



Report on the technical assessment of the proposed forest reference level of Senegal submitted in 2025

Summary

This report covers the technical assessment of the voluntary submission of Senegal 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 Senegal 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 paragraph 70 of decision 1/CP.16.

For its submission, Senegal developed a national FRL. The FRL presented in the original submission, based on the reference period 2011–2020, corresponds to –8,860,748 tonnes of carbon dioxide equivalent per year.

The assessment team notes that the data and information used by Senegal in constructing its FRL are mostly transparent, complete and partially in accordance with the guidelines contained in the annex to decision 12/CP.17. This report contains information on 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 the annex to decision 13/CP.19.



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
CFRN	Coalition for Rainforest Nations
CO ₂	carbon dioxide
CO ₂ eq	carbon dioxide equivalent
COP	Conference of the Parties
DOM	dead organic matter
EF	emission factor
FAO	Food and Agriculture Organization of the United Nations
FRL	forest reference level
GHG	greenhouse gas
IPCC	Intergovernmental Panel on Climate Change
LUA	land-use assessment
LULUCF	land use, land-use change and forestry
MODIS	Moderate Resolution Imaging Spectroradiometer
NFI	national forest inventory
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
Wetlands Supplement	<i>2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands</i>

I. Introduction and summary

A. Overview

1. This report covers the TA of the submission of Senegal on its proposed FRL,¹ submitted on 20 January 2025, in accordance with decisions 12/CP.17 and 13/CP.19. The TA took place from 24 to 28 March 2025 and was coordinated by the secretariat.² The TA was conducted by the AT, consisting of two LULUCF experts from the UNFCCC roster of experts:³ Esther Mertens (Belgium) and Diana Marcela Vargas (Colombia). The Consultative Group of Experts was invited to participate in the TA as an observer⁴ but no representative was available. The TA was coordinated by Pierre Brender (secretariat).

2. In response to the invitation of the COP and in accordance with the provisions of paragraphs 7–15 of and the annex to decision 12/CP.17, Senegal submitted its proposed FRL on a voluntary basis. The proposed FRL is one of the elements⁵ to be developed in implementing the activities referred to in paragraph 70 of decision 1/CP.16. Pursuant to paragraphs 1–2 of decision 13/CP.19 and paragraphs 7–8 of decision 14/CP.19, the COP decided that each submission of a proposed FRL, as referred to in paragraph 13 of decision 12/CP.17, shall be subject to a TA in the context of results-based payments.

3. Senegal provided its submission in French. The submission is supported by 10 annexes, also in French, covering digital image processing using the CfrN LUA app (annex 1), fire detection using MODIS (annex 2), canopy height (annex 3), Google Earth Engine (annex 4), Google Earth (annex 5) and the remote sensing based detection of trends in disturbance and recovery graphical user interface (annex 6) and including a list of national experts trained to use the CfrN LUA app (annex 7), a list of national experts involved in AD collection (annex 8) and the agenda of the first and second workshops convened on AD collection (annexes 9 and 10 respectively), which enhance the transparency of the FRL.

4. The objective of the TA is to assess the degree to which the information provided by Senegal is in accordance with the guidelines for submissions of information on reference levels⁶ 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 Senegal to construct and improve its FRL in the future, as appropriate.⁷

5. The TA of the FRL submitted by Senegal was undertaken in accordance with the guidelines and procedures for the TA of submissions from Parties on proposed forest reference emission levels and/or FRLs.⁸ This report on the TA was prepared by the AT following the same guidelines and procedures.

6. Following the process set out in those guidelines and procedures, a draft version of this report was communicated to the Government of Senegal. The facilitative exchange during the TA allowed Senegal to provide clarifications and additional information, which were considered by the AT in preparing this report.⁹ As a result of the facilitative interactions with the AT during the TA, Senegal provided a modified version of its submission on 6 May 2025, 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.

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

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

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

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

⁵ See decision 1/CP.16, para. 71(b).

⁶ Decision 12/CP.17, annex.

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

⁸ Decision 13/CP.19, annex.

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

B. Proposed forest reference level

7. In paragraph 70 of decision 1/CP.16, 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 Senegal, 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 referred to in paragraph 70 of decision 1/CP.16. Deforestation is defined as the conversion of forest land to other land uses, regardless of whether the cause is anthropogenic. Operationally, it refers to forest areas of at least 0.5 ha whose canopy cover drops to below 10 per cent. Forest degradation involves processes that reduce a forest's capacity to provide goods and services, often through structural or functional changes that reduce its productivity. Enhancement of forest carbon stocks, defined as the conversion from other land uses to forest land, relates to reforestation, afforestation, land protection or restoration efforts aimed at increasing a forest's capacity to produce and store carbon. It is operationally defined as the conversion of other land uses to forest land, according to the national forest definition. For its submission, Senegal applied a stepwise approach to developing its FRL in accordance with paragraph 10 of decision 12/CP.17, which enables Parties to improve their forest reference emission level or FRL by incorporating better data, improved methodologies and, where appropriate, additional pools.

