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From reference levels to results reporting: REDD+ under the UNFCCC 2018 update

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2018 update

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Acronyms and abbreviations

AD	activity data
AGB	aboveground biomass
BGB	belowground biomass
BUR	biennial update report
CO_2	carbon dioxide
COP	Conference of the Parties
DW	deadwood
EF	emission factor
ER	emission reduction
FCPF	Forest Carbon Partnership Facility
FRA	Global Forest Resources Assessment
FREL	forest reference emission level
FRL	forest reference level
GCF	Green Climate Fund
GHG	greenhouse gas
ha	hectare(s)
HFLD	high-forest-cover, low-deforestation
INDC	intended nationally determined contribution
IPCC	Intergovernmental Panel on Climate Change
$MtCO_2eq/yr$	megatonne(s)/million tonne(s) of carbon dioxide equivalent per year
L	litter
LULUCF	land use, land-use change and forestry
m	metre(s)
MRV	measurement, reporting and verification
NDC	nationally determined contribution
NFI	national forest inventory
NFMS	national forest monitoring system
NS/AP	national strategy/action plan
RBP	results-based payment
REDD+	reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries
SAE	stratified area estimate
SC	soil carbon
SMF	sustainable management of forests
TA	technical assessment/technical analysis
TATR	technical report of the technical analysis (of REDD+ results)
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States dollar(s)

Executive summary

The landmark Paris Agreement on climate change has created a new context for international efforts to mitigate climate change and affirmed the existing framework for reducing emissions from deforestation and forest degradation and the role of sustainable management of forests, conservation and enhancement of forest carbon stocks, known as REDD+. Within this framework, many countries are making progress in developing and submitting to the United Nations Framework Convention on Climate Change (UNFCCC) their forest reference (emission) levels (FREL/FRLs), participating in the technical assessment of these, reporting on REDD+ results in their biennial update reports, and undergoing the required international consultation and analysis of reported results. Countries have reported just over 6 billion tonnes of carbon dioxide-equivalent in emission reductions as a result of REDD+ implementation to date. Nearly all countries pursuing REDD+ have submitted nationally determined contributions that include forest-sector actions.

The aim of this publication is to inform countries about the latest developments in the measurement, reporting and verification of REDD+ activities. It provides an update on FREL/FRLs and REDD+ results submitted to the UNFCCC. The report illustrates the choices that countries made when they constructed their FREL/FRLs and areas for improvement identified during technical assessments. Such information can help countries learn from each other's experiences and thus facilitate South–South knowledge exchange on REDD+. The report also provides an update of the evolving context of REDD+, including a summary of the Green Climate Fund's recently approved pilot programme for results-based payments for REDD+.

As of early 2018, the following REDD+ measurement, reporting and verification milestones had been achieved:

- Thirty-four countries had submitted 38 FREL/FRLs to the UNFCCC for technical assessment.
- The UNFCCC had published 22 FREL/FRL technical assessment reports, and a further 16 technical assessments were ongoing.
- Four countries had reported REDD+ results to the UNFCCC through five REDD+ results submissions (in the REDD+ technical annex of their biennial update reports), totalling more than 6 billion tonnes of carbon dioxide-equivalent in emission reductions, mostly in Brazil.
- All five technical analyses of REDD+ results had been completed.
- Eighty-eight percent of the countries that had submitted FREL/FRLs had completed or were establishing national forest inventories.

This publication shows the remarkable progress that countries have made in REDD+ reporting to the UNFCCC. Particularly striking is the increase in uncertainty assessment: 67 percent of the countries that submitted FREL/FRLs in January 2018 provided uncertainty estimates around their activity data, and 83 percent provided uncertainty estimates around their emission factors. This is an important development for increasing transparency in REDD+.

1 Introduction

Reducing emissions from deforestation and forest degradation, and the role of sustainable management of forests, conservation and enhancement of forest carbon stocks (REDD+) has gained momentum in recent years. REDD+ is mentioned in Article 5 of the 2015 Paris Agreement on climate change,[1] and forests and land-use mitigation measures are mentioned in more than 70 percent of nationally determined contributions (NDCs).

The aim of this paper is to inform countries about recent developments in the measurement, reporting and verification (MRV) of REDD+ activities under the United Nations Framework Convention on Climate Change (UNFCCC). It provides an update on submissions on forest reference (emission) levels (FREL/FRLs) and REDD+ results reporting; a summary of experiences with the UNFCCC technical assessment (TA) process; and an overview of initial REDD+ results reports and their technical analyses. The paper also summarizes the progress made on results-based payments (RBPs), including the Green Climate Fund (GCF)'s Pilot Programme for REDD+ Results Based Payments, launched in October 2017.

This publication updates *From Reference Levels to Results Reporting: REDD+ under the UNFCCC* (FAO, 2017) and builds on three previous UN-REDD/FAO publications: *Technical Considerations for Forest Reference Emission Level and/or Forest Reference Level Construction for REDD+ under the UNFCCC* (FAO, 2015a)*; National Forest Monitoring Systems: Monitoring and Measurement, Reporting and Verification (M & MRV) in the Context of REDD+ Activities* (FAO, 2013); and *Emerging Approaches to Forest Reference Emission Levels and/or Forest Reference Levels for REDD+* (FAO, 2014).

The paper includes:

- an overview of the progress made in FREL/FRL and REDD+ results submissions by countries to the UNFCCC (Chapter 1);
- information on the choices made by countries on their FREL/FRL constructions and a summary of experiences to date in the TA process (Chapter 2);
- examples of submitted REDD+ results (i.e. the REDD+ technical annex in biennial update reports – BURs) and a technical analysis of these as part of the UNFCCC's international consultation and analysis process (Chapter 3); and
- an update of international climate-change mitigation policy for FREL/FRL submissions and REDD+ results reporting, including linkages between REDD+ strategies and FREL/FRL submissions and between REDD+ and NDCs (Chapter 4).

1.1 Status of FREL/FRL and REDD+ results submissions

As of April 2018, 34 countries had submitted 38 FREL/FRLs to the UNFCCC,[2] comprising 11 countries in Africa, 11 in Asia and the Pacific and 12 in Latin America and the Caribbean (Figure 1). Brazil, Madagascar and Malaysia provided more than one FREL/FRL submission, for various reasons: to expand the geographic scope (Brazil added the Cerrado biome); cover more REDD+ activities (Malaysia added conservation and reduced deforestation); add an additional results reporting period (Brazil added "Amazon C" for results in 2016–2020); and update the FREL with new, improved data (Madagascar). For the 38 FREL/FRL submissions, 22 TA reports had been published by April 2018.

[1] The Paris Agreement on climate change was adopted on 12 December 2015 at COP 21 of the UNFCCC. It represents a commitment by the international community to limit the rise of the global average temperature to well below 2 °C, and it requests countries to communicate their climate actions, known as their NDCs.

[2] The 34 countries comprise 22 percent of the UNFCCC's 154 non-Annex I countries.

Five submissions of REDD+ results were included in the technical annexes of the BURs of four countries, which all undertook technical analyses (TAs) as part of the international consultation and analysis process. Brazil submitted two technical annexes with REDD+ results for the Amazon biome: results for 2006–2010 were included in the technical annex of Brazil's 2014 BUR and results for 2011–2015 were in the technical annex of the 2016 BUR. Chapter 3 of this report summarizes the submitted REDD+ results and common areas for technical improvement noted in the technical reports of REDD+ results.

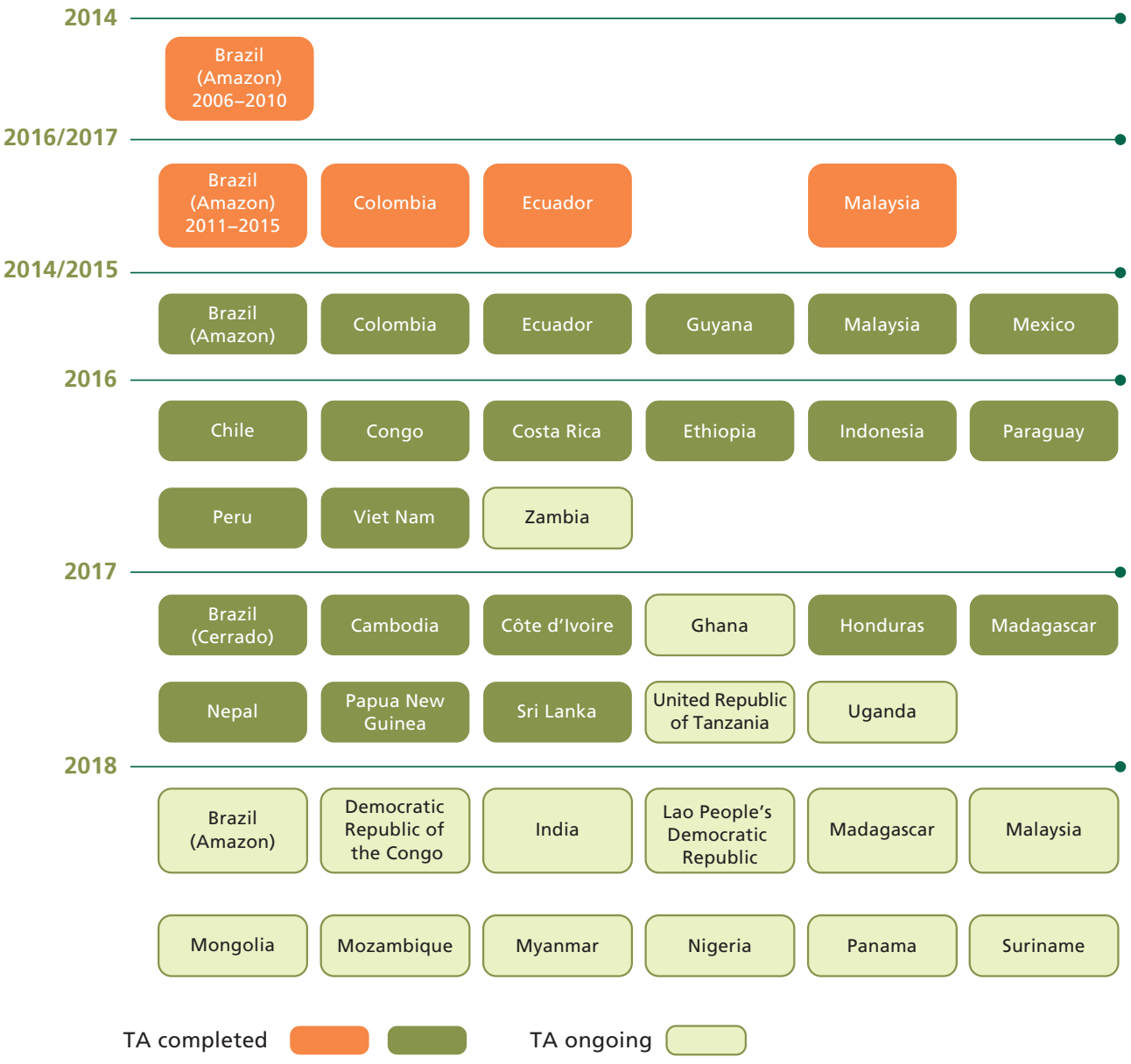

Figure 1. Overview of REDD+ results with completed technical analyses and FREL/FRL submissions with ongoing or completed technical assessments, as of April 2018

Notes: The year on the left indicates the year in which countries submitted their FREL/FRLs (light and dark green boxes) or BURs with REDD+ technical annexes (orange boxes).

1.2 UNFCCC guidance and modalities

Countries can voluntarily submit FREL/FRLs to the UNFCCC for TA. Once a TA has been completed, countries can submit REDD+ results in an annex to their BURs for technical analysis (Figure 2).

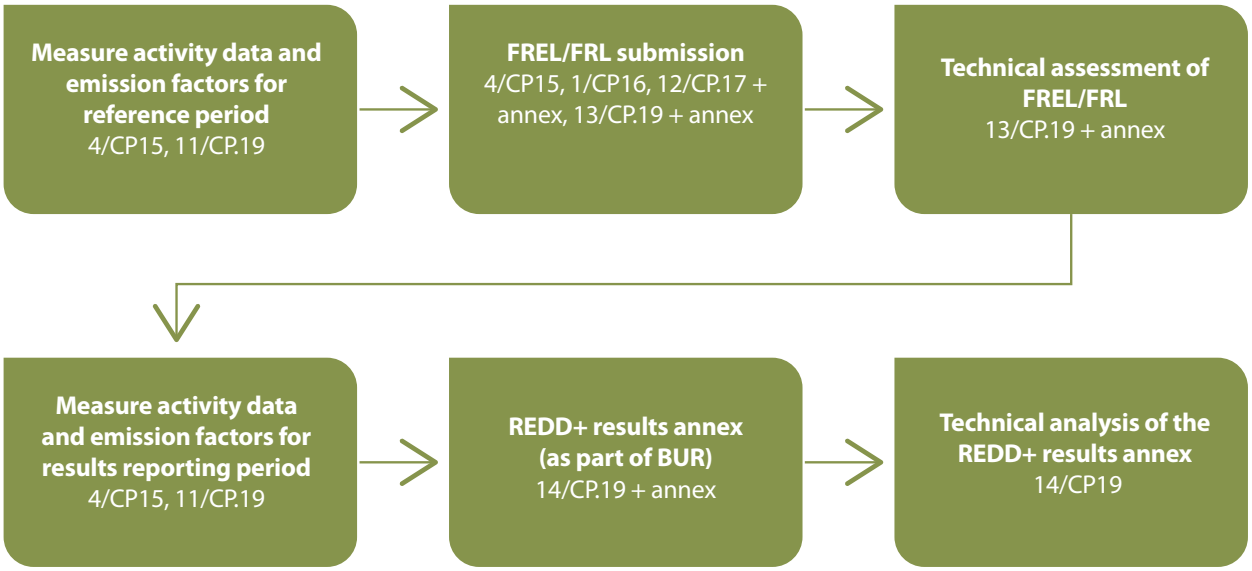

Figure 2. Measurement, reporting and verification for REDD+, and the most relevant decisions of the United Nations Framework Convention on Climate Change

Two FAO publications (2015; 2017) provide more detailed explanation of UNFCCC guidance and modalities.

Countries that plan to report REDD+ results to the UNFCCC have several timelines to consider, especially because a technically assessed FREL/FRL is needed before results can be reported (Figure 3). FREL/FRLs can be submitted once per year on a date determined by the UNFCCC Secretariat (usually in January).[3] The TA process that follows typically takes about one year. If a country decides to submit REDD+ results, it can do so by including them in a technical annex to the BUR, which should have a two-year reporting cycle. Thus, REDD+ results submissions are constrained by BUR submissions. Countries should consider the various reporting periods for their FREL/FRLs and REDD+ results submissions.

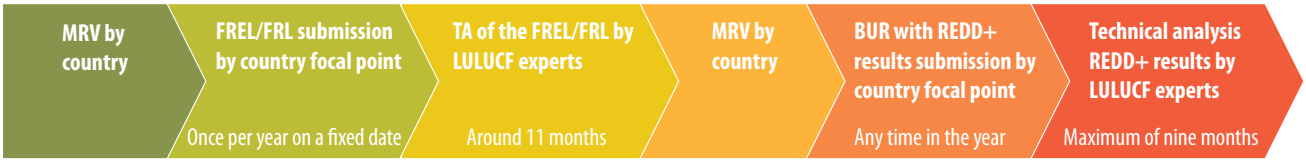

Figure 3. FREL/FRL and REDD+ results submission timelines

[3] The indicative time frames for the technical assessment of FREL/FRLs in 2018 and 2019 are available at: http://unfccc.int/files/parties_and_observers/notifications/application/pdf/message_to_parties_information_on_the_submission_of_proposed_forest_reference_emission_levels_and_or_forest_reference_levels__2017.pdf

2 Summary of UNFCCC FREL/FRLs

This chapter takes stock of the choices that countries have made in their FREL/FRL submissions to the UNFCCC, including, in some cases, why countries made particular choices. It also summarizes common areas for technical improvement included in the TAs and the changes countries have made, in modified submissions,[4] as a result of TAs.

