3); the accuracy assessment error matrix for land-cover maps for 2000 and 2010 (annex 4); the forest change accuracy assessment using the Open Foris Collect Earth tool (annex 5); a forest types map for Nepal (annex 6); a comparative assessment of the national-level fuelwood supply and demand estimates (annex 7); data analysis for estimating emissions from forest degradation due to fuelwood harvesting (annex 8); and highlights of key policies and measures guiding the FRL document (annex 9).

4.   The key objective of Nepal's FRL process is to enable the measurement of the results-based performance of REDD-plus[6] activities associated with the implementation of the national REDD-plus strategy. Nepal's FRL was prepared on the basis that the FRL submission and subsequent submissions of results through a technical annex to its biennial update report are voluntary and for the purpose of obtaining and receiving payments for results-based actions, pursuant to decision 13/CP.19, paragraph 2, and decision 14/CP.19, paragraphs 7 and 8.

5.   The objective of the TA was to assess the degree to which information provided by Nepal was in accordance with the guidelines for submissions of information on FRELs/FRLs[7] and to offer a facilitative, non-intrusive, technical exchange of information on the construction of the FRL with a view to supporting the capacity of Nepal for the construction and future improvement of its FRELs/FRLs, as appropriate.[8]

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[1] The submission of Nepal is available at http://redd.unfccc.int/submissions.html?country=npl.
[2] Decision 13/CP.19, annex, paragraph 7.
[3] Decision 13/CP.19, annex, paragraphs 7 and 9.
[4] Decision 13/CP.19, annex, paragraph 9.
[5] Decision 1/CP.16, paragraph 71(b).
[6] 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.
[7] Decision 12/CP.17, annex.
[8] Decision 13/CP.19, annex, paragraph 1(a) and (b).

6.   The TA of the FRL submitted by Nepal 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.

7.   Following the process contained in those guidelines and procedures, a draft version of this report was communicated to the Government of Nepal. The facilitative exchange during the TA allowed Nepal to provide clarifications and information that were considered by the AT in the preparation of this report.[9] As a result of the facilitative interactions with the AT during the TA session, Nepal submitted a final modified version of its FRL submission on 18 September 2017, which took into consideration the technical input of the AT. The modifications improved the clarity and transparency of the submitted FRL. This TA report was prepared in the context of the modified FRL submission. The modified submission, which contains the assessed FRL, and the original submission are available on the UNFCCC website.[10]

B.   Proposed forest reference level

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 FRL proposed by Nepal, on a voluntary basis, for a TA in the context of results-based payments, covers the activities "reducing emissions from deforestation", "reducing emissions from forest degradation" and "enhancement of forest carbon stocks", which are three of the five activities included in decision 1/CP.16, paragraph 70. Pursuant to paragraph 71(b) of the same decision, Nepal has developed a national FRL for the entire national territory. The FRL presents information on the entire forest land in the country, comprising five physiographic regions: High Himalayas, High Mountain, Middle Mountain, Siwaliks and Terai. In its submission, Nepal applies a stepwise approach to the development of the FRL, in accordance with decision 12/CP.17, paragraph 10. The stepwise approach enables Parties to improve the FRL by incorporating better data, improved methodologies and, where appropriate, additional pools.

9.   The national FRL proposed by Nepal for the historical reference period 2000–2010 is the annual average of the carbon dioxide (CO_2) emissions and removals associated with: (1) deforestation, defined as the long-term or permanent conversion of forest to another (non-forest) land use; (2) forest degradation, defined as the long-term or permanent reduction of biomass in forest land remaining forest land, not compensated by subsequent removals through post-harvest regrowth; and (3) afforestation and/or reforestation, defined as the long-term or permanent conversion of non-forest land-use categories to forest.[11] In the absence of complete and consistent time-series data, Nepal reported that only two data points, the years 2000 and 2010, were available (i.e. the average between 2000 and 2010 was taken).

