Trove Research

IMPACT OF THE VOLUNTARY CARBON MARKET ON TROPICAL FOREST COUNTRIES – IMPLICATIONS FOR CORRESPONDING ADJUSTMENTS

4 JULY 2022

Table of Contents

List of Tables

List of Figures

Executive Summary

This report presents the findings of the project 'Impact of the Voluntary Carbon Market on Tropical Forest Countries – Implications for Corresponding Adjustments'. The aim of the work is to quantify the materiality of voluntary demand for carbon credits on emission commitments of tropical forest countries.

To date the debate on whether corresponding adjustments should be applied to voluntary carbon market transactions has been somewhat theoretical. This study, for the first time, provides a quantitative basis for assessing the potential implications of applying corresponding adjustments to these countries.

The results of the modelling are expressed as the ratio of demand and supply from 12 tropical forest countries included in the study, across the 2021-2030 and 2021-2050 time periods and for a range of demand and supply scenarios.[1] Demand forecasts are developed from Trove Research's analysis of future climate commitments from the corporate sector together with assumptions around the potential need for carbon credits. These demand forecasts take into account potential demand from companies with net zero targets under the Science-Based Targets Initiative, international airlines under CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation) and thousands of other companies with self-declared carbon commitments.

Assumptions are also made around the potential share of demand that could be provided from tropical forest countries. Demand and supply are both separated into 'reduction' and 'removal' types of carbon credits. Reduction credits reduce releases of greenhouse gases to the atmosphere, while removal credits sequester CO_2 from the atmosphere. In the case of tropical forest countries reduction credits represent reduced emissions from deforestation and degradation (REDD+) and removal credits afforestation and reforestation.

Carbon credit demand projections are compared with the availability of credits from tropical forest countries under three supply scenarios. Each scenario represents different levels of carbon sequestration from forest conservation and reforestation. These supply scenarios assume that all carbon credits could be available to the voluntary market before any application of corresponding adjustments.

S1: NDCs – Commitments governments have made to reduce emissions from forests in their Nationally Determined Contributions (NDCs) under the Paris Agreement.

S2: PFP - Primary (humid) forest protection. This scenario assumes that countries end deforestation of primary humid forest by 2030.

S3: NND – No net deforestation. This scenario assumes that countries meet the commitments to halt and reverse forest loss by 2030, as set out in the *Glasgow Leaders Declaration on Forests and Land Use* published at COP26.

The overall results are shown in Figure E1.

[1] In all the 'reduction' (REDD+) credit scenarios the analysis assumes that all emission savings from reduced deforestation in tropical forest countries are available for use in the voluntary market.

Figure E1. Summary voluntary carbon credit demand-supply ratios for all scenarios

2021-2030							
Demand scenario	Removal credit supply	Reduction credit supply			Combined credit supply		
		S1: NDC	S2: PFP	S3: NND	Removal + S1: NDC	Removal + S2: PFP	Removal + S3: NND
Low	0.3	0.6	0.3	0.1	0.5	0.3	0.2
Medium	0.5	0.9	0.5	0.2	0.8	0.5	0.2
High	0.6	1.2	0.6	0.3	1.0	0.6	0.3

2021-2050							
Demand scenario	Removal credit supply	Reduction credit supply			Combined credit supply		
		S1: NDC	S2: PFP	S3: NND	Removal + S1: NDC	Removal + S2: PFP	Removal + S3: NND
Low	2.8	2.4	1.6	1.6	2.5	1.9	1.9
Medium	4.5	3.7	2.5	2.4	4.0	3.0	2.9
High	6.1	4.6	3.1	3.0	5.1	3.9	3.8

From these results we draw a number of conclusions for the two periods:

2021 – 2030

- In the 2021-2030 period the potential demand for carbon credits from tropical forest countries is less than the potential supply, for all scenario combinations, except for High demand, S1:NDC for reduction credit supply. In this combination, the relatively low ambition of NDCs for tropical forest countries is outweighed by a rapid growth in demand from the voluntary market in the 2021 to 2030 period.
- Even with demand being less than supply in 2021-2030, the voluntary market still represents a potentially significant source of demand for these countries. Combining demand for removal and reduction credits, even under a low demand scenario the voluntary market represents more than 15% of the available supply under the highest supply scenario (where countries achieve no net deforestation by 2050).[2]

2021 – 2050

- In the two decades from 2030 to 2050, demand for carbon credits from tropical forest countries is expected to increase, especially for removal credits under science-based net zero commitments. Our projected supply also increases in line with projected afforestation, restoration and REDD+ commitments from these countries, but does not keep pace with projected demand. As a result, demand exceeds available supply in all scenarios to 2050.

[2] NB: due to rounding, this value is displayed as 0.2 in Figure E1.

- Under the low demand scenario, demand for carbon credits is up to two and half times larger than available supply. This increases to four to five times under the high demand scenario.

In summary under most scenarios modelled by Trove Research – and assuming all carbon absorption activities in these countries are eligible for creating carbon credits – the potential demand for carbon credits exceeds the supply to 2050. In the period to 2030, demand could represent 15% and 100% of available supply.

Implications

The use of corresponding adjustments for voluntary carbon credits is controversial. The concept is designed to ensure that a claim for an emission reduction by a buyer is not also claimed by the host country – as the host country would adjust its emissions upwards by the volume of credits claimed by the buyer. To achieve its NDC the host country would need to make an extra effort to reduce emissions. A key challenge to this mechanism is that company emissions are not accounted for under national emissions accounting systems and there is no risk of double-counting.

To date, most of the debate around the use of corresponding adjustments for voluntary purposes has assumed that the voluntary market would not have a material impact on host country emissions. This research suggests the opposite is likely to be true when the long-term growth in demand for voluntary carbon credits is factored in.

This report does not conclude on whether the corresponding adjustments should or should not be applied to voluntary market transactions, but sets out an assessment of the potential significance of the voluntary market in contributing to tropical forest climate pledges.

One potential implication is that if voluntary demand for carbon credits materialises to the extent projected in this report, tropical forest countries could achieve emission reductions in excess of their current NDC commitments through finance available from the voluntary sector. This would facilitate the creation of correspondingly adjusted credits.

A qualification on this interpretation is that there may be limitations on the willingness to pay for correspondingly adjusted credits in the voluntary market. Projections of future demand for carbon credits in the modelling are built up from company level commitments on the basis that they are achieved at any cost. In practice voluntary corporate climate commitments will face budgetary limitations. Logically, governments would prioritise the lowest cost forms of mitigation first in achieving their NDCs, so that emissions reductions beyond their NDCs would be more costly. In tropical forest countries this may mean foregoing more valuable revenue from agricultural activities on deforested land. Emission reductions in excess of a host country's NDC, which could carry a corresponding adjustment, would therefore be more expensive to the buyer. The appetite to pay for these has yet to be tested in the voluntary corporate sector.

1. Introduction and scope

1.1 Background

This report presents the main findings of the project 'Impact of the Voluntary Carbon Market on Tropical Forest Countries – Implications for Corresponding Adjustments'. The research has been supported by the Environmental Defense Fund.

The principle aim of the project is to quantify the materiality of voluntary demand for carbon credits on emission commitments of tropical forest countries and assess the implications of applying corresponding adjustments on both the voluntary carbon market and the climate ambition of host countries.

To date, the debate on whether corresponding adjustments should be applied to voluntary carbon market transactions has been somewhat theoretical. This study, for the first time, provides a quantitative basis for assessing the potential implications of applying these accounting measures.

At COP26 in Glasgow, an agreement was reached on the details of 'Article 6', the final part of the Paris Agreement from 2015 that remained under negotiation. The text of Article 6 outlines how cooperation between countries and the international transfers of credits will function under the Paris Agreement. This established the application of 'corresponding adjustments' to transfers of carbon credits and other 'mitigation outcomes', when they are to be used towards achievement of a country's NDC, or for other international compliance purposes. At the current time, the only such purpose is the emissions scheme for international civil aviation, CORSIA, administered by the International Civil Aviation Organization (ICAO).

The main areas of Article 6 that could impact the voluntary carbon market (VCM) are Article 6.2 that covers country-to-country cooperation and Article 6.4, that covers the use of market mechanisms at the project level, and the successor to the Clean Development Mechanism of the Kyoto Protocol. Article 6.4 will create a registry for emissions reductions (currently referred to A6.4ERs) under the Paris Agreement that will be available for countries to use towards their NDCs.

If carbon credits are to be used towards the achievement of another country's NDC, or by airlines to comply with CORSIA, the credit must be authorised for transfer by the host country. In these cases, the host country emissions need to be increased in proportion to the quantity of credits used for compliance elsewhere – known as a "corresponding adjustment".

Article 6.4 also states that corresponding adjustments will be required where UN authorised credits are registered by the host country, for "other purposes". The term "other purposes" is not defined, but could be interpreted to mean voluntary claims under certain circumstances. No subsequent decision has been made on this, and little work has been done on the potential implications.

