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

Summary

This report covers the technical assessment of the submission of Sri Lanka, 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 Sri Lanka covers the activities “reducing emissions from deforestation” and “enhancement of forest carbon stocks” (afforestation and reforestation), which are among the activities included in decision 1/CP.16, paragraph 70. In its submission, Sri Lanka has developed a national FRL for the reference period 2010–2015. The FRL for the activity “reducing emissions from deforestation” corresponds to 4,459,000 tonnes of carbon dioxide equivalent per year (t CO₂ eq/year), and the FRL for the activity “enhancement of forest carbon stocks” corresponds to –70,000 t CO₂ eq/year. As a result of the facilitative process during the technical assessment week, the FRL for the activity “reducing emissions from deforestation” was modified to 4,365,000 t CO₂ eq/year and that for the activity “enhancement of forest carbon stocks” was modified to –72,000 t CO₂ eq/year. The assessment team notes that the data and information used by Sri Lanka in constructing its FRL are partially transparent and complete and are partially in overall accordance with the guidelines contained in the annex to decision 12/CP.17. This report contains the assessed FRL and the areas identified by the assessment team for further technical improvement, according to the scope of the technical assessment in the annex to decision 13/CP.19.

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I. Introduction and summary

A. Overview

1. This report covers the technical assessment (TA) of the submission of Sri Lanka on its proposed forest reference level (FRL),¹ submitted on 6 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 experts from the UNFCCC roster of experts³ (hereinafter referred to as the assessment team (AT)): Juan José Rincón Cristóbal (Spain) and Walter Oyhantcabal (Uruguay). In addition, Mr. Khanyisa Brian Mantlana (South Africa), an expert from the Consultative Group of Experts on National Communications from Parties not included in Annex I to the Convention, participated as an observer⁴ 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, Sri Lanka submitted its proposed FRL on a voluntary basis. The proposed FRL is one of the elements⁵ 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 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. The objective of the TA was to assess the degree to which information provided by Sri Lanka was in accordance with the guidelines for submissions of information on FRLs⁶ 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 Sri Lanka for the construction and future improvement of its FRLs, as appropriate.⁷

4. The TA of the FRL submitted by Sri Lanka was undertaken in accordance with the guidelines and procedures for the TA of submissions from Parties on proposed forest reference emission levels (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 contained in the same decision.

5. 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 Sri Lanka. The facilitative exchange during the TA allowed Sri Lanka to provide clarifications and information that were considered by the AT in the preparation of this report.⁸ As a result of the facilitative interactions with the AT during the TA session, Sri Lanka submitted a modified version of its FRL on 7 July 2017, which partly took into consideration the technical inputs by the AT. The modifications partially improved the clarity and transparency of the submitted FRL. This TA report was prepared based on the modified FRL submission. The modified submission that contains the assessed FRL and the original submission are available on the UNFCCC website.⁹

¹ The submission of Sri Lanka can be found at <http://unfccc.int/8414>.

² Decision 13/CP.19, annex, paragraph 7.

³ Decision 13/CP.19, paragraphs 7 and 9.

⁴ Decision 13/CP.19, paragraph 9.

⁵ Decision 1/CP.16, paragraph 71(b).

⁶ Decision 12/CP.17, annex.

⁷ Decision 13/CP.19, annex, paragraph 1(a) and (b).

⁸ Decision 13/CP.19, annex, paragraphs 1(b), 13 and 14.

⁹ <http://unfccc.int/8414>.

B. Proposed forest reference level

6. The national FRL values proposed by Sri Lanka for the period 2011–2015 are the annual averages of the carbon dioxide (CO₂) emissions for the historical period 2000–2010 associated with the activity “reducing emissions from deforestation” (hereinafter referred to as “deforestation”), defined as the conversion of forest consistent with the national forest definition to other land-use categories, and the activity “enhancement of forest carbon stocks” through afforestation and reforestation (hereinafter referred to as “reforestation”), defined as the conversion of non-forest land-use categories to forest through afforestation and reforestation. The FRL for deforestation does not include the emissions resulting from the temporary de-stocking of forest land. Reforestation includes conversion to forest of non-forest land that has not been forested previously (afforestation) and of land which had been forested at some point in the past (reforestation). The information on the area of deforestation and reforestation for the 2000–2010 period used in constructing the FRL is obtained from the Global Forest Change (GFC) product¹⁰ supplemented by the input map prepared by the Forestry Department (FD) of Sri Lanka and the assessment was performed using Collect Earth.¹¹ The information on emission factors (EFs) was obtained mainly from the Intergovernmental Panel on Climate Change (IPCC) *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines). The FRL presented in the modified submission, which may also be used in future for accessing results-based payments for REDD-plus,¹² corresponds to 4,365,000 tonnes of carbon dioxide equivalent per year (t CO₂ eq/year) for the activity deforestation and –72,000 t CO₂ eq/year for the activity reforestation.

