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## **Report on the technical assessment of the proposed forest reference level of Vanuatu submitted in 2023**

### *Summary*

This report covers the technical assessment of the voluntary submission of Vanuatu 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 Vanuatu covers the activities reducing emissions from deforestation, reducing emissions from forest degradation and enhancement of forest carbon stocks, which are among the activities included in decision 1/CP.16, paragraph 70.

For its submission, Vanuatu developed a national FRL. The FRL presented in the original and modified submissions, for the reference period 2008–2017, corresponds to 732,441 tonnes of carbon dioxide equivalent per year.

The assessment team notes that the data and information used by Vanuatu in constructing its FRL are transparent, complete and mostly in accordance with the guidelines contained in decision 12/CP.17, annex. This report contains the assessed FRL and a few areas identified by the assessment team for future technical improvement in accordance with the provisions on the scope of the technical assessment contained in decision 13/CP.19, annex.



## Abbreviations and acronyms

2006 IPCC Guidelines	<i>2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>
2019 Refinement to the 2006 IPCC Guidelines	<i>2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>
AD	activity data
AT	assessment team
BUR	biennial update report
CH <sub>4</sub>	methane
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> eq	carbon dioxide equivalent
COP	Conference of the Parties
EF	emission factor
FAO	Food and Agriculture Organization of the United Nations
FREL	forest reference emission level
FRL	forest reference level
GHG	greenhouse gas
IPCC	Intergovernmental Panel on Climate Change
LULUCF	land use, land-use change and forestry
N <sub>2</sub> O	nitrous oxide
NC	national communication
NFI	national forest inventory
NFMS	national forest monitoring system
REDD+	reducing emissions from deforestation; reducing emissions from forest degradation; conservation of forest carbon stocks; sustainable management of forests; and enhancement of forest carbon stocks (decision 1/CP.16, para. 70)
SOC	soil organic carbon
TA	technical assessment

## I. Introduction and summary

### A. Overview

1. This report covers the TA of the voluntary submission of Vanuatu on its proposed FRL,<sup>1</sup> submitted on 5 January 2023, in accordance with decisions 12/CP.17 and 13/CP.19. The TA took place from 20 to 24 March 2023 and was coordinated by the secretariat.<sup>2</sup> The TA was conducted by two LULUCF experts from the UNFCCC roster of experts<sup>3</sup> (hereinafter referred to as the AT): Christian Mielke (Germany) and George Kipkorir Tarus (Kenya). In addition, Komalan Edou, an expert from the Consultative Group of Experts, participated as an observer<sup>4</sup> during the session. The TA was coordinated by Milan Dhungana (secretariat).

2. In response to the invitation of the COP and in accordance with the provisions of decision 12/CP.17, paragraphs 7–15 and annex, Vanuatu submitted its proposed FRL on a voluntary basis. The proposed FRL is one of the elements<sup>5</sup> to be developed in implementing the activities referred to in decision 1/CP.16, paragraph 70. Pursuant to decision 13/CP.19, paragraphs 1–2, and decision 14/CP.19, paragraphs 7–8, 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.

3. The objective of the TA is to assess the degree to which the information provided by Vanuatu is in accordance with the guidelines for submissions of information on reference levels<sup>6</sup> 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 Vanuatu to construct and improve its FRL in the future, as appropriate.<sup>7</sup>

4. The TA of the FRL submitted by Vanuatu was undertaken in accordance with the guidelines and procedures for the TA of submissions from Parties on proposed FRELs and/or FRLs.<sup>8</sup> This report on the TA was prepared by the AT following the same guidelines and procedures.

5. Following the process set out in those guidelines and procedures, a draft version of this report was communicated to the Government of Vanuatu. The facilitative exchange during the TA allowed Vanuatu to provide clarifications and additional information, which were considered by the AT in the preparation of this report.<sup>9</sup> As a result of the facilitative interaction with the AT during the TA, Vanuatu provided a modified version of its submission on 12 September 2023, which took into consideration the technical input of the AT. The modifications improved the clarity and transparency of the submitted FRL without needing to alter the approach used to construct it. This TA report was prepared in the context of the modified FRL submission.