10.   In its modified FRL submission, Nepal revised its bias-corrected areas of deforestation and afforestation, and excluded emissions from forest degradation due to grazing. Nepal also shared with the AT its Excel tables showing these calculations and relevant clarifications. The FRL presented in the modified submission, with the aim of accessing results-based payments for REDD-plus activities, corresponds to emissions of 929,325 tonnes of carbon dioxide equivalent per year (t CO_2 eq/year) from deforestation and 408,500 t CO_2 eq/year from forest degradation due to fuelwood extraction, and

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

[10] http://redd.unfccc.int/submissions.html?country=npl.

[11] Nepal, in its modified submission, defined the activity "enhancement of forest carbon stocks" as including the activities "afforestation" and "reforestation" on non-forest land. In this report, reference to "afforestation" includes the activities "afforestation" and/or "reforestation" as defined by Nepal. Nepal also considered the activity "restoration" from community-based forest management of forest land remaining forest land as contributing to enhancement of forest carbon stocks. However, owing to data constraints, restoration is not included in the FRL (see chapter II.3 below).

removals of 151,077 t CO_2 eq/year from enhancement of forest carbon stocks due to afforestation and/or reforestation.[12] Nepal decided to exclude the subactivity forest degradation due to grazing (which it had included in the original submission) because of the lack of sufficient reliable data and information. However, Nepal provided information on this subactivity in annex 1 to the modified submission.

11.   The activity data used in constructing the FRL for deforestation and afforestation were derived at the level of physiographic region using bias-corrected estimates of changes to areas of forest cover and prepared using Landsat TM satellite data for 2000–2010. Emission factors were based on data from Nepal's national forest inventory (NFI) for 2010–2014 and the Intergovernmental Panel on Climate Change (IPCC) default values. Activity data for estimating emissions from forest degradation due to fuelwood extraction were based on information on forest land remaining forest land, other wooded lands and national census data on population. The emission factors for estimating emissions from forest degradation were developed on the basis of information on above-ground biomass, mean annual increment, physical and legal accessibility, fuelwood consumption/year/person and fuel-type consumption patterns.

12.   The proposed FRL includes the carbon pools above-ground biomass and below-ground biomass. The pools deadwood, litter and soil organic carbon (SOC) were not included owing to the lack of reliable data. Regarding greenhouse gases (GHGs), the submission includes only CO_2.

13.   Nepal noted in its submission that its FRL does not take into account adjustment for national circumstances. During the TA, Nepal explained that, currently, it has no available data (e.g. data from migration policies that may either indicate increase or decrease pressure on forest resources, from development plans for specific economic sectors such as biofuels, tea or rubber that may increase deforestation, or from infrastructure development plans that are still in the planning stage) to enable it to conduct an analysis of suitable adjustments. However, Nepal stated that it may undertake a more detailed study of the key socioeconomic factors in order to improve future projections of emissions from deforestation and forest degradation as part of the stepwise approach.

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

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

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

14.   For the construction of the FRL, Nepal used the methodological guidance of the IPCC *Good Practice Guidance for Land Use, Land-use Change and Forestry* to estimate emissions by sources and removals by sinks. The FRL was constructed using data from remote sensing, from the NFI undertaken by the Department of Forest Research and Survey (DFRS) and national statistics relating to timber and roundwood, and fuelwood extraction. In addition, the project Forest Resources Assessment Nepal (FRA Nepal) (implemented from 2010 to 2014) provided a wide range of information for the FRL, including data and information on forest cover, growing stock, biomass, emission factors and forest carbon stocks. The FRA Nepal project covered the entire country and its results were presented in a national report.[13] Separate detailed reports for the physiographic regions of Terai,

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[12] In its original submission, Nepal proposed a national FRL of 2,875,906 t CO_2 eq/year for the period 2000–2010. The emissions from deforestation were 917,743 t CO_2 eq/year and from forest degradation due to fuelwood extraction and to grazing 341,000 t CO_2 eq/year and 1,767,273 t CO_2 eq/year, respectively, and removals from afforestation were 150,110 t CO_2 eq/year. The differences between the original and modified submission are mainly due to the exclusion of emissions from forest degradation due to grazing and to the bias-corrected area estimates, which decreased the overall estimated forest losses and gains.

[13] Available at www.dfrs.gov.np/downloadfile/state%20of%20forest_1470140234.pdf.