7. 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 Sri Lanka, on a voluntary basis, for a TA in the context of results-based payments, covers the activities “reducing emissions from deforestation” and “enhancement of forest carbon stocks”, which are two of the five activities included in decision 1/CP.16, paragraph 70. Pursuant to paragraph 71(b) of the same decision, Sri Lanka has developed a national FRL for the entire national territory of Sri Lanka, incorporating all biomes/forests in the country. In its submission, Sri Lanka applies a step-wise approach to its development of the FRL, in accordance with decision 12/CP.17, paragraph 10. The step-wise approach enables Parties to improve the FRL by incorporating better data, improved methodologies and, where appropriate, additional pools and gases.

8. The proposed FRL includes the pools “above-ground biomass”, “below-ground biomass” and “litter” and excludes “soil organic carbon” and “deadwood”. Regarding greenhouse gases (GHGs), the submission includes only CO₂.

¹⁰ Hansen MC, Potapov PV, Moore R, Hancher M, Turubanova SA, Tyukavina A, Thau D, Stehman SV, Goetz SJ, Loveland TR, Kommareddy A, Egorov A, Chini L, Justice CO and Townshend JRG. 2013. High-resolution global maps of 21st-century forest cover change. *Science*. 342: pp.850–853.

¹¹ Available at www.openforis.org/tools/collect-earth.html.

¹² In decision 1/CP.16, paragraph 70, the COP encouraged 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.

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

9. For the construction of the FRL, Sri Lanka used the methodologies provided in the 2006 IPCC Guidelines. The activity data (AD) on the area of deforestation (forest land converted to other land-use categories) and reforestation (non-forest land-use categories converted to forest land) for the period 2000–2010 used in constructing the FRL are obtained from the GFC product, which were further refined based on an assessment using the input map for 1999 prepared by the FD and the Collect Earth tool. Sri Lanka used these AD together with the default EFs from the 2006 IPCC Guidelines to estimate the emissions and removals from deforestation and reforestation for the 2000–2010 period. Sri Lanka's FRL comprises the average annual emissions from deforestation and reforestation, respectively.

10. Sri Lanka obtained the preliminary data on areas subject to deforestation and reforestation in the 2000–2010 period used in constructing the FRL from the GFC product. The forest map for the year 1999, prepared by the FD using remote sensing images of 1996, was then used to identify the areas of deforestation and reforestation within the areas subject to tree cover loss and gain, respectively. To further improve the quality of the change detection, Sri Lanka performed an accuracy assessment of the results through visual interpretation of 902 sampling plots using the Collect Earth and OpenForis accuracy assessment tools together with very high-resolution imagery available from various applications (i.e. Google Earth, Bing Maps and Google Earth Engine).

11. Sri Lanka used default values of carbon stocks and other parameters from the 2006 IPCC Guidelines (as presented in the referenced tables in the FRL submission) to estimate the emissions and removals from deforestation (tables 10.7–10.9) and reforestation (tables 10.10–10.13). For deforestation, Sri Lanka used the default values of above-ground biomass (table 10.7) and the ratio of below-ground biomass to above-ground biomass (table 10.8) for natural forests in tropical rain forest, tropical moist deciduous forest, and tropical dry forest ecological zones. Sri Lanka also used the value of litter carbon stock for broadleaf deciduous forest in the tropical climate domain (table 10.9) for deforestation. For reforestation, Sri Lanka used the values of above-ground net biomass growth (table 10.11) and root-to-shoot ratio (table 10.12) for plantations in tropical moist deciduous forest and tropical rain forest ecological zones. Teak and eucalyptus species cover most of the plantation area in Sri Lanka, followed by *Pinus* and other mixed species. Regarding plantations (table 10.12), Sri Lanka used the general value of above-ground net biomass growth for tropical moist deciduous forest in Asia for teak species (8 t dry matter/ha) and the value for tropical rain forest in Asia for eucalyptus, *Pinus caribaea* and other species (5 t dry matter/ha). Sri Lanka used the root-to-shoot ratio of 0.20 for tropical moist deciduous forest (above-ground biomass < 125 t/ha) for teak plantation and that of 0.37 for tropical rain forest for eucalyptus, *Pinus caribaea* and other plantation species. The value for growth in litter carbon stocks in plantations per year, 0.1050 (table 10.12), was derived by dividing the default value for litter carbon stocks in tropical plantations in the 2006 IPCC Guidelines (2.1 t C/ha) by the default transition period (20 years).