### B. Proposed forest reference level

6. In decision 1/CP.16, paragraph 70, the COP encouraged 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 providing adequate and predictable support. The FRL proposed by Vanuatu, 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

<sup>1</sup> The submission of Vanuatu is available at <https://redd.unfccc.int/submissions.html?country=VUT>.

<sup>2</sup> As per decision 13/CP.19, annex, para. 7.

<sup>3</sup> As per decision 13/CP.19, annex, paras. 7 and 9.

<sup>4</sup> As per decision 13/CP.19, annex, para. 9.

<sup>5</sup> See decision 1/CP.16, para. 71(b).

<sup>6</sup> Decision 12/CP.17, annex.

<sup>7</sup> Decision 13/CP.19, annex, para. 1(a–b).

<sup>8</sup> Decision 13/CP.19, annex.

<sup>9</sup> As per decision 13/CP.19, annex, paras. 1(b), 13 and 14.

activities referred to in that paragraph. Pursuant to paragraph 71(b) of the same decision, Vanuatu developed a national FRL that covers 89 per cent of its territory, namely its land areas with forest cover. The remaining 11 per cent of its land area is primarily characterized by atolls with no forest cover and thus was considered by the Party not to be relevant to developing its FRL. For its submission, Vanuatu applied a stepwise approach to developing its FRL in accordance with decision 12/CP.17, paragraph 10. The stepwise approach enables Parties to improve their FREL or FRL by incorporating better data, improved methodologies and, where appropriate, additional pools.

7. The national FRL proposed by Vanuatu for the historical reference period 2008–2017 is the annual average of the CO<sub>2</sub> emissions associated with gross emissions from deforestation and forest degradation and removals from enhancement of forest carbon stocks in areas subject to afforestation or reforestation. The AD used in constructing the FRL were estimated using sample-based analyses of high-resolution Earth observation data for 2008–2017 gathered using the Collect Earth tool. The EFs were obtained from Vanuatu’s NFI (covering 2019–2021), the 2019 Refinement to the 2006 IPCC Guidelines and the 2006 IPCC Guidelines, and international reports. The FRL presented in the modified submission, with the aim of accessing results-based payments for REDD+ activities for the reference period 2008–2017, corresponds to 732,441 t CO<sub>2</sub> eq/year.<sup>10</sup>

8. The proposed FRL includes the pools above-ground biomass, below-ground biomass and dead organic matter (comprising both standing and lying deadwood, as well as stumps and litter). It excludes the SOC pool owing to an absence of adequate data. Regarding GHGs, the submission includes CO<sub>2</sub> only.

9. During the TA, Vanuatu provided to the AT information on its NFMS, as well as its NFI and reports on AD, EFs and removal factors that served to assist the AT in understanding the methodology applied and reconstructing the FRL.

## **II. Data, methodologies and procedures used in constructing the proposed forest reference level**

### **How each element in decision 12/CP.17, annex, was taken into account in constructing the forest reference level**

#### **1. Information used by Vanuatu in constructing its forest reference level**

10. For constructing its FRL, Vanuatu primarily applied a tier 2 approach using the methodologies described in the 2019 Refinement to the 2006 IPCC Guidelines, the 2006 IPCC Guideline and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*.

11. In selecting the reference period for the FRL, Vanuatu took into account the fast recovery of tropical biomass, as well as major national Government efforts to reduce emissions from deforestation and forest degradation after the 2014–2015 cyclone season. The period 2008–2017 was therefore considered most appropriate for predicting future emissions and removals.

12. Deforestation is defined as the conversion of forest land to non-forest land and forest degradation as the loss of biomass in forest land remaining forest land; and enhancement of carbon stock is considered to take place in areas that have transitioned from non-forest land to forest land, namely areas subject to afforestation or reforestation. Forest land is classified into four classes: dense forest, open forest, plantations and mangroves. Changes in the classes dense forest and open forest were measured using the sample-based approach proposed by Olofsson et al. (2014), whereas changes in plantations and mangroves, which are so small in scale in Vanuatu that they would not have been detected in the sample-based approach, were directly mapped using other geographic information system methods. Forest degradation was

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<sup>10</sup> In its original submission, Vanuatu proposed the same national FREL/FRL of 732,441 t CO<sub>2</sub> eq/year for 2008–2017.

accounted for by determining shifts from dense to open forest in forest land remaining forest land, with the drivers identified as shifting cultivation, grazing under canopies, logging and minor infrastructure expansion; natural events such as cyclones, wind, fire and damage caused by invasive species were not taken into account. With regard to the enhancement of forest carbon stocks, the Party took into account the conversion of cropland, grassland and other land to forest land, as determined by its NFMS. The Party stated that, although it is significant, carbon stock enhancement in forest land remaining forest land was not accounted for in determining the FRL owing to the lack of data.