8. The FRL submitted by Senegal in the modified submission corresponds to $-8,860,748$ t CO₂ eq/year based on the reference period 2011–2020. The table contained in annex I summarizes the main features of the FRL presented in the modified submission, with the aim of accessing results-based payments for REDD+ activities, including reference period, territorial coverage, and pools and gases included.

9. For constructing its FRL, Senegal used methodologies from the 2006 IPCC Guidelines. The FRL was calculated at the national level as the arithmetic average of emissions and removals during the 2011–2020 reference period, considering three REDD+ activities: reducing emissions from deforestation, reducing emissions from forest degradation and enhancement of forest carbon stocks. The carbon pools analysed comprise above- and below-ground biomass and CO₂ was the only GHG assessed.

10. The AD used in constructing the FRL were derived mainly from systematic sampling of 12,278 plots across the country, considering six land-use categories, which involved visually interpreting satellite images of the plots and evaluating their land-use dynamics during the 2005–2023 analysis period. Additional AD on wood harvesting were obtained from the annual reports of the Directorate of Water, Forests, Hunting and Soil Conservation.

11. Most of the EFs used are default values from the 2006 IPCC Guidelines, the 2019 Refinement to the 2006 IPCC Guidelines or the Wetlands Supplement.

12. Senegal included an uncertainty analysis for AD and EFs in the modified submission. Uncertainties in AD were derived from visual interpretation errors while the uncertainty values for emission and removal factors and other parameters were mostly either default values taken directly from the 2006 IPCC Guidelines, the 2019 Refinement to the 2006 IPCC Guidelines and the Wetlands Supplement or values derived from default values provided in those guidelines (see table 52 of the modified submission), with some uncertainty values for non-forest land parameters coming from national data. The methodology for estimating uncertainty is based on the tier 1 error propagation in the 2006 IPCC Guidelines.

II. Technical assessment of the proposed forest reference level

13. The table below describes the findings from the TA of the data, methodologies and procedures used by the developing country Party under assessment in constructing its FRL within the scope of the TA in accordance with decision 13/CP.19 and its annex.

Findings from the technical assessment of the data, methodologies and procedures used by the developing country Party under assessment in constructing its forest reference emission level and/or forest reference level

<i>Finding ID#</i>	<i>Aspect of the scope of the TA (decision 13/CP.19, annex, para. 2)</i>	<i>Description of the issue, additional information shared by the Party during the TA and conclusion of the AT</i>	<i>Area for future technical improvement</i>
1	2(a) Consistency with the national GHG inventories	<p>The AT noted that, overall, Senegal did not maintain consistency, in terms of sources of AD and EFs used for its FRL, with those used for the GHG inventory included in its first BUR, submitted in 2025. The forestry sector is reported as a net sink of GHGs in the BUR and the FRL; however, the AT noted that for the time series 2010–2018 there is a trend of increasing net removals according to the BUR (–22,103,07 to –24,141,94 t CO₂) compared with a trend of decreasing net removals according to the FRL (–13,769,433 to –6,137,164 t CO₂). Further, the FRL estimates are disaggregated by ecogeographic zone and land-use subcategory that are not harmonized with those used for the BUR.</p> <p>During the TA, Senegal initially explained that, for the FRL, biomass stock and growth rates were based on data from the most recent NFI (2023), while for the BUR they were based largely on projections made using data from previous NFIs (2004 and 2007). Later in the TA, Senegal confirmed that most of the EFs used to estimate the FRL are actually default values from the 2006 IPCC Guidelines, the 2019 Refinement to the 2006 IPCC Guidelines or the Wetlands Supplement (see also finding ID# 9 below). Senegal also explained that AD for the FRL are based on a sample-based land assessment, while for the BUR AD were obtained on the basis of projections and isolated studies of land-use areas, which are not as representative of the entire national territory.</p> <p>In the modified submission, Senegal stated that the FRL is a subcomponent of the national GHG inventory and is therefore consistent with it; however, it remains unclear to the AT how using the AD presented in chapter 5 of the modified submission resulted in an increase in net removals being reported in the BUR for 2010–2018 and a decrease in net removals according to the FRL for the same period.</p>	The AT notes that improving the consistency of the FRL with the national GHG inventory by improving the alignment of the EFs and AD used is an area for future technical improvement of the FRL submission.
2	2(b) How historical data have been taken into account	<p>The average historical emissions in 2011–2020 used for constructing the FRL were estimated using mainly a combination of AD from the visual interpretation of remote-sensing data using a systematic grid of sample plots, using the CfRN LUA app, and EFs, some of which were obtained from the 2007 and 2023 NFIs and many of which were default tier 1 EFs from the 2006 IPCC Guidelines, the 2019 Refinement to the 2006 IPCC Guidelines or the Wetlands Supplement. Additional AD on wood harvesting were obtained from the annual reports of the Directorate of Water, Forests, Hunting and Soil Conservation. The AT noted that, in the original FRL submission, two historical periods are mentioned: 2005–2023, for which annual emissions and removals were estimated, and 2005–2030, presented as the reference period in table 2. The AT considered that this raised concerns about the transparency of the information used to construct the FRL.</p> <p>During the TA, Senegal explained that the reference period for the FRL is 2011–2020 and that this period captures the most recent national circumstances, but data were</p>	