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

12. The AT found several inconsistencies between the FRL submission and the corresponding anthropogenic forest-related GHG emissions and removals as contained in the last national GHG inventory in Sri Lanka's second national communication (NC2) (corresponding to the year 2000), including those in relation to the methods used, EFs, tiers

and pools included. The AT also noted that the GHG inventory in the NC2 used the gain–loss method of the 2006 IPCC Guidelines, accounting for both increments (gains) and losses (e.g. those due to harvest, fuelwood removals and forest fires) in the biomass pool, whereas in the initial submission of the FRL, Sri Lanka accounted for gains but did not account for losses in the biomass pool. In response to a question from the AT during the TA, Sri Lanka resolved this issue in the modified submission. The AT commends Sri Lanka for resolving this issue in its modified submission. The AT notes that ensuring consistency between the FRL submission and the forest-related GHG emissions and removals in the national GHG inventory in Sri Lanka’s national communication/biennial update report is an area for future technical improvement.

13. Sri Lanka used the GFC product together with the forest cover map for 1999 prepared by the FD to estimate the AD (areas subject to deforestation and reforestation). Sri Lanka further performed an accuracy assessment of the AD using the Collect Earth tool and reference data. This assessment not only assesses the accuracy of the preliminary area estimates but also provides area estimates that are corrected for map bias (bias-corrected areas) together with the confidence intervals for those estimates. The AT, however, noted that the accuracy of the base maps (forest cover map produced by the FD in 1999 and the GFC product) as assessed using the Collect Earth tool, is too low to estimate areas subject to afforestation or reforestation with reasonable accuracy. The confusion matrix presented in the FRL submission (table 10.2) indicates that although the base map is reasonably accurate for the detection of forests and deforestation (with an accuracy above 80 per cent), its accuracy is extremely low (9 per cent) for the detection of changes from non-forest land to forest land. During the TA, in response to a question from the AT, the Party explained that the low accuracy is mainly due to the uncertainty related to the technical limitations of remote sensing (including the use of medium-resolution images), which the expert and local knowledge can only partially address.

14. In response to an observation from the AT in the draft version of this report, Sri Lanka included additional information on the procedure and methodology used for selecting the sampling points in the modified submission, as follows. For the generation of AD for deforestation and afforestation, Sri Lanka uses a combination of a wall-to-wall map (input map) and sample interpretation (reference data) to generate area estimates that are corrected for biases (“bias-corrected area estimates”). This methodology allows Sri Lanka to calculate the uncertainty of the area estimates. The methodology uses an input map with information on the location of classes of interest (deforestation, afforestation, stable forest, stable non-forest) to stratify the distribution of sample points for the collection of reference data. Reference data are collected through the interpretation of aerial photography and satellite data. The distribution of the reference data points follows stratified random sampling with a statistically sufficient number of samples in each of the classes of interest, ensuring the location of sufficient samples in the rare classes (deforestation and afforestation). The AT, however, considers that the number of sampling points (902) may be insufficient to enable a robust estimation of the assessment of land-use change from non-forest land to forest land. For example, in the bias correction process, out of the area of forest gain of 9,454 ha, an area of 9,295 ha (98 per cent of the total bias-corrected area of forest gain) is based on only one plot of stable non-forest in the base map. In response to a question from the AT during the TA, Sri Lanka acknowledged that the number of plots may be insufficient to provide statistically significant results for forest gain and cited a number of ways to improve the accuracy of detection of the area of forest gain, which the AT found useful.

15. The AT also noted that because the existing methodology cannot clearly identify horticultural, rubber and coconut plantations, there could be a potential overestimation of the area under reforestation owing to the possible inclusion of such areas, which are not included in the forest definition. In response to a question from the AT during the TA, Sri Lanka acknowledged that the data currently available in the country do not allow precise estimation of areas subject to afforestation and reforestation and noted this as an area for future technical improvement.