13. AD were estimated using the sample-based approach, with sample plots evenly distributed across the national territory under assessment in a systematic grid of 1.5 x 1.5 km, which was selected because it allowed the Party to integrate the NFI grid (3 km plot resolution) and resulted in a sufficient number of sample plots to produce accurate results. High-resolution imagery of those sample plots was then used to assess a predefined selection of attributes using the Collect Earth tool, which allowed for a statistical estimation of land cover and disturbances during the reference period, after which ground truthing was conducted. During the TA, Vanuatu provided the AT with its national AD report, which provided further details of the Party's usage of the Collect Earth tool.

14. The sample-based approach proposed by Olofsson et al. (2014) was complemented by the Continuous Degradation Detection methodology in Google Earth Engine developed by Bullock et al. (2020), which involved using a monthly composite of Landsat and Sentinel images to create spatially explicit layers representing stable and changed areas (see section 6.1.4 of the modified FRL submission). Areas with stable land cover during the reference period were identified as 'no change' or 'stable' strata, while areas in which disturbances were determined to be probable were recorded as 'change' strata. Sample plots in the 'change' strata, which were densified to produce a 750 x 750 m grid, were then visually interpreted to identify deforestation and forest degradation. During the TA, the Party mentioned that, after testing various approaches, this approach to estimating AD was selected owing to its sufficient accuracy and effective use of the Party's available resources and capacities.

15. The Party mentioned that another grid measuring 375 x 375 m was used for conducting visual interpretation of areas on islands for which it was determined that there would be a low rate of accuracy for detecting probable forest change. Sample plots measuring 100 x 100 m with 7 x 7 m subplots were used to provide visual support in assessing land cover, especially regarding land and canopy cover percentages defined in the response design. In total, 15,426 sample plots were visually interpreted to estimate AD using the approach proposed by Olofsson et al. (2014).

16. In estimating the EFs used to construct the FRL, Vanuatu considered the biomass carbon stock of different vegetation types after land-use conversion. Estimates of above-ground biomass and dead organic matter carbon stocks, used for estimating EFs for deforestation, were obtained using allometric equations for pan-tropical regions, to which country-specific data taken from Vanuatu's NFI were applied. To obtain below-ground biomass estimates, the Party used default root-to-shoot ratios by vegetation type as provided in the 2019 Refinement to the 2006 IPCC Guidelines and the 2006 IPCC Guidelines.

17. The EFs used for determining changes in forest carbon stock are based on the land classes. Vanuatu applied cluster sampling to those land classes to take into account different terrain characteristics and forest heterogeneity. Forest stock data taken from the Party's NFI, which were collected from 832 clusters, each with four concentric circular plots, and aggregated at the plot and cluster level, were then used to assign biomass stock to each land class.

18. Forest biomass, calculated as the sum of above-ground biomass, below-ground biomass and dead organic matter, was converted into carbon using a carbon fraction of 0.4, as provided in the 2006 IPCC Guidelines. That carbon was then converted to CO<sub>2</sub> using the IPCC molecular weight ratio of 44/12. Lastly, the EFs for land-use conversions were estimated as the difference in carbon stock in an area between 2008 and 2017.

19. The overall uncertainty of the FRL was assessed using the Monte Carlo analysis. The combined uncertainty of the FRL was reported to be 12 per cent. Similarly, quality

assurance/quality control was performed throughout the compilation of the AD and the calculation of the FRL.

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

**(a) Methodological information, including description of data sets, approaches and methods**

20. In its original submission, Vanuatu reported on the methodology used for estimating its FRL. During the TA, Vanuatu provided additional information at the request of the AT in the form of an AD report and its NFI. In its modified submission, the Party included information on its methodology for constructing the AD and EFs used to estimate its FRL as referred to in the AD report and NFI, which significantly enhanced the transparency of the submission.