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3	2(c) Approaches – transparency	<p>collected over a longer historical time series (2005–2023). The 2011–2020 reference period is presented consistently throughout the modified submission.</p> <p>The AT commends Senegal for explaining in a transparent way in the modified submission that the FRL is based on the reference period 2011–2020.</p> <p>The AT noted that Senegal used a systematic sampling approach to collect AD on areas of land classified under six land-use categories and changes between such categories for estimating emissions and removals from deforestation, forest degradation and enhancement of forest carbon stocks. The sampling approach is based on the use of a 4 × 4 km grid. This sampling intensity was chosen after comparing the results for a 4 × 4 km grid with those for a 2 × 2 km grid for some areas included in the FRL; the results indicated that the 4 × 4 km grid allowed for sufficient sampling accuracy. AD were subsequently collected from 12,278 plots. However, the AT noted that the submission does not contain a confusion matrix or a quantitative comparison of the results for the two grids on the basis of which the sampling intensity was chosen. Furthermore, Senegal did not report on alternative data sources used to compare the AD it derived using this sampling approach or on any quality assurance it conducted on its estimates of areas classified as disturbed or reforested.</p>	<p>The AT notes that clarifying the sampling intensity and comparing the AD obtained with the systematic sampling approach with alternative data sources (e.g. Sentinel-2 for burned areas) for assessing forest degradation and enhancement of forest carbon stocks is an area for future technical improvement that would increase the transparency of the FRL submission.</p>
4	2(c) Approaches – transparency	<p>During the TA, Senegal explained that a new approach is being developed for detecting areas affected by bushfires through MODIS and subsequently estimating, using high-resolution imagery (Sentinel-2 imagery), the actual areas burned.</p> <p>The AT noted that in its original FRL submission Senegal presented the methods used for and the results of an uncertainty analysis performed for the areas under different land uses but that it did not report an uncertainty analysis for areas affected by land-use changes, or on uncertainties for EFs or estimates of emissions and removals. The AT noted that the estimates of uncertainty for individual land-use categories are not representative of the uncertainty of the AD for the FRL, for which uncertainty estimates for the actual detection of deforested, reforested and disturbed areas should be provided. While uncertainties for individual land-use categories can be low, uncertainties for land-use change categories are often much higher.</p> <p>During the TA, Senegal confirmed that the uncertainty analysis for EFs and estimated emissions and removals was ongoing and would be included in the modified submission.</p> <p>The modified submission includes comprehensive details on the estimation of the uncertainty associated with the FRL. Senegal estimated uncertainty using a tier 1 error propagation method from the 2006 IPCC Guidelines (vol. 1, chap. 3.2.3.1), combining AD uncertainties by land-use category with EF uncertainties either derived from the 2006 IPCC Guidelines, the 2019 Refinement to the 2006 IPCC Guidelines and the Wetlands Supplement or calculated using data from the 2023 NFI. However, the AT noted that the reported uncertainty values may not fully convey the overall uncertainty of the FRL, and that incorporating uncertainty estimates related to the detection of land-use</p>	<p>The AT notes that incorporating uncertainty estimates related to the detection of land-use changes into the estimation of AD uncertainty for the uncertainty analysis for the FRL using error propagation is an area for future technical improvement that would increase the transparency of the FRL submission.</p>