16. In view of the above-mentioned issues (paras. 13–15), the AT considers that the current method for estimating areas under reforestation cannot generate results with an

acceptable level of accuracy, owing to the very high level of uncertainty. Noting this as an area for future technical improvement, the AT suggests that Sri Lanka consider improving the AD for this activity by reducing the uncertainties in the monitoring method, including by implementing the potential improvements cited by Sri Lanka, namely: using high-resolution satellite imagery instead of the mid-resolution imagery available from the GFC product for preliminary change assessment; increasing significantly the sample size of the Collect Earth sample for the area subject to forest gain and using these data directly for preliminary change assessment; using local knowledge on possible areas of afforestation; using national maps as a proxy for detection of afforestation; applying training points for forest gain in remote sensing imagery; and using supervised classification. The AT also notes that Sri Lanka could consider the possibility of not including this activity in its submission until the availability of data and quality of sampling and monitoring systems permit a more accurate estimation of AD.

17. Per the definition provided in the submission (section 6.3), deforestation in Sri Lanka does not include the temporary destocking of forest land. Sri Lanka's FRL submission, however, did not provide information on how Sri Lanka ensured that harvested plantation is identified as temporary destocking and not as conversion to another land use. During the TA, in response to a question from the AT, Sri Lanka provided additional information and included a reference to the issue in the modified submission (section 6.1), thereby increasing the transparency of the submission. Sri Lanka explained that the FD undertakes continuous management of forest plantations by planting the harvested areas of mature forest plantations (teak, eucalyptus and *Pinus* species) with seedlings in the following planting season and thus there is no land-use change. In the case of mixed mahogany plantations, there is only selection felling of trees above a certain diameter, which thus maintains the forest cover intact. The AT notes that the inclusion of this information would further enhance the transparency of future FRL submissions.

18. Sri Lanka's FRL submission (section 10.1.5) provides the total forest area as well as the losses of forest area by forest type ("dense", "open", "sparse", "wet", "dry", "plantation" and "mangroves"). The FRL submission, however, does not provide information on areas of plantations by eco-zone. Sri Lanka uses the terminology "dense", "open", "sparse", "wet" and "dry" forests without providing their exact definitions in the submission or details of how they correspond to the forest types in the 2006 IPCC Guidelines. The submission also provides no information on the forest areas by forest type. In response to a question from the AT during the TA, Sri Lanka provided information on the forest areas by forest type together with areas of plantations by eco-zone. The AT noted that proper selection of the default parameters in the 2006 IPCC Guidelines requires the disaggregation of the forest area by IPCC eco-zone and by tree species in the case of plantations. The AT also found several errors in the selection of the default parameters and EFs for the application of the tier 1 methodology in the 2006 IPCC Guidelines, mostly related to the selection of default parameters in the 2006 IPCC Guidelines (e.g. root-to-shoot, above-ground biomass) corresponding to the incorrect eco-zones. The AT notes that the inclusion of disaggregated information on forest area by eco-zone, forest type and plantation species at the same level of disaggregation as used for the default parameters provided in the 2006 IPCC Guidelines, as well as the selection of the correct default parameters from the 2006 IPCC Guidelines corresponding to the appropriate eco-zones, would greatly enhance the transparency of future FRL submissions.

19. The AT noted that Sri Lanka's FRL submission does not contain a transparent description of the methods used by Sri Lanka to construct its FRL. The submission only states that the Party has used the 2006 IPCC Guidelines, but does not include a transparent description of the calculation methodology, including the equations used to calculate the carbon stock changes. During the TA, in response to a request from the AT, the Party provided detailed information on the calculation methodology, including the spreadsheets used for the calculations, which the AT found useful. The AT considers that including the detailed information on the calculation methodology provided during the TA as well as ensuring its accuracy and consistency with the FRL submission would greatly enhance the transparency of future FRL submissions by enabling the AT to reproduce the calculations.