Siwaliks and Middle Mountain and a combined report for the High Mountain and High Himalayas physiographic regions were also prepared, giving region-specific details on methodology and results. The highest level of deforestation was found in the Terai region (11,500 ha during the reference period, or 52 per cent of the deforestation in the country) and the highest level of afforestation was in the Middle Mountain region (5,556 ha during the reference period, or 41 per cent of the total afforestation in the country).

15.   To construct the FRL, Nepal used activity data for deforestation and for afforestation and reforestation from a land-cover assessment conducted between 2000 and 2010, which was based on the use of remotely sensed data (Landsat TM images with 30 m resolution). In addition to assessing for forest change, accuracy assessment was also undertaken to ensure accurate and consistent activity data. An assessment of the accuracy of forest change was performed by comparing map data with higher-quality data (reference data) using a sampling approach. The comparison of reference and map data allowed for bias-corrected area estimates with associated confidence intervals.

16.   Afforestation in Nepal is the assisted natural regeneration of non-forested areas, which takes, on average, 20 years to grow back to the average biomass at the national level. Emission and removal factors, used to estimate carbon stock changes from deforestation and afforestation, respectively, were sourced from the NFI for 2010–2014 and from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. The annual growth rate was obtained by dividing the average biomass in the five different physiographic regions by 20. To infer the growth during the reference period (2000–2010) the annual growth rate was multiplied by 5.5, which represents the average age of the afforested area detected during the period 2000–2010.

17.   The NFI provided data and information on stem volume, tree stem, branch and foliage biomass and root-to-shoot ratio for the derivation of the emission factors used in assessing above-ground biomass. The national average above-ground (air-dried) biomass was estimated to be 194.51 t/ha, with the High Mountain and High Himalayas regions containing the highest above-ground biomass (271.46 t/ha). For assessing below-ground biomass, a root-to-shoot ratio of 0.25 was used, which is the average for the five different forest types. The IPCC default carbon fraction of 0.47 was applied when converting biomass to carbon estimates.

18.   Nepal also undertook an assessment of the reliability of the NFI results by systematically allocating sample clusters in forest areas in all physiographic regions and strata. A 95 per cent confidence limit was set for the inventory results, with a range of ±10 per cent of the stem value of biomass. According to the findings of the assessment, the mean stem volume at the national level was 164.76 m^3/ha with a standard error of 6.17 and the error of the mean at 95 per cent confidence level was 7.34 per cent, both of which were within the preset reliability limits. These results contributed to the reliability of the emission factor estimates used for constructing the FRL.

19.   Forest degradation was estimated using indirect data from proxy indicators on harvesting of fuelwood for 2010, using information from national governmental agencies. In the absence of consistent multidate observations of forest biomass stock for the country from which degradation rates could be measured, Nepal employed the Woodfuel Integrated Supply/Demand Overview Mapping (WISDOM) methodology to estimate forest degradation, specifically that due to unsustainable fuelwood harvesting. The data available for the WISDOM analysis were collected in or around 2010 and are therefore more representative of the annual degradation rates at the end of the reporting period. Nepal emphasized that WISDOM was used instead of a direct measurement method. The WISDOM methodology was specifically developed to analyse the spatial relationship between fuelwood consumption and accessible supply sources and to model fuelwood harvesting on a gradient of demand pressure and accessibility of resources.

20.   In the preparation of its FRL, Nepal used field plot level inventory information from the FRA Nepal study as one of the essential inputs for fuelwood assessment of forest degradation. In the first part of the analysis using the WISDOM model, the best possible estimation and mapping of fuelwood supply and demand and surplus and deficit in a local harvesting context was developed. For the second phase on woodshed analysis, several data

variants (e.g. full or partial market conditions, transport limit, by-product substitution) were used to generate different scenarios.[14] Forest degradation takes place when harvesting of fuelwood exceeds the regrowth capacity, and the quantity of forest degradation is estimated as the harvesting portion in excess of the regrowth capacity. Owing to the use of proxy values for estimating forest degradation, no true confidence intervals could be computed for the forest degradation estimates. However, a range around this estimate was developed by changing assumptions and exploring several likely scenarios, such as high- or low-degradation scenarios (uncertainty assessment). The range of values between the low-degradation and the high-degradation scenarios may be considered as equivalent to a confidence interval around the estimate of the leading scenario that forms the basis of the FRL (i.e. 227 kt dry matter/year).