21. The AT commends Vanuatu for providing supporting information during the TA, including relevant data, methodological information, references and assumptions. The AT considers that including this information in future submissions could help to improve transparency, overall consistency and reproducibility.

22. Regarding the response design used to produce unbiased estimates of AD on deforestation and forest degradation from the sample plots, during the TA the AT requested additional details on the standard operating procedures related to the response design to enable it to better understand the construction of the AD. In its modified submission, Vanuatu included detailed information on the response design and the standard operating procedures. The AT commends Vanuatu for providing this information, which greatly increased transparency.

23. The AT noted that estimates of emissions from forest degradation due to natural causes were not included in the FRL, despite 32 per cent of forest degradation in Vanuatu being attributed to natural events like cyclones, wind, fire and damage caused by invasive species (see section 1.4.2 of the modified submission). The AT considers that the Party including such information in future submissions would enhance the accuracy of the FRL and notes this as an area for future technical improvement.

24. To estimate the FRL, Vanuatu calculated annual emissions using EFs from its NFI and AD derived from the sample-based approach applied. The AT noted that, though this method is reasonable, the NFI was conducted in 2019–2021 while the reference period for the FRL is 2008–2017. Thus, it is difficult to use the data to establish a robust yearly trend in emissions and could result in significant statistical errors. The AT therefore notes that Vanuatu may wish to include more data points and supporting information in future submissions to increase the accuracy of its estimates as part of the stepwise approach, and considers this as an area for future technical improvement.

25. The AT noted that the EFs used to determine the enhancement of carbon stocks were based on the assumption that afforested and reforested forests were open forests rather than using an annual carbon accumulation growth rate. As part of the stepwise approach, the AT encourages the Party to address this issue by calculating forest carbon stock rates over time, using the year of establishment of the forest and its annual growth rates as a basis. The AT considers this as an area for future technical improvement.

26. The AT commends Vanuatu for providing information on its systematic quality assurance/quality control procedure for checking its AD and EFs and on its methodology for estimating uncertainties, which increased the transparency of its emission estimates.

27. Pursuant to decision 13/CP.19, annex, paragraph 2(a), in assessing the consistency of the FRL with corresponding forest-related GHG emissions contained in the national GHG inventory, the AT noted that the Party did not maintain consistency, in terms of methods, data and assumptions used for its FRL, with those used for its GHG inventories included in its first BUR and its NC3, submitted in 2020 and 2021 respectively. The AT also noted that the GHG inventory included in the Party's first BUR did not include emission estimates for the LULUCF sector, and furthermore that the GHG inventory used for its NC3 assumed a

steady sequestration rate for forest land remaining forest land and did not take into account emissions from deforestation or forest degradation. Vanuatu justified the exclusion of the LULUCF sector emission estimate from its first BUR and its NC3 by stating that the NFI and AD reports were not published at the time of their submission. During the TA, Vanuatu reported that it plans to ensure consistency in reporting emissions and removals from the LULUCF sector, as well as consistency in sources of AD, EFs and land classes taken into account, in its future reporting. The AT acknowledges the Party's intention to improve consistency between its future GHG inventories and FREL/FRL submissions and notes this as an area for future technical improvement.

28. During the TA, Vanuatu shared with the AT data sets and calculations, and the examples of how estimates of CO<sub>2</sub> emissions from deforestation were calculated, which enabled the AT to reproduce the FRL calculations and thus greatly enhanced the transparency and completeness of the FRL. However, such information was stored on an external website, which may have implications for the sustainability of that information should the external website in question cease to exist. The AT considers building in-country capacity to process and store such data as an area for future technical improvement.

**(b) Description of relevant policies and plans, as appropriate**

29. In its FRL submission, Vanuatu provided a detailed description of REDD+ processes and programmes (see section 1.6 of its modified submission), including details on the administrative and technical aspects of those processes and programmes, such as institutional arrangements. The Party also explained its national interest in implementing a national approach to REDD+ aimed at ensuring the sustainability of land-use activities and lowering rates of deforestation and forest degradation and associated GHG emissions. It also pointed to its nationally determined contribution and REDD+ policies and plans, which highlight its commitment to mitigating and adapting to climate change. The AT commends Vanuatu for the descriptions provided in its FRL submission and encourages the Party to elaborate on other relevant policies and plans such as its National Forest Policy and how national circumstances were considered in constructing its FRL in its future submissions.