This study assesses the potential demand for carbon credits from the voluntary market from tropical forest countries and compares it to the expected supply of credits from the same countries. This ratio of voluntary demand for credits to potential supply indicates whether

application of corresponding adjustments to credits from these countries is likely to be a material consideration.

1.2 Objectives and scope

Tropical forest countries are critical natural resources, storing large quantities of carbon in above and below ground vegetation and providing habitats for much of the world's flora and fauna. Between 2015 and 2017, tropical forest loss accounted for around 12% of global CO2 emissions.[3] Reducing the rate of forest loss and reforesting degraded land will provide significant climate and ecosystem benefits.

Tropical forest countries also represent an important share of carbon credits used in the market today, through REDD+ and afforestation or reforestation projects, as well as other forms of sustainable land management. Moreover, under science-based net zero targets, only removal technologies are permitted to neutralise residual emissions after all feasible abatement has been undertaken. The planting of trees, either through afforestation or reforestation, represents the only 'technology' for carbon removals currently available at scale globally. Due the combination of strong sunlight and humid climates, tropical forests absorb carbon more rapidly than forests at higher latitudes and will play a key role in absorbing CO2 for use under net zero commitments.

The key inputs for the analysis include the potential scale of demand for tropical forest carbon credits from voluntary buyers, and the potential supply of these credits. In this area, the study focuses on REDD+ and removal credits from forestry.

The central questions the study seeks to answer are:

- What is the potential future supply of emission reduction and removal credits from tropical forest countries under different scenarios between now, 2030 and 2050?
- What is the potential demand for emission reduction and removal credits from tropical forest countries from private companies in the VCM between now, 2030 and 2050?
- How material is the potential demand for voluntary carbon credits on tropical forest countries that supply carbon credits?
- How would the application of corresponding adjustments to voluntary carbon credit transactions affect the climate ambition of tropical forest countries.

[3] https://www.wri.org/insights/numbers-value-tropical-forests-climate-change-equation. 4.8Gt/yr emissions 2015-2017. Global CO2 emissions 40Gt https://www.co2.earth/global-co2-emissions

1.2.1 Country selection

The study analyses the impact of voluntary carbon market activity on a sample of tropical forest countries. Countries were selected to achieve a balance across the following characteristics:

- Geography and region: 4 in South America, 1 in Central America, 3 in Africa, 3 in Asia and 1 in Oceania.
- Country area and population.
- Share of land area under forest cover.
- State of economic and social development, indicated by the UNDP's Human Development Index (HDI) score.[4]
- Type of NDC target:
  - Reductions against a base year: e.g. Brazil.
  - Fixed level of emission reductions: e.g. Costa Rica.
  - Emissions reductions against a baseline scenario (sometimes referred to as Business-As-Usual – BAU): e.g. Indonesia.
  - Reduction in emissions intensity: e.g. India.
  - Commitment to deliver specific climate actions (an 'Actions Only' NDC): e.g. Suriname.
- Deforestation rates: high forest coverage, low deforestation (HFLD) nations (above 50% forest coverage and below 0.22% rate of deforestation).[5]

The twelve countries selected for inclusion in this study are: Brazil, Colombia, Costa Rica, Democratic Republic of the Congo, Gabon, India, Indonesia, Kenya, Papua New Guinea, Peru, Suriname, and Vietnam. These detailed in Table 1 and in Figure 1.

In Table 1, HFLD countries are indicated in light green. High levels of forest cover and lower deforestation pressures are a possible contributor to lower targets for REDD+ activities. These countries are important to this study because they account for a significant share of global forest coverage and contain forests of particular global significance (in terms of size, carbon sequestration, biodiversity, etc). Figure 2 shows the selected countries, colour-coded by HDI score, highlighting the diversity of countries covered.

Table 2 summarises the key statistics for the countries covered in this study. Together they represent a significant proportion of the world's forest cover (25%), tropical forest cover (71%), and areas of tropical forest at risk of deforestation (37% of human caused deforestation and 70% of primary humid forest loss).

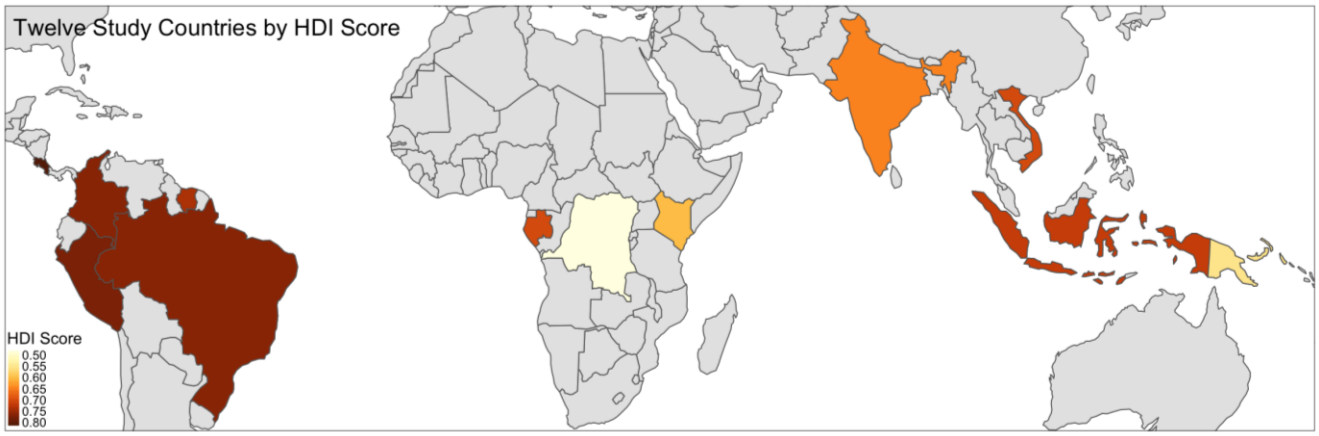
[4] https://hdr.undp.org/en/content/human-development-index-hdi

[5] https://www.ipsnews.net/Library/2019/02/Krutu-of-Paramaribo_13-02-19.pdf

Table 1: Countries selected for inclusion in the study

Country	HDI Score	Global Emissions Share (%)	NDC Target Type	2030 Reduction Target[6]	Forest Area (Mha, 2020)	Forest Area (%, 2020)	Primary Forest Loss (Mha 2020)
Brazil	0.76	2.9	Base year (2005)	43%	497	59	1.7
Colombia	0.75	0.6	Fixed Level	169.44 $MtCO_2e$ (51% reduction vs BAU)	59	53	0.1
Costa Rica	0.79	0.02	Fixed Level	9.11 $MtCO_2e$	3.0	59	0.001
DRC	0.46	1.4	Baseline scenario	21% vs BAU in 2030	126	56	0.5
Gabon	0.70	0.03	Baseline scenario	50% vs BAU by 2025	24	91	0.01
India	0.64	6.8	Intensity (2005)	33% to 35% vs base year	72	24.	0.02
Indonesia	0.69	3.5	Baseline scenario	29% vs BAU	93	49	0.3
Kenya	0.59	0.2	Baseline scenario	32% vs BAU	3.6	6.3	0.004
PNG	0.54	0.1	Multiple: Fixed level; Baseline	10 $MtCO_2$ reduction in forestry	36	79	0.05
Peru	0.75	0.4	Fixed Level	179 $MtCO_2e$	72	57	0.2
Suriname	0.72	0.03	Actions only	N/A	15	97	0.01
Vietnam	0.69	0.7	Baseline scenario	9% vs BAU	15	47	0.03

Figure 1: Selected countries by HDI score



[6] Targets shown here are countries' unconditional NDC targets, where a country may also have a conditional target based on funding requirements or other needs.

Table 2: Share of global forest indicators covered by 12 countries in study

Indicator	Time Period	Share of World
Total forest cover[7]	2020	25 %
Annual average human-caused deforestation[8]	2016-2020	37 %
Total tropical rainforest cover[9]	2020	71 %
Annual primary humid forest loss[10]	2020	70 %

[7] FAO, Forest Resource Assessment 2020.
[8] Global Forest Watch
[9] Global Forest Watch. Here and thereafter, 'tropical rainforest' refers to primary humid forest, Global Forest Watch uses the term to cover the two here.
[10] Global Forest Watch, link.

2. Modelling approach

The materiality analysis estimates the voluntary demand for carbon credits from the tropical forest countries covered in the study and compares this against the potential carbon credit supply from the countries over two time periods: 2020 -2030 and 2020 to 2050.

The 2020-2030 period reflects the years over which current NDCs are to be achieved – most tropical forest countries do not climate plans that go beyond 2030. However, analysis over 2020-2050 also needs to be included because under the long-term net zero commitments made by many companies demand for carbon credits (removals) will only materialise into the second and third decade.

Three scenarios are derived for both demand and supply to capture the range of uncertainties in forecasting both variables. The three supply scenarios (S1, S2 and S3) reflect different levels of ambition from tropical forest countries in reducing rates of deforestation and replanting new forest cover. The demand for carbon credits is split into reduction credits and removal credits, based on the expected need from net zero and other forms of climate commitments over time. The combination of demand and supply permutations is summarised in Table 3.