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

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

21. The construction of Nepal's FRL was based on historical data for two data points, the years 2000 and 2010. According to Nepal, at the national level, a historical wall-to-wall land-cover data map for 2000 was available from Landsat TM with 30 m resolution and was prepared by the International Centre for Integrated Mountain Development (ICIMOD) Nepal. Supplementary information was obtained from the Advanced Spaceborne Thermal Emission and Reflection Radiometer, the Shuttle Radar Topographic Mission Digital Elevation Model, with 30 m and 90 m resolutions respectively, and the DFRS forest cover database for 2010, which was prepared using RapidEye with 5 m resolution.

22. The land-cover data for 2000 and 2010 prepared under a NASA-SERVIR/ICIMOD[15] collaborative programme and by ICIMOD using the Landsat sensor with 30 m resolution was selected as the primary map data source. The minimum mapping unit used in the assessment of land-cover change (2.25 ha) was applied in the FRL submission. Nepal did not use the minimum mapping unit of 0.5 ha that had been used for the national forest definition. Nepal reported in its FRL submission that consistency with the national forest definition will be ensured in future assessments of land-cover change.

23. The accuracy of land-cover data was assessed using a systematic random sampling approach for land-cover data for 2000 and 2010. For both years, 450 random sample points were selected and verified using Google Earth historical data and, for 2010, an additional 300 government-verified (DFRS) field sample plots were included. The overall land-cover classification accuracies for 2000 and 2010 were found to be 86.7 per cent and 85.7 per cent, respectively. The land-cover change map for between 2000 and 2010 was developed by identifying the four strata denoting change or no change: forest converted to non-forest (forest loss), non-forest converted to forest (forest gain), forest remaining as forest (stable forest) and non-forest remaining as non-forest (stable non-forest). Areas above the minimum mapping unit of 2.25 ha and those that had changed were considered in the FRL. All land-cover change areas below 2.25 ha were considered as stable non-forest, providing a more conservative forest estimate. In total, 632 sample plots, distributed across the country over the four strata, were used in the verification of land-cover change. The reference plot data used for verification were taken from the Google Earth Engine database, with 1 m resolution data for both 2000 and 2010. The overall accuracy of the estimation of the areas of land-cover change is 83 per cent. The accuracy assessment, resulting in a confusion matrix, was used to adjust the estimated area, taking into account the bias for each stratum.

24. The AT commends Nepal for conducting all these analyses, and stresses that the assessments of land cover and land-cover change should be carried out for additional years in the time series. In addition, in order to increase the overall accuracy of the assessments

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[14] For an overview of the phases of analysis in WISDOM, see figure 12 in the modified FRL submission.

[15] SERVIR is a joint development initiative of the National Aeronautics and Space Administration (NASA) and the United States Agency for International Development. For information on SERVIR Himalaya, implemented by ICIMOD, see www.icimod.org/servir-himalaya.

of land cover and land-cover change, the AT encourages Nepal to use higher-resolution mapping in future assessments and to include more years in the time series. As stated in Nepal's FRL submission, the ongoing constraints on available data (including the geological conditions of the country, with large terrain effects, shaded relief, mosaic and fragmented land cover) present challenges when assessing land-cover change at parcel sizes of less than 2.25 ha using 30 m resolution data and when assessing the associated accuracy.

25.   The AT sought a number of clarifications on the activity data used, including concerning discrepancies in the estimates of total forest area reported by Nepal in different reports, such as in its GHG inventory, to the Food and Agriculture Organization of the United Nations (FAO) for the *Global Forest Resources Assessment* (FRA) and in its FRL submission. In Nepal's country report for FRA 2015,[16] the forest area for 2000 and 2010 was reported to be 3,636,000 ha, while in the modified FRL submission Nepal reported a forest area of 5,945,220 ha for 2000 and 5,937,644 ha for 2010 (see the modified submission, table 1 on land-cover statistics). In response to a question raised during the TA, Nepal stated that its country report will be updated in due course on the basis of its national assessment (the FRA Nepal project for 2010–2014), which presents a forest area of 5,962,038 ha.[17] The AT encourages Nepal to ensure consistency and coherence in the activity data reported under various processes in its future submissions.