20. Sri Lanka used the EFs from the 2006 IPCC Guidelines to construct its FRL. The modified submission states that Sri Lanka originally intended to use country-specific EFs. However, following an assessment by a technical working group which found that this national information was biased and thus, even though within the range of values of default EFs in the 2006 IPCC Guidelines, not representative of the forests in Sri Lanka, the Party decided to use default values and tier 1 methods from the 2006 IPCC Guidelines. The AT notes that the modified FRL submission (annex I) contains several references to peer-reviewed articles providing national parameters. The AT also notes that in its NC2, Sri Lanka mainly used the tier 2 methodology from the 2006 IPCC Guidelines together with several country-specific EFs and parameters. The AT further notes that the submission does not transparently provide evidence to justify the use of tier 1 EFs and parameters. Considering that the use of tier 1 normally results in less accurate estimates than those based on national parameters (including expert judgment, as necessary), the AT notes the development of appropriate country-specific EFs as an important area of technical improvement to enhance the accuracy of the FRL. In this regard, the AT commends Sri Lanka for providing detailed and transparent information on planned future improvements regarding EFs in the modified submission (section 13), including the planned replacement of default EFs with national EFs.

21. Sri Lanka has chosen 2000–2010 as the historical period for the two elected activities. However, per the modified submission, the length of the historical period is 10 years. In response to a question from the AT during the TA, Sri Lanka explained that it has considered the period 2000–2010 to be composed of the following time intervals: 2000–2001, 2001–2002, 2002–2003, 2003–2004, 2004–2005, 2005–2006, 2006–2007, 2007–2008, 2008–2009, 2009–2010. The AT, however, notes that each year in an inventory time series should be a calendar year and therefore the period 2000–2010 comprises 11 years. The AT notes that the length of the historical period has significant implications for the formulas used to estimate carbon stock changes in the carbon pools. The AT, therefore, suggests that the Party either change the length of the historical period to 11 years making consequential corrections to the calculation methodology for carbon stock changes, or modify how it denotes the historical period (either 2000–2009 or 2001–2010).

22. The AT noted that Sri Lanka's FRL submission mentions *Pinus caribaea* as one of the species used for new plantations. The AT noted that, based on a study undertaken by the FD under the auspices of the Food and Agriculture Organization of the United Nations (FAO),¹³ *Pinus caribaea* has not been used in Sri Lanka since the mid-1990s and thus this species may not be representative of the species used for plantations in the period 2000–2010 and in the future. In response to a question from the AT during the TA, the Party, while confirming that the plantation of *Pinus caribaea* was indeed stopped in the mid-1990s for environmental reasons, explained that this species has been included in the FRL because its plantations still exist and form a significant portion of the growing stock. The AT, however, notes that *Pinus caribaea* has been included in the FRL as one of the species used for new plantations in the period 2000–2010 and not just as part of the existing plantations. The AT, therefore, considers that ensuring the inclusion of the correct tree species used for plantations in the historical period for FRL construction is an area for future technical improvement.

Description of relevant policies and plans, as appropriate

23. Sri Lanka's FRL submission (section 13: Future improvements) includes a description of some relevant policies and plans, where it provides information on government decisions mainly linked to Sri Lanka's intended nationally determined contribution (INDC) relating to the forestry sector. Sri Lanka's INDC recommends a 32 per cent increase in forest cover. This is planned to be achieved through a range of policies and measures in the first phase, including: improvement of the quality of growing stock of natural forests and forest plantations; restoration of degraded forests and hilltops (shrubs, grassland and state lands); increased river basin management for major rivers in Sri Lanka; forestation of underutilized private lands and marginal tea lands; urban forestry (tree

¹³ Forest Department, Government of Sri Lanka. 2009. *Sri Lanka Forestry Outlook Study*. Working Paper No. APFSOS II/WP/2009/29. Available at www.fao.org/docrep/014/am624e/am624e00.pdf.

planting along roadside, temple lands, schools and other Government-owned lands); establishment and reactivation of the National Forest Monitoring System; and promotion of investment in environmental conservation projects by private and public sector companies through corporate social responsibility programmes. The FRL submission also provides some information on 13 policies and measures for REDD-plus implementation in the second phase, including those focused on: forest, wildlife and watershed; land-use planning; and other forested lands. The AT considers that presenting the description of relevant policies and plans in a dedicated section rather than in the section on future improvements would enhance the transparency of future submissions.

24. Sri Lanka's FRL submission (section 11) includes an analysis of the potential adjustment of the FRL based on various predictors related to national circumstances (e.g. number of industrial establishments/firms by district). Based on this analysis, Sri Lanka has concluded that there is no case for adjustment of the FRL to reflect national circumstances.

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

25. According to decision 12/CP.17, annex, subparagraph (c), 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.

26. The pools included in the FRL are above-ground biomass, below-ground biomass and litter. The deadwood and soil organic carbon pools were not included.