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5	2(c) AD – accuracy and transparency	<p>changes, such as deforestation, reforestation and forest degradation, would provide a more accurate representation of the uncertainty associated with the AD.</p> <p>The AT noted a trend of decreasing net removals in the FRL estimates over the reference period, while the total area of forest land over the time series does not decrease at the same rate. From the calculation spreadsheet shared by the Party during the TA, the AT found that Senegal included significant removals from areas of undisturbed forest land but did not estimate removals from all areas of disturbed forest land following similar assumptions; instead, removals were assumed to occur only in the year following a disturbance in areas affected by fire. Given that each year some areas of undisturbed forest are converted by fire into disturbed forest, a reduction in removals is reported over time. In order to be consistent with the estimation of removals from undisturbed forest land, removals from areas reported as disturbed forest land that have not been disturbed in a year should also be reported annually, unless there is evidence that the disturbance negatively affected the growth of the forest in the following year.</p> <p>During the TA, Senegal explained that the decrease in net removals over time according to the FRL is due to the degradation factors used to assess forest degradation from forest fires and logging, as shown in table 42 of the original submission. From the calculation spreadsheet shared by Senegal, the AT found that forest degradation did not intensify in 2011–2020 and that those factors thus cannot be the reason for the increase in estimated emissions and thus the decline in estimated net removals. In the modified submission, Senegal added a table with the removal factors used for calculating forest regeneration after a disturbance in forest land remaining forest land (table 33); however, the AT noted that this does not explain why regeneration was calculated only for the year after the disturbance in the calculation sheet. Furthermore, the carbon removals associated with biomass growth were reported as being calculated using the tier 2 method in the 2006 IPCC Guidelines but the source of the EFs for biomass growth was not provided. Senegal also explained in the modified submission that forest growth returns to the growth rate of undisturbed forest after the time of regeneration, but the AT noted that this was not the case in the actual calculation as in the calculation spreadsheet (see also finding ID# 19 below).</p>	<p>The AT notes that estimating removals from all forest land disturbed over the entire time series consistently with the calculation method for undisturbed forests while transparently documenting the data and IPCC methods used is an area for future technical improvement of the FRL submission.</p>
6	2(c) AD – accuracy	<p>Senegal referred in its FRL submission to using equations 2.12 and 2.13 from the 2006 IPCC Guidelines to estimate losses of biomass carbon from harvesting fuelwood and logwood from forest land remaining forest land that is managed for wood extraction. Senegal stated that the annual volumes of wood extracted are available for the time series since 2012 and were extrapolated back to 2005. Senegal also reported a disturbance factor of 40 per cent for wood affected and lost during disturbances from wood extraction.</p> <p>During the TA, Senegal explained that it used the gain–loss method for estimating emissions and removals from forest land (disturbed and undisturbed). However, the Party</p>	<p>The AT notes that using data on volumes of extracted wood in estimating losses from harvesting wood from undisturbed and disturbed forest land is an area for future technical improvement that could contribute to the quality assurance of the estimates and potentially improve the accuracy of the FRL.</p>

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		<p>also confirmed that data on the volumes of wood extracted and the method referred to in the submission were not used to estimate losses from wood removals, and those losses were estimated on the basis of the disturbance factor only.</p> <p>In its modified submission, Senegal reported data on fuelwood and timber extracted from forest land remaining forest land (table 36), but it did not specify how those data were used for estimating the FRL.</p> <p>The AT concludes that Senegal did not double count between volumes of fuelwood and timber and the disturbance factors used and that a comparison between disturbance factors and the volumes extracted could contribute to the quality assurance of the estimates and potentially improve the accuracy of the estimates.</p>	
7	2(c) AD – transparency	<p>The AT noted that Senegal used the CfRN LUA app for land classification and AD collection. All land-use definitions are provided in the submission. The land cover of sampling points (49 in each plot) was characterized by visual interpretation. Hierarchical rules that considered the percentage of sampling points in the plot associated with different land cover were then applied to determine the land-use category of the plot. The threshold for forest land was 10 per cent, while 20 per cent was the threshold for all other land uses (see table 11 of the original submission and table 10 of the modified submission). The Party provided a few examples in the submission of how the thresholds were applied but did not describe all the rules and underlying assumptions, in other words the interpretation keys used to distinguish between land uses at the plot level.</p> <p>Senegal responded to a question from the AT by confirming that much expert discussion preceded the establishment of the hierarchical rules and that the final thresholds were selected with special attention to the classification of forest land.</p>	The AT notes that providing the interpretation key for each land-use category, and details regarding interpretation for complex land systems (such as fallow land), is an area for future technical improvement that would clarify how the hierarchical rules have been applied consistently and thus increase the transparency of the FRL submission.
8	2(c) AD – transparency	<p>The AT noted that Senegal did not include in its submission a definition of managed land, which the 2006 IPCC Guidelines (vol. 4, chap. 1) recommend should be consistently applied over time to identify emissions and removals that are predominantly generated by anthropogenic activities through the application of a managed land proxy.</p> <p>During the TA, Senegal confirmed that it has no specific definition of managed land and explained that all land in Senegal is considered managed according to the 2006 IPCC Guidelines definition that managed land is where human practices are implemented for various purposes, including food production, ecological conservation or social use.</p>	The AT notes that including the definition of managed land and showing that it has been applied consistently over time is an area for future technical improvement that would increase the transparency of the FRL submission.
9	2(c) EFs – accuracy	The AT noted that for estimating removals from undisturbed forest land Senegal used default increment rates from the 2006 IPCC Guidelines, the 2019 Refinement to the 2006 IPCC Guidelines and the Wetlands Supplement instead of national data presented in the original FRL submission (table 32). Furthermore, the Party mentioned in the original submission that the average annual net increase in biomass in forest land by ecogeographic zone was derived from the difference in biomass stocks in permanent	The AT notes that using national increment rates for estimating removals from undisturbed forest land is an area for future technical improvement that would increase the accuracy of the FRL.