Table 3: Demand and supply permutations used in the analysis

Demand scenarios		Carbon credit supply scenarios		
		S.1 NDC pledges	S2. Primary forest loss prevention	S3. No Net Deforestation
Removals	Low	✓	✓	✓
	Medium	✓	✓	✓
	High	✓	✓	✓
Reductions	Low	✓	✓	✓
	Medium	✓	✓	✓
	High	✓	✓	✓

Country commitments for deforestation and reforestation are taken from NDCs and related public commitments. Demand forecasts are derived from Trove Research's independent analysis and forecasts of voluntary carbon credit demand and supply.

3. Credit demand from tropical forest countries

The estimated future demand for voluntary carbon credits from the 12 selected tropical countries is split into demand for reduction and removals. Five calculation steps are used to derive these estimates:

1. Total demand for voluntary carbon credits to 2030 and 2050
2. Share of total demand split between reductions and removals
3. Share of reduction/removal demand from nature-based solutions (REDD+ or nature restoration)
4. Share of nature-based solutions from tropical forest countries
5. Share of tropical forest activities from the countries in the study

3.1 Future carbon credit demand

Future demand for carbon credits from the voluntary sector is taken from Trove Research's regular analysis of corporate climate commitments covering over 4,000 companies. The demand for reduction credits is driven by growing claims for carbon neutral – both at the product and company level, CORSIA and some proportion of net zero commitments that fall outside of the SBTI, e.g. oil & gas companies. The use of removal credits is driven by net zero commitments under SBTI and also parts of the commitments from net zero companies outside SBTI. To align with the SBTi Corporate Net-Zero Standard, companies "must neutralise any residual emissions by permanently removing carbon from the atmosphere" upon reaching their net zero target year.[11]

Removal credit demand grows more rapidly from 2035 in the run-up to 2050 as corporates begin to reach net-zero target years in significant numbers, requiring high quality permanent removal credits. Despite its low starting point given the greater 'need' for reduction in credits in the private sector currently, by 2050 the annual demand for removals would equate to approximately 70% of cumulative credit demand.

The cumulative demand over the periods 2021-2030 and 2021-2050 are summarised in Table 4 and Table 5. Three scenarios are shown for low, medium, and high demand estimates.

[11] SBTi Corporate Net-Zero Standard. Version 1.0. October 2021. Page 11. Link.

Table 4: Cumulative carbon credit demand forecasts ($MtCO_2$)

	Removal Demand		Reduction Demand		Total Demand	
	2021-2030	2021-2050	2021-2030	2021-2050	2021-2030	2021-2050
Low	557	16,000	3,434	34,000	**3,991**	**50,000**
Medium	891	26,000	5,383	52,000	**6,274**	**78,000**
High	1,217	35,000	7,202	65,000	**8,420**	**101,000**

Table 5: Proportion of total demand under each demand scenario

	2021-2030		2021-2050	
Demand Forecast	**Reduction**	**Removal**	**Reduction**	**Removal**
Low	86%	14%	67%	33%
Medium	86%	14%	67%	33%
High	86%	14%	65%	35%

3.2 Allocating carbon credit demand to tropical forest countries

The assumptions used to allocate demand to the selected tropical forest countries (steps 3 to 6) are shown in Figure 2 (reduction credits) and Figure 3 (removal credits). The proportion of reduction and removal credits expected to come from the global forestry sector (REDD+ and afforestation) is derived from Trove Research's projections of future credit issuances from all known projects including registered and those in the development pipeline (Figure 3). These issuance projections take into account a number of factors related to historical issuance performance, delays in registration and issuance, and the likelihood of recrediting.

Figure 2: Steps and assumptions for estimating reduction credits from selected countries

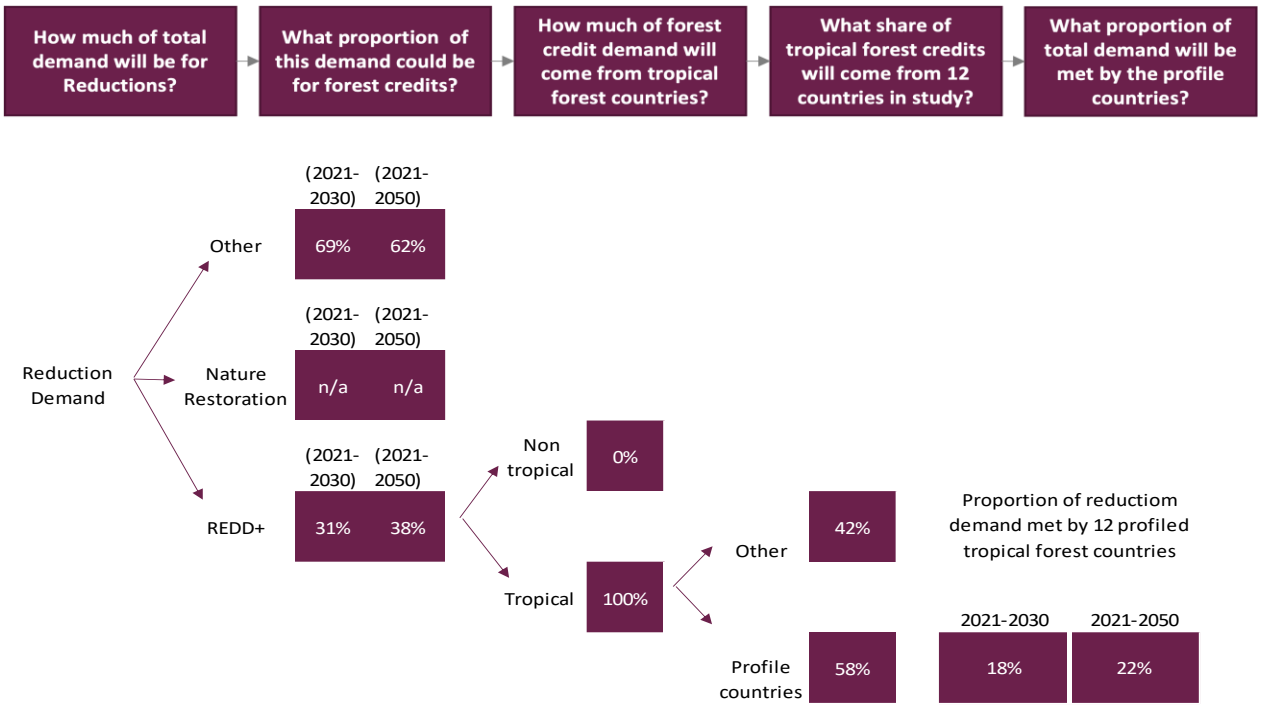
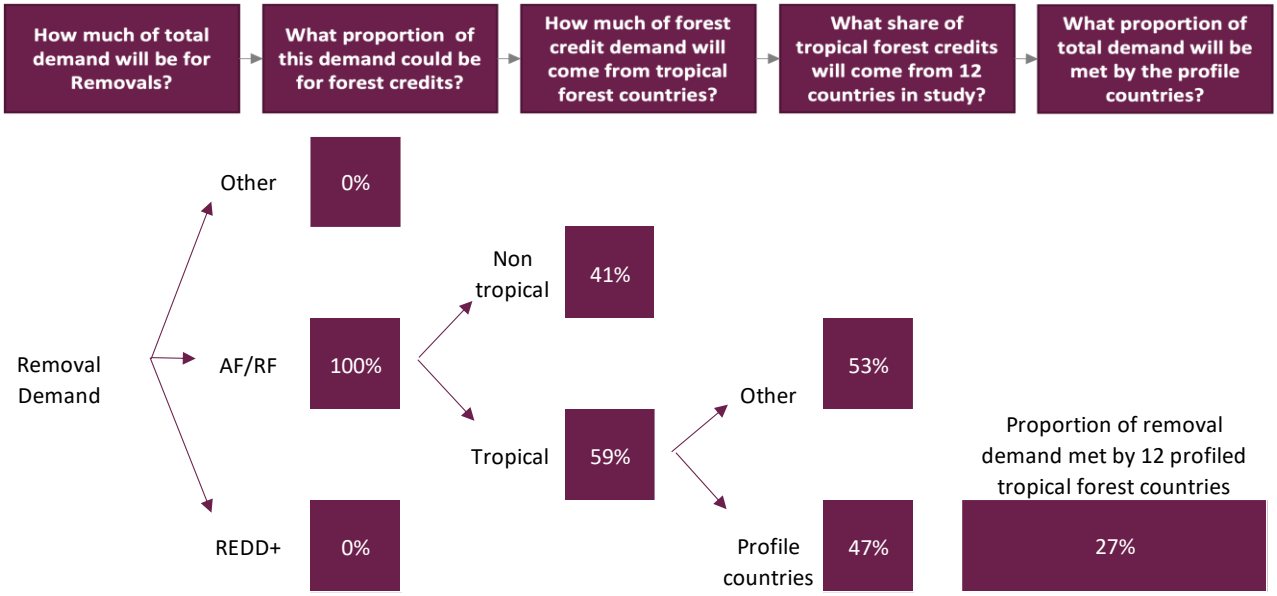