30. In its FRL submission (see section 10 of the modified submission), Vanuatu identified future improvement plans, including steps to improve AD, EFs and removal factors. The AT commends Vanuatu for identifying these critical steps.

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

31. According to decision 12/CP.17, annex, paragraph (c), reasons for omitting a pool or activity in constructing the FRL should be provided, noting that significant pools and activities should not be excluded.

32. The pools included in the Party's FRL are above-ground biomass, below-ground biomass and dead organic matter (comprising both standing and lying deadwood, as well as stumps and litter). The SOC pool was not included owing to an absence of adequate data.

33. The AT noted the Party's efforts to include the dead organic matter pool in its submission, but noted that it did not adequately explain why windthrows were excluded. The AT considers that including windthrows would enhance the accuracy of the emission estimates for the dead organic matter pool and notes this as an area for future technical improvement.

34. With regard to emissions from SOC, the AT requested clarification of the reasons for omitting the pool. In response, Vanuatu explained that the pool was not included because sufficient data were not available and informed the AT that it is considering this as a part of its improvement plan following the collection of country-specific data on SOC. The AT considers that, since the Party did not analyse or report on the significance of the pool, its exclusion from the FRL was not adequately justified; however, it commends Vanuatu's intention to obtain better information on the pool with the aim of including it in future FREL/FRL submissions as part of the stepwise approach.

35. Regarding GHGs, Vanuatu included only CO<sub>2</sub> in its FRL. During the TA, Vanuatu acknowledged that CH<sub>4</sub> and N<sub>2</sub>O emissions from wildfires might also be relevant sources.

The AT considers the estimation of emissions of non-CO<sub>2</sub> gases as an area for future technical improvement, which would also maintain consistency with the GHG inventories included in Vanuatu's future BURs and NCs. The AT commends Vanuatu for its aim to estimate such emissions as part of its improvement plan following the collection of relevant country-specific data.

36. The AT acknowledges that Vanuatu included in its FRL the most significant activities of the five activities identified in decision 1/CP.16, paragraph 70, in accordance with its national capabilities and circumstances, but notes that, although significant, the Party did not consider enhancement of forest carbon stocks in forest land remaining forest land. In addition, the activities conservation of forest carbon stocks and sustainable management of forests were not included owing to a lack of data. Vanuatu reported that it plans to conduct another NFI in order to track gradual changes in carbon stocks, including in forest land remaining forest land. The AT acknowledges and commends Vanuatu's intention to include enhancement of forest carbon stocks in forest land remaining forest land and the activities conservation of forest carbon stocks and sustainable management of forests as part of the stepwise approach.

#### **4. Definition of forest**

37. Vanuatu provided in its submission the definition of forest used in constructing its FRL. The definition is the same as that used by the Party for its reporting to FAO for the Global Forest Resources Assessment (i.e. minimum area of 0.5 ha, height of 5 m or more and at least 10 per cent canopy cover, or trees able to reach these thresholds in situ). However, the operational definition of forest used for the FRL deviates from this definition in one aspect: instead of 0.5 ha the operational definition includes a minimum mapping unit of 0.81 ha, with this deviation designed to improve the Party's detection of forest changes and facilitate mapping on a national scale.

38. The AT noted that the GHG inventories included in the Party's first BUR and its NC3 do not include a definition of forest, preventing it from assessing its consistency with the definition used for the FRL. During the TA, Vanuatu clarified that the GHG inventory included in its NC3 applied the definition of forest used for its reporting to FAO for the Global Forest Resources Assessment. The AT noted that Vanuatu could enhance transparency by clarifying how it intends to harmonize the definition of forest used for constructing its FRL with that used for estimating emissions and removals for the LULUCF sector in its GHG inventory.