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		<p>plots between the 2007 and 2023 NFIs. Compared with the default growth rates used, the rates based on national data in table 32 of the original submission are significantly lower.</p> <p>During the TA, Senegal confirmed that the rates provided in table 32 of the original submission were not used in the calculation of removals from undisturbed forest land.</p> <p>In the modified submission, Senegal reported the default increment rates used in table 32 instead of the national values available, which increased the transparency of the information in the calculation spreadsheet.</p>	
10	2(c) EFs – accuracy	<p>The AT noted that Senegal in its FRL submission accounted for gains from the conversion of non-forest land to forest land using equation 2.16 from the 2006 IPCC Guidelines (vol. 4, chap. 2), but, instead of using the biomass stock immediately after land conversion as a parameter in the equation, Senegal input an amount of biomass that corresponds to several years of growth. According to the 2006 IPCC Guidelines (vol. 4, chap. 2), gain of biomass stock from growth of forest carbon stocks should be calculated and accounted for on a yearly basis in the years following the conversion from another land use to forest land using equation 2.15.</p> <p>The AT also noted that growth rates were not consistently used for the corresponding forest classes in Senegal, namely a default growth rate for natural forests of more than 20 years was used for conversion to natural forests, a default growth rate for natural forests of less than 20 years was used for conversion to forest plantations and a default growth rate for forest plantations was used for conversion to mangroves.</p>	The AT notes that estimating the yearly gain in forest carbon stocks to account for enhancement of forest carbon stocks in the various forest classes is an area for future technical improvement that would increase the accuracy of the FRL.
11	2(c) EFs – transparency	<p>The AT noted that Senegal used tier 2 disturbance factors for logging (40 per cent) and fire (20 per cent), provided in table 36 of the original submission; however, no data source or model was mentioned to indicate what these percentages were based on. The AT also noted that the submission does not include an explanation for how the values were used in the calculation of losses from forest degradation. Senegal mentioned in the submission a regeneration time of, on average, five years, and provided examples of visual interpretation at four- and five-year intervals for different plots; however, it was not clear to the AT if this information was used in calculating forest regrowth or average biomass stock after conversion to disturbed forests.</p> <p>During the TA, Senegal explained that there are limited data in the scientific literature to determine the extent of forest biomass lost in a disturbance event and that the disturbance factors are therefore based on expert judgment. Senegal also explained that the data were used to determine the amount of biomass lost in a disturbance event and the regeneration of biomass after a disturbance.</p>	The AT notes that describing the modelling approach used to estimate EFs for disturbed areas of forest land is an area for future technical improvement that would increase the transparency of the FRL submission.
12	2(c) EFs – accuracy	<p>Senegal reported biomass stocks for forest land categories and biomass increment rates for ecogeographic zones in tables 31 and 32 respectively of the original submission, where it is stated that, based on the changes in biomass in permanent plots between the 2007 and 2023 NFIs, there is a general decline in forest carbon stocks in Senegal.</p>	The AT notes that using national values for forest biomass stocks and increment rates is an area for future

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13	2(d) Description of relevant policies and plans, as appropriate	<p>During the TA, Senegal shared a calculation spreadsheet demonstrating the changes in forest biomass stock for each land-use category and ecogeographic zone for the 2007 and 2023 NFIs. The Party explained that, although data from the NFI conducted in 2004 are available too, they were not used. The AT noted that the data provided in the spreadsheet show the calculation of forest carbon stock changes, with large uncertainties. The forest carbon stocks in some plots reach 1,000 t dry matter/ha, which should be labelled as outliers but are instead included in the calculation of the forest biomass stock and increment rates. It is unclear to the AT from the data if an attempt was made to disaggregate forest carbon stocks between disturbed and undisturbed forests and, if so, which plots were used, and if plots that underwent conversion between 2007 and 2023 to or from non-forest land were excluded from the calculation. Senegal later clarified that the national values by ecogeographic zone for forest biomass stocks and increment rates estimated by the Party were not used for calculating the FRL; instead, default values from the 2019 Refinement to the 2006 IPCC Guidelines (vol. 4, chap. 4, tables 4.7–4.8) were used.</p> <p>The AT commends the Party for its work on preparing national increment rates. The AT concludes that the values reported for forest carbon stocks and increment rates (tables 31–32 of the original submission and 60–61 of the modified submission) can be improved by undertaking additional quality control on the data and using Senegal’s 2004 NFI.</p> <p>The AT noted that the introduction to Senegal’s FRL submission outlines the strategic framework set out in its Environment, Sustainable Development and Ecological Transition Sector Policy Letter 2022–2026. This document is aimed at establishing a foundation for sustainable development in Senegal that integrates ecological and climate resilience. Implementation is broken down into programmes, including combating deforestation and land degradation, conserving biodiversity and managing protected areas, and addressing pollution, nuisances and the harmful effects of climate change.</p> <p>In its submission, Senegal affirmed its strong commitment to addressing the underlying causes of forest and environmental degradation. Senegal explained that its nationally determined contribution, which focuses on areas such as the forest and land sector, necessitates substantial resources for its implementation. Alongside establishing dedicated national funds, such as the Special Fund for the Protection of the Environment and the Fund of National Intervention for the Valorization of Forests, Senegal is investigating further funding opportunities and is interested in using innovative mechanisms such as the Warsaw Framework for REDD+ to reinforce its forest governance framework within the global context of combating climate change.</p> <p>The AT commends Senegal for providing this information and notes that Senegal may want to provide further information on REDD+ strategies and additional relevant policies in future FRL submissions.</p>	technical improvement that would increase the accuracy of the FRL.