2.1 Forest definition

UNFCCC guidance. Countries should provide the forest definition they used for the construction of FREL/FRLs and explain whether it differs from that used in the national greenhouse gas (GHG) inventory or in reporting to other international organizations. If applicable, an explanation of why and how a different definition is used should be provided.

Summary of submissions. Most countries included references to threshold parameters[5] and the use of the land. Threshold parameters for forest land typically included minimum canopy cover, minimum tree height and minimum area. Figure 4 shows that many countries chose minimum thresholds that align with FAO's Global Forest Resources Assessment (FRA) definition: a canopy cover of 10 percent; a tree height of 5 m; and an area of 0.5 ha.

The choice of thresholds was often based on forest ecology; for example, many countries with humid tropical forests applied a canopy-cover threshold of 30 percent. In the case of Papua New Guinea, a height threshold of 3 m was chosen "to include savannah and scrub in forest to provide appropriate management to these vegetation types". Many countries used an existing national (legal) definition of forest for REDD+ or aligned with definitions used in previous reporting to the UNFCCC (e.g. for the Clean Development Mechanism and GHG inventory reporting). The choice of definition might also have been influenced by the type and quality of historical data available for constructing FREL/FRLs (FAO, 2015).

Countries typically included temporarily unstocked forest land in the forest definition (as suggested by the forest land description of the Intergovernmental Panel on Climate Change – IPCC, 2006). In addition, some countries indicated that land covered with trees but with another predominant use (e.g. agriculture) was excluded from the forest definition (as suggested by the FRA definition). In practice, these provisions are difficult to implement in assessments that use remote sensing to assess tree cover (loss). Visual interpretation (e.g. through sample data or the creation of thematic maps), or auxiliary data (e.g. on known locations of agricultural tree crops or harvesting in timber tree plantations), may be required but, even then, the data may be incomplete.

In some cases, countries indicated a difference between the legal or official forest definition used and the operational forest definition, or they indicated certain divergences from the forest definition in the collected data, especially concerning the minimum area considered. For example, Brazil and Nepal indicated a minimum area of 0.5 ha in their forest definitions but the minimum mapped area of deforestation was 6.25 ha in Brazil and 2.25 ha in Nepal due to technical limitations in the (historical) data. Another difference concerned the inclusion of only one forest type (e.g. Brazil's Amazon FREL submission only assessed the loss of primary forest).

[4] About eight weeks after the "TA week" in Bonn, Germany, countries can submit modified FREL/FRL submissions in which they can change the initial FREL/FRLs and provide additional explanations and clarifications.

[5] Forests are defined using binary (young stands, temporarily unstocked areas, non-forest land uses, and agroforestry) and threshold (minimum area, minimum height, crown cover, temporary, and strip width) parameters.

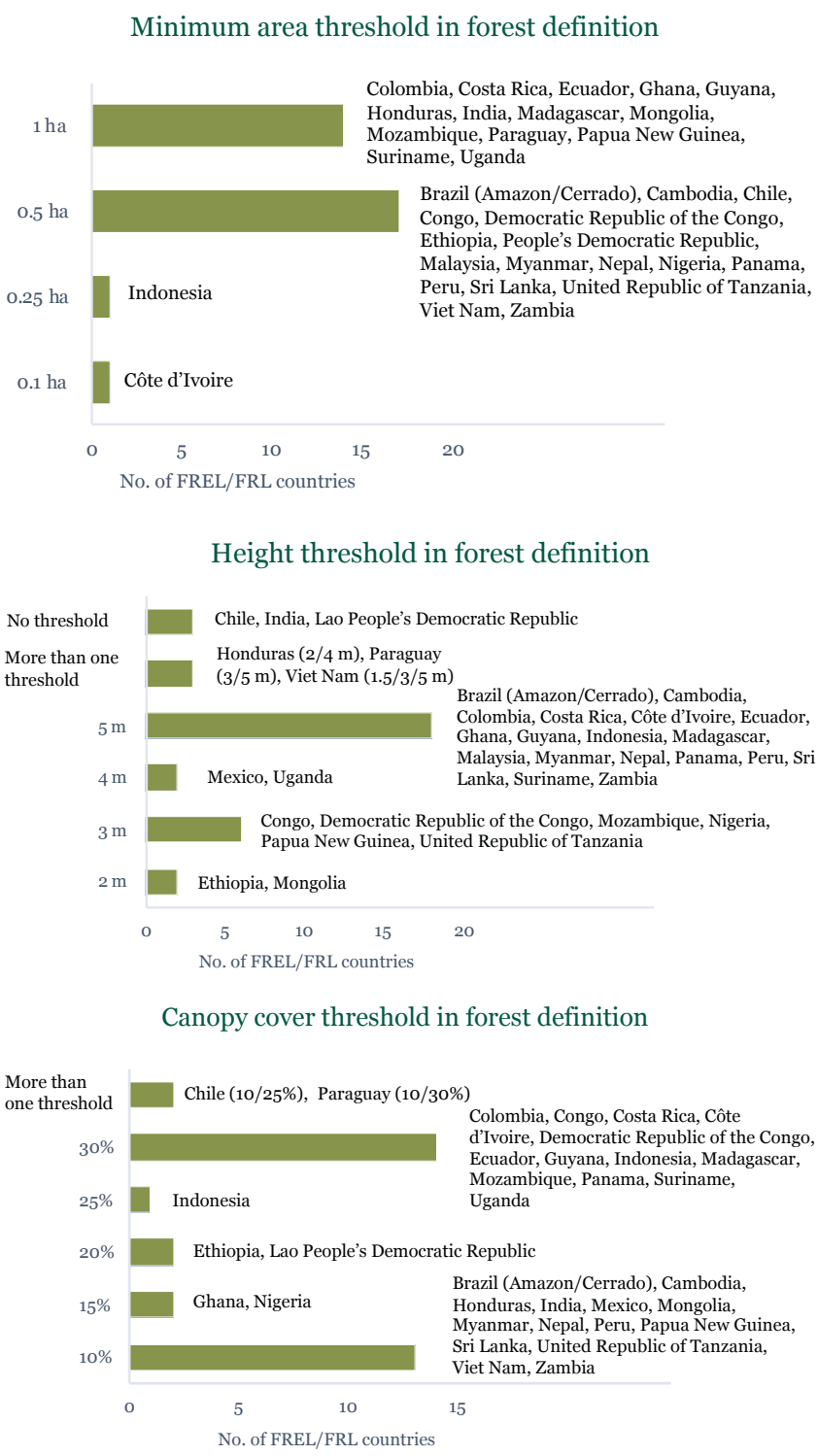

Figure 4. Threshold values for REDD+ forest definitions, by country

TA responses. The TAs often compared whether the definition used in the FREL/FRL submission *is the same as that used in the GHG inventory* in the Clean Development Mechanism (if the country has one) and whether and how it differed from the FAO definition the country must apply when reporting for the FRA. When countries included areas with temporary forest-cover loss as part of the area deforested (in several TA reports referred to as "gross deforestation"[6]), some TAs suggested applying a *land-use-based forest definition*

[6] The use of the term "gross deforestation" for "tree cover loss including temporary destocked areas" is confusing because temporary tree-cover loss is not deforestation. Other TAs interpreted "gross deforestation" as not considering the carbon stock in the replacing non-forest land use when estimating emissions from deforestation. Although both interpretations may be similar in terms of net long-term emissions to the atmosphere, the difference is that the IPCC allows a Tier 1 assumption for conversion to cropland but not for forest land remaining forest land.

rather than a land-cover-based definition. The TAs noted that when regrowth after the deforestation event in temporarily unstocked forest was not included, deforestation emissions were likely to be overestimated. TAs also indicated that, in some cases, the minimum-area threshold in the forest definition used was smaller than the minimum mapping area used for the activity data (AD) assessment, and they recommended the reconciliation of the two, for example by reducing the minimum mapping area unit.

2.2 Scale

UNFCCC guidance. Developing countries wishing to participate in REDD+ are asked to develop national FREL/FRLs or, if appropriate as an *interim* measure in accordance with their national circumstances, subnational FREL/FRLs.

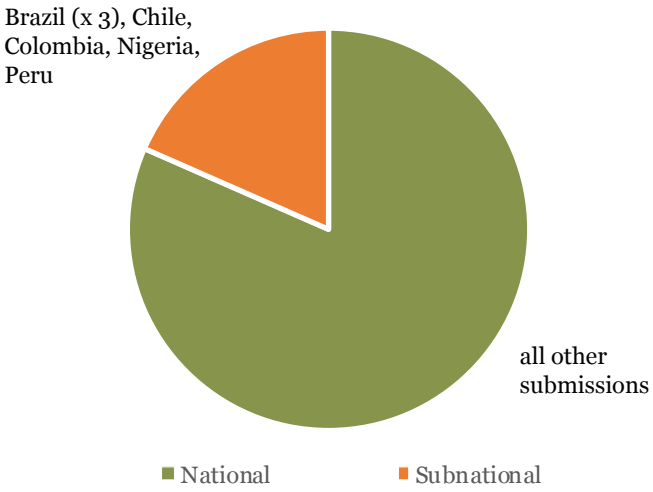

Figure 5. Scale of FREL/FRL submissions
Note: There was a total of 38 FREL/FRL submissions.

Summary of submissions. Most submitting countries (82 percent) have developed national FREL/FRLs (Figure 5). Reasons mentioned by countries for submitting subnational FREL/FRLs were usually the following: data were available in only some parts of the country (such as certain biomes or administrative units) at the time of submission; and countries were implementing policies and measures to conserve and sustainably manage forests in a given area and therefore results were likely to occur.

For some countries, national FREL/FRLs comprised the sum of subnational jurisdictional FRELs/FRLs, such as provinces (e.g. in the case of the Democratic Republic of the Congo). Some countries submitting national FREL/FRLs disaggregated their estimates by jurisdiction; Viet Nam, for example, provided AD and emission factors (EFs) for each region in the country in the annex to its FREL/FRL submission. Other countries (e.g. Zambia) indicated their intention to disaggregate national estimates in the future. Such disaggregation would provide countries with information on performance at the subnational jurisdictional level, which may be of particular value if jurisdictions move at different speeds in REDD+ implementation.

TA responses. In cases where countries submitted subnational FREL/FRLs that covered *regions of highest forest cover or highest level of emissions*, TA reports included positive comments on the choice to start with the most significant regions. Similar positive comments were made when a country revealed plans to transition over time to national FREL/FRLs. For most subnational submissions, TAs asked the countries for evidence of potential *displacement of emissions*, as indicated in footnote 7 of UNFCCC Decision 1/CP.16. In some TA reports, the *expansion of coverage*, or the monitoring of additional forested lands, was suggested as an area for improvement.

2.3 Scope

UNFCCC guidance. Countries are required to indicate the REDD+ activities, carbon pools and GHGs included in the scope of their FREL/FRLs (Table 1).[7] Where possible, FREL/FRLs should not exclude significant REDD+ activities or carbon pools, and omissions must be justified. Countries may take a stepwise approach to developing FREL/FRLs, and they should improve them over time by incorporating better data, improved methodologies and additional pools.

Table 1. Activities, carbon pools and the greenhouse gases that countries may consider in the scope of their REDD+ programmes

Activities	Carbon pools	Greenhouse gases
• Reducing emissions from deforestation • Reducing emissions from forest degradation • Conservation of forest carbon stocks • Sustainable management of forests • Enhancement of forest carbon stocks	• Aboveground biomass • Belowground biomass • Dead wood • Litter • Soil carbon	• Carbon dioxide (CO_2) • Carbon monoxide (CO) • Methane (CH_4) • Nitrous oxide (N_2O)

Scope of REDD+ activities

Summary of submissions. The five REDD+ activities (listed in Table 1) are not clearly defined in UNFCCC REDD+ decisions. Deforestation, forest degradation and the enhancement of carbon stocks can be translated relatively straightforwardly into IPCC Forestry and Other Land Use subcategories (Table 2) and, together, they could cover all emissions and removals from forests. Countries that included conservation and the sustainable management of forests (SMF) typically used auxiliary administrative information to define these activities, such as when measured removals/emissions occurred in officially protected (conservation) areas or sustainably managed forests. Thus, countries may have reported similar fluxes under different REDD+ activities. For example, Chile reported removals in areas with protected status under "conservation", whereas Viet Nam reported such removals under "enhancement". Some countries chose not to define conservation and SMF specifically but rather to report (potentially all) forest-related emissions/removals under deforestation, degradation and enhancement. In contrast, India assessed deforestation, forest degradation and enhancement (both the conversion of non-forest to forest land and forest land remaining forest land) but stated that all these activities were primarily the result of practising sustainable forestry, thereby capturing all fluxes as SMF. These differences reflect the variety of national circumstances, national policies, land arrangements and practices across REDD+ countries.

[7] UNFCCC Decision 12/CP.17 paragraph 10; UNFCCC Decision 12/CP.17, annex, paragraph (c); UNFCCC Decision 13/CP.19, annex, paragraph 2(f).

Table 2. How REDD+ activities relate to Intergovernmental Panel on Climate Change land-use subcategories

IPCC land-use subcategories	REDD+ activities	
Forest land => Other land use	Deforestation	*Conservation and sustainable management of forests can overlap with any of these, depending on whether and how countries define these*
Forest land => Forest land (emissions)	Forest degradation	
Forest land => Forest land (removals)	Enhancement of forest carbon stocks	
Other land use => Forest land	Enhancement of forest carbon stocks (afforestation/reforestation)	

To date, just over half of FREL/FRL submissions have included more than one REDD+ activity, and slightly more than one-third have included a combination of REDD+ activities (Figure 6). Deforestation is the most frequently included activity because it tends to be the most significant activity in terms of emissions and because more-reliable historical AD can be generated to assess emissions associated with it.

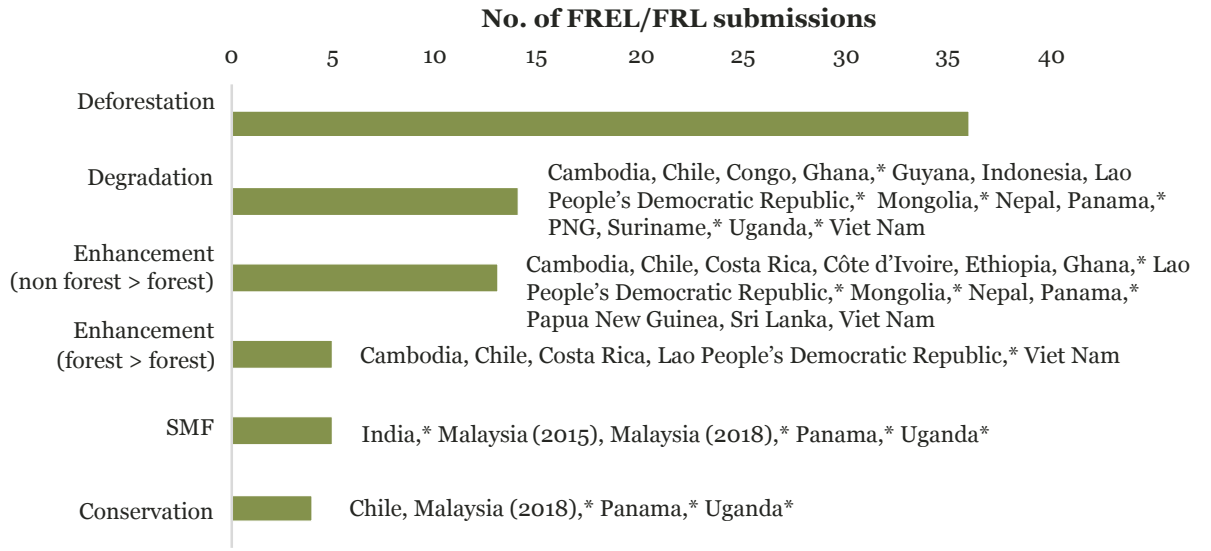

Figure 6. REDD+ activities chosen by countries in their FREL/FRL submissions

Notes: All submissions included deforestation, with the exception of those of Malaysia (2015) and India.
* Countries with ongoing TAs; scope may still change.