26.   Nepal's most recent GHG inventory, which includes estimates for the LULUCF sector,[18] was for 2000 and does not include emission estimates for 2010. Hence, the AT notes that, in accordance with decision 13/CP.19, annex, paragraph 2(a), Nepal's FRL does not maintain consistency with its latest national GHG inventory. During the TA, this issue was raised. Nepal responded that its previous national communications had been developed before the development of the national FRL. The FRL construction uses more robust and more recent data on land cover and land-cover changes and methodologies. Nepal also informed the AT that the third national communication will include estimates of emissions for 2010 and use the FRL estimates as a basis for estimating emissions and removals from the LULUCF sector so that consistency is ensured in future submissions. Nepal stated that it expects to submit its third national communication in 2019 as well as prepare its first biennial update report over the same time frame. Nepal further explained that different approaches and data sets were used for the GHG inventory and the FRL for estimating emissions from deforestation and forest degradation and removals from afforestation. For example, for the GHG inventory, emissions from forest clearing were estimated, both off-site and on-site emissions as well as decay, while for the FRL total annual biomass loss resulting from forest clearing was converted directly to carbon emissions.

27.   The emission factors were derived from information from the FRA Nepal project for 2010–2014, such as forest cover, growing stock, biomass and forest carbon stocks. In total, 1,553 permanent sample plots were distributed throughout the five physiographic regions of Nepal. On the basis of the NFI permanent sample plots, more than 75 per cent of the total forest area of Nepal is distributed in four forest types: *Shorea robusta* (15.27 per cent); lower mixed hardwood (17.06 per cent); upper mixed hardwood (18.23 per cent); and tropical mixed hardwood (24.61 per cent).

28.   For the activity forest degradation, indirect sources of information were used to estimate the related emissions. The WISDOM model used by Nepal is based on the estimation and mapping of fuelwood consumption, and the estimation and mapping of sustainable, accessible and available fuelwood supply potential, to assess the local and/or informal harvesting of fuelwood (assuming a 3 km radius) as well as commercial harvesting that is supplied to urban areas. The forest degradation rate is based on the estimated unsustainable harvesting, which represents the fraction of annual fuelwood harvesting that exceeds the annual regrowth capacity of the forest. In response to a request from the AT for more transparency of the model and data and information used in estimating emissions from forest degradation, Nepal provided a background document on

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[16]   Available at www.fao.org/3/a-az286e.pdf.

[17]   See www.dfrs.gov.np/downloadfile/state%20of%20forest_1470140234.pdf, page 25, table 7.

[18]   The GHG inventory was contained in Nepal's second national communication (submitted in 2014), which is available at http://unfccc.int/resource/docs/natc/nplnc2.pdf.

the model and all the information, data and assumptions used in the assessments, as well as the thematic maps produced during the analysis.[19] Nepal explained that the individual steps of the analyses are described in annex 6 to that document. The AT noted that the large amount of data and information and the underlying assumptions used by the model made it impossible for the AT to reconstruct the reference level for the activity forest degradation. The AT is of the view that, despite the provision of all the data and information used in the model, there remains much uncertainty regarding the assumptions, data and information applied.

29.   As stated in Nepal's FRL, the direct observation and measurement of forest degradation is of paramount importance for the accurate accounting of forest-related carbon fluxes. The AT considers that the development of new methodologies for the direct estimation of emissions from forest degradation is an area for future improvement. The indirect assessment approach currently applied presents challenges concerning the accuracy of the assessment of the results. Since many of the data sources used in the analysis do not have statistical parameters (e.g. fuelwood consumption data and accessibility parameters), a conventional calculation of the confidence interval of the final degradation value was not possible. However, to ensure the reliability of the model, Nepal applied two steps: (1) the provision of accuracy levels and confidence intervals for all the data inputs that presented statistical parameters and (2) the provision of a range of output values under different scenarios based on available confidence intervals, where possible, and on alternative assumptions, thus providing a sensitivity measure of the model. The AT notes that Nepal presented, in its modified submission, details of a number of limitations associated with the WISDOM model. A key limitation was that the estimates for annual degradation rate are only for one point in time, that is 2010, and Nepal clarified that this is due to data availability. Nepal also noted data weakness in terms of identifying robust information on fuelwood demand and forest productivity. In its modified submission, Nepal noted that it is aware of the need to validate the assumptions and some preliminary estimates used in the model and that these estimates should be replaced with solid referenced data over time. In the light of these limitations, the AT encourages Nepal to develop monitoring protocols and to collect direct data on forest degradation resulting from fuelwood collection as an area for future technical improvement.