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14	2(f) Pools – DOM and SOC	<p>The DOM and SOC pools were not included. According to subparagraph (c) of the annex to decision 12/CP.17, reasons for omitting a pool in constructing the FRL should be provided, noting that significant pools should not be excluded. In natural forests, carbon stock changes in the DOM pool could be large, given the regularity of bushfires, and in forest plantations changes in the DOM pool could also be large as litter is collected and used on cropland for agricultural purposes. Senegal explained in its submission that the DOM and SOC pools were excluded because there are no reliable data for them in the country.</p> <p>During the TA, Senegal explained that data on litter and deadwood are collected as part of the NFI, but it was concluded that the data are not sufficiently robust for use for the FRL. Senegal also explained that SOC data are not collected as part of the NFI.</p> <p>The AT considers that at least a tier 1 estimate should be provided to demonstrate that the DOM and SOC pools are not significant for conversions from or to forest land, or otherwise used to include the pools in the FRL. Furthermore, the AT notes that the <i>Good Practice Guidance for Land Use, Land-Use Change and Forestry</i> provides a method for estimating carbon stock changes in DOM and SOC and the corresponding default EF. The AT considers that the exclusion of the DOM and SOC pools was not adequately justified by Senegal in the FRL submission and commends its intention to obtain better information on these pools with a view to including them in future FRL submissions as part of the stepwise approach.</p>	<p>The AT considers the treatment of emissions from DOM and SOC (i.e. either including tier 1 estimates for these pools or providing information about their insignificance to justify their omission) to be an area for future technical improvement of the FRL.</p>
15	2(f) Gases – nitrous oxide and methane	<p>The AT noted that Senegal included CO₂ emissions and removals only in the FRL submission, while non-CO₂ emissions related to fire disturbances were included in the GHG inventory included in its first BUR, submitted in 2025. In its FRL submission, Senegal explained that non-CO₂ emissions were excluded because of the lack of accuracy of the data available for estimating the exact area affected by fires (see also finding ID# 3 above).</p> <p>During the TA, the Party clarified that the visual interpretation of satellite images using MODIS produced results for areas affected by fire disturbances that were significantly different to recent forest degradation assessments, for which ground fires were detected using high-resolution imagery. Senegal therefore decided not to include non-CO₂ emissions from fires at this stage but expects to include them in its next FRL submission.</p>	<p>The AT considers the treatment of non-CO₂ gases to be an area for future technical improvement so as to maintain consistency with the GHG inventory included in the Party’s first BUR.</p>
16	2(f) Activities – conservation of forest carbon stocks and sustainable management of forests	<p>Conservation of forest carbon stocks and sustainable management of forests were not included in the FRL according to table 2 and chapter 3.2 of the submission. Pursuant to subparagraph (c) of the annex to decision 12/CP.17, reasons for omitting an activity in constructing the FRL should be provided, noting that significant activities should not be excluded.</p> <p>During the TA, Senegal explained that emission and removal estimates for all forests under management, even forests where sustainable management is practised, were included under forest degradation. Furthermore, all areas under conservation were</p>	<p>The AT considers the treatment of emissions and removals from conservation of forest carbon stocks and sustainable management of forests stocks (e.g. indicating that these activities have been included and explaining how the emissions and removals from these activities are</p>