### **III. Conclusions**

39. The information used by Vanuatu in constructing its FRL for reducing emissions from deforestation, reducing emissions from forest degradation and enhancement of forest carbon stocks is transparent, complete and mostly in accordance with the guidelines for submissions of information on reference levels (see paras. 44 and 45(a–d) below).

40. The FRL presented in the modified submission, for the reference period 2008–2017, corresponds to 732,441 t CO<sub>2</sub> eq/year.

41. The AT acknowledges that Vanuatu included in its FRL the most significant activities and the most significant pools in terms of emissions from forests. The AT considers that, in doing so, Vanuatu followed decision 1/CP.16, paragraph 70, on activities undertaken, and decision 12/CP.17, paragraph 10, on applying the stepwise approach. The AT commends Vanuatu for providing information on its ongoing work to develop FRLs for other activities, as well as for other pools, as part of the stepwise approach.

42. As a result of the facilitative interactions with the AT during the TA, Vanuatu provided a modified submission that took into consideration the technical input of the AT. The AT notes that the transparency and completeness of the information provided were significantly improved in the modified FRL submission, without having to alter the approach or values used to construct the FRL, and commends Vanuatu on its efforts. The new information provided in the modified submission, including the data made available online



and the examples of how estimates of CO<sub>2</sub> emissions from deforestation were calculated, increased the reproducibility of the FRL calculations.

43. The AT notes that, overall, Vanuatu did not maintain consistency, in terms of sources of AD and EFs used for its FRL, with those used for the GHG inventories included in its first BUR and its NC3 (see para. 27 above).<sup>11</sup>

44. Pursuant to decision 13/CP.19, annex, paragraph 2(f), in assessing the pools and gases included in the FRL the AT noted that the pools and gases excluded by Vanuatu are likely to be insignificant in the context of the FRL. Nevertheless, pursuant to decision 13/CP.19, annex, paragraph 3, the AT identified the following additional areas for future technical improvement regarding pools and gases excluded from the FRL:

(a) Including the SOC pool in the FRL or providing more information to justify its omission (see para. 34 above);

(b) Including estimates of emissions of non-CO<sub>2</sub> gases and maintaining consistency with the GHG inventories included in Vanuatu's BURs and NCs (see para. 35 above).

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

(a) Estimating emissions from forest degradation caused by natural drivers (see para. 23 above);

(b) Including more data points to establish a robust yearly trend in emissions and enhance the accuracy of the estimates (see para. 24 above);

(c) Calculating forest carbon stock rates over time with a view to accurately estimating removals from non-forest land converted to forest land (see para. 25 above);

(d) Ensuring and maintaining consistency between the FRL and the GHG inventories (see para. 27 above);

(e) Building in-country capacity to process and store data in order to ensure their sustainability (see para. 28 above);

(f) Collecting data on windthrows with a view to including estimates of emissions from windthrows in future FRL submissions (see para. 33 above).

46. The AT acknowledges and welcomes Vanuatu's intention to:

(a) Perform a sensitivity analysis to determine the main uncertainty factors underlying the FRL with a view to improving overall certainty;

(b) Take steps towards applying a wall-to-wall mapping approach, involving the creation of a land-use base and a land-use change map, with a view to enhancing the accuracy of its FRL estimates;

(c) Conduct another cycle of the NFI with a view to estimating carbon stock enhancement in forest land remaining forest land;

(d) Include the activities conservation of forest carbon stock and sustainable management of forest to improve the quality of its FRL;

(e) Densify forest inventory sample plots in cases where land-use changes have been detected or may occur, particularly in areas of conversion from forest land to other land-use categories;

(f) Include the SOC pool in future FRL submissions.

47. In conclusion, the AT commends Vanuatu for showing strong commitment to continuously improving its FRL estimates in line with the stepwise approach. A number of areas for the future technical improvement of Vanuatu's FRL have been identified in this report. At the same time, the AT acknowledges that such improvements are subject to national capabilities and policies, and notes the importance of providing adequate and

<sup>11</sup> In reference to the scope of the TA, as per decision 13/CP.19, annex, para. 2(a).

predictable support.<sup>12</sup> The AT also acknowledges that the TA was an opportunity for a rich, open, facilitative and constructive technical exchange of information with Vanuatu.