27. The AT noted that, based on a study by Kurupparachchi et al. (2016),¹⁴ total soil carbon stock in dry-zone and wet-zone forests constituted 53.3 and 29.9 per cent of the total carbon stocks, respectively. Soil organic carbon is thus a significant pool in Sri Lanka's forests. The AT further noted that Sri Lanka's NC2 presents an estimate of carbon stock changes in soil organic carbon for lands converted to forest land ("enhancement of forest carbon sinks") (636.85 Gg of CO₂ in 2000), even though soil organic carbon was not included in the FRL submission. During the TA, in response to a question from the AT, Sri Lanka clarified this apparent inconsistency between the FRL and the NC2 by explaining that it was because Sri Lanka did not include the data used in the NC2 in the FRL owing to lack of confidence in those data. Sri Lanka stated in its modified submission that the newly established national forest inventory (NFI) will provide the information on soil organic carbon to enable carbon stock changes in this pool to be included in future FRL submissions after the completion of two cycles of the NFI. The AT considers that the exclusion of soil organic carbon is adequately justified by Sri Lanka as stemming from the unavailability of robust national data. The AT commends Sri Lanka for its efforts to obtain better information on this pool with the aim of including it in future submissions, as part of the step-wise approach, and considers this to be an area of future technical improvement.

28. Regarding the exclusion of the deadwood pool, the FRL submission states that carbon stock changes in deadwood have not been estimated owing to a lack of national data. In response to a question by the AT during the TA, Sri Lanka informed the AT that the newly established NFI has been designed to collect information on the deadwood pool and Sri Lanka plans to include it in its FRL after the completion of two cycles of the NFI. The AT commends the Party for its efforts to obtain better information on this pool in the future, with the aim of including it as part of the step-wise approach, and considers this to be an area of future technical improvement.

29. Sri Lanka's FRL only includes CO₂ emissions from forest fires and excludes non-CO₂ emissions. The FRL submission states that almost all fires occur in forest plantations which are subsequently replanted, thus leading to no net emissions in the long term. The FRL submission further states that non-CO₂ emissions from forest fires are insignificant (0.15 per cent of the total emissions from deforestation). During the TA, the Party cited a paper by Ariyadasa (1999) in an FAO publication¹⁵ to substantiate that there is significantly

¹⁴ Kurupparachchi KAJM, Seneviratne G and Madurapperuma BD. 2016. Carbon sequestration in tropical forest stands: its control by plant, soil and climatic factors. *Open Journal of Forestry*. 6: pp.59–71. Available at <http://dx.doi.org/10.4236/ojf.2016.62006>.

¹⁵ Ariyadasa KP. 1999. Fire situation in Sri Lanka. In: JG Goldammer and RW Mutch (eds.). *Global*

more fire risk to plantations than to native vegetation. The AT, however, notes that non-CO₂ emissions from biomass burning cannot be assumed to be balanced out by CO₂ removals from biomass regrowth because these gases are not absorbed in the process of regrowth. The AT further notes that, according to the referenced FAO report, there are prescribed fires in 600 ha of forests annually in Sri Lanka and the FRL submission does not transparently explain why these emissions are not included in the emissions from fires. The AT, therefore, considers that the treatment of non-CO₂ emissions from forest fires (inclusion of these emissions or the provision of more information on the justification of their exclusion) is an area for future technical improvement.

30. The AT noted that the annex to decision 12/CP.17 states that significant activities should not be excluded or a justification of why omitted activities were deemed not significant shall be presented. According to the modified FRL submission, “degradation” could be a significant activity in Sri Lanka, because the illicit felling of trees, illegal cultivation, livestock grazing and extraction of gravel minerals and metal occur in the country. Sri Lanka explains in its FRL submission that degradation cannot be identified or estimated currently and thus it has not been included in the FRL. The AT noted that the measures to reduce deforestation could result in the displacement of emissions (i.e. cause an increase in degradation in a different part of the country). The AT therefore considers the inclusion of the activity “degradation” in the FRL as an area for significant technical improvement for future submissions.

31. Overall, the AT commends Sri Lanka for the additional information provided in the modified submission, which increases the transparency. The AT acknowledges the intention expressed by Sri Lanka to identify the steps being taken by the Party to improve future FRL submissions when new, adequate data and better information become available as part of the step-wise approach.