Finding ID#	Aspect of the scope of the TA (decision 13/CP.19, annex, para. 2)	Description of the issue, additional information shared by the Party during the TA and conclusion of the AT	Area for future technical improvement
		<p>included under enhancement of forest carbon stocks (emissions and removals from undisturbed forests).</p> <p>The AT notes that emissions and removals from excluded activities are implicitly included in the estimates of emissions and removals from forest degradation and enhancement of forest carbon stocks used to estimate the FRL.</p> <p>On the basis of the information provided during the TA, the AT considers that Senegal could indicate in its submission that all activities have been included and explore the use of secondary data on conservation of forest carbon stocks and sustainable management of forests, such as official concession areas with sustainable forest plans and protected areas managed for conservation purposes, to differentiate those activities from forest degradation and enhancement of forest carbon stocks respectively. The AT acknowledges that Senegal included in its FRL the most significant activities (reducing emissions from deforestation, reducing emissions from forest degradation and enhancement of forest carbon stocks) of the five activities identified in paragraph 70 of decision 1/CP.16, in accordance with its national capabilities and circumstances.</p>	<p>reported, while exploring the use of secondary data to report emissions and removals from these activities separately) to be an area for future technical improvement of the FRL submission.</p>
17	2(g) Definition of forest	<p>Senegal provided in its submission the definition of forest used in constructing its FRL, including the thresholds for minimum area (0.5 ha), percentage of canopy cover (10 per cent) and tree height (2 m). The definition also includes land with a forestry vocation that does not meet the thresholds, for example forest land on which wood harvesting or fire recently occurred and land that is soon to be afforested or reforested. The AT noted that the methodological description of the process for generating AD on land use and land-use change includes the criteria and parameters used in assessing whether the plots meet the minimum area and canopy cover thresholds of the forest definition, but no information on how the tree height threshold is operationalized or how other forest land that does not yet meet the definition thresholds is included in the area of forest land.</p> <p>During the TA, the AT asked Senegal to explain how it operationalized the tree height threshold of the forest definition. Senegal explained that tree height was not quantified for forest land identification, mainly owing to technological barriers caused by the difficulty of identifying tree height, especially as the threshold is very low, in the remote-sensing data available on the C_fRN LUA app and that the methodology prioritized the canopy cover threshold. The field knowledge of local technicians provided a reasonable approximation of whether the height threshold was met in the sampling points subject to visual interpretation within each plot. Senegal also explained, in response to a question from the AT, that for estimating the FRL, only the sample plots analysed using the C_fRN LUA app with canopy cover exceeding the 10 per cent threshold were classified as forest land. Other aspects of the definition (e.g. land with a forestry vocation) were not taken into account.</p>	<p>The AT notes that reporting the operational definition of forest used in estimating the FRL and improving the methodology for operationalizing the tree height threshold of the forest definition is an area for future technical improvement that would increase the transparency and accuracy of the FRL submission.</p>
18	2(g) Definition of forest	<p>The definition of forest used for the FRL is different from that used by the Party for its reporting to FAO for the Global Forest Resources Assessment.</p>	<p>The AT notes that describing the difference between the tree height</p>

Finding ID#	Aspect of the scope of the TA (decision 13/CP.19, annex, para. 2)	Description of the issue, additional information shared by the Party during the TA and conclusion of the AT	Area for future technical improvement
19	2(i) Consistency of the FRL with the information and descriptions provided by the Party	<p>The Party explained in answer to a question during the TA how and why it differs, namely that the threshold for tree height is 2 m for the FRL instead of 5 m as for the reporting to FAO because a 2 m threshold is used in the national definition of forest contained in Forest Code Act 2018-25 of 12 November 2018.</p> <p>The AT noted that Senegal’s original FRL submission does not contain a transparent description of the method used to construct the FRL. The FRL submission provides a summary of the calculation tools used for developing the FRL, including some of the data used in those tools; however, the AT could not verify the FRL calculations or the FRL estimate provided in table 42 of the original submission on the basis of the summary provided and the data included in the submission.</p> <p>During the TA, in response to a request from the AT, Senegal provided a spreadsheet containing detailed information on the AD, EFs and some of the steps used for the FRL calculation, which allowed the AT to reconstruct the FRL estimate, but the AT noted that the methodologies applied were not always consistent with those reported in the original FRL submission. For instance, tier 1 EFs from the 2006 IPCC Guidelines, the 2019 Refinement to the 2006 IPCC Guidelines and the Wetlands Supplement were used for the gains in biomass carbon stocks in undisturbed forests, but the original FRL submission mentions the use of higher-tier EFs.</p> <p>In the modified submission, consistency between the methods reported in the FRL submission and the actual calculation was improved. However, the AT still noted some differences. For instance, Senegal explained in the modified submission that forest growth returns to the growth rate of undisturbed forest after the time of regeneration, but the AT could not see this being reflected in the calculation spreadsheet. Instead, growth was assumed for only one year following fire disturbance, and continued until the end of the reference period following wood extraction.</p>	<p>threshold in the definitions of forest for the FRL and for the FAO Global Forest Resources Assessment and why and how the definition for the FRL was chosen is an area for future technical improvement that would increase the transparency of the FRL submission.</p> <p>The AT notes that ensuring consistency between the calculation of the FRL and the documentation thereof in the FRL submission is an area for future technical improvement that would increase the transparency and accuracy of the FRL submission.</p>

III. Conclusions

14. The FRL presented in the modified submission, based on the reference period 2011–2020, corresponds to –8,860,748 t CO₂ eq/year.