TA responses. For countries that included multiple REDD+ activities in their submissions, especially deforestation and forest degradation, TAs noted the importance of ensuring that the same emissions are not captured under both activities to avoid *double counting*. TAs encouraged the *inclusion of significant REDD+ activities* in future FREL/FRL submissions. In other cases, as a result of TAs, countries decided to *omit – because of a lack of reliable data – activities in their modified FREL/FRLs that were included in initial submissions*. In such cases, countries often moved the information on omitted activities to annexes.

Scope of pools

Summary of submissions. Generally, aboveground biomass (AGB) and belowground biomass (BGB) represent larger sources of emissions than the other carbon pools (with the exception of soil carbon – SC – in the case of organic soils), and most countries included these two carbon pools in their submitted FREL/FRLs (Figure 7). Many countries did not include litter (L), deadwood (DW) or soil carbon (SC) due to data gaps. On the omission of DW, some countries referred to IPCC (2006), which noted that default values for this pool are unavailable because of wide variability. For the omission of SC,[8] countries often referred to the information needed for a Tier 1 estimate of (the management of) the replacing land use, which was often unavailable. In most cases, the omission of these carbon pools for deforestation and forest degradation may be considered conservative (meaning that the exclusion does not overestimate emissions and subsequent emission reductions – ERs), and, in most tropical-forest countries, L is likely to be insignificant. For countries submitting more than one REDD+ activity, the number of pools included per activity usually differed (e.g. the L and DW pools might have been included for deforestation but not for forest degradation). No country included harvested wood products in their modified submission; the IPCC's good-practice guidance (IPCC, 2003) and guidelines (IPCC, 2006) do not consider harvested wood products as a pool. The data requirements for the inclusion of this aspect may be high because records would be needed of the final use of harvested wood (e.g. as furniture) and estimates of the length of time the carbon will be stored.

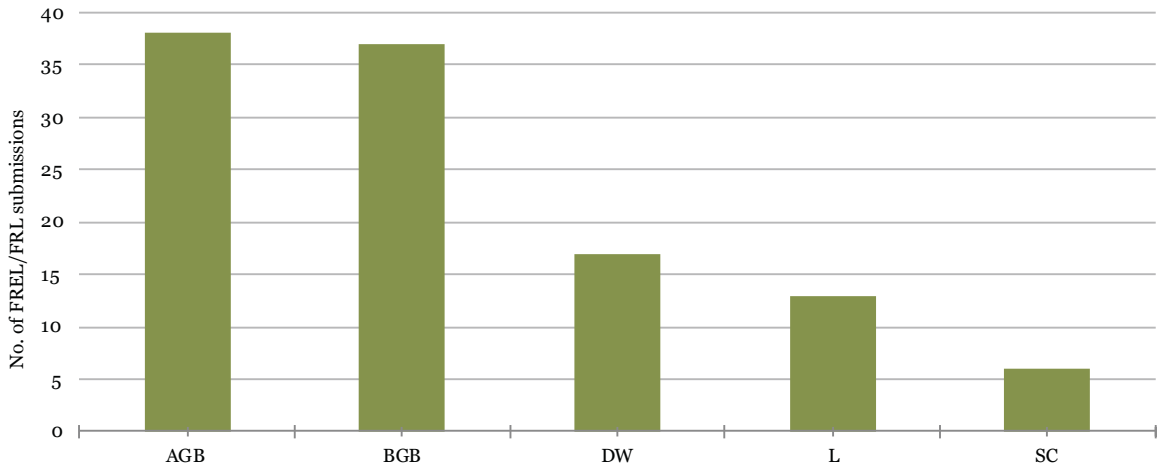

Figure 7. Scope of carbon pools chosen by countries for their FREL/FRL submissions

Note: There was a total of 38 FREL/FRL submissions.

TA responses. In discussing a country's choice of carbon pools, TA teams often considered the initial inclusion of only AGB and BGB to be part of a stepwise approach. In many instances, TA reports identified *adequate justification of exclusion* as an area for improvement; another area for improvement was identified as the *collection of more information for the future inclusion of the omitted carbon pools*, particularly if these are thought to be significant (which most often applies to SC).

Scope of gases

Summary of submissions. Although emissions of nitrous oxide and methane can be a significant component of GHG fluxes in forests, especially where fire is widespread or soils are drained that are high in organic content, most countries did not include non-carbon dioxide (CO_2) GHG emissions due to a lack of data (Figure 8). In the case of fire, national data are often available, but it is challenging to associate fire with a specific REDD+ activity; for example, it may be challenging to distinguish between fire on forest land that is subsequently converted to non-forest land (i.e. non-CO_2 emissions associated with deforestation) and

[8] Unlike L and DW, which in Tier 1 can be assumed to fully oxidize at the time of deforestation, emissions of SC should be calculated considering the SC content in the replacing land use and the long-term dynamic after conversion.

fires on forest land that remains as forest land (which could be considered as non-CO_2 emissions associated with forest degradation). Few countries included nitrous oxide and methane emissions from fires in their submissions, although some provided information to demonstrate that such emissions were likely to be insignificant (e.g. by providing a default calculation based on estimates of burned forest area derived from the MODIS burned area product[9]). Generally, only countries with forest-fire monitoring systems reported associated nitrous oxide and methane emissions.

TA responses. Similar to the exclusion of carbon pools, in most cases the assessment teams indicated that

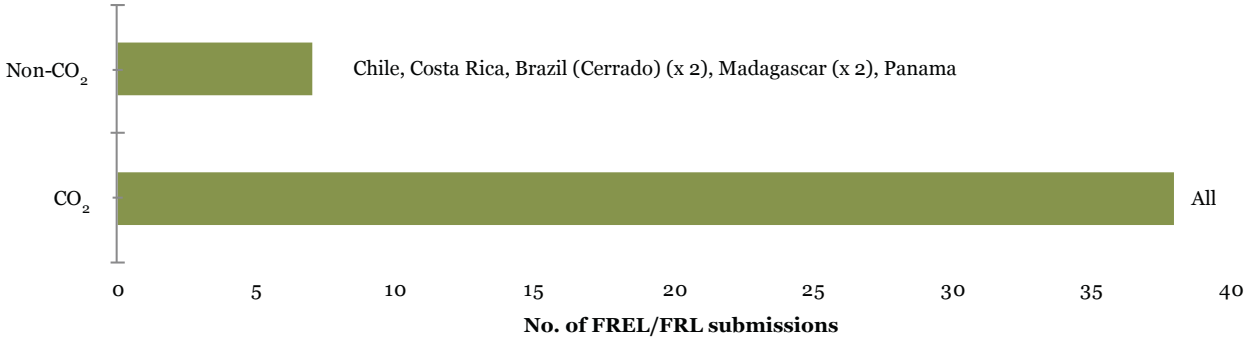

Figure 8. Scope of greenhouse gases chosen by countries for their FREL/FRL submissions
Note: There was a total of 38 FREL/FRL submissions.

countries' decisions to limit the scope of GHGs to CO_2 in their FREL/FRLs was *adequately justified* (if a country provided information to show it was not significant) or part of a country's stepwise approach. In some instances, assessment teams suggested the *treatment of non-CO_2 GHGs* as an area for improvement, particularly if a country had included such gases in their national GHG inventories. A few submissions (e.g. Brazil Cerrado, and Madagascar) *introduced non-CO_2 emissions in their modified FRELs as a result of the TAs*.

2.4 Data selection and analysis

This section summarizes the methodologies and data used in submissions to generate AD and the choice of development of country-specific EFs.

UNFCCC guidance. Robust national forest monitoring systems (NFMSs) should provide data and information that are transparent, consistent over time and accurate and which allow the MRV of GHG fluxes in the forest sector. NFMSs should use a combination of remote sensing and ground-based forest-carbon inventory approaches for estimating forest carbon stocks and changes in forest area. Information should be guided by the most recent IPCC guidance and guidelines, as adopted or encouraged by the UNFCCC Conference of the Parties (COP).[10]

Deforestation and afforestation area estimates

Summary of submissions. Countries used three methods for generating AD on deforestation (and in some cases afforestation): 1) areas extracted directly from wall-to-wall change maps (referred to as pixel counts); 2) areas from samples that are stratified using wall-to-wall maps (referred to as stratified area estimates – SAEs); and 3) areas from systematic sampling (Table 3).

Figure 9 shows that early submissions used pixel counts only; from 2016, however, countries have increasingly used SAEs, reflecting the progress this relatively new approach is making in the scientific remote

[9] Several countries used the burned forest area reported in the 2015 Global Forest Resources Assessment (FAO, 2015), which is based on the burned area assessed by MODIS.
[10] UNFCCC decisions 4/CP.15p1d and 11/CP.19.

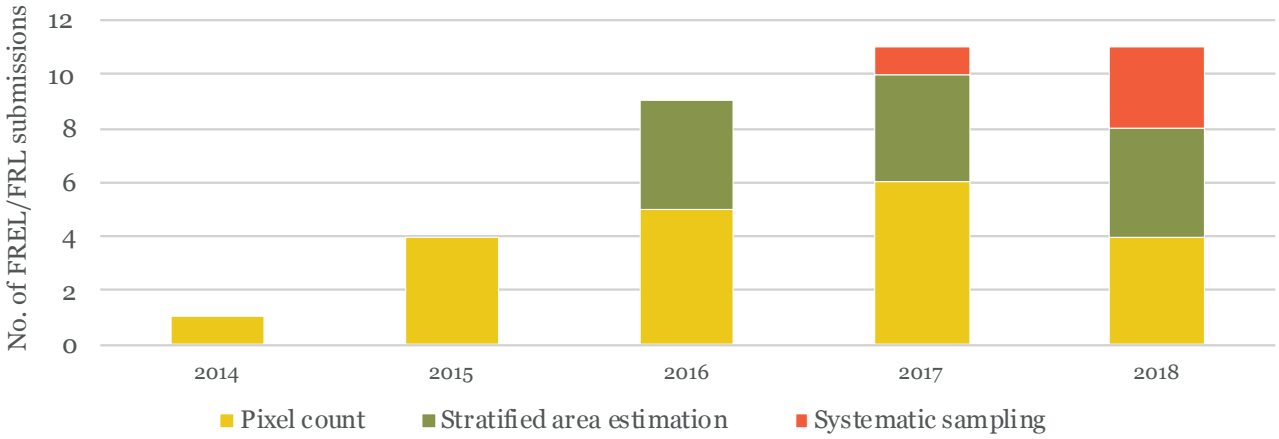

Figure 9. Methods used to assess deforestation (and in some cases also afforestation)

Note: 36 submissions included deforestation.

sensing community (Olofsson *et al.*, 2014; Tyukavina *et al.*, 2015; Potapov *et al.*, 2017). Box 1 explains the difference between pixel counts, SAEs and systematic sampling, using a simplified theoretical example.

There are differences in how wall-to-wall change maps were created for generating AD. Some countries assessed change in wall-to-wall maps by comparing independently created maps (change assessment through post-classification). Errors in input maps are transferred directly to change maps, which is why post-classification is likely to result in substantial false change detections (Tewkesbury *et al.*, 2015). In 2015, 50 percent of submissions with wall-to-wall maps for assessing forest emissions used post-classification. In 2018, this share had dropped to 11 percent, illustrating the progress made by countries in increasing accuracy.

The use of SAE[11] implies that AD are obtained from a sample of reference data (e.g. data considered to be the "truth")[12] distributed in a stratified manner using a classified map corresponding with the classes of interest (e.g. stable forest, stable non-forest, deforestation and afforestation). SAEs differ from estimates derived solely from samples in two ways: they imply the creation of a map, and they ensure that rare classes (like deforestation) are sampled sufficiently.[13] In targeted stratification, significantly fewer samples are needed to achieve a similar level of statistical precision to other methods. Countries that collected AD through systematic sampling obtained more than 10 000 samples and, in some instances, more than 100 000; countries that collected AD using the SAE method typically required 600–3 000 samples, depending on the size of the area covered by the FREL/FRL.[14] However, omitted activities in strata that occupy large proportions of a study area can have a profound impact on the precision of AD estimates (GFOI, 2018). Unlike pixel counts, the SAE method accounts for systematic errors and biases in final area estimates caused by map classification errors (GFOI, 2016). Although error matrices and map accuracy indices can inform issues of systematic error and precision, they do not directly produce the information necessary to construct confidence intervals around pixel count statistics (GFOI, 2016, section 5.1.5). As such, the SAE method provides estimates that are accurate as far as can be judged (they neither overestimate nor underestimate), and they come with confidence intervals, providing a measure of uncertainty. On the other hand, the statistics derived from SAEs (e.g. area deforested) no longer match the areas on maps, which may lead to apparent inconsistencies.[15] Maps may be generally useful for many other land-management applications, and countries may wish to maintain full consistency in all area statistics derived from their maps beyond REDD+ reporting. Such consistency would be obtained through pixel counts.

[11] The procedure for generating SAEs is described in FAO (2016) and Olofsson *et al.* (2014).

[12] Reference data involve better-quality sample data, typically consisting of visual interpretations of aerial photography or (high-resolution) satellite imagery, but they may also be based on the same imagery used to create the maps but with a more careful, customized interpretation. For AD, ground observations can rarely be used because assessments require looking back in time.

[13] The map–sample combination helps interpolate continuous phenomena outside the samples. Although individual samples may be spatially explicit, the use of systematic samples only is "blind" to information on the area between samples (see Box 1).

[14] The exception was the Democratic Republic of the Congo, which collected 21 324 samples for its SAE.

[15] These will not be true inconsistencies if confidence intervals around estimates are considered.

Table 3. Methods used for FREL/FRL submissions, by country

Method	FREL/FRL submission
Pixel count	Brazil (Amazon/Cerrado), Cambodia, Chile, Colombia, Costa Rica, Ecuador, Ghana, Guyana, Honduras,[a] Indonesia, Lao People's Democratic Republic, Madagascar,[b] Malaysia,[c] Mexico, Peru, United Republic of Tanzania, Viet Nam
Stratified area estimate	Congo, Côte d'Ivoire, Democratic Republic of the Congo, Ethiopia, Myanmar, Nepal, Nigeria, Paraguay,[d] Sri Lanka, Suriname, Uganda, Zambia
Systematic sample[e]	Mongolia, Mozambique, Panama, Papua New Guinea

[a] The initial FREL submissions of Honduras used the SAE method but, as a result of the TA, this was replaced with the pixel count approach. [b] In its 2018 submission, Madagascar stated its intention to replace pixel counts with SAEs in the course of the TA. [c] Malaysia used information on (de)gazetted areas in combination with map areas obtained through remote sensing. [d] Paraguay's initial FREL submissions used pixel counts but, in the TA, this was replaced with SAEs. [e] For some countries (e.g. Mongolia), the sampling intensity was higher in locations of interest (e.g. forest); even if systematic, therefore, some form of stratification was applied.

Box 1

The difference between pixel counts, stratified area estimates and systematic samples

A simplified theoretical example can be used to explain the three methods that countries used to estimate AD. In the example, two classes of land-use change are assumed (Figure 10): forest land remaining as forest land (stable forest); and forest land converted to another land use (deforestation).

Figure 10. The "real situation", depicting stable forest in green and deforestation in red

Pixel counts

The areas of stable forest and deforestation in Figure 10 can be assessed by deriving statistics directly from a wall-to-wall map (Figure 11). Wall-to-wall maps always have classification errors because generally they are produced by applying models derived in relatively small areas to much larger areas of interest. Other sources of error arise from the satellite imagery, which can be a "noisy" data source. A map-accuracy assessment can provide information on the level of error but does not correct for it and does not allow the assessment of uncertainties around change area statistics (i.e. AD).