Figure 3: Steps and assumptions for estimating removal credits from selected countries

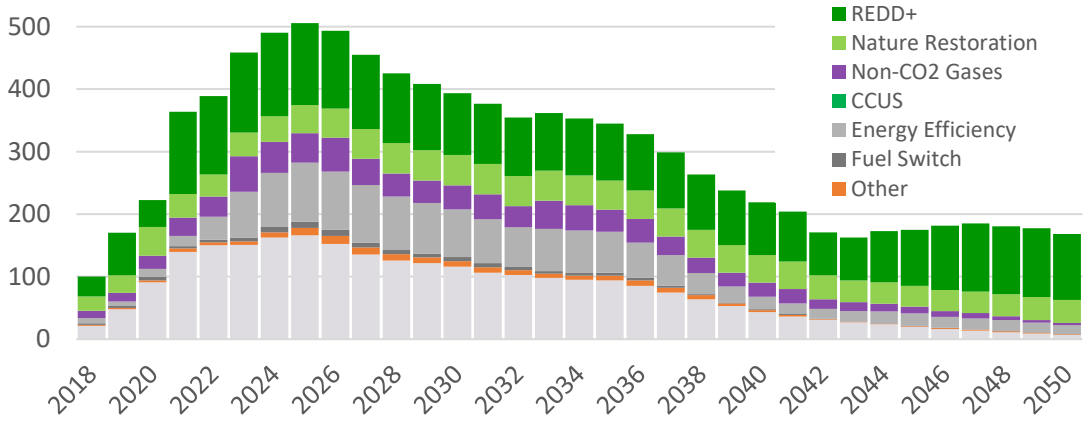


Share of demand from nature-based solutions (step 3)

The proportion of reduction and removal credits expected to come from the global forestry sector (REDD+ and afforestation) is derived from Trove Research's projections of future credit issuances from all known projects including registered and those in the development pipeline (Figure 4). These issuance projections take into account historical issuance performance, delays in registration and issuance, and the likelihood of recrediting.

It is possible that new projects that will be developed after those currently in the pre-registration stage, will follow a different profile to those currently in existence. However, there is no basis for assuming a different profile, so the modelling uses the known supply of current and projects.

Figure 4: Projected credit issuances by project type (MtCO2e)



Source: Trove Research

From Figure 4, we project that around 31% of reduction credits are likely to be come from forest activities to 2030 and 38% by 2050. The remainder of reduction credits will come from a range of technologies such as energy efficiency, renewable energy, non-CO2 gases and fuel switching. We assume that 100% of removals are generated through forest activities (afforestation and reforestation) on the basis that Direct Air Capture and other removal technologies provide negligible contribution to removal supply over this time period.

Proportion of nature-based solutions from tropical forest countries (step 4)

Tropical forest countries account for 100% of REDD+ projects in Trove's supply pipeline for January 2022, and we assume this same proportion through to 2050. Northern hemi-sphere and developed countries are mostly increasing their forest cover. For removal demand we calculate that tropical forest countries will account for 59% of future pipeline supply.

Whilst tropical forests provide productive environments for forest growth, other parts of the world are adding forest cover, notably Europe where forest cover has increased by around

10% between 1990 and 2020.[12] Although forest cover in the US has been shrinking, changes in forest management practice can retain more carbon and

Proportion of selected tropical forest countries (step 5)

Analysis of Trove's pipeline data shows that 58% of REDD+ activity, and 47% of tropical afforestation activity takes place in the 12 countries included in the study.

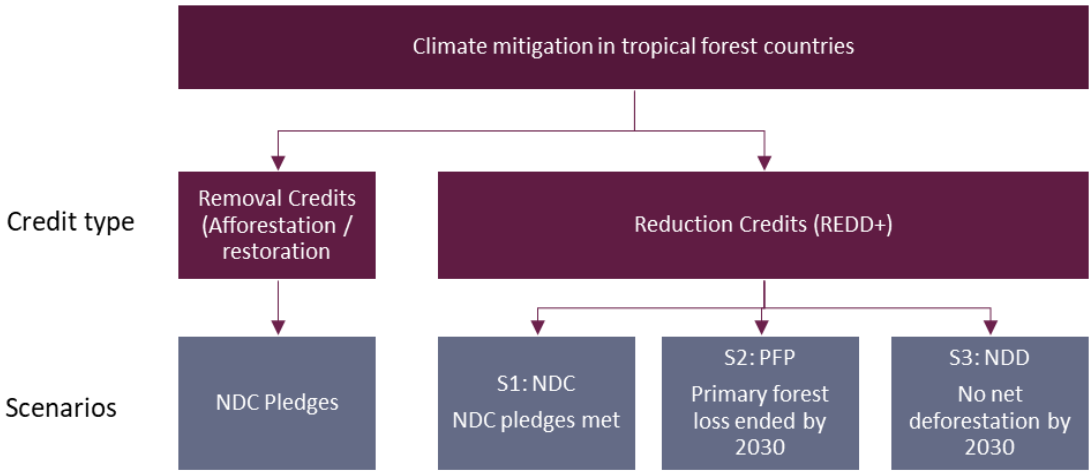
Overall, the analysis shows that if demand for carbon credits follows a pattern similar to that of the type and location of supply, 18% of reduction credit demand would be sourced from REDD+ projects in the countries included in the study between 2021 and 2030 and 33% between 2021 and 2050. Similarly, some 27% of the future demand for removal credits would be sourced from afforestation and restoration projects these countries.

[12] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Forests,_forestry_and_logging#:~:text=In%202020%2C%20the%20EU%20had,by%20almost%2010%20%25%20since%201990

4. Credit supply from tropical forest countries

The analysis calculates the potential carbon credit supply from selected tropical forest countries for REDD+ (reduction) and afforestation and restoration (removal) activities under different scenarios. Three scenarios are modelled for REDD+ reflecting different commitments in reducing deforestation rates. These different commitment levels are all announced pledges by the countries. One afforestation scenario is modelled, based on a country's NDC. No country has pledged a more ambitious reforestation plan than in its NDC. These scenarios are summarised in Figure 5 and explained in more detail below.

Figure 5: Credit supply scenarios from tropical forest countries



4.1 Carbon credit supply from removal projects

The potential carbon credit supply from tropical forest countries are calculated based on the available data on their reforestation and afforestation pledges in their NDCs. These pledges are then converted into the projected rate of annual afforestation/reforestation, assuming a linear projection of supply. Data sources for the analysis are summarised in

Table 6.

Pledges or committed submitted to the UNFCCC were prioritised, from NDCs in the first instance. When sectoral targets for forestry were not available, for example with Kenya, other official documentation was used. Brazil had set a target in their initial first NDC, but subsequently removed this in a later update. However, this target is also communicated through their Bonn Pledge. Peru had no specific afforestation or reforestation targets in its NDC, therefore a peer-reviewed article that estimated an emission reductions and removals pathway based on the country's stated level of ambition is used.

Table 6: Data sources of afforestation and reforestation commitments or pledges

Source	Publisher	Countries
NDC	UNFCCC	Indonesia
NDC	UNFCCC and Climate Watch Translation	Colombia, Costa Rica
NDC	UNFCCC and Translation	Democratic Republic of the Congo, Gabon
NDC	Calculations	India, Gabon, Papua New Guinea, Suriname, Vietnam
UNFCCC pledges	National Action Plan	Kenya
Other pledges	Bonn Target	Brazil
Peer-reviewed literature	De La Torre Ugarte et al. (2021). [13]	Peru

The resulting credit supply from afforestation and reforestation activities from NDCs and other commitments is shown in Table 7 on an annual and cumulative basis to 2030 and 2050.