48. The table contained in annex I summarizes the main features of Vanuatu's proposed FRL.

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<sup>12</sup> As per decisions 13/CP.19, annex, para. 1(b); and 12/CP.17, para. 10.

## Annex I

## Summary of the main features of the proposed forest reference level based on information provided by Vanuatu

	<i>Main features of the FRL</i>	<i>Remarks</i>
Proposed FRL	732 441 t CO <sub>2</sub> eq/year	See paragraph 7 of this document
Type and reference period of FRL	FRL = average of historical emissions and removals in 2008–2017	See paragraph 7 of this document
Application of adjustment for national circumstances	No	–
National/subnational	National	Vanuatu developed a national FRL that covers 89 per cent of the total national land area (see para. 6 of this document)
Activities included	Reducing emissions from deforestation Reducing emissions from forest degradation Enhancement of forest carbon stocks	Vanuatu included in its FRL the most significant three activities, with the activity enhancement of forest carbon stocks considered in areas subject to afforestation or reforestation (see paras. 6 and 36 of this document)
Pools included	Above-ground biomass Below-ground biomass Dead organic matter	Dead organic matter pool comprised both standing and lying deadwood, as well as stumps and litter. SOC was not included owing to a lack of data, but including the pool in future submissions has been identified as an area for future improvement (see paras. 8 and 32 of this document)
Gas included	CO <sub>2</sub>	Vanuatu included CO <sub>2</sub> emissions and removals but did not include CH <sub>4</sub> and N <sub>2</sub> O emissions (see para. 35 of this document)
Forest definition	Included	The definition is the same as that used by the Party for its reporting to FAO for the Global Forest Resources Assessment (i.e. minimum area of 0.5 ha, height of 5 m or more and at least 10 per cent canopy cover, or trees able to reach these thresholds in situ). However, the operational definition of forest deviates from the forest definition (see para. 37 of this document)
Consistency with latest GHG inventory	Methods used for estimating the FRL are not consistent with those used for the latest GHG inventory (2020)	The latest GHG inventory presented in the first BUR of Vanuatu excludes emissions for the LULUCF sector; however, the Party plans to maintain consistency between its future FRL submissions and GHG inventories. See paragraph 27 of this document
Description of relevant policies and plans	Included	See paragraph 29 of this document
Description of assumptions on future changes to domestic policy, if included in constructing the FRL	Not included	–
Description of changes to previous FRL	Not applicable	–

<i>Main features of the FRL</i>		<i>Remarks</i>
Identification of future technical improvements	Included	Several areas for future technical improvement have been identified (see paras. 44–45 of this document)

## Annex II

### Reference documents

#### A. Reports of the Intergovernmental Panel on Climate Change

IPCC. 2006. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. S Eggleston, L Buendia, K Miwa, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl>.

IPCC. 2019. *2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories*. E Calvo Buendia, K Tanabe, A Kranjc, et al. (eds.). Geneva: IPCC. Available at <https://www.ipcc-nggip.iges.or.jp/public/2019rf/index.html>.

#### B. UNFCCC documents

First BUR of Vanuatu. Available at <https://unfccc.int/documents/403573>.

First and modified FRL submission of Vanuatu. Available at <https://redd.unfccc.int/submissions.html?country=VUT>.

“Guidelines and procedures for the technical assessment of submissions from Parties on proposed forest reference emission levels and/or forest reference levels”. Decision 13/CP.19, annex. Available at <https://unfccc.int/sites/default/files/resource/docs/2013/cop19/eng/10a01.pdf#page=36>.

“Guidelines for submissions of information on reference levels”. Decision 12/CP.17, annex. Available at <https://unfccc.int/sites/default/files/resource/docs/2011/cop17/eng/09a02.pdf#page=19>.

NC3 of Vanuatu. Available at <https://unfccc.int/documents/271162>.

#### C. Other documents

The following references may not conform to UNFCCC editorial style as some have been reproduced as received or as cited in the submission:

E. L. Bullock, C. E. Woodcock, and P. Olofsson, “Monitoring tropical forest degradation using spectral unmixing and Landsat time series analysis,” *Remote Sensing of Environment*, vol. 238, p. 110968, Mar. 2020, doi: 10.1016/J.RSE.2018.11.011.

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