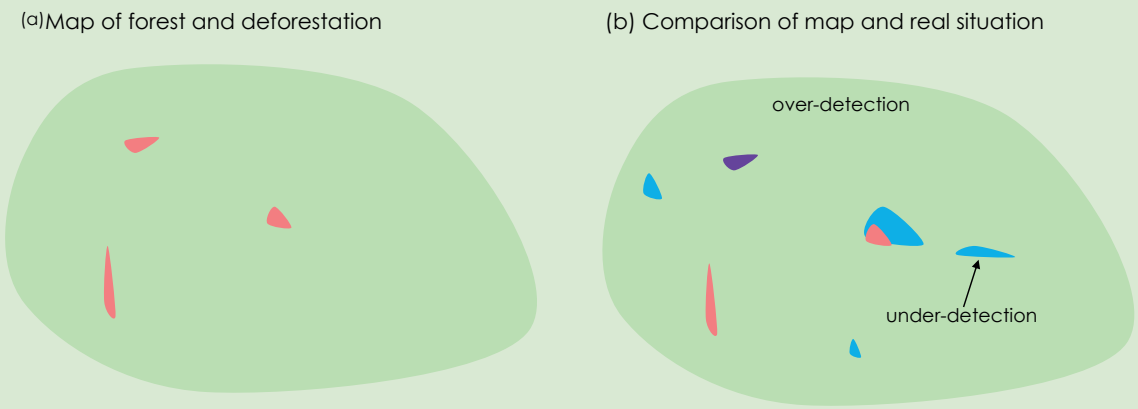

Figure 11. Wall-to-wall map of forest and deforestation (a), compared with the real situation (b)
Note: The "real" situation is shown in Figure 10. Errors of over-detection (commission) of deforestation are shown in purple, and errors of under-detection (omission) of deforestation are shown in blue.

Stratified area estimates

SAEs use a combination of wall-to-wall maps and sampling, where maps are used to stratify the distribution of sample units (Figure 12). In this example, sample units are allocated randomly in the two map classes, a method called stratified random sampling. Rare classes (such as deforestation) are allocated a minimum number of samples, meaning that a relatively high number of samples are located in these classes to capture them adequately. The sample interpretations are called "reference data" and are presumed to be the truth (see previous explanation of "truth").

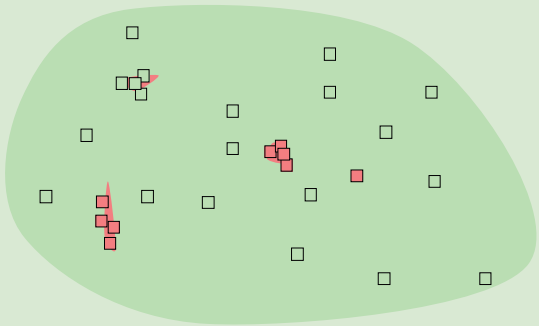

Figure 12. Example of assessment using stratified area estimation
Note: The number of samples has been reduced to simplify the example.

The results of the analysis of the stratified sample are used to produce an error matrix (Table 4).

Table 4. Error matrix for the example in Figure 12

		Reference data (sampling units)		
		Stable forest	Deforestation	
Map strata	Stable forest class	16	1	17
	Deforestation class	4	8	12
		20	9	29

Note: This example has been simplified: the minimum number of samples per class is usually 50–100.

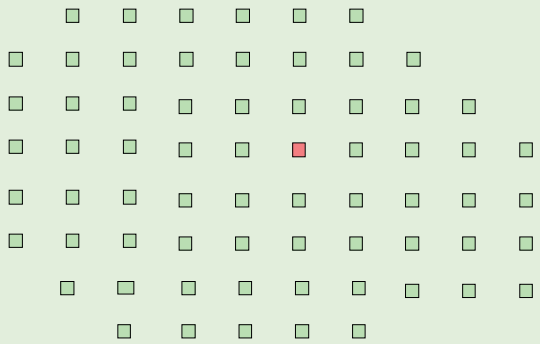

Figure 13. Example of assessment using systematic sampling

The deforestation estimate is obtained by determining the proportion of deforestation sampling units in both strata (map classes), weighted by the area of each stratum. For example, if the study area in Figure 11a comprises 1 000 ha of stable forest and 25 ha of deforestation, the SAE for deforestation is calculated as follows: the proportion of deforestation in stratum 1 (the stable forest class) (i.e. 1/17 = 0.059), is multiplied (weighted) by the area of the first stratum (1000 ha) (0.059 × 1 000 *ha* = 58.8 *ha*), plus the proportion of deforestation in the second stratum (the deforestation class) weighted by the area (8/12 × 25 *ha* = 16.7 *ha*). Therefore, the SAE of deforestation in this example is: 58.8 + 16.7 = 75.5 *ha*.*

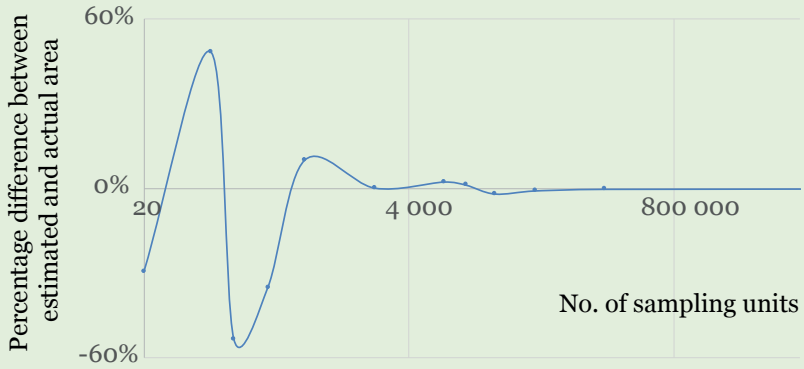

Figure 14. Example of how an estimate improves with a larger number of sampling units: systematic sampling of the total 2000–2014 loss from the global forest change product at 30 percent threshold over Mozambique, with increasing intensity of sampling

Systematic sampling

The areas of stable forest and deforestation in Figure 10 can be assessed using systematic sampling. The method is relatively simple, and the user can collect additional information (e.g. on the occurrence of visually detectable disturbances). Systematic sampling can be considered more transparent than random sampling because it isn't possible to prove randomness in the selection of sample unit locations. The method is, however, "blind" to information on the areas between sampling units (e.g. several occurrences of deforestation in Figure 10 are not captured by the samples in Figure 13). A high sampling intensity is needed to obtain precise estimates, as illustrated in Figure 14, which may not always be cost-effective.

* Another way of looking at this is that the SAE "corrects" the map areas (e.g. the pixel counts of deforested areas) for the omissions (misses) and commissions (under-detections) of the feature of interest (e.g. deforestation). Thus, the SAE can also be calculated as the pixel count of deforestation (25 ha) minus the over-detections (i.e. 4/12 = 33 percent of the area of deforestation in the map) plus the misses (i.e. 1/17 = 5.9 percent of the stable forest map area) weighted by the map areas: 25 *ha* –(0.33 × 25 *ha*)+(0.059 × 1 000 ha)=75.5 *ha*.

TA responses. TAs sometimes pointed to the potential risk of overestimating land-use change when estimating deforestation by comparing independently created maps (change assessment through post-classification). For countries that did not apply the principle of comparing images rather than maps, the assessment teams identified *direct-change assessment as an area for improvement*. For countries that submitted AD based on SAEs with large confidence intervals, TAs suggested *using the results of accuracy assessment to identify the uncertainties and bias sources in AD estimation and to propose an improvement plan to increase accuracy*. When systematic sampling was used, TAs proposed the *correction of identified interpretation errors* of sample units and the inclusion of a *summary of quality assurance/quality control procedures applied in the AD assessment*.

Emission factors for deforestation

Summary of submissions. Of the 34 countries that submitted FREL/FRLs, 18 (53 percent) had completed a national forest inventory (NFI), 12 (35 percent) were in the process of establishing an NFI with ongoing field data collection at the time of submission, and four (12 percent) had no NFI (Figure 15). Those countries without NFIs used information from local forest inventories to calculate the forest carbon densities used to approximate EFs for deforestation. Overall, 32 countries (94 percent) used (national or local) forest inventory data to calculate EFs for deforestation. Sri Lanka used IPCC default values because national estimates were considered insufficiently representative at the national level. Brazil complemented inventory data from the Amazon with literature to generate full coverage of the FREL forest area in the Amazon and, for the Cerrado biome, it used a combination of literature and IPCC defaults. Both Brazil and Sri Lanka are in the process of establishing NFIs and indicated that they would use NFI data in future submissions.

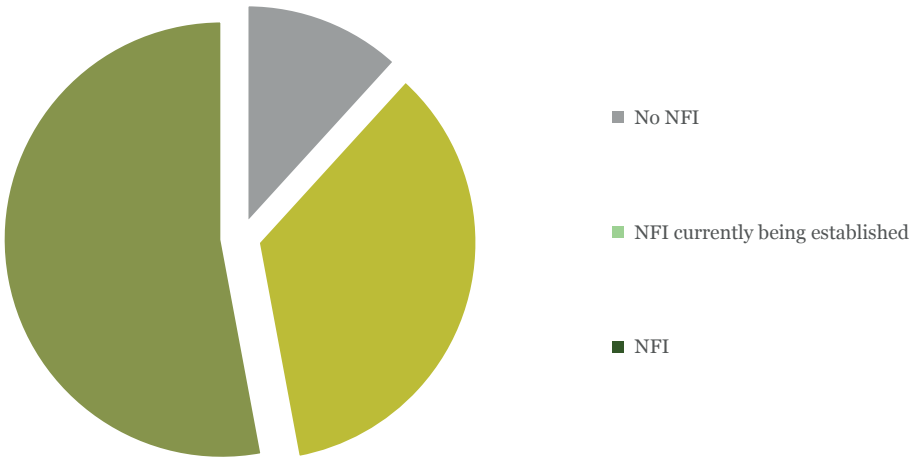

Figure 15. Share of countries that submitted a FREL/FRL that had undertaken a national forest inventory or were establishing one

Most countries considered the average long-term carbon contents in the (non-forest) land use after a deforestation event to approximate the EF for deforestation; in other words, they assumed full oxidation of the carbon pools AGB, BGB, DW and/or L at the time of conversion. This situation does seem to be changing: although no country submitting in 2014, 2015 and 2016 considered the carbon contents in the non-forest land-use following a deforestation event, roughly one-third of countries submitting in 2017 and 2018 did account for carbon in the land use following deforestation.

To select the most appropriate EFs using NFIs, countries tended to "post-stratify" their forests into strata or subpopulations with homogeneous carbon content, such as forest types, ecozones, management practices and biomes. In a few cases (e.g. Guyana and Peru), stratification considered the accessibility of forest; in the Democratic Republic of the Congo, stratification also distinguished between primary and secondary forest. The estimation of average values for such targeted subpopulations is known in the statistical literature as

domain estimation. Specific statistical approaches (Birigazzi, Gamarra and Gregoire, 2018) must be adopted to ensure that these estimates are precise and unbiased, especially if derived from complex surveys (which may be the case for NFIs).

TA responses. For some countries that used local inventories, using a *statistically representative sampling* (e.g. through an NFI) was indicated as an area for improvement. In several TA reports, the *consideration of carbon stocks on land following deforestation* was mentioned as an area for improvement, noting that omitting carbon in the replacing land use leads to the overestimation of (long-term net) emissions from deforestation.

Assessing emissions from forest degradation

Summary of submissions. Relatively clear procedures have been established for assessing deforestation, but this is not the case for assessing emissions from forest degradation. Countries proposed various approaches (Table 5); the choice of approach depended on the type of degradation (e.g. what was driving it) and the availability of (high-resolution) satellite imagery, data on timber, woodfuel and fire, and national capacities for analysing available data.

Although data sources for AD and EFs for deforestation were usually clearly separate (i.e. area estimates versus carbon stock estimates), this was often not the case for forest degradation, with some data sources providing the basis for both AD and EFs (e.g. extracted wood volumes of timber species). For approaches using remote sensing, the underlying assumption was that forest degradation can be assessed by changes (or changes of degradation proxies) detected in satellite imagery (e.g. changes in canopy cover); this assumption may not hold for all forms of degradation. Some countries used data collected in NFIs; for example, Mongolia measured the average carbon stock in disturbed and intact forests and calculated the EF for degradation as the difference between the two values. AD were collected by interpreting sample data for the occurrence of disturbance events (i.e. grazing, pest outbreaks and fire) to estimate the area of degraded forest. Other data collected in NFIs used to estimate forest degradation included stump counts and the comparison of multiple NFI cycles (or, if available, permanent sample plots) to estimate increases and decreases in carbon stock in forest land that remained as forest land. Many countries assessed degradation only partially; for example, Cambodia indicated that it only assessed degradation if this resulted in a change in forest subcategory, and degradation within the same subcategory was therefore not assessed. Nepal only included degradation due to woodfuel collection (and not from grazing or fire).

Table 5. Methodologies proposed in FREL/FRL submissions for assessing forest degradation

Methodology	Country
Combination of remote sensing and ground inventories	Cambodia, Chile, Indonesia, Uganda*
Combination of remote sensing and ground inventories + multiple national forest inventory cycles	Viet Nam
Combination of remote sensing and ground inventories + stump counts from national forest inventories	Lao People's Democratic Republic*
Official timber extraction statistics	Congo, Ghana,* Guyana, Suriname*
Sample data interpretation of disturbance or changes in forest subdivisions and ground inventories	Mongolia,* Panama,* Papua New Guinea

Modelling supply–demand balance (WISDOM)	Ghana,* Nepal
Proxy statistics (monitoring log truck numbers)	Ghana*
MODIS burned area and IPCC default values	Ghana,* Chile
Comparison of permanent sample plots	(Mexico – in annex, degradation was not included in FREL)

Notes: Fourteen submissions (of 38) included degradation. * Countries with ongoing TAs; scope may still change.

TA responses. For countries that assessed forest degradation using emissions occurring in logging without subtracting post-harvest regrowth, TAs noted *accounting for post-disturbance forest recovery* as an area for improvement to avoid overestimating what the atmosphere "sees" when emissions are reduced. When a REDD+ activity was disaggregated by driver (e.g. the assessment of degradation due to timber extraction but not other drivers), TAs identified the need for the *estimation of emissions from other drivers of forest change*. For some countries that omitted forest degradation, TAs identified *the collection of data on forest degradation (possibly including, as interim steps, proxy or subnational data)* as an area for improvement. Some TAs suggested that this information could improve understanding of the relationship between deforestation and forest degradation (including any risk of displacement of emissions among activities) and facilitate the assessment of the significance of forest degradation in future FREL submissions.

Assessing removals from carbon stock enhancement

Summary of submissions. Roughly one-third of the countries that submitted FREL/FRLs included the enhancement of forest carbon stocks (Figure 6); all those countries included afforestation but only a few included enhancement in forest land remaining as forest land. For estimating the enhancement of forest carbon stocks in forest land remaining as forest land, the approach usually consisted of a combination of remote sensing and ground inventories (e.g. Cambodia, Chile and the Lao People's Democratic Republic), in one case (Viet Nam) combined with the comparison of multiple NFI cycles. Costa Rica used data on the age structure of secondary forest to estimate removals from growing secondary forests by applying growth models.