Table 7: Carbon credit supply from afforestation and reforestation (NDC targets)

Country	Annual ($MtCO_2$/yr)	Cumulative ($MtCO_2$)	
		2021-2030	2021-2050
Brazil	15	153	459
Colombia	2	15	45
Costa Rica	0.1	1	3
DRC	15	145	435
Gabon	2	20	59
India	8	79	238
Indonesia	4	44	133
Kenya	7	68	204
Papua New Guinea	0.4	4	11
Peru	1	9	28
Suriname	0.4	4	11
Vietnam	0.2	2	5
Total	**54**	**544**	**1,633**

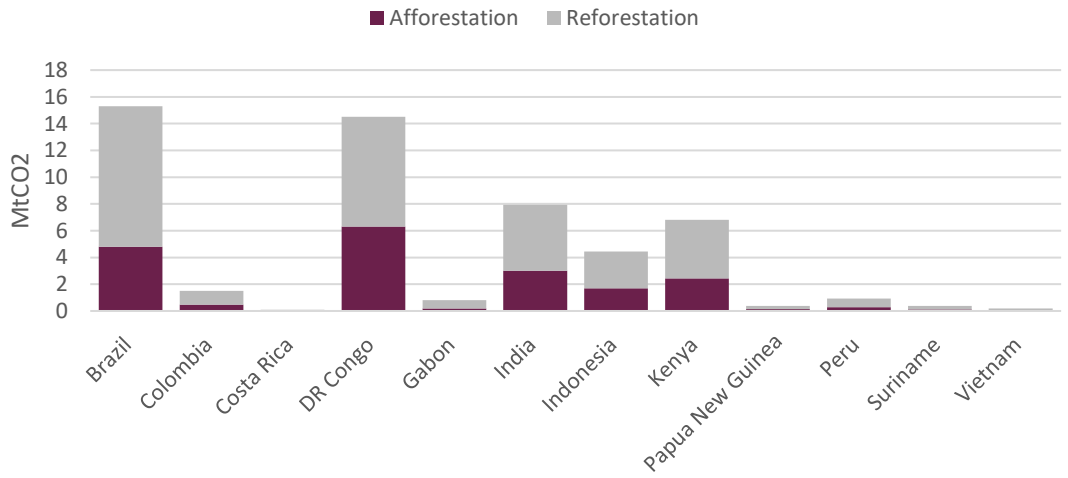
Brazil and the Democratic Republic of the Congo, with large areas of rainforest, also have the greatest afforestation and reforestation targets. The DRC greatly increased their ambition regarding afforestation and reforestation in their most recent NDC update.

[13] 'A deep decarbonization pathway for Peru's rainforest', DOI

However, the relationship between forest area and the area/emissions removals pledged from afforestation and reforestation is not consistent. Kenya, with a low share of its land area under forest cover, has a higher annual target in even absolute terms than larger countries with greater forest coverage. Countries that could be classified as HFLD[14] in general have a lower ambition for generating more emission removals from forestry. This may be because there is less need to reforest and afforest in these countries. This may also relate to the land area of the country in the cases of Costa Rica, Gabon, Papua New Guinea, and Suriname.

Figure 6 presents the annual emissions removals, split between afforestation and reforestation, by country. In all cases, countries have pledged greater levels of reforestation than afforestation.

Figure 6: Annual average emissions removed through national afforestation and reforestation targets 2021 - 2030 ($MtCO_2yr$)



Source: Trove Research analysis

4.2 Carbon credit supply from reduction projects (REDD+)

4.2.1 Calculating baseline emissions from deforestation

The three REDD+ scenarios reflect different rates of reducing forest loss. The potential carbon emissions savings (i.e. carbon credit supply potential) under each scenario depends on the baseline rate of deforestation in each country.

The baseline emissions from deforestation are calculated using Global Forest Watch data for 'Annual Tree Cover Loss by Dominant Driver', from which wildfire-driven forest loss was subtracted. This data was selected as it provides a breakdown of deforestation by cause. We used data corresponding to "canopy density >30%", the default density for Global Forest

[14] High forest cover, low deforestation rate

Watch data. GFW do not provide data for Gabon and Suriname on urbanisation- or forestry-driven deforestation, and it was assumed that these values were zero.

Urbanisation- and commodity-driven deforestation are considered to be more likely causes of deforestation, whereas forestry and shifting agriculture only lead to temporary forest loss, in some cases. This temporary forest loss still produces carbon emissions and would be considered deforestation by some definitions and in some circumstances, it can become a permanent land use change. Table 8 presents the baseline deforestation values calculated for tree cover loss and emissions.

Table 8: Baseline Emissions from Deforestation– Historical Annual Average 2016-2020

Country	Tree Cover Loss (ha/yr)	Emissions ($MtCO_2$/yr)
Brazil	3,766,000	2,318
Colombia	332,000	195
Costa Rica	13,000	7
Democratic Republic of the Congo	1,350,000	869
Gabon	30,000	19
India	151,000	77
Indonesia	1,416,000	866
Kenya	18,000	9
Papua New Guinea	88,000	83
Peru	251,000	161
Suriname	18,000	14
Vietnam	258,000	190
Total	**7,690,000**	**4,807**

4.2.2 REDD+ Scenario 1: NDC Targets Achieved (S1: NDC)

In the NDC scenario, the potential supply of emission reductions is estimated by assessing the commitments to REDD+ in the 12 study countries' latest NDCs under the Paris Agreement. These calculations assume that countries will meet the REDD+ targets in their NDCs.

However, not all countries' NDCs specify targets for reducing deforestation. Where no specific REDD+ target was set in the most recent NDC update, the share of the country's overall NDC mitigation target that could be met through reducing deforestation was estimated.[15] We assumed that emissions reductions would be equal across the current sources of emissions in the country's most recent emissions accounting. Beyond 2030, we assumed that countries would continue to reduce emissions at the same rate through to 2050.

[15] This method was used for Brazil, Peru and Suriname.

This scenario does include national REDD+ targets which have been set independently from NDCs, but only in cases where the document references its contribution to the NDC, or the NDC refers to the national communication in question. In these cases, the NDC's implementation timeframe,[16] is used unless a separate timeframe is provided.

NDC commitments were standardised across countries, taking into account variation in start dates for NDC implementation. The number of years for target implementation was used to convert REDD+ targets into annual average rates when necessary (Table 9). Although all the NDCs covered by this report extend no further than 2030, we assume that the same level of ambition extends to 2050.

Table 9: NDC implementation timeframes

Country	Last Update	Number of submissions	Implementation timeframe	Target period (years)
Brazil	December 2020	2	2005 - 2030	26
Colombia	December 2020	2	2020 - 2030	11
Costa Rica	December 2020	2	2021 - 2030	10
DRC	December 2021	2	2021 - 2030	10
Gabon	November 2016	1	2010 - 2025	16
India	October 2016	1	2021 - 2030	10
Indonesia	July 2021	2	2020 - 2030	11
Kenya	December 2020	2	2021 - 2030	10
PNG	December 2020	2	2021 - 2030	10
Peru	December 2020	2	2021 - 2030	10
Suriname	December 2019	2	2020 - 2030	11
Vietnam	September 2020	2	2021 - 2030	10

4.2.3 REDD+ Scenario 2: Primary Humid Forest Protection (S2: PFP)

In Scenario 2, countries focus on reducing deforestation of primary humid forest (also referred to as 'tropical forest' or 'rainforest'). The scenario assumes that countries end deforestation of primary humid forest by 2030.

In this scenario, we refer to the 'protection of primary humid forests' as 'primary forest protection'. After 2030, countries continue to achieve 'no net deforestation' in the remaining forest area by 2050. Some countries may have existing NDC targets that extend beyond the emissions from primary humid deforestation. However, if the twelve profiled countries were to end primary humid deforestation by 2030, this would likely generate more emission reductions than the current NDC pledges.

[16] NDC timeframes were collated from Climate Watch's 'NDC Overview' for each country.

Evidence suggests that there are benefits to focusing on the protection of primary forests, which sequester more carbon than secondary forests and have greater benefits to nature and biodiversity.[17] Some countries have already implemented measures to protect primary humid forests. Costa Rica's NDC, for example, sets the target to maintain a rate of zero deforestation in mature forests. We interpreted this as ending deforestation in primary humid forest.

Emission reductions from ending primary humid deforestation are estimated based on Global Forest Watch data for 'primary forest loss' by country. To reduce all emissions from primary humid forest loss by 2030, we assume that the rate of deforestation falls by 10% per year over the 10-year period from 2021-2030. Annual rates of emission reductions between 2021 and 2030 generated from primary forest protection were calculated following this assumption.

The emission reductions are estimated beyond 2030 assume no net deforestation is achieved by 2050, based on GFW data for 'forest loss by primary driver'. Because some deforestation is likely to occur under a 'no net' target, even if this scenario is achieved, the end point for emission reductions in 2050 taken to be 95% of the annual baseline emissions from deforestation.

Emissions from annual primary humid forest loss is then subtracted from this value to derive the remaining human-driven deforestation emissions to be reduced by 2050. We assume that between 2030 and 2050, countries reduce remaining deforestation emissions at a linear rate.

4.2.4 REDD+ Scenario 3: No Net Deforestation (S3: NND)

Scenario 3 is the most ambitious scenario and creates the largest potential supply of carbon credits. The scenario assumes that countries meet the commitments set out in the *Glasgow Leaders Declaration on Forests and Land Use* was published at COP26. The declaration's target is "halting and reversing forest loss and land degradation by 2030".[18] Countries have interpreted the Glasgow Declaration on Forests as a commitment to achieve a state of net deforestation, rather than halting all deforestation.

We estimate emissions reductions in Scenario 3 based on all twelve profiled countries achieving no net deforestation by 2030, even where some countries may not have signed the Glasgow Declaration.

To calculate the potential supply of carbon credits in this scenario we assume no net forest loss would involve reducing nearly all, but not 100%, of emissions from deforestation by 2030. The remaining 5% would be offset with reforestation, afforestation, reversal of forest degradation, etc. After 2030, countries continue to reduce the remaining 5% of deforestation emissions by 2050, albeit at a slow rate given that these would be the most persistent drivers of deforestation.