30.   The AT commends Nepal for making available its activity data and other relevant data and information used in the construction of its FRL on a website of the Ministry of Forests and Soil Conservation.[20] All wall-to-wall land-cover maps for 2000 and 2010, as well as the information needed for the assessment of emission factors for the activities reducing emissions from deforestation and enhancement of forest carbon stocks through afforestation, were made available. According to Nepal, a more complex model is needed to better represent the carbon dynamics of changes in forest cover. However, the application of complex models always presents a challenge in terms of ensuring the transparency and completeness of processes and calculations (see para. 28 above). Under the circumstances, the AT notes that the methodological information, including data sets, approaches and methods, used by Nepal in the construction of its FRL was mostly transparent, partially complete and accurate.

Description of relevant policies and plans, as appropriate

31.   In response to a request from the AT, Nepal provided in its modified submission a summary of 13 key national policies and measures guiding REDD-plus implementation in the country. One of the most prominent pieces of national legislation is the Constitution of Nepal 2015, which prioritizes environmental and social safeguards for all its citizens. The Constitution also recognizes the emission reduction and carbon enhancement functions of forest resources as an environmental service. The Climate Change Policy 2011 specifically mentions REDD-plus, while the National Forestry Sector Strategy 2015 aims to establish

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[19]   Refer to the document titled *Data analysis for estimating emissions from forest degradation due to fuelwood harvesting in the context of Nepal's Forest Reference Level (FRL)*, available at www.wisdomprojects.net/global/csdetail.asp?id=30# , and http://mofsc-redd.gov.np/wp-content/uploads/2017/10/WISDOM_Nepal_Update__upgrade_2016_ver_8May2017.pdf.

[20]   http://mofsc-redd.gov.np/?page_id=948.

forest carbon trade or payment mechanisms by linking forests, biodiversity and watershed conservation and management. Nepal also noted its Forest Act 1993 and Regulation 1995, which ensures the rights of local communities and the community-based management of forests.

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

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

33.   The pools included in the FRL are above-ground biomass and below-ground biomass. Litter and deadwood were not considered significant pools and therefore were not included in the FRL. For the SOC pool, Nepal stated that there were no reliable data available and that the costs of data collection and analysis exceed the potential benefits of including this pool in the FRL.

34.   Regarding emissions from the excluded pools (i.e. litter, deadwood and SOC), the AT requested clarification on the reasons for the omission of these pools. In response Nepal explained that its estimates of emissions from litter and deadwood based on the available NFI data, the FRA Nepal study and default IPCC values were considered to not be significant (the carbon contribution from litter and deadwood is equal to 1.19 t carbon/ha compared with average above-ground biomass of 108.88 t carbon/ha). Both of these pools account for less than 5 per cent of the country's total emissions and can be deemed to be insignificant. In addition, Nepal noted in its modified submission that, on the basis of expert judgment, SOC represents a small proportion of the country's total emissions because there is no drainage of peatlands in Nepal.

35.   The AT notes the efforts made by Nepal to collect data on carbon pools for the construction of its FRL. The AT considers the provision of more information justifying the omission of the deadwood, litter and SOC pools as an area for future technical improvement of the FRL. In addition, the AT identifies the inclusion of more carbon pools in Nepal's estimates as another area for future technical improvement.

36.   Nepal considered only CO_2 emissions and removals in the construction of the FRL. A description of the main drivers resulting in non-CO_2 emissions was provided by Nepal. In the original submission, Nepal assessed the contribution of non-CO_2 emissions from fires to be equivalent to 13 per cent of the total annual emissions included in the FRL and considered that fires are not a significant source of emissions. Thus, Nepal decided to omit non-CO_2 gases.