4. Definition of forest

32. Sri Lanka provided in its submission the definition of forest used in the construction of the FRL, namely: land with tree crown cover of more than 10 per cent and area of more than 0.5 ha with trees able to reach a minimum height of 5 m at maturity in situ. Forest plantations are included in this definition, while agricultural land, oil palm and rubber plantations are excluded. As per the FRL submission, this definition is the same as the one used in the national GHG inventory in Sri Lanka’s NC2. However, the AT notes that Sri Lanka’s NC2 did not explicitly include the forest definition and thus the AT could not assess the consistency of the forest definition between the FRL submission and the NC2.

III. Conclusions

33. The information used by Sri Lanka in constructing its FRL for the two activities selected is partially transparent and complete, and is partially in overall accordance with the guidelines for submission of information on FRLs (as contained in the annex to decision 12/CP.17).

34. The AT acknowledges that Sri Lanka included in the FRL the most significant activities and the most significant pools in terms of emissions from forests. In doing so, the AT considers that Sri Lanka followed decision 1/CP.16, paragraph 70, on activities undertaken, paragraph 71(b), and decision 12/CP.17, paragraph 10, on implementing a step-wise approach. The AT commends Sri Lanka for the information provided on the planned future work towards the development of FRELs/FRLs for other activities, in particular, “degradation”.

35. The AT considers that the methodology used to estimate the AD for reforestation does not generate AD with acceptable levels of accuracy (see paras. 13–16 above). The AT welcomes the acknowledgment of this issue by Sri Lanka and the efforts planned to significantly improve the AD for this activity in future submissions.

36. As a result of the facilitative interactions with the AT during the TA session, Sri Lanka submitted a modified submission that took into consideration some of the technical inputs by the AT. The AT notes that the transparency and completeness of information partially improved in the modified FRL submission, without the need to alter significantly the approach or values used to construct the FRL, and commends Sri Lanka for the efforts made. The new information provided in the modified submission, including through the spreadsheets on the calculation of CO₂ emissions from deforestation, increased the reproducibility of the FRL calculations by the AT.

37. The AT notes that there were several inconsistencies, in terms of sources for the AD and the EFs, with the GHG inventory included in Sri Lanka's NC2 (see para. 12 above).¹⁶

38. Pursuant to decision 13/CP.19, annex, paragraph 3, the AT identified the following areas for future technical improvement:

(a) Ensure consistency between the FRL submission and the forest-related GHG emissions and removals in the national GHG inventory in Sri Lanka's national communication or biennial update report (see para. 12 above);

(b) Improve the accuracy of the AD for reforestation by reducing the uncertainties in the monitoring method (see para. 16 above);

(c) Provide information on how Sri Lanka ensured that harvested plantation is identified as temporary destocking and not as conversion to another land use (see para. 17 above);

(d) Include disaggregated information on forest area by eco-zone, forest type and plantation species at the same level of disaggregation as used for the default parameters provided in the 2006 IPCC Guidelines, and select the correct default parameters from the 2006 IPCC Guidelines corresponding to the appropriate eco-zones (see para. 18 above);

(e) Include detailed information on the calculation methodology for the construction of the FRL provided during the TA and ensure its accuracy and consistency with the FRL submission (see para. 19 above);

(f) Develop appropriate country-specific EFs for estimating emissions and removals from REDD-plus activities (see para. 20 above);

(g) Either change the length of the historical period to 11 years, making consequential corrections to the calculation methodology for carbon stock changes, or modify how the historical period is denoted (either 2000–2009 or 2001–2010) (see para. 21 above);

(h) Include the tree species that are representative of those used for plantations in the historical period for FRL construction (see para. 22 above);

(i) Present the description of relevant policies and plans in a dedicated section rather than in the section on future improvements (see para. 23 above).

39. In assessing the pools and gases included in the FRL, pursuant to decision 13/CP.19, annex, paragraph 2(f), the AT notes that the current omissions of pools and gases may not be conservative in the context of the FRL. Nevertheless, the AT identified the following additional areas for future technical improvement:

(a) The inclusion of soil carbon as a significant pool that should not be omitted (see para. 27 above);

(b) The treatment of the deadwood pool (inclusion of this pool or the provision of more information on the justification of its omission) (see para. 28 above);

(c) The treatment of emissions of non-CO₂ gases from forest fires (inclusion of these emissions or the provision of more information on the justification of their omission) (see para. 29 above);

¹⁶ In reference to the scope of the TA, decision 13/CP.19, annex, paragraph 2(a).