---

[17] Kormos, C. et al. *IUCN Primary Forests Task Team.* Primary forests: a priority nature-based solution. Link.

[18] Glasgow Leaders' Declaration on Forests and Land Use - UN Climate Change Conference (COP26) at the SEC – Glasgow 2021 (ukcop26.org)

Because such plans would represent a significant change in policy direction and countries are unlikely to have yet implemented plans to end net deforestation, we assume that progress towards no net deforestation goal is achieved linearly up to 2050.

4.2.5 Carbon credit supply projections

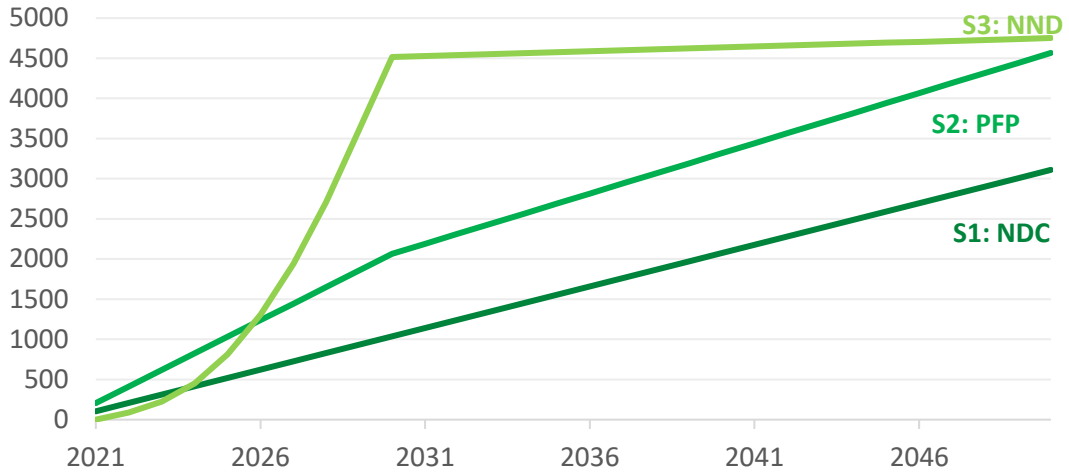
Table 10 and Figure 7 show the cumulative emission reductions between 2021-2030 and 2021-2050 for each scenario. For most countries S1: NDC produced fewer emission reductions than S2: PFP or S3: NND. The exceptions are Gabon and Cost Rica, whose NDC targets do not vary substantially from the goal of preventing primary forest loss (S2: PFP), and India and Kenya, whose NDCs state higher ambition than S2: PFP and S3: NND.

These variations, especially in Kenya, can be explained by lower forest coverage as a proportion of total land area. Suriname's NDC indicates the intention of maintaining its status as a carbon sink and HFLD country with deforestation rates below 0.1%, which is comparable to S3: NND.

Table 10: Cumulative Emissions Reductions ($MtCO_2$)

	S1: NDC		S2: PFP		S3: NND	
	2021-2030	2021-2050	2021-2030	2021-2050	2021-2030	2021-2050
Brazil	283	28	1,197	2,202	2,187	2,302
Colombia	54	5.4	93	185	183	193
Costa Rica	2	0.2	2	7	7	7
DRC	187	19	339	826	812	855
Gabon	11	1.1	10	18	16	17
India	146	15	13	73	66	69
Indonesia	266	27	336	823	818	861
Kenya	4	0.4	0.3	9	2	2
PNG	6	0.6	11	79	78	82
Peru	54	5.4	22	153	152	160
Suriname	11	1.1	11	13	13	13
Vietnam	12	1.2	30	181	180	190
Total	**1,037**	**104**	**2,064**	**4,567**	**4,515**	**4,753**

Figure 7: Cumulative emissions reductions (2021-2050) by scenario ($MtCO_2$)



In all countries from 2021-2030 there were greater levels of emission reductions in S3 than S2: PFP. S2: PFP and S3: NND produced similar reductions over this time period in Suriname and Gabon, as both countries have high levels of forest cover, and a greater proportion of forest cover is primary.

Between 2021 and 2050, both S2: PFP and S3: NND produce similar emission reductions as they involve countries having met net deforestation by 2050 at the latest. The minor negligible variation between the two between 2021-2050 can be attributed to the level of ambition for afforestation and reforestation in each country's NDC, which factors into calculation of emission reductions for ending net deforestation in S3: NND.

Table 11 (Figure 8, Figure 9) show the average annual emissions reductions for each scenario across the two time periods. The annual average emissions reductions for S1: NDC remain the same from 2021 to 2030 and 2050 as the scenario assumes a linear rate of emissions reductions from the level of ambition in countries' most recent NDC updates.

Gabon, India, and Peru are notable as countries where the annual average reductions from 2021-2050 are higher in S1: NDC than the other two scenarios. The large variation in country area and forest area means that the values are more difficult to observe for some smaller countries.

Table 11: Annual average emissions reductions (MtCO2/yr)

	S1: NDC		S2: PFP		S3: NND	
	2021-2030	2021-2050	2021-2030	2021-2050	2021-2030	2021-2050
Brazil	28	28	120	73	219	77
Colombia	5.4	5.4	9	6	18	6
Costa Rica	0.2	0.2	0.2	0.2	0.7	0.2
DRC	19	19	34	28	81	28
Gabon	1.1	1.1	1	0.6	1.6	0.6
India	15	15	1	2	7	2
Indonesia	27	27	34	27	82	29
Kenya	0.4	0.4	0.03	0.3	0.2	0.1
PNG	0.6	0.6	1.1	3	8	3
Peru	5.4	5.4	2.2	5	15	5
Suriname	1.1	1.1	1.1	0.4	1.3	0.4
Vietnam	1.2	1.2	3	6	18	6
Total	**104**	**104**	**206**	**152**	**451**	**158**

Figure 8: Annual average emissions reductions 2021 – 2030 ($MtCO_2$)

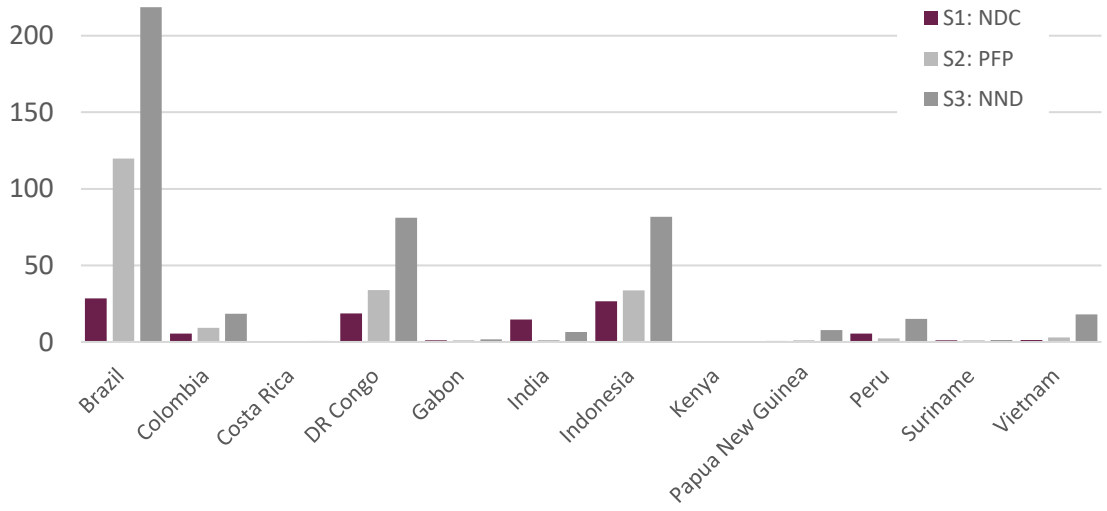
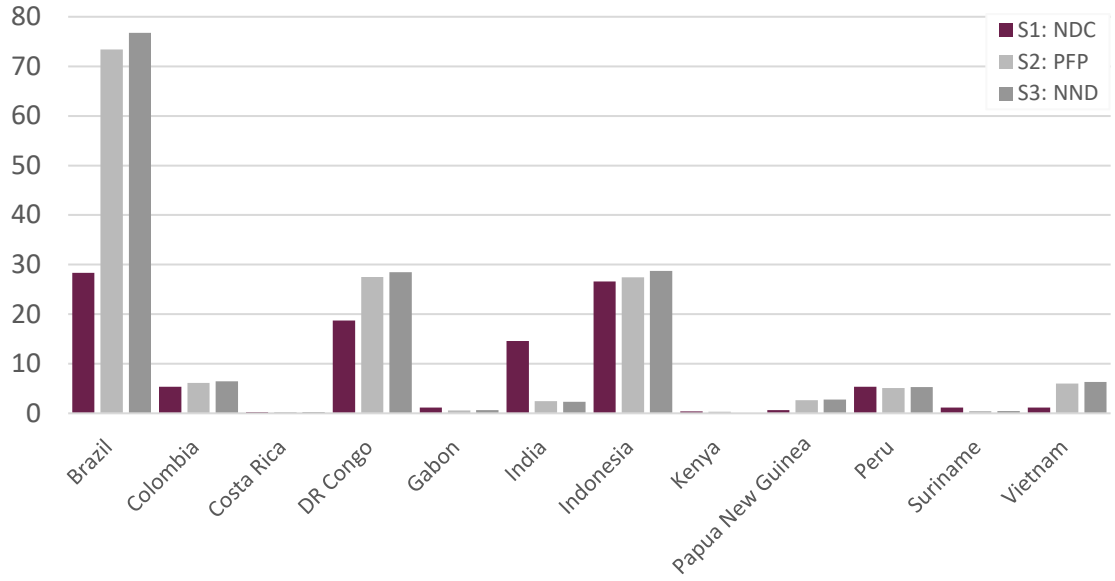


Figure 9: Annual average emission reductions 2021 – 2050 ($MtCO_2$)



5. Materiality of voluntary carbon market demand

In this section we compare the potential demand from the voluntary carbon market demand for carbon credits sourced from tropical forests against the projected supply from these countries. The results are presented as ratio of demand divided by supply over the periods 2020-30 and 2030-2050. Separate results are shown for reductions (REDD+) and removals across low, medium, and high demand scenarios, and the three tropical forest reduction scenarios.