For afforestation, countries made various assumptions for estimating the removals associated with growing forest. Some countries (e.g. Ethiopia and Mongolia) approximated removals as the opposite of EFs – that is, they assumed that full carbon stock had been attained at the time the new forest land was detected. Justifications for this choice include the following: transparency of accounting; new forest land is only detected when it is already of considerable age (Ethiopia); and the average carbon stock used for "full carbon stock" includes a range of forest conditions, including those of growing forests (Mongolia). Other countries (e.g. Côte d'Ivoire, Nepal and Sri Lanka) applied growth rates to afforested lands, starting in the first year of the historical reference period and including linear growth in subsequent years. This approach does not consider growth in plantations established before the first year of the historical FRL period and therefore results in higher removals (Table 6). It also means that the longer the historical period chosen, the higher the average removals will be in the FRL. These countries either used IPCC default growth factors, country-specific increment values, or NFI-derived forest carbon stocks, divided by the number of years it is expected to take the forest to reach maturity.

Table 6. Fictitious example of incremental accounting of growth in plantations established during an FRL historical period

		Removals per year over the FRL period									
		2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Year in which plantation was established	**2005**	10 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000
	2006		10 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000
	2007			10 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000
	2008				10 000	10 000	10 000	10 000	10 000	10 000	10 000
	2009					10 000	10 000	10 000	10 000	10 000	10 000
	2010						10 000	10 000	10 000	10 000	10 000
	2011							10 000	10 000	10 000	10 000
	2012								10 000	10 000	10 000
	2013									10 000	10 000
	2014										10 000
	Total	**10 000**	**20 000**	**30 000**	**40 000**	**50 000**	**60 000**	**70 000**	**80 000**	**90 000**	**100 000**

Note: The example assumes linear growth and a linear increase in afforested area.

One country (Papua New Guinea) used a zero value for afforestation because no activities on carbon stock enhancement were detected during the historical reference period.

TA responses. Where countries assumed that the full carbon stock was attained at the moment afforestation was detected, TAs suggested that this could result in the overestimation of removals and encouraged countries to apply *annual increments or a method that would better reflect removals from forest area gain* in a function of the time from the onset of the activity. Countries that calculated incremental removals (as shown in Table 6) all proposed the average of historical removals (thus not projecting a linear increment over the results reporting period). TAs did *not comment on the use of a historical average of incremental removals*. On the use of a zero value for historical removals where historical data detected no activity, TAs noted *improvement of the methods for the estimation of enhancement of forest carbon stocks* as an area for improvement. Other areas for improvement concerned *more robust data on age-class distribution and the revision and increase of sample plots for more representative growth estimates over time*.

2.5 Uncertainty analysis

UNFCCC guidance. The methodological guidance on REDD+ provided by the UNFCCC asks countries to provide estimates that are accurate, as far as practicable, and that reduce uncertainties.[16]

Summary of submissions. There is a positive trend in the inclusion of uncertainty estimates around reported numbers in FREL/FRLs, especially for AD estimates (Figure 16). Sixty-seven percent of the 2018 FREL/FRL submissions included uncertainty estimates around AD, and 83 percent included uncertainty estimates around EFs. By comparison, although the share of countries that reported uncertainties around EFs in 2015 was roughly the same (4 percent less) as in 2018, the reported uncertainty around AD increased more than fivefold, growing from 13 percent in 2015 to 67 percent in 2018 (Figure 16).

[16] UNFCCC Decision 4/CP.15, paragraph 1(d)(ii) asks that Parties establish, according to national circumstances and capabilities, robust and transparent NFMSs that provide estimates that are transparent, consistent, accurate (as far as possible), and that reduce uncertainties, taking into account national capabilities and capacities.

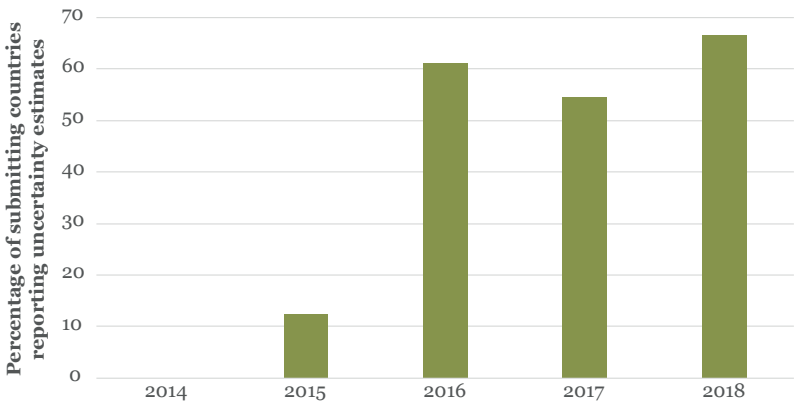

Figure 16. Percentage of submissions that include uncertainty estimates (i.e. confidence intervals) around activity data used for FREL/FRLs

Notes: Some countries provided uncertainty estimates without calculating them. For example, one country estimated uncertainty and another derived an uncertainty estimate based on overall map accuracy. Also, some countries provided uncertainty on AD but not for all activities (e.g. uncertainty was provided for deforestation but not for degradation).

Uncertainty estimates in FREL/FRL submissions have most frequently been provided for EF estimates (Figure 17), typically by including sampling errors for carbon stock estimates obtained from (national) forest inventory data. Uncertainty estimates for AD have been reported less frequently, which may partly be explained by the fact that, especially in early submissions, countries reported pixel counts (which do not allow the calculation of confidence intervals). In 2018, several countries that did not include uncertainty estimates for AD or EFs included information on uncertainties for some elements, such as the range of confidence values for forest inventory data, overall map accuracy or qualitative information on the sources of uncertainty in AD.

Uncertainty estimates in the FREL/FRL submissions are not directly comparable due to the use of different methodologies, reporting at different confidence levels (e.g. 90 percent versus 95 percent), and the inclusion of different sources of error. In addition, some countries provided uncertainty estimates without calculating them (approximating or estimating uncertainties). The inclusion of more sources of error is likely to lead to increases in estimated uncertainty. Thirteen countries provided overall uncertainty estimates for their FREL/FRLs, although a few assessed this from error propagation for EFs only and did not take into account uncertainties in AD. Overall, reported confidence values for FREL/FRLs were in the range of 1.55–34 percent.

In previous years, much effort has been made to support countries in uncertainty analysis through the Global Forest Observations Initiative's Methods and Guidance Documentation (GFOI, 2016) and implementing agencies such as Silvacarbon, FAO and the World Bank. Further guidance on this aspect of the reporting was published recently (GFOI, 2018). Box 2 outlines possible sources of error in EFs and AD.

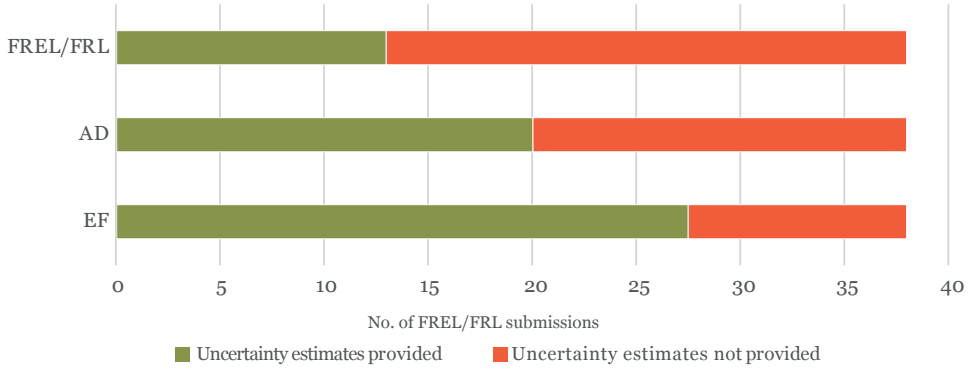

Figure 17. Number of submissions in 2018 providing uncertainty estimates around emission factors, activity data and overall emissions in FREL/FRLs

Box 2

Sources of error in estimates of emission factors and activity data

According to the IPCC, estimates should be accurate, meaning they should not systematically overestimate or underestimate true values, as far as can be judged (i.e. systematic errors and bias should be removed). Errors that result in random variation can be considered to balance each other out when scaling up from smaller resolutions (e.g. from tree level in the case of inventories and from sensor level in the case of satellite data) to final national and subnational estimates.

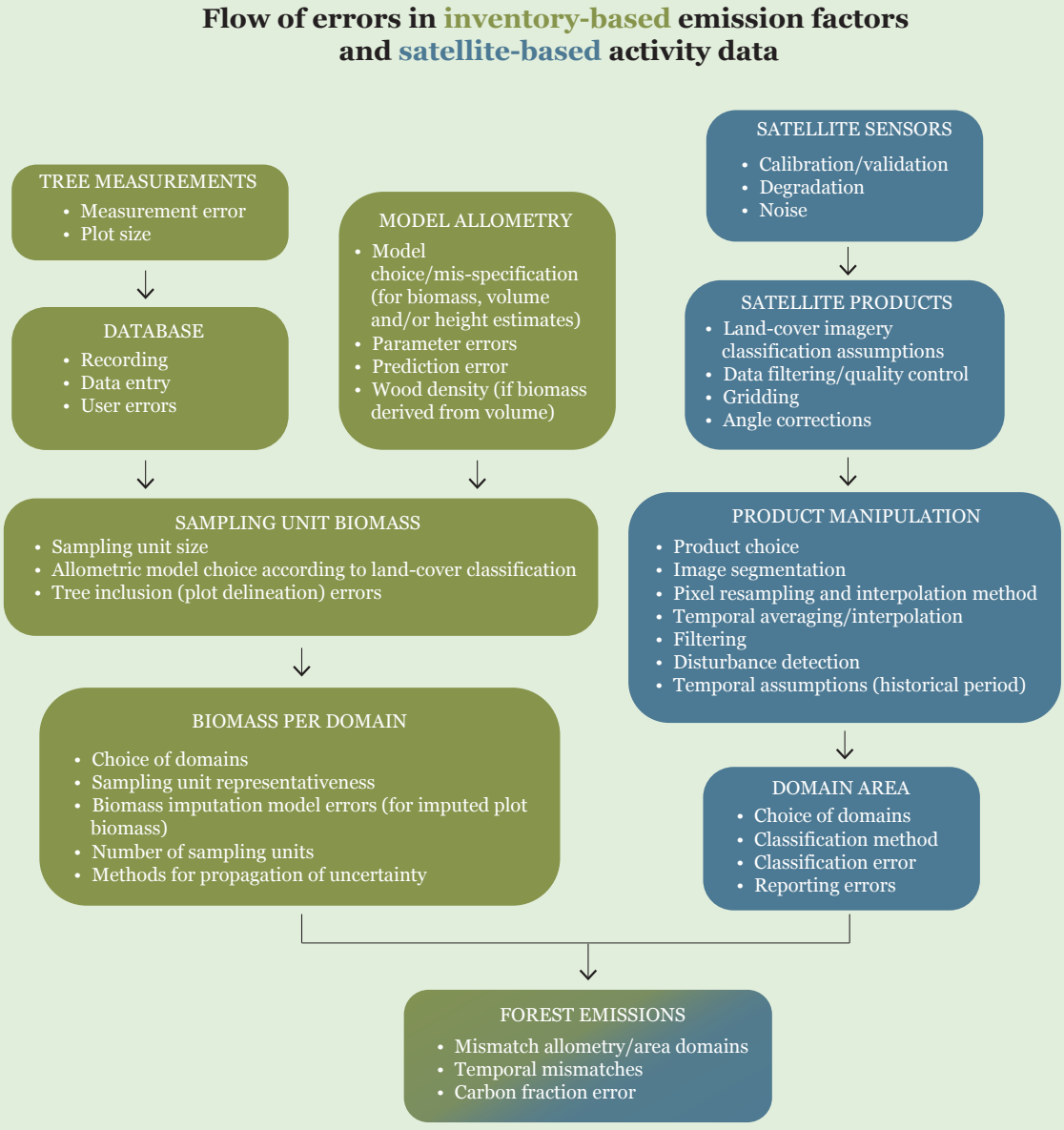

Figure 18. Comprehensive list of potential sources of error typically arising in the processing chain to calculate emission factors, activity data and total carbon reported by countries

Note: Green routes are defined exclusively by inventory data. Blue routes are followed by satellite data processing. The blue–green box stems from the combination of inventory-based EFs and satellite-based estimates of AD.

Source: Modified from Hill *et al.* (2013).

For estimating emissions from deforestation, countries typically combine EFs derived from field inventory data and AD derived from satellite products. Figure 18 shows a comprehensive list of potential errors involved in the AD and EF calculation process, from equipment-related precision errors to database, model-building, sampling and detection errors. Systematic errors may occur at several locations in Figure 18. For example, tree-height measurements may be overestimated if assessors stand too close to the trees when estimating height with angle-gauge methods.

Ensuring adequate representativeness in sampling design will reduce systematic errors, and controlling other errors will reduce the random component of uncertainty structure, thereby increasing precision (Birdsey *et al.*, 2013). Adequate quality control and assurance should be in place to eliminate or minimize systematic errors in final subnational and national estimates.

TA responses. Many TAs identified *including (quantitative) uncertainty estimates* to improve the accuracy of estimates in future FREL/FRLs as an area for improvement. Some countries provided only partially complete uncertainty estimates, in which case TAs indicated the *coverage of additional sources of error in uncertainty estimates* as an area for improvement.

2.6 Consistency of FREL/FRLs with greenhouse gas inventories

UNFCCC guidance. FREL/FRLs should maintain consistency with GHG inventories (i.e. those contained in national communications and BURs).[17]

Summary of submissions. Many FREL/FRL submissions included a section explaining how the data and methodologies used related to those in the most recently submitted national communication or BUR. In many cases, countries collected new, improved data for their FREL/FRLs, sometimes leading to (large) differences with the latest (often old) GHG inventory. In such situations, countries usually indicated that this new data would be included in future GHG inventories (Box 3).

Box 3

Differences between greenhouse inventories and FREL/FRLs

There are some fundamental differences between GHG inventories and FREL/FRLs. GHG inventories are intended to provide comprehensive estimates of GHG fluxes, while FREL/FRLs are benchmarks for assessing REDD+ performance, often in the context of receiving finance. As such, GHG inventories should neither overestimate nor underestimate GHG fluxes, while FREL/FRLs in the context of receiving finance may consider the concept of conservativeness.* GHG inventories report based on land-use (sub)categories, while FREL/FRLs report by REDD+ activities, which do not necessarily match (as discussed in section 2.6). Generally, GHG inventories aim to be as complete as possible (filling data gaps with Tier 1 estimates), while FREL/FRLs may use a step-wise approach (only including pools and activities for which robust and reliable data are available) or, in the interim, report at the subnational scale. For these reasons, overall net emissions/removals from forests are unlikely to be the same in GHG inventories and FREL/FRLs, although this doesn't necessarily imply inconsistency between them.

* When accurate estimates cannot be achieved, the concept of conservativeness suggests that countries should provide estimates that do not overestimate ERs or which reduce the risk of overestimation.

[17] UNFCCC Decision 12/CP.17: "maintain consistency with anthropogenic forest related GHG emissions by sources and removals by sinks as contained in each country's GHG inventories" and "the information provided [on FREL/FRLs] should be guided by the most recent IPCC guidance and guidelines, as adopted or encouraged by the COP, as appropriate …", p.8.

TA responses. For several countries, TAs noted that *overall, the FREL/FRL maintains consistency, in terms of sources for the AD and the EFs, with the GHG inventory* and suggested that countries *add pools/ gases to increase consistency with the GHG inventory*.

2.7 Construction approaches and adjustments

UNFCCC guidance. Countries should establish FREL/FRLs transparently, taking into account historical data, and adjust for national circumstances.[18]

Summary of submissions. Most countries (78 percent) chose a simple historical average as the construction approach for their FREL/FRLs (Figure 19). Five countries (13 percent) submitted linear projections of historical emissions (based on 2–14 emission data points), and four countries (10 percent) made adjustments to their FREL/FRLs. Most countries proposing linear trend extrapolations or upward adjustments were high-forest-cover, low-deforestation (HFLD) countries.

Some countries that proposed a simple historical average included information on how future FREL/FRLs would be calculated. Some countries proposed a "rolling average" (maintaining the same length of historical period and updating the start date), and others proposed a "dynamic mean" (maintaining the same start date and increasing the length of the historical period).