(d) The inclusion of “degradation” as a significant activity that should not be omitted (see para. 30 above).

40. The AT acknowledges and welcomes the intention expressed by Sri Lanka to:

(a) Strengthen the NFI to: replace tier 1 EFs with country-specific factors; include all carbon pools; and include degradation in the FRL;

(b) Strengthen satellite monitoring systems for enhanced monitoring, measuring, reporting and verification;

(c) Strengthen the procedures applied for the development of the national GHG inventory.

41. The AT notes that Sri Lanka has mentioned the inclusion of “enhancement of forest carbon stocks” as a future improvement even though this activity was already included in the FRL. In this regard, the AT welcomes the intention of Sri Lanka to improve the FRL in order to include it in a more accurate and transparent manner.

42. In conclusion, the AT commends Sri Lanka for showing commitment to continuous improvement of its FRL estimates, in line with the step-wise approach. A number of important areas for future technical improvement of Sri Lanka’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.¹⁷ The AT also acknowledges that the assessment process was an opportunity for a rich, open, facilitative and constructive technical exchange of information with Sri Lanka.

¹⁷ 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

	<i>Main features of the FRL</i>	<i>Remarks</i>
Proposed FRL for “deforestation” (in t CO ₂ eq/year)	4 365 000	The Party used methodologies and default EFs from the 2006 IPCC Guidelines together with AD derived using global land cover and national land-use maps and assessed using the Collect Earth tool with very high-resolution imagery (see paras. 9–11 of this report)
Proposed FRL for “enhancement of forest carbon stocks” (in t CO ₂ eq/year)	–72 000	The AT considers that the AD would need to be improved to make the FRL more accurate and transparent (see paras. 13–16 of this report)
Type and duration of FRL	FRL = average annual historical emissions 2000–2010 valid for 5 years (2011–2015)	The information used in the estimation covers 2000 to 2010 (see section 12 of the modified FRL submission). The AT notes that it is not clear whether the period comprises 10 or 11 years (see para. 21 of this report)
Adjustment for national circumstances	No	Sri Lanka has provided information demonstrating that there is no case for adjustment of the FRL to reflect national circumstances (see para. 24 of this report)
National/subnational ^a	National	
Activities included ^b	Deforestation Enhancement of forest carbon stocks	The FRL for “deforestation” does not include the emissions resulting from the temporary destocking of forest land. “Reforestation” includes conversion to forest of non-forest land that has not been forested previously (afforestation) and of land which had been forested at some point in the past (reforestation) (see para. 6 of this report)
Pools included ^b	AB, BB, L	Sri Lanka does not include deadwood and soil organic carbon owing to a lack of data (see paras. 27 and 28 of this report)
Gases included	CO ₂	Sri Lanka does not include non-CO ₂ emissions from forest fires owing to their insignificance (see para. 29 of this report)
Forest definition ^c	Included	Land with tree crown cover of more than 10% and area of more than 0.5 ha. The trees should be able to reach a minimum height of 5 m at maturity in situ. Forest plantations are included in this definition and agricultural land, oil palm and rubber plantations are excluded. The AT was not able to assess the consistency of the forest definition in the FRL submission with that in the GHG inventory contained in Sri Lanka’s NC2 because there was no mention of that in the NC2 (see para. 32 of this report)
Relationship with latest GHG inventory	Methods used for the FRL submission are not consistent with the latest GHG inventory	The latest GHG inventory was reported in the NC2 of Sri Lanka in 2012 (see para. 12 of this report)

<i>Main features of the FRL</i>		<i>Remarks</i>
Description of relevant policies and plans ^d	Included	See paragraphs 23 and 24 of this report
Description of assumptions on future changes in policies ^d	Not applicable	Sri Lanka has not applied an adjustment to its FRL based on future changes in policies (see para. 24 of this report)
Descriptions of changes to previous FRL	Not applicable	
Future improvements identified	Yes	Several areas of future technical improvement have been identified (see paras. 38 and 39 of this report)

Abbreviations: AB = above-ground biomass, AD = activity data, AT = assessment team, BB = below-ground biomass, EF = emission factor, FRL = forest reference level, GHG = greenhouse gas, IPCC = Intergovernmental Panel on Climate Change, L = litter, NC2 = second national communication, 2006 IPCC Guidelines = 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

^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.