The ratios are colour-coded to indicate bands of significance (Figure 10). A ratio of >1 indicates that the forecast demand for carbon credits from the group of tropical forest countries is greater than the available supply, and vice-versa.

Figure 10: Colour legend for ratio matrices

	Over 3
	Between 2 and 2.99
	Between 1 and 1.99
	Between 0.5 and 0.99
	Under 0.5

5.1 Demand-Supply ratios: reduction credits (REDD+)

Table 12 shows the materiality assessment for emissions reductions from 2021 to 2030. An important caveat in interpreting these ratios is that not all potential 'supply' of REDD+ will become available in the voluntary carbon market. The analysis does, however, indicate whether the application of corresponding adjustments to emissions reductions transferred for voluntary purposes have the potential to have a material impact in tropical forest countries.

The ratios suggest that between 2021 and 2030, ambition levels for REDD+ activities in NDCs (in S1: NDC) are slightly higher than the forecast demand in the low and medium demand scenarios, but unaligned with the high demand forecast. Under scenarios S2: PFP and S3: NND, REDD+ activities would exceed the demand for tropical forest credits from countries in the study.

Table 12: Demand-supply ratios for reduction credits (2021-2030)

Reduction Demand / Supply (2021-2030)		Forest Protection Scenarios		
		S1: NDC	S2: PFP	S3: NND
REDD+ Demand	Low	0.6	0.3	0.1
	Medium	0.9	0.5	0.2
	High	1.2	0.6	0.3

However, demand for reduction credits is forecast to increase more rapidly after 2030. Table 13 shows the forecasts through to 2050 and highlights greater risks to the balance to supply and demand. This suggests higher potential for material impact of decisions on corresponding adjustments for the VCM. As noted above, the REDD+ targets of tropical forest countries' NDCs in S1: NDC are held constant. Across the different demand scenarios, forecasted demand could be up to 1.4 times higher than current levels of country ambition for REDD+.

Table 13: Demand-supply ratios of reduction credits (2021-2050)

Reduction Demand / Supply (2021-2050)		Forest Protection Scenarios		
		S1: NDC	S2: PFP	S3: NND
REDD+ Demand	Low	2.4	1.6	1.6
	Medium	3.7	2.5	2.4
	High	4.6	3.1	3.0

From 2030 onwards, the main objectives of S2: PFP (ending deforestation of primary humid forest) and S3: NND (achieving no net deforestation) will have been achieved. Thus, between 2021 and 2050, in these two scenarios the potential for the supply of REDD+ levels off, while demand is forecast to grow more rapidly in later years. Forecasted demand from each of the three scenarios is larger than the potential for supply in the long-term model, remaining 1.6 to 4.6 times greater in all three scenarios.

5.2 Demand-supply ratios: removal credits

Table 14 shows the ratio of estimated removal demand to the supply of emissions removals from tropical forest countries. Even though afforestation and restoration pledges are very modest in most countries NDCs, demand for forest-based removals is also expected to be low until the mid-2030s due to back-loading of carbon credit use under SBTI net zero commitments. The means demand is less than supply for all credit demand scenarios up to 2030.

Demand for removals increases after the mid-2030s so that over the entire 30-year period 2020 to 2050 demand for removals exceeds the available supply – as defined through an extrapolation of NDC afforestation commitments. Over this period demand exceeds supply with a ratio of 2.8 to 6.1.

Table 14: Demand-supply ratios of removal credits

Period	Low demand	Medium demand	High demand
2021-2030	0.3	0.5	0.6
2021-2050	2.8	4.5	6.1

For comparison, Table 15 shows ratio of demand to supply in the final report of the Taskforce on Scaling Voluntary Carbon Markets (TSVCM).[19] These figures represent the amount of carbon that would be sequestered in forests, and on the assumption that 100% of the sequestered carbon would be eligible for the creation of carbon credits for the voluntary carbon market.

The figures are based on the total requirements for removals and sequestration to maintain a 1.5°C or 2°C pathway. In 2030, under these maximum scenarios, 1,500 to 2,000 $MtCO_2$/yr of removal/sequestration would be required to adhere to 1.5°C and 2.0°C scenarios respectively. In 2050, some 7,000 to 13,000 $MtCO_2$ would be required to adhere to 1.5°C and 2.0°C scenarios. These figures are not a projection but represent the upper limit of removals that could flow through the VCM.

Table 15: Ratio of annual removal supply to TSVCM estimates for the 'Maximum Bound' scenarios for demand

Scenario	2030	2050
TSVCM Maximum Bound (2°)/Annual Removals from NDCs	2.1	9.9
TSVCM Maximum Bound (1.5°)/Annual Removals from NDCs	2.8	18.4

5.3 Demand-supply ratios: combined reduction and removal credits

This section combines the demand and supply analysis for the removal credits and the three reduction scenarios. The forecast demand for credits from the 12 tropical forest countries in the study are combined to provide an overall assessment of the demand for credits from the private sector between 2021 and 2030, and 2021 and 2050. These combined values are presented in Table 16.

Table 16: Combined annual average reduction and removal credit demand from selected tropical forest countries ($MtCO_2$/yr)

Combined removal & reduction credit demand ($MtCO_2$/yr)			
Year	Low	Medium	High
2021-2030	77	121	162
2021-2050	398	620	802

Figure 11 shows the cumulative estimates of carbon reductions and removals from the tropical forest countries in the study from 2021 to 2050. The difference in cumulative reductions and removals between the three combined scenarios is approximately 1,600 $MtCO_2$, which is just over a third of the cumulative reductions and removals in the S1: NDC + Removals scenario.

[19] TSVCM Final Report. January 2021. Page 50-54. Link

Figure 11: Cumulative emission removals and reductions 2021-2050 ($MtCO_2$)

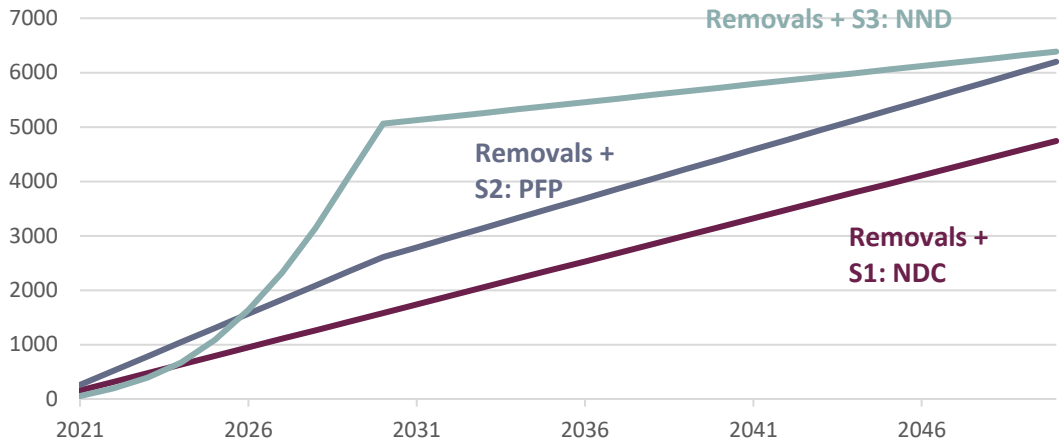


Table 17 shows the annual average emissions reductions and removals in $MtCO_2/yr$. These values are equal for both time periods for S1: NDC + Removals as both assume linear emissions reductions or removals.