15. The AT acknowledges that Senegal 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, Senegal followed paragraph 70 of decision 1/CP.16, on activities undertaken, and paragraph 10 of decision 12/CP.17, on applying the stepwise approach. The AT commends Senegal for providing information on its ongoing work to include other pools and gases in its FRL.

16. As a result of the facilitative interactions with the AT during the TA, Senegal 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 in constructing the FRL, and commends Senegal on its efforts. The new information provided in the modified submission increased the reproducibility of the FRL calculations.

17. Pursuant to paragraph 3 of the annex to decision 13/CP.19, the AT identified areas for future technical improvement (see the table above).

18. The information used by Senegal in constructing its FRL for reducing emissions from deforestation, reducing emissions from forest degradation and enhancement of forest carbon stocks is mostly transparent (see finding ID#s 3–5, 7, 8, 11 and 17–19 in the table above), complete and partially in accordance with the guidelines for submissions of information on reference levels (see finding ID#s 1, 5, 6, 9, 10, 12 and 14–19 in the table above).

19. The AT acknowledges and welcomes the Party's intention to:

- (a) Estimate soil organic matter potential at the national level;
- (b) Establish a system for rigorous monitoring of carbon stock changes in the deadwood and litter pools at the national level;
- (c) Collect the AD necessary for estimating non-CO₂ emissions;
- (d) Improve the methods used to estimate areas of forest affected by fire;
- (e) Improve the collection of AD on wood harvesting;
- (f) Develop tier 2 EFs for each forest type in the country.

20. Senegal identified the following capacity-building needs:

- (a) Training LULUCF stakeholders, including staff of relevant national institutions, in GHG inventory preparation;
- (b) Mapping soil carbon stocks at the national level and estimating emissions for the DOM and SOC pools;
- (c) Operationalizing the tree height threshold of the national forest definition;
- (d) Mapping forest ecosystems and improving the collection of field data on forest biomass stocks and increment rates, thus allowing the development of EFs specific to different forest types;
- (e) Improving estimates of emissions from bushfires;
- (f) Managing and archiving LULUCF data.

21. In conclusion, the AT commends Senegal 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 Senegal'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

predictable support.¹⁰ The AT also acknowledges that the TA was an opportunity for a rich, open, facilitative and constructive technical exchange of information with Senegal.

¹⁰ 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 Senegal

	<i>Main features of the FRL</i>	<i>Remarks</i>
Proposed FRL	–8 860 748 t CO ₂ eq/year	–
Type and reference period of FRL	FRL = average of historical emissions and removals in 2011–2020	See also finding ID# 2 in the table in this document
Application of adjustment for national circumstances	No	–
National/subnational	National	–
Activities included	Reducing emissions from deforestation Reducing emissions from forest degradation Enhancement of forest carbon stocks	See also finding ID# 16 in the table in this document
Pools included	Above-ground biomass Below-ground biomass	See also finding ID# 14 in the table in this document
Gas included	CO ₂	See also finding ID# 15 in the table in this document
Forest definition	Included	See also finding ID#s 17–18 in the table in this document
Consistency with latest national GHG inventory	Methods used for estimating the FRL are not consistent with those used for the latest national GHG inventory (2025)	See also finding ID#s 1 and 15 in the table in this document
Description of relevant policies and plans	Included	See also finding ID# 13 in the table in this document
Description of assumptions on future changes to domestic policy, if included in constructing the FRL	Not applicable	–
Description of changes to previous FRL	Not applicable	–
Identification of future technical improvements	Included	Several areas for future technical improvement have been identified (see finding ID#s 1, 3–12 and 14–19 in the table in this document)

Annex II

Reference documents

A. Reports of the Intergovernmental Panel on Climate Change

IPCC. 2003. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. J Penman, M Gytarsky, T Hiraishi, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at <http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.html>.

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. 2014. *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*. T Hiraishi, T Krug, K Tanabe, et al. (eds.). Geneva: IPCC. Available at <https://www.ipcc-nggip.iges.or.jp/public/wetlands/>.

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 biennial transparency report of Senegal. Available at <https://unfccc.int/first-biennial-transparency-reports>.

First BUR of Senegal. Available at <https://unfccc.int/BURs>.

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

“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>.

NC1, NC2 and NC3 of Senegal. Available at <https://unfccc.int/non-annex-I-NCs>.

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:

Ministry of Environment and Ecological Transition. 2022. Policy Letter for the Environment, Sustainable Development, and Ecological Transition Sector (2022-2026).