Colombia proposed a 10 percent upward adjustment of historical average emissions; the justification for this was that a successful peace process would bring new economic activity to the Amazon region. Guyana proposed an adjustment based on a global emissions rate for tropical countries. The Congo proposed an adjustment based on government development plans for envisioned macro-agricultural concessions. Viet Nam proposed an adjustment based on historical removals, with the justification that a 5 million ha afforestation government programme had ended. Adjustments have been identified as particularly important in the context of RBPs, as illustrated by existing pilots: the GCF pilot (see annex) and the Forest Carbon Partnership Facility (FCPF)'s Carbon Fund do not provide RBPs for countries proposing adjustments to their FREL/FRLs, with the exception of HFLD countries, which may propose limited adjustments (see section 4.3).

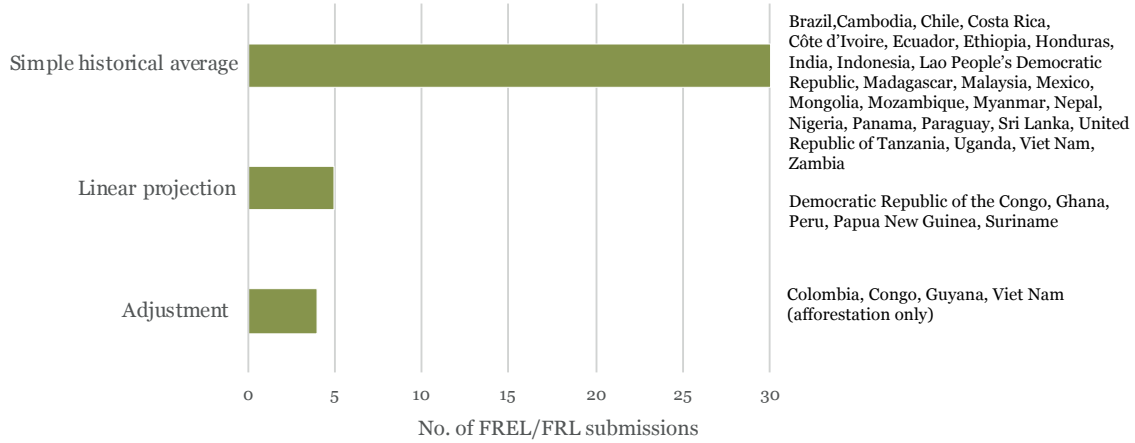

Figure 19. Construction approaches chosen for FREL/FRLs
Note: There was a total of 38 FREL/FRL submissions.

TA responses. TAs generally did not provide specific comments when countries chose a historical average of emissions/removals for their FREL/FRLs. One country changed from a dynamic mean to a rolling average, and the TA noted that *when historical data show a clear trend, a rolling average of historical data on*

[18] UNFCCC Decision 4/CP.15, p.7.

emissions and removals can more appropriately reflect counterfactual emissions/removals. For countries that proposed a *linear trend extrapolation,* TAs requested *additional information on the goodness of fit* and noted that other regression models may be constructed with the same data yielding different results. Moreover, TAs suggested that countries provide *additional information on national circumstances, future policies, changing socio-economic factors and drivers of deforestation and forest degradation* that support the linear extrapolation. Similarly, when countries proposed an adjustment, TAs asked for *robust information on the relationship between national circumstances and the quantified adjustment* to FREL/FRLs. On Guyana's combined approach adjustment, for example, the TA stated that *there should be more clarity as to how the average deforestation emissions of developing countries as a whole are related to Guyana's future emissions* and that in future FREL/FRL submissions, *a clearer link should be made to national circumstances*.

2.8 Historical reference and validity periods

UNFCCC guidance. Countries should take into account historical data, but no guidance is provided under the UNFCCC on the length of the reference period. Countries should update their FREL/FRLs periodically, as appropriate.[19]

Summary of submissions. The length of the historical reference periods used in the FREL/FRLs varied widely – from 8 to 22 years (Figure 20). Starting dates ranged from as early as 1986 (Costa Rica) to as recent as 2006 (Cambodia, Panama and Zambia). Many countries chose 2000 as the starting date or, in more recent submissions, 2005.

Countries provided different motivations for their choice of reference period. Some countries referred to existing guidance in the FCPF Methodological Framework[20] and the GCF pilot for RBPs[21] (see annex). Brazil and Ecuador chose end dates for their reference periods that coincided with the point at which they considered REDD+ implementation to have started in their countries; for example, Ecuador's reference period ended in 2008, the year in which a constitutional change marked the start of the implementation of a new forest policy. Some countries chose reference periods based on data availability. For the same reason, reference periods may differ between REDD+ activities – Chile, for example, has a longer time series available for deforestation than for degradation – and between jurisdictions – the United Republic of Tanzania, for example, has chosen different reference periods for Zanzibar and the mainland, based on data availability.

In some instances, countries specified validity periods for their FREL/FRLs for accounting for REDD+ results. The longest validity periods were proposed by Costa Rica (2010–2025) and Panama (2016–2035); the most common length of the validity period was five years. Some countries did not specify a validity period for their FREL/FRLs.

TA responses. In general, TAs did *not comment on the choice of reference or accounting period* by countries. After its TA, Malaysia revised its reference period to a later starting date so that it coincided with the year a revised national forest policy was implemented, thereby ensuring that the period reflected management practices resulting from this policy.

[19] UNFCCC Decision 12/CP.17, p.12.
[20] The starting date for reference periods is about ten years before the end date. An alternative starting date may be allowed only if there is convincing justification and if it is not more than 15 years before the end date (FCPF, 2016).
[21] The GCF pilot for RBPs gives the highest score to a reference period of 10–15 years.

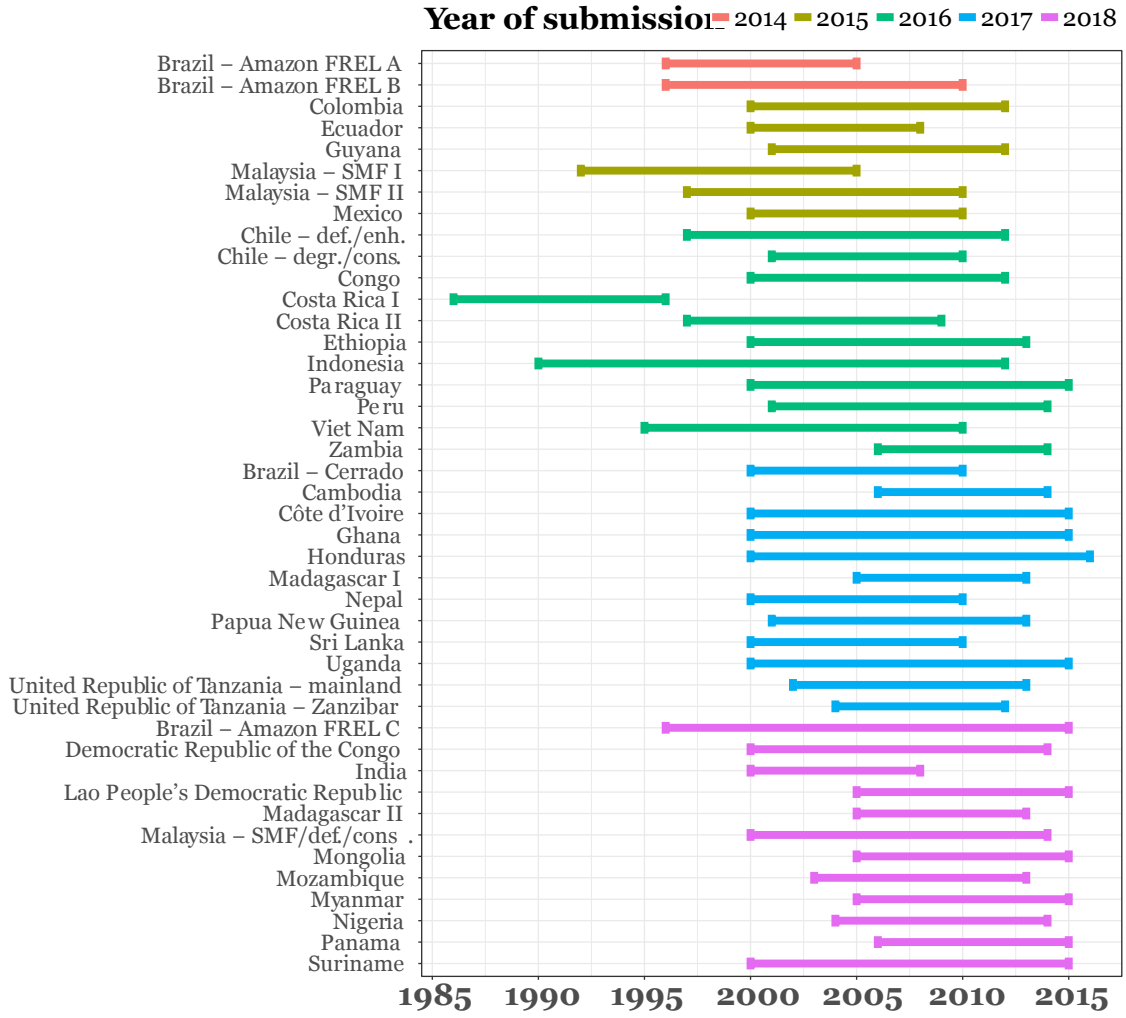

Figure 20. Overview of FREL/FRL historical reference periods proposed by countries

2.9 Proposed FREL/FRLs

Technically assessed FREL/FRL values varied greatly. For emissions, they varied between 0.4 megatonnes of CO_2 equivalent per year ($MtCO_2eq/yr$) (Nepal's FREL for degradation) and 1 181.6 $MtCO_2eq/yr$ (the Democratic Republic of the Congo's FREL). For removals, values varied between 0.048 $MtCO_2eq/yr$ (Mongolia) and 225 $MtCO_2eq/yr$ (Malaysia). There was variation in the way countries reflected their FREL/FRL values. Some (e.g. Chile and Nepal) indicated separate values for each REDD+ activity, resulting in 3–4 FREL/FRL values. Others (e.g. Costa Rica and Côte d'Ivoire) indicated a single net value for emissions and removals. Yet other countries summed their emitting activities (e.g. Guyana, the Congo and Indonesia) or used a positive value for the FREL and a negative value for the FRL, either from single activities (e.g. Ethiopia and Sri Lanka) or as the sum of multiple activities (e.g. Viet Nam). Countries that proposed a historical average or adjustment used the same value over the results reporting period, with the exception of Indonesia, which used incremental values due to delayed emissions from soil.

2.10 Changes countries have made as a result of technical assessments

As a result of the TAs, almost all countries submitted modified FREL/FRLs, sometimes only providing more and improved information to increase the transparency of their submissions (although 76 percent of finalized TAs resulted in modified FREL/FRLs). FREL (emission) values were reduced in 57 percent of TAs and increased for 19 percent. On average, FREL values were reduced by 5 percent as a result of the TAs.[22]

[22] The average of the percentage change per country, so not weighed by FREL values.

For proposed FRL values (removals), all were modified as a result of TAs: values were increased (meaning removals were smaller) in 60 percent of cases and reduced in 40 percent of cases. On average, FRL values were increased by 19 percent. TAs tended to result in more conservative estimates for FRELs.

Changes in FREL/FRL values were the result of corrections in the data or the use of improved data (e.g. including new results that became available after the initial submission). For example, Paraguay replaced its pixel-count estimate of AD in its initial submission with an SAE in its modified submission, and Côte d'Ivoire replaced IPCC default values for AGB in its initial FRL submission with field inventory data collected in 2016–2017, also adding DW from this field data, which was not reported in the initial submission. Changes in the scope of activities, pools or GHGs may occur as a result of discussions with TA teams. For example, some countries (Brazil and Madagascar) added non-CO_2 emissions from fires as a result of TAs, arguing that this was to increase consistency with GHG inventories. On the other hand, if data were insufficiently robust or could lead to overestimates of emissions, some TAs suggested that countries should omit an activity or pool and report the information in an annex. As a result of TAs, Nepal moved an estimate of degradation from grazing to an annex; Chile omitted soil; and Mexico omitted L. To avoid overestimating emissions in its FREL, Viet Nam changed the way it accounted for the conversion of natural forest to plantations: in the initial submission it calculated full carbon loss but, in the modified submission, it calculated the actual EF (i.e. the difference between the carbon stock in natural forests and that in plantations).

3 Summary of REDD+ results reported to the UNFCCC

UNFCCC guidance. REDD+ results can be reported in a technical annex to a country's BUR. Results need to be consistent with the technically assessed FREL/FRLs and, as far as possible, they need to be accurate and reduce uncertainties. Moreover, the information needs to be transparent, allowing the reconstruction of results. Technical annexes need to provide a description of NFMSs and the institutional roles and responsibilities for measuring, reporting and verifying the results.[23]

Summary of submissions. As of March 2018, the UNFCCC had received five REDD+ results submissions from four countries (Table 7 and Figure 21). Together, these sum to 6.28 billion tCO_2 of ERs obtained between 2006 and 2015. Most (98 percent) of these ERs were associated with deforestation, with only one country (Malaysia) submitting results from another REDD+ activity (SMF). Brazil and Colombia submitted subnational results (both for the Amazon biome), and Ecuador and Malaysia submitted national results. Brazil submitted results for two consecutive periods (2006–2010 and 2011–2015) in its first and second BURs, respectively. Both results were reported against the same FREL submission (in 2014), which contained two FRELs for the two subsequent results periods. Colombia is the only country to date to have submitted REDD+ results against a FREL with an upward adjustment.

Table 7. Overview of REDD+ results submitted to the United Nations Framework Convention on Climate Change

	Brazil (Amazon A)	Colombia	Ecuador	Malaysia	Brazil (Amazon B)
Results period	2006–2010	2013–2014	2009–2014	2006–2010	2011–2015
Duration of results period (years)	5	2	6	5	5
Result ($MtCO_2eq$)	2 971	28.9*	29.0	97.5	3 155
Average annual result ($MtCO_2eq/yr$)	594	14.5*	4.8	19.5	631
Area covered by FREL/FRL (million ha)	419.7	45.9	24.9	12.3–13.0	419.7

* The LULUCF experts "are of the view that the changes to the national circumstances justifying the adjustment upwards by 10 per cent should not apply to the results reported for 2013–2014" and note "the results for 2013–2014 should be considered relative to this conclusion". The reason for this is that the condition identified by Colombia to apply the adjustment was the ratification of the peace process prior to the result period.

[23] UNFCCC Decision 14/CP.19.