37.   The AT noted that GHG emissions from forest fires were included in Nepal's most recent national GHG inventory (for 2000) (submitted as part of its second national communication in 2014). Furthermore, the AT considered that the inclusion of non-CO_2 emissions from fires in afforested areas (i.e. enhancement of forest carbon stocks from afforestation) would enhance the accuracy and completeness of the reported estimates. In response, Nepal replied that it would consider the inclusion of non-CO_2 emissions in its modified FRL submission. In that submission, Nepal stated that it had overestimated the non-CO_2 emissions from forest fires reported in the original submission for two reasons: (1) the burned area reported to FAO for FRA 2015 was larger than the estimated area affected by fires identified from smaller mapping units; and (2) when using the IPCC default fuel biomass consumption value related to primary or dense forest and the default IPCC factors for secondary forests, the resulting estimates of non-CO_2 emissions from fires were 40 per cent lower. Nepal stated in its modified FRL submission that "it is likely the estimate would be even less than 10 per cent of the total annual emissions included in Nepal's FRL". The AT considers the treatment of non-CO_2 gases in the construction of the FRL to be an area for future technical improvement in order to maintain consistency with future GHG inventories and to improve the accuracy of the estimates that will be submitted together with Nepal's third national communication.

38.   The AT commends Nepal for the inclusion of its most significant of the five activities identified in decision 1/CP.16, paragraph 70, in accordance with its national

capabilities and circumstances (i.e. reducing emissions from deforestation, reducing emissions from forest degradation and enhancement of forest carbon stocks (afforestation)).

4.   Definition of forest

39.   Nepal provided in its submission the definition of forest used in the construction of the FRL. This definition is the same as the one that it uses in its reporting to FAO FRA (i.e. minimum area of 0.5 ha, minimum height of 5 m at maturity and in in-situ conditions and at least 10 per cent canopy cover).

III. Conclusions

40.   The information used by Nepal in constructing its FRL for the activities reducing emissions from deforestation, reducing emissions from forest degradation and enhancement of forest carbon stocks is mostly transparent, partially complete and in overall accordance with the guidelines for submissions of information on FRELs/FRLs (as contained in the annex to decision 12/CP.17) (see para. 30 above).

41.   The AT acknowledges that Nepal included in the FRL the most significant activities and, to the extent possible, the most significant pools in terms of emissions from forests. In doing so, the AT considers that Nepal followed decision 1/CP.16, paragraph 70, on activities undertaken, paragraph 71(b), on elaboration of a national FRL, and decision 12/CP.17, paragraph 10, on implementing a stepwise approach. The AT commends Nepal for the information provided on the ongoing work relating to the development of the FRL for other activities as well as for the inclusion of other pools and more data points in the current time series (see paras. 33–35 and 38 above).

42.   As a result of the facilitative interactions with the AT during the TA session, Nepal submitted a modified submission that took into consideration the technical input of the AT. The AT notes that the transparency and completeness of the information improved significantly in the modified FRL submission and commends Nepal for the efforts made. The new information provided in the modified submission, including the data made available on the website of the Ministry of Forests and Soil Conservation and the additional information provided in the annexes to the modified submission, increased the transparency of the FRL data and calculations.

43.   The AT notes that the FRL does not maintain consistency with the GHG inventory included in Nepal's second national communication,[21] particularly in terms of the sources of activity data and emission factors. This is mainly due to the use of updated data for the period 2000–2010 in the construction of the FRL. Nepal indicated that consistency will be maintained with its third national communication (see paras. 26 and 37 above).

44.   The AT acknowledges and welcomes the intention expressed by Nepal to make improvements to its FRL in the following specific areas:

(a)   To include the removals resulting from improved forest management and forest restoration under community forestry programmes in the activity enhancement of forest carbon stocks on forest land remaining forest land (see para. 9 above);

(b)   To replace the indirect assessment of forest degradation from fuelwood extraction with cost-effective direct measurements of forest degradation from fuelwood extraction, which would allow for consistent and sufficiently accurate monitoring over time (see paras. 28 and 29 above);

(c)   To include, in a cost-efficient manner, data and information and estimates for small-scale deforestation and afforestation that are accurate to the extent possible (see para. 24 above).