Table 17: Annual average supply of combined carbon reductions and reductions ($MtCO_2/yr$)

	S1: NDC + Removals		S2: PFP + Removals		S3: NND + Removals	
Country	**2021-2030**	**2021-2050**	**2021-2030**	**2021-2050**	**2021-2030**	**2021-2050**
Brazil	44	44	135	89	234	92
Colombia	7	7	11	8	20	8
Costa Rica	0	0	0	0	1	0
DRC	33	33	48	42	96	43
Gabon	3	3	3	3	4	3
India	23	23	9	10	14	10
Indonesia	31	31	38	32	86	33
Kenya	7	7	7	7	7	7
PNG	1	1	1	3	8	3
Peru	6	6	3	6	16	6
Suriname	2	2	1	1	2	1
Vietnam	1	1	3	6	18	7
Total	**158**	**158**	**261**	**207**	**506**	**213**

The split between removals and reductions for annual average emissions in each of the three combined scenarios is shown in Figure 12. The annual average reductions and removals values for S2: PFP + Removals and S3: NND + Removals are significantly larger than in the 2021-2050 time period, given the 'front-loading' of ambition in these scenarios by 2030.

Figure 12: Annual average carbon reductions and removals 2021-2030 ($MtCO_2/yr$)

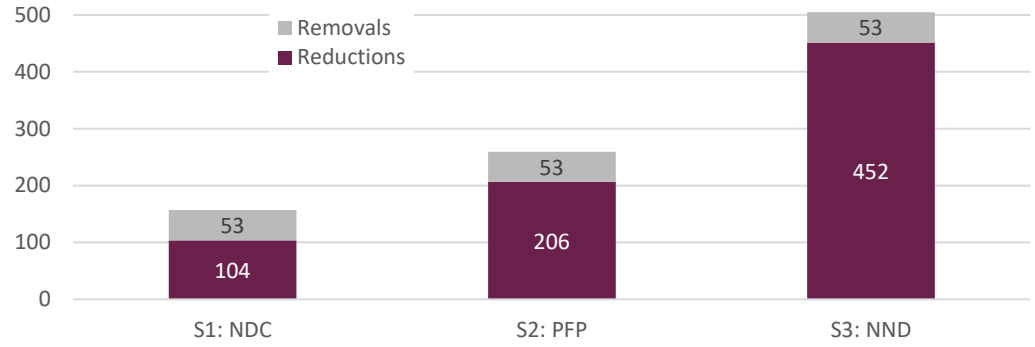


Table 18 shows the ratio of combined reduction and removal demand to supply for 2021-2030. Between 2021 and 2030, the 12 countries in the study could be capable of meeting demand for credits from tropical forest countries if their current share of the pipeline for annual issuances remains constant and current REDD+ targets are achieved.

Table 18: Ratios of annual average reduction and removal demand to supply (2021-2030)

Combined Demand / Supply (2021-2030)		Forest Protection Scenarios		
		S1: NDC	S2: PFP	S3: NND
Demand	Low	0.5	0.3	0.2
	Medium	0.8	0.5	0.2
	High	1.0	0.6	0.3

Increasing national ambition on deforestation prevention targets to the level that protected all primary humid forest from deforestation by 2030 would be more likely to deliver the volume of supply needed to meet all levels of forecasted demand. Table 19 shows the ratio of combined reduction and removal demand to supply for 2021 to 2050. Over the longer time period to 2050, demand for carbon credits, in particular removals, increases. Under all scenarios, these countries would no longer be able to supply sufficient quantity of credits to meet expected demand.

Table 19: Ratios of annual average reduction and removal demand to supply (2021-2050)

Combined Demand / Supply (2021-2050)		Forest Protection Scenarios		
		S1: NDC	S2: PFP	S3: NND
Demand	Low	2.5	1.9	1.9
	Medium	4.0	3.0	2.9
	High	5.1	3.9	3.8

6. Conclusions and discussion

6.1 Conclusions

Figure 13 summarises the demand-supply ratios across the 2021-2030 and 2021-2050 time periods and for all demand and supply scenarios. Note that in all the "reduction" (REDD+) credit scenarios the analysis assumes that all emission savings from reduced deforestation in tropical forest countries are available for use in the voluntary market.

Figure 13: Summary voluntary carbon credit demand-supply ratios for all scenarios

2021-2030							
Demand scenario	Removal credit supply	Reduction credit supply			Combined credit supply		
		S1: NDC	S2: PFP	S3: NND	Removal + S1: NDC	Removal + S2: PFP	Removal + S3: NND
Low	0.3	0.6	0.3	0.1	0.5	0.3	0.2
Medium	0.5	0.9	0.5	0.2	0.8	0.5	0.2
High	0.6	1.2	0.6	0.3	1.0	0.6	0.3

2021-2050							
Demand scenario	Removal credit supply	Reduction credit supply			Combined credit supply		
		S1: NDC	S2: PFP	S3: NND	Removal + S1: NDC	Removal + S2: PFP	Removal + S3: NND
Low	2.8	2.4	1.6	1.6	2.5	1.9	1.9
Medium	4.5	3.7	2.5	2.4	4.0	3.0	2.9
High	6.1	4.6	3.1	3.0	5.1	3.9	3.8

From these results we draw a number of conclusions for the two periods:

2021 – 2030

- In the 2021-2030 period the potential demand for carbon credits from tropical forest countries is less than the potential supply, for all scenario combinations, except for High demand, S1:NDC for reduction credit supply. In this combination, the relatively low ambition of NDCs for tropical forest countries is outweighed by a rapid growth in demand from the voluntary market in the 2021 to 2030 period.
- However, even with demand being less than supply in 2021-2030, the voluntary market still represents a potentially significant source of demand for these countries. Combining demand for removal and reduction credits, even under a low demand scenario the voluntary market represents more than 15% of the available supply under the highest supply scenario (where countries achieve no net deforestation by 2050).

2021 – 2050

In the two decades from 2030 to 2050, demand for carbon credits from tropical forest countries is expected to increase, especially for removal credits under science-based net zero commitments. Our projected supply also increases in line with projected afforestation, restoration and REDD+ commitments from these countries, but does not keep pace with projected demand. As a result, demand exceeds available supply in all scenarios to 2050.

Under the low demand scenario, demand for carbon credits is up to two and half times larger than available supply. This increases to four to five times under the high demand scenario.

6.2 Discussion

The aim of this study was to answer the question "is the potential demand for carbon credits for voluntary purposes likely to be a material consideration for tropical forest countries?" From the results described above, the answer is that they could well be material. Under most scenarios modelled by Trove Research – and assuming all carbon absorption activities in these countries are eligible for creating carbon credits - the potential demand for carbon credits exceeds the supply to 2050. In the period to 2030, demand could represent 15% to 100% of available supply.

The use of corresponding adjustments for voluntary carbon credits is controversial. The concept is designed to ensure that a claim for an emission reduction by a buyer is not also claimed by the host country – as the host country would adjust its emissions upwards by the volume of credits claimed by the buyer. To achieve its NDC the host country would need to make an extra effort to reduce emissions. A key challenge to this mechanism is that company emissions are not accounted for under national emissions accounting systems and there is no risk of double-counting.

To date, most of the debate around the use of corresponding adjustments for voluntary purposes has assumed that the voluntary market would not have a material impact on host country emissions. This research suggests the opposite is likely to be true when the long-term growth in demand for voluntary carbon credits is factored in.

This report does not conclude on whether the corresponding adjustments should or should be applied to voluntary market transactions, but sets out an assessment of the potential significance of the voluntary market in contributing to tropical forest climate pledges.

One potential implication is that if voluntary demand for carbon credits materialises to the extent projected in this report, tropical forest countries could achieve emission reductions in excess of their current NDC commitments through finance available from the voluntary sector. This would facilitate the creation of correspondingly adjusted credits.

A qualification on this interpretation is that there may be limitations on the willingness to pay for correspondingly adjusted credits in the voluntary market. Projections of future demand for carbon credits in the modelling are built up from company level commitments on the basis that they are achieved at any cost. In practice voluntary corporate climate commitments will face budgetary limitations. Logically, governments would prioritise the lowest cost forms of mitigation first in achieving their NDCs, so that emissions reductions beyond their NDCs would be more costly. In tropical forest countries this may mean foregoing more valuable revenue from agricultural activities on deforested land. Emission

reductions in excess of a host country's NDC, which could carry a corresponding adjustment, would therefore be more expensive to the buyer. The appetite to pay for these has yet to be tested in the voluntary corporate sector.

Disclaimer

The information contained in this publication is derived from carefully selected public sources we believe are reasonable. We do not guarantee its accuracy or completeness and nothing in this document shall be construed to be a representation of such a guarantee. Any opinions expressed reflect the current judgment of the author of the relevant article or features, and does not necessarily reflect the opinion of Trove Research.

The opinions presented are subject to change without notice. Trove Research accepts no responsibility for any liability arising from use of this document or its contents. Trove Research does not undertake Regulated Activities as defined in Section 22 of the Financial Services and Markets Act 2000 and is not registered with the Financial Services Authority of the UK.

Company Information

Trove Research

Vaughan Chambers
Vaughan Road
Harpenden
Herts
UK
AL5 4EE

www.trove-research.com

For information about this or other research, please contact:

info@trove-research.com