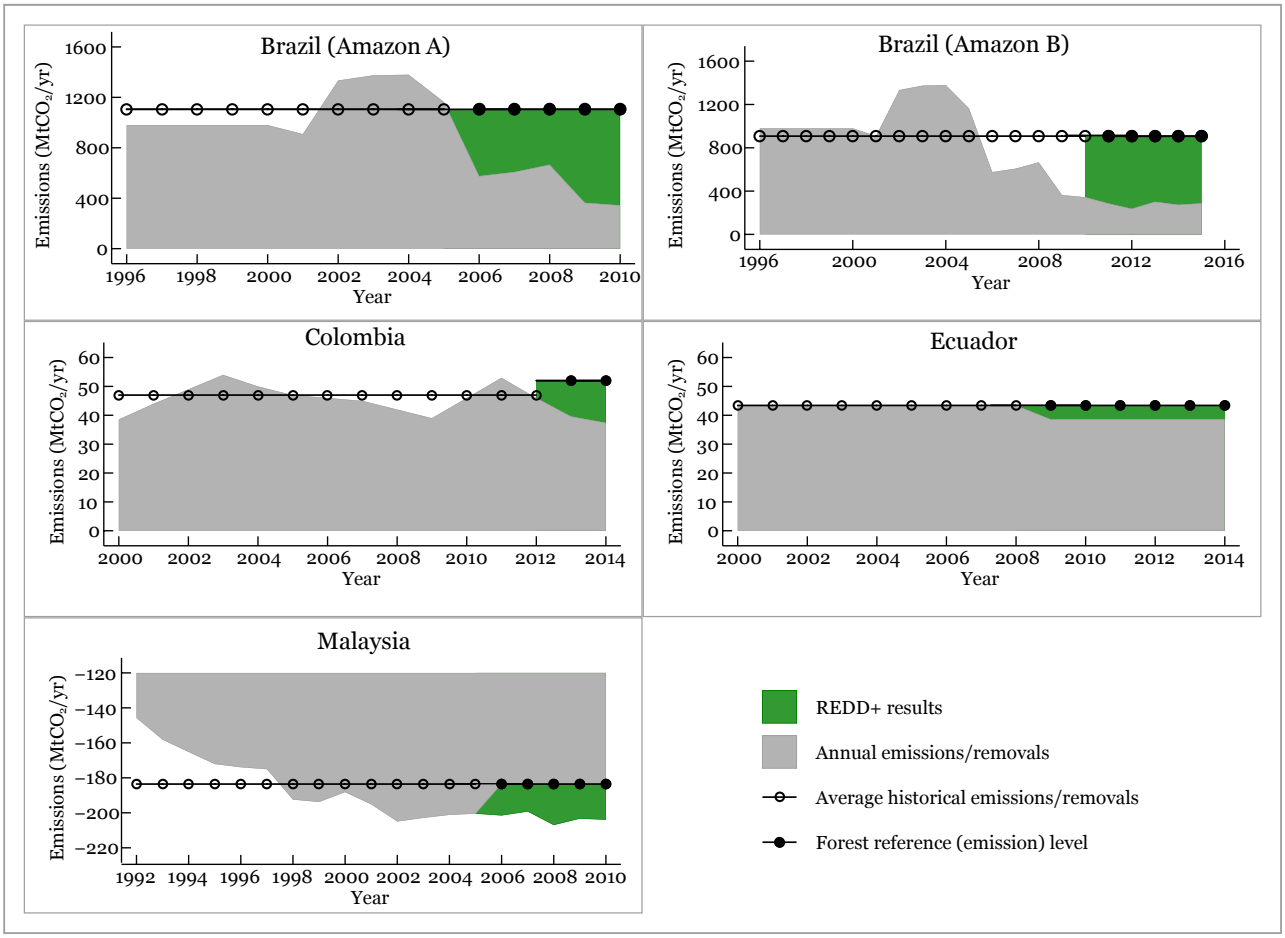

Figure 21. Overview of FREL/FRLs with REDD+ results reported against them

Technical analysis and areas for improvement. The technical report of the technical analysis of the BUR technical annex with REDD+ results (TATR) assessed the following: consistency between the FREL/FRL and REDD+ results (section IIB1 of TATRs); whether the information is transparent, consistent, complete and accurate (section IIB2); whether the information includes all elements suggested by the UNFCCC COP guidelines (section IIB3); and whether the results are accurate (section IIB4). The TATRs usually confirmed the areas for improvement identified by FREL/FRL TAs and sometimes proposed additional areas for improvement. Many of the areas for improvement identified in the TATRs focused on accuracy – that is, reducing the probability of overestimating and underestimating ERs.

Common areas for improvement identified in the TATRs were the following:

- Include uncertainty analysis (Brazil, Colombia, Ecuador and Malaysia).
- Expand coverage of REDD+ activities, notably degradation for Brazil, Colombia and Ecuador, which included deforestation only, and deforestation for Malaysia, which included SMF only.
- Expand coverage of pools (Brazil and Colombia).
- Address treatment of non-CO_2 gases (Brazil and Colombia).
- Monitor displacement and/or move from subnational to national coverage (Brazil and Colombia).
- Improve the accuracy of EFs, including ground inventory data from NFIs (Brazil and Colombia) and verification of applied biomass increment rates (removal factor) (Malaysia).
- Improve the accuracy of AD (Brazil, Ecuador and Malaysia).
- Implement quality assurance and quality control procedures (Colombia, Ecuador and Malaysia).

Malaysia's areas for improvement were somewhat different in character to those of Brazil, Colombia and Ecuador because a different REDD+ activity was covered (SMF as opposed to deforestation). Brazil is the only country to date to have two TATRs for two consecutive REDD+ results submissions. Both TATRs for Brazil noted the same areas for improvement, although the second TATR reported remarkable progress in these areas and encouraged Brazil to use such improvements in future FREL/FRL and results submissions. The second TATR added additional areas for improvement. Colombia is the only country to date to have submitted results against an adjusted FREL. Colombia's adjustment took into account the prospect of successful negotiations to end an internal armed conflict. Because the signing of the peace agreement took place in 2016, the land use, land-use change and forestry (LULUCF) experts considered that the changes in national circumstances, which justified the upward adjustment by 10 percent, should not apply to the results reported for 2013–2014.[24] Colombia received, as an area for improvement, the suggestion of conducting more in-depth research and analysis to justify the adjustment for national circumstances depending on actual developments.

When countries submit a REDD+ national strategy or action plan (NS/AP) and a summary of safeguard information to the UNFCCC, in addition to their FREL/FRLs, the technically assessed REDD+ results are published on the UNFCCC website, Info Hub.[25] Info Hub also publishes ER quantities that have been paid for and indicates the entities paying for results.

[24] Colombia presented an account of relevant milestones in the peace process and explained that the social and environ mental effects of that process began before the actual signing of the peace agreement.

[25] http://redd.unfccc.int/info-hub.html

4 REDD+ reporting in the broader context

This chapter discusses how REDD+ reporting relates to national REDD+ strategies and NDCs and discusses the role of FREL/FRLs and REDD+ results submissions to the UNFCCC in accessing RBPs.

4.1 National REDD+ strategies and REDD+ reporting

Conceptually, there is a clear relationship between REDD+ reporting and a country's mitigation efforts under their REDD+ NS/APs. NFMSs should be designed to track performance in the implementation of those strategies; the FREL/FRLs are the benchmarks against which results are measured; and BUR technical annexes report on REDD+ results.

Thus, the design choices for NFMSs and FREL/FRLs need to be understood in the context of REDD+ NS/APs. An alignment between REDD+ reporting and strategies is not automatic, not least because, often, different teams work on these components at the country level. Achieving alignment requires regular communication and feedback loops in the development and implementation of the components.

To date, the NS/APs of three countries have been published on Info Hub. All refer to the FREL/FRLs, sometimes using them to quantify targets or potential ERs. Ecuador has set a quantitative target for the REDD+ strategy of 20 percent gross ERs by 2025 measured against the submitted FREL.[26] Malaysia's REDD+ NS does not indicate quantitative targets against the submitted FRL, but it does specify potential ERs against the FRL as follows: 3–6 $MtCO_2eq/yr$ for reduced deforestation; 5–9 $MtCO_2eq/yr$ for conservation; and 6–22 $MtCO_2eq/yr$ for SMF (Ministry of Natural Resources and Environment Malaysia, undated). Brazil also provides quantitative targets, but these are not expressed against the FREL.

REDD+ reporting design choices (e.g. on scope, scale and forest definition) should be informed by NS/APs. In addition to including significant REDD+ activities (as suggested by UNFCCC decisions), countries may select REDD+ activities based on their national mitigation priorities. The scope of REDD+ reporting for Papua New Guinea and Sri Lanka, for example, was directly informed by REDD+ actions included in their REDD+ NS/APs. Both countries included estimates for afforestation in their FREL/FRL submissions (enhancement of forest carbon stocks) because they are investing in this activity as part of their REDD+ NS/APs; for example, Papua New Guinea referred to a policy targeting the establishment of 800 000 ha of tree plantations. Both Papua New Guinea and Sri Lanka face challenges in assessing historical data for this activity. Papua New Guinea included it as a zero value because *no activity on carbon stock enhancement was detected during the historical reference period*. Sri Lanka included it despite large confidence intervals, indicating that existing country data do not allow precise estimates.

Malaysia's first FRL submission included SMF, which Malaysia explained is an important activity in view of the country's REDD+ NS. The FRL submission included an intention to assess results from improved forest management in production forests, such as a cap on harvest volumes and the implementation of the Malaysian Criteria and Indicators for Sustainable Forest Management. Brazil also made specific reference to its NS in its modified 2018 FREL submission for the Amazon: *During the period from 2004 until 2011, the decrease in gross deforestation has been mostly attributable to Environmental Monitoring and Control actions, due to the implementation of the Deforestation Detection at Almost Real Time (DETER) integrated with planning and supervision. Land Tenure and Territorial Planning were also key areas for achieving results during this period, through the establishment of Conservation Units and demarcation of Indigenous Lands.*

[26] See http://suia.ambiente.gob.ec/web/suia/red

It can be challenging for countries to fully align the scope of their FREL/FRLs with the REDD+ activities identified in their NS/APs. For example, Nepal stated in its FRL submission that community-based forest management practices, especially community forestry and pro-poor leasehold forestry programmes, are considered to significantly contribute to enhancement on forest land remaining as forest land. Although recognizing this importance, the related REDD+ activity of enhancement of forest carbon stocks could not be included in the FRL because of the lack of nationally representative data. In its FRL submission, Nepal recognized that omitting enhancement on forest land would result in the underestimation of removals and therefore the underestimation of results in this activity. Nepal's case illustrates the challenges of fully aligning REDD+ NS/APs and FRLs.

The scale at which a country starts the implementation of REDD+ actions often influences the scale of initial FREL/FRLs (national versus subnational). Several countries (e.g. Nepal and Papua New Guinea) indicated that the choice of a national FREL/FRL was based on the REDD+ NS/AP to be implemented at the national scale, such as through policies with national impacts. Other countries have chosen to set interim subnational FREL/FRLs because implementation may be piloted at this scale (e.g. in Nigeria's Cross River State).

4.2 Nationally determined contributions and REDD+ reporting

Under the Paris Agreement on climate change, all countries (with flexibility for least-developed countries and small-island developing states) are to contribute to global climate mitigation by achieving NDCs.[27] The Paris Agreement confers significant momentum on REDD+ and overall mitigation in the land-use sector, with REDD+ explicitly mentioned in its Article 5. Seventy-seven percent of NDCs contain actions in LULUCF, some including REDD+ actions, to achieve mitigation contributions (second only to the energy sector), and agriculture is referenced in 73 percent of all NDCs (FAO, 2016b).

Nearly all major forest countries (by forest area, deforestation rate or restoration potential) have included forest-related mitigation targets in their NDCs, with varying levels of ambition (Petersen and Braña-Varela, 2015). Some countries have stated that their mitigation efforts in the forest sector will be coordinated through REDD+ initiatives (UNFCCC, 2016). Table 8 provides information on the reporting process under the UNFCCC for REDD+, including intended nationally determined contribution (INDC)/NDC submissions. All 34 countries that have submitted FREL/FRLs have also submitted INDCs and almost all (30 of 34) have submitted NDCs.

Countries that have submitted FREL/FRLs largely also included forests in their NDCs, and some countries consider their REDD+ activities to be important in their NDCs for adaptation.[28] Most countries quantified their mitigation contributions against business-as-usual projections, while FREL/FRLs often relied on historical averages. A few countries (e.g. Brazil and Malaysia) used a base year in their NDCs. Some quantified their contributions in absolute terms, such as through a zero-deforestation target by 2030 (Mexico) and the intention to plant 1 million ha of forest before 2030 (Honduras). Chile is one of the few countries that has explicitly separated its LULUCF-sector target from its national mitigation commitment because of the LULUCF sector's high annual variability and its low dependence on economic growth. Thus, Chile's non-LULUCF target is expressed against 2007 as the base year and its LULUCF-sector target is expressed in absolute terms (i.e. the restoration of 100 000 ha of forest by 2030).

Direct comparisons between the estimated emissions in NDC baselines for LULUCF and the FREL/FRLs are difficult for the same reasons that FREL/FRLs often cannot be compared directly with GHG inventories: the scope and scale are rarely the same (Lee and Sanz, 2017) and, often, the NDC is longer-term (e.g. up to 2030) than the FREL/FRL results reporting period.

[27] Decisions 1/CP.19 and 1/CP.20 invited countries to communicate their INDCs to the UNFCCC Secretariat. INDCs were converted to NDCs after ratification, unless countries chose to revise them (e.g. Indonesia). By 1 March 2018, 169 of the 195 signatories to the Paris Agreement had ratified the agreement and submitted their NDCs.

[28] Of the 34 countries that submitted FREL/FRLs, 26 (76 percent) also included forests explicitly in the adaptation component (e.g. Honduras and Mexico).

Many countries expressed unconditional and conditional targets in their submitted NDCs. For example, Indonesia indicated a target of reducing emissions by 29 percent unconditionally, or up to 41 percent conditionally, by 2030 against a business-as-usual projection. Several countries (e.g. Cambodia, the Congo, the Democratic Republic of the Congo and Suriname) included REDD+ as part of their conditional contributions, and others included SMF and the implementation of forest policies or laws as their unconditional contributions or without clearly specifying whether this was conditional. For many countries, there was some overlap; for example, Guyana indicated its unconditional contribution as continuing and improving sustainable forest management without quantifying the target, and it quantified its conditional contribution through reduced impact logging as a 20 percent reduction of historical emissions from forest degradation. As part of their mitigation contributions, a few countries specified REDD+ as a means of implementation for the forest sector (Brazil and Uganda); and the implementation of the REDD+ NS/AP (Côte d'Ivoire) or forestry strategy (Lao People's Democratic Republic).

To date, although many countries include forests in their NDCs, most have not specified whether (and, if so, how) FREL/FRLs might relate to either unconditional or conditional contributions. Most NDC baselines and targets were developed before, or separate from, the development of FREL/FRLs, often using data and information from GHG inventories that, in many cases, differ from those used in the FREL/FRLs (section 2.6). How countries might align REDD+ reporting (both FREL/FRLs and results) and accounting for the achievement of their NDCs is an area that requires further consideration.

Table 8. Reporting process under the United Nations Framework Convention on Climate Change for REDD+, intended nationally determined contributions and nationally determined contributions

Country	FREL submission(s)[a]	First BUR[b]	REDD+ First BUR[b]	Second BUR[b]	REDD+ Second BUR[b]	INDC[c]	Paris Agreement ratification[d]	NDC[e]
Brazil	2014, 2017, 2018	Yes, 2014	Yes, 2014	Yes, 2017	Yes, 2017	Yes	Yes	21/9/2016
Cambodia	2017	No	No	No	No	Yes	Yes	6/2/2017
Chile	2016	Yes, 2014	No	Yes, 2017	No	Yes	Yes	10/2/2017
Colombia	2015	Yes, 2015	Yes, 2016	No	No	Yes	Not yet	No
Congo	2016	No	No	No	No	Yes	Yes	21/4/2017
Costa Rica	2016	Yes, 2015	No	No	No	Yes	Yes	13/10/2016
Côte d'Ivoire	2017	No	No	No	No	Yes	Yes	25/10/2016
Democratic Republic of the Congo	2018	No	No	No	No	Yes	Yes	13/12/2017
Ecuador	2015	Yes, 2016	Yes, 2016	No	No	Yes	Yes	No
Ethiopia	2016	No	No	No	No	Yes	Yes	9/3/2017
Ghana	2017	Yes, 2015	No	No	No	Yes	Yes	21/9/2016
Guyana	2015	No	No	No	No	Yes	Yes	20/5/2016
Honduras	2017	No	No	No	No	Yes	Yes	21/9/2016
India	2018	Yes, 2016	No	No	No	Yes	Yes	2/10/2016
Indonesia	2016	Yes, 2016	No	No	No	Yes	Yes	6/11/2016
Lao People's Democratic Republic	2018	No	No	No	No	Yes	Yes	7/9/2016
Madagascar	2017, 2018	No	No	No	No	Yes	Yes	21/9/2016
Malaysia	2015, 2018	Yes, 2016	Yes, 2016	No	No	Yes	Yes	16/11/2016
Mexico	2015	Yes, 2015	No	No	No	Yes	Yes	21/9/2016

Country	FREL submission(s)[a]	First BUR[b]	REDD+ First BUR[b]	Second BUR[b]	REDD+ Second BUR[b]	INDC[c]	Paris Agreement ratification[d]	NDC[e]
Mongolia	2018	Yes, 2017	No	No	No	Yes	Yes	21/9/2016
Mozambique	2018	No	No	No	No	Yes	Not yet	No
Myanmar	2018	No	No	No	No	Yes	Yes	19/9/2017
Nepal	2017	No	No	No	No	Yes	Yes	5/10/2016
Nigeria	2018	No	No	No	No	Yes	Yes	16/5/2017
Panama	2018	No	No	No	No	Yes	Yes	18/4/2016
Paraguay	2016	Yes, 2015	No	No	No	Yes	Yes	14/10/2016
Peru	2016	Yes, 2014	No	No	No	Yes	Yes	25/7/2016
Papua New Guinea	2017	No	No	No	No	Yes	Yes	24/3/2016
Sri Lanka	2017	No	No	No	No	Yes	Yes	6/11/2016
Suriname	2018	No	No	No	No	Yes	Not yet	No
United Republic of Tanzania	2017	No	No	No	No	Yes	Not yet	No
Uganda	2017	No	No	No	No	Yes	Yes	21/9/2016
Viet Nam	2016	Yes, 2014	No	Yes, 2017	No	Yes	Yes	3/11/2016
Zambia	2016	No	No	No	No	Yes	Yes	9/12/2016

Notes: [a] UNFCCC (2018a); [b] UNFCCC (2018b); [c] UNFCCC (2018c); [d] UNFCCC (2018d); [e] UNFCCC (2018e).