45.   Pursuant to decision 13/CP.19, annex, paragraph 3, the AT acknowledges and commends Nepal for continuing to improve the data and methodologies in the specific

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[21]   In reference to the scope of the TA, decision 13/CP.19, annex, paragraph 2(a).

areas for future improvement referred to in paragraph 44 above. The AT also identified the following additional areas for future technical improvement:

(a) Developing monitoring protocols and collecting direct data on forest degradation due to fuelwood collection (see paras. 28 and 29 above);

(b) Collecting information on forest degradation due to forest fires (see para. 37 above);

(c) Including emissions of non-CO_2 gases (see paras. 36 and 37 above);

(d) Using higher-resolution images and more time-series data points for deforestation, in a cost-effective manner, in order to allow for the inclusion of small-scale deforestation and afforestation with sufficient accuracy (see para. 24 above);

(e) Maintaining consistency between future proposed FRLs and the GHG inventory (see para. 37 above).

46. In assessing the pools and the gases included in the FRL, pursuant to decision 13/CP.19, annex, paragraph 2(f), the AT noted that the justification provided by Nepal for the omission of pools and gases is adequate and that it is likely that the omitted pools are not significant sources. Nevertheless, the AT identified the following additional areas for future technical improvement:

(a) Including other pools: deadwood, litter and SOC;

(b) Including non-CO_2 emissions, particularly from forest fires;

(c) Ensuring consistency with the reported pools in the GHG inventory included in future national communications;

(d) Including estimates of emissions from forest degradation caused by drivers other than fuelwood collection.

47. In conclusion, the AT commends Nepal for showing a strong commitment to the continuous improvement of its FRL estimates in line with the stepwise approach. A number of areas for the future technical improvement of Nepal's FRL 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.[22] The AT also acknowledges that the assessment process was an opportunity for a rich, open, facilitative and constructive technical exchange of information with Nepal.

48. The table contained in the annex summarizes the main characteristics of Nepal's proposed FRL.

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[22] 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 level based on information provided by the Party

	Main features of the FRL	Remarks
Proposed FRL (in t CO_2 eq/year)	929 325 t CO_2 eq/year (deforestation) –151 077 t CO_2 eq/year (afforestation) 408 500 t CO_2 eq/year (degradation due to fuelwood harvesting)	The FRL includes emissions from deforestation and forest degradation and removals from enhancement of forest carbon stocks (see para. 10 of this document)
Type and duration of FRL	FRL deforestation and afforestation = historical emissions/removals (2010 compared with 2000) FRL degradation = projection/ modelling of emissions using proxies	Historical average approach based on land-cover data for 2000 and 2010 (see para. 9 of this document)
National/subnational[a]	National	The FRL covers the whole territory of Nepal (see para. 8 of this document)
Activities included[b]	Deforestation Forest degradation Enhancement of forest carbon stocks (afforestation)	See paragraph 9 of this document for definitions
Pools included[b]	AB, BB	
Gases included	CO_2	See paragraphs 36 and 37 of this document
Forest definition[c]	Included	Land with tree crown cover of more than 10% and area covering more than 0.5 ha, with minimum height of the trees to be 5 m at maturity and in in-situ conditions, consistent with FAO FRA definition (see paras. 22 and 39 of this document)
Relationship with latest GHG inventory	Data, emission factors and some methodologies used for the FRL are not consistent with the latest GHG inventory as included in the second national communication	See paragraph 26 of this document
Description of relevant policies and plans[d]	Included	See paragraph 31 of this document

	Main features of the FRL	*Remarks*
Description of assumptions on future changes in policies[d]	Not applicable	
Description of changes to previous FREL	Not applicable	
Future improvements identified	Yes	See paragraphs 44–46 of this document

Abbreviations: AB = above-ground biomass, BB = below-ground biomass, FAO FRA = Food and Agriculture Organization of the United Nations Forest Resources Assessment, FRL = forest reference level, GHG = greenhouse gas.

[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.

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