4.3 Drawing on FREL/FRLs and REDD+ results reporting for results-based payments

Most countries stated that the submission of their FREL/FRLs and REDD+ results annexes was for the purpose of obtaining RBPs or finance. Countries cited diverse additional purposes for submissions, such as *to build capacity and to have a facilitative exchange with technical LULUCF experts* and *to measure the impacts of policies and measures for domestic purposes*.

The UNFCCC suggests that RBPs for results-based actions may come from various sources[29] – public and private, bilateral and multilateral.[30] Notably, the GCF, which is the operating entity of the financial mechanism of the UNFCCC and plays an important role in REDD+ RBPs, launched a pilot programme in October 2017 (see the annex for details). Bilateral arrangements also exist between donor governments and developing countries for providing RBPs, and certain UNFCCC decisions include references to market-based approaches for REDD+ that could be developed by the COP.[31] The FCPF Carbon Fund (RBPs for REDD+ ERs) and the BioCarbon Fund Initiative for Sustainable Forest Landscapes (RBPs for landscape ERs) are both pilot programmes for testing such transactions, for example by requiring countries to demonstrate the ability to transfer titles for ERs.

The governments of Norway, Germany and the United Kingdom of Great Britain and Northern Ireland have been important donors in efforts to develop payments for REDD+ results. For example, Brazil created the Amazon Fund in 2008, and Norway has since contributed more than USD 1 billion in grant payments to the Fund.[32] Similarly, the Guyana and Norway Joint Concept Note, signed in 2009, provided the basis for RBPs to Guyana. The Government of Germany set up the REDD+ Early Movers Programme (REM) in 2012 to provide RBPs for avoided deforestation, and it made its first agreement with Brazil's Acre state. The governments of Germany, Norway and the United Kingdom of Great Britain and Northern Ireland

[29] Some RBPs are reported at http://redd.unfccc.int/info-hub.html
[30] UNFCCC Decision 9/CP.19, paragraph 1.
[31] UNFCCC Decision 14/CP.19, paragraph 15.
[32] Details on Norway's partnerships are available at www.regjeringen.no/en/topics/climate-and-environment/climate/climate-and-forest-initiative/id2000712

signed a joint concept note in 2015 to provide RBPs to Colombia through the REM. Ecuador is preparing a programme with Germany under the REM, and the REM formed a partnership with the Brazilian state of Mato Grosso in 2017 (Ehringhaus, 2017). In 2014, Peru, Norway and Germany signed a declaration of intent, including to pay for verified results.

RBP pilots have tended to have requirements that build on, but go beyond, UNFCCC guidance. Table 9 provides a comparison of several elements of two RBP pilots alongside UNFCCC reporting guidance for REDD+. The level of requirements is dictated by the kinds of transaction carried out, from grant financing connected to achieved GHG reductions (GCF) to the purchase of GHG reduction units potentially for use in markets (FCPF Carbon Fund).

Table 9. Comparison of some criteria for REDD+ reporting in the context of the United Nations Framework Convention on Climate Change with two financing initiatives, the Green Carbon Fund and the Forest Carbon Partnership Facility

Criteria	UNFCCC REDD+ reporting	GCF scorecard	FCPF Methodological Framework
Historical period	Should take into account historical data	Preferable 10–15 years; fail if less than 5 years or more than 20 years	10 years (can be alternative if justified, but no longer than 15 years)
Gap between historical FREL/FRL period and results	No details	Highest score if less than 5 years, but no fail if longer	No more than 2 years before commencement of Technical Advisory Panel review
Adjustment	May adjust for national circumstances	Only HFLD countries may adjust, but no more than 10% of historical average or 0.02% of forest carbon stock per year	Only HFLD countries may adjust, but no more than 0.1% of forest carbon stock per year
Uncertainties	Reduce uncertainties as far as practicable	Fail* if no uncertainty is provided or score is based on aggregate uncertainty, resulting in a 4% maximum discount on ERs	Aggregated uncertainties need to be assessed and ERs set aside in a buffer, resulting in a maximum 15% discount on ERs

* For submissions before 2019, not estimating uncertainties gives the lowest score instead of a fail.

Countries participating in the FCPF Carbon Fund create reference levels specifically for their participation in the fund following the FCPF Methodological Framework.[33] These reference levels usually differ from the FREL/FRLs submitted to the UNFCCC;[34] for example, they are often at the subnational scale. By contrast, the recently launched GCF RBP pilot aims to use UNFCCC REDD+ reporting as a basis for RBPs.[35] A scorecard contains criteria that are additional to UNFCCC requirements; adds a new layer of scrutiny; and aligns REDD+ RBPs with GCF policies and procedures. An independent technical assessment panel assesses the FREL/FRL and REDD+ results against the scorecards, and the assessed scores affect the allocation of payments (as set out in the annex).

[33] The FCPF Methodological Framework expresses the intention to achieve consistency with UNFCCC reporting but the requirements arguably exceed those included in the applicable UNFCCC guidance.

[34] The FCPF requires countries to explain how the Carbon Fund reference levels relate to UNFCCC FREL/FRLs (in case countries are preparing these) while allowing countries to pilot approaches at the subnational scale.

[35] UNFCCC Decision 9/CP.19, p.6, encourages entities such as the GCF to apply the methodological guidance consistent with UNFCCC decisions on REDD+ when providing RBPs.

Annex. The GCF pilot programme for results-based payments

At the 18th GCF Board meeting in October 2017, the GCF opened a call for proposals from countries to a pilot programme for REDD+ RBPs (Decision B.18/07). The draft terms of reference for the pilot programme, including the eligibility criteria, modality and scope, are described in Annex XI of the Board meeting report (GCF, 2017a).

REDD+ results-based payments approval process

The pilot programme accepts for consideration REDD+ results achieved in the period 2014–2018.[36] The ERs for RBPs are proposed by an "accredited entity". The accredited entity submits a **concept note** and **funding proposal** (GCF, 2017b) in close consultation with the GCF National Designated Authority[37] and the REDD+ entity/focal point. Concept notes can be submitted to the pilot programme until the last GCF Board meeting in 2022.

To ensure country ownership during the process, the GCF requests that, at the time of submission of the concept note, the country's REDD+ national entity/focal point to the UNFCCC writes a letter of support and at the time of submission of the funding proposal, the National Designated Authority/focal point writes a no-objection letter.

When the concept note and the funding proposal are submitted, a first-stage (for the concept note) and second-stage (for the funding proposal) scorecard assessment will be carried out. The scorecard and a full assessment by the Technical Advisory Panel are the basis of the proposal for calculating payments. This proposal is to be submitted to the GCF Board for a final decision. In case of approval, the transfer of funds will be carried out through the Trustee,[38] with all necessary extra-legal arrangements. Figure 22 illustrates this process for GCF accounting, from submission to approval.

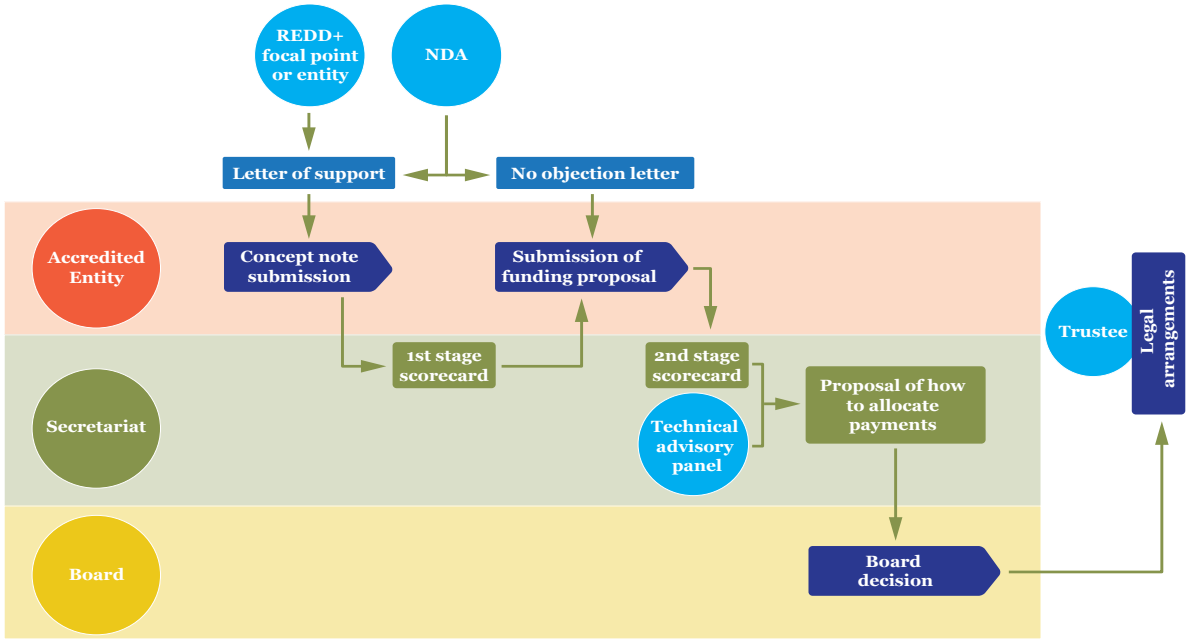

Figure 22. The REDD+ results-based payments approval process

Source: GCF (2017a).

[36] 31 December 2013–31 December 2018.
[37] The National Designated Authority or focal point functions as the main interface between a country and the GCF.
[38] The World Bank is the Trustee of the GCF.

Eligibility criteria

The proposals in the pilot programme for REDD+ RBPs submitted by Parties must meet the *minimum criteria* summarized here.

- By the time of submission of a concept note, the following Warsaw pillars should be in place and made publicly available (e.g. on Info Hub):
  - a REDD+ NS/AP;
  - a FREL/FRL that is applied to the results period for which payments are requested and has undergone a TA, as per UNFCCC Decision 13/CP.19;
  - an NFMS, with a description provided in the BUR; and
  - a safeguards information system to show how safeguards are to be addressed and respected, and a summary of information on how all the Cancun REDD+ safeguards were addressed and respected during the period for which RBPs are being requested.
- The REDD+ results for which payments are requested must be included in the technical annex of the country's BUR submitted to the UNFCCC by the time of submission of the concept note. The TA should have been completed and the report made available on the UNFCCC website by the time of submission of the complete funding proposal.
- The scale of the REDD+ RBP proposal must be national or, on an interim basis, subnational (which should be one level below the national level).
- Written consent for participation in the request for proposals must be provided by the REDD+ national entity/focal point to the UNFCCC (if a national entity/focal point has been nominated by the country at the time of submission of the concept note).
- The country's National Designated Authority must provide a no-objection letter at the time of submission of the funding proposal.

Modality of the pilot programme

The **amount allocated for the pilot programme** is USD 500 million, with a valuation of USD 5/tCO_2eq; thus, 100 million tCO_2eq ERs can be paid for. The **maximum amount for payments per country** would be set at 30 percent of the total payable volume, which is 30 $MtCO_2eq$ over the length of the eligibility period.

Proposals are approved on a **rolling basis**, meaning that countries can submit at any time, followed by assessment of the scorecard. Once a country submits results for any year, it is expected to submit a significant volume of results for each subsequent year. Countries are allowed to submit more than once as long as the GCF volume of ERs does not exceed 30 percent of the overall payable ERs.

The RBP pilot will employ a scorecard to assess results submitted to the UNFCCC. The scorecard constitutes a two-stage evaluation, with questions that assess the information reported in the concept note (stage 1) and funding proposal (stage 2). The stage-1 scorecard is a checklist for ensuring that all eligibility criteria are met. The stage-2 scorecard assesses carbon elements (section 2) and non-carbon elements[39] (sections 3–5). The carbon elements scorecard should be filled in based on information in the TA report of the FREL/FRL and the TATR of the REDD+ results in the annex to the BUR. The stage-2 scorecard contains quantitative elements, with a points system (0, 1 or 2) and qualitative elements that gain either a pass or a fail. A country must score a pass on all criteria to be eligible for RBPs; higher scores result in higher payments, and the maximum possible score is 48 points. The ERs offered by a country are converted to payable ERs ("GCF volume of ERs") as follows:

$$\text{Volume of ERs offered} \times \frac{\text{Total score achieved}}{\text{Maximum score}} = \text{GCF Volume of ERs}$$

[39] Cancun safeguards, use of proceeds and non-carbon benefits (section 3), investment framework (section 4) and GCF policies (section 5).

An additional 2.5 percent of the value will be included in the final payment for any country that: provides information that is consistent with GCF policies and in line with the country's NDC, REDD+ NS/AP and/or low-carbon development plans and policies; and explains the nature, scale and importance of non-carbon benefits for the long-term sustainability of REDD+ activities.

Countries receiving REDD+ RBPs through accredited entities must reinvest the proceeds in activities in line with their current or next NDCs, as established under the Paris Agreement on climate change, their REDD+ NS/APs, or low-carbon development plans. These activities must also be consistent with the objectives of the GCF.

Countries can, at their own discretion, use ERs towards the achievement of their NDCs. The proposals should indicate the measures to be taken to ensure that such ERs will not be transferred or used for other purposes (e.g. offsetting). Subnational-level proposals should also demonstrate an ambition to scale up to the national level, and they should demonstrate a contribution to the national ambition for ERs – such as NDCs or the implementation of a REDD+ NS/AP.

Finally, with the submission of a funding proposal, countries should demonstrate that implementation of past REDD+ activities complied with GCF policies and procedures and the predestined use of RBP proceeds should be mapped out. Therefore, diligence reports are required that show consistency with the GCF's Environmental and Social Safeguard Standards,[40] Gender Policy, and Interim Policy on Prohibited Practices.[41] All these reports are assessed against the scorecard.

[40] Consistent with the International Finance Corporation's Performance Standard 6, "Biodiversity conservation and sustainable management of living natural resources", GCF funding should not be used to support the expansion of industrial-scale logging or any other industrial-scale extractive activities in areas that were primary/intact tropical forests.

[41] Money laundering and the financing of terrorism; the improper subsequent use of GCF proceeds in the prohibited practices; and double payment or financing for the same results achieved, etc.

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