Annex to the NYDF Goal 7 Progress Report (2021)

Chapter 2

To provide context to NDC ambition, we present technical and economic mitigation potential estimates for three forest-related activities (reduced deforestation, afforestation/reforestation, and improved forest management) from existing literature. Here, technical potential is defined as the maximum mitigation potential that can be delivered by current technologies, whereas economic potential refers to mitigation that could be achieved, constrained by a carbon price.

When comparing NDC targets to mitigation potentials, we use the economic potentials and not technical potentials. While technical potential represents what science identifies as biophysically possible, economic potentials represent public willingness to pay and indicate near-term feasibility to reduce emissions and enhance sequestration. Therefore, economic mitigation potentials are more relevant for policy making and national plans. Various other factors affect feasibility – political, financial, institutional, and socio-cultural – however, there is currently no available mitigation data that consider these factors.

For technical potential, we use data from Griscom et al. (2017), which indicates that forests' maximum mitigation potential globally is 16.2 $GtCO_2$e per year. This estimate includes avoided forest conversion, reforestation, natural forest management, improved plantations, fire management, and avoided woodfuel harvest. The estimates are constrained by increasing human needs for food and fiber. For the three main forest sector activities we consider in this report (reduced deforestation, A/R, and improved forest management), the maximum mitigation potential is 15.6 $GtCO_2$/e. Approximately half of this mitigation potential can be achieved at carbon prices up to USD 100/tCO_2e, which has also been supported by Roe et al. (2019) estimates.

For economic mitigation potential, we use data on reduced deforestation and A/R estimates based on carbon prices of USD 20/tCO_2e from Busch et al. (2019), and improved forest management at USD 20–50/tCO_2e from Austin et al. (2020). The above sources of information are the basis for Figure 2.1.

For Figure 2.2., we use data from Roe et al (2019), which identifies the top 25 countries with highest technical mitigation potential, based on Griscom et al. (2017). We use these more recent data because it also contains mitigation potential for reduced deforestation at individual country level. Similarly, we use country-level data provided by Busch et al. (2019) and Austin et al. (2020) for the economic mitigation potential. Note that data for mitigation potential of reducing deforestation and afforestation/reforestation are only available for tropical countries, based on Busch et al. (2019).

To assess the ambition of forest targets in NDCs relative to economic mitigation potential, we gathered the top 15 countries with the highest mitigation potential for reduced deforestation, improved forest management, and afforestation/reforestation, respectively **(Table 2)**. In total, there are 32 countries that offer the highest mitigation potential for these three measures.

TABLE 2. Top 15 countries for avoided deforestation, improved forest management, and afforestation/reforestation

Avoided deforestation[8]		Improved forest management[9]		Afforestation/ Reforestation[8]	
Top 15	Yearly Mt at 20$ /tCO$_2$	Top 15	Yearly Mt at 20–50$ /tCO$_2$	Top 15	Yearly Mt at 20$ /tCO$_2$
Brazil	396.7	South Africa	81.91	Brazil	42.0
Indonesia	275.7	Japan	41.96	Indonesia	11.6
DRC	171.6	China	40.25	DRC	9.0
Peru	121.5	Belarus	38.45	Mexico	6.7
Colombia	92.8	Brazil	37.61	Angola	6.7
Bolivia	82.8	USA	37.57	Colombia	6.5
PNG	70.9	Ukraine	32.34	India	6.4
Congo Rep.	64.4	Chile	26.32	Tanzania	6.2
Venezuela	63.4	Canada	25.36	Mozambique	5.3
Malaysia	48.9	Mexico	21.79	Thailand	5.0
Zambia	29.1	Uganda	21.79	Myanmar	4.4
Myanmar	26.7	Russia	17.81	Zambia	4.4
Guyana	23.4	Tanzania	15.5	Bolivia	4.2
Mexico	23.4	Indonesia	15.43	Ethiopia	4.1
Cameroon	23.3	Ghana	13.56	Venezuela	4.1

8   Busch, J. *et al.* Potential for low-cost carbon dioxide removal through tropical reforestation.
    Nat. Clim. Change **9**, 436–466 (2019).

9   Austin, K. G. *et al.* The economic costs of planting, preserving, and managing the world's
    forests to mitigate climate change. *Nat. Commun.* **11**, 5946 (2020)

We reviewed the NDC documents of 32 countries to find any numerical target related to forests. Of countries that submitted an updated NDC (till 31st July 2021), we reviewed their updated NDCs. For the rest, we reviewed their previous (first) NDC. NDCs were also checked for mentions of any qualitative forest-related targets.

The forest related targets vary significantly across NDCs both in terms of intervention (e.g., reduced deforestation, restoration, and afforestation) and metric used (e.g., hectares, tons of CO_2 and rate in %). They also assume different timeframes (e.g., until 2025, 2030, 2035). We categorized targets based on the following groups:

- Unconditional/conditional targets
- Mitigation targets for: reduced deforestation, A/R, improved forest management

Restoration, reforestation, and afforestation are activities that tend to be used interchangeably and overlap in national climate pledges. For the purpose of this analysis, we considered targets related to restoration under afforestation/reforestation.

We recorded targets as they appear in the NDC documents; where targets were specified in hectares or tCO_2, we recorded them as such. We converted the targets into yearly rates where they were not specified to ease comparison. For instance, Colombia has a target achieving emissions reductions of 59.18 $MtCO_2$ as part of reducing deforestation in the period between 2021 and 2030. The total of 59.18 $MtCO_2$ was divided by 11 years to get an average yearly rate of 5.38 $MtCO_2$ per year. In computing yearly rates, we always assumed progress towards a target to be linear, with an equal change in hectares/ tCO_2 in each year of the implementation period. Where baseline rates of deforestation or forest coverage were not specified in NDCs, we used data from several national and international sources.

We focused our analysis on those countries with quantitative mitigation targets (11 out of 32) and compared the NDC targets to their economic mitigation potential for different activities. Figure 2.3 compares the economic mitigation potential of the countries that provide quantitative NDC targets for each of the three forest-climate activities.

Tables 3, 4, and 5 below summarize the NDC targets (in both Mha and $MtCO_2$) of high-potential countries for each forest activity and their economic mitigation potential according to the literature. "x" means that the NDC does not contain a clear target for this activity.

TABLE 3. NDC targets and economic mitigation potential for reducing deforestation for Top 15 countries

Country	Reducing deforestation		
	NDC target (Mha) (per year)	NDC target (MtCO$_2$) (per year)	Mitigation potential (MtCO$_2$/year) at USD 20 /tCO$_2$ (Busch et al. 2019)
Brazil	x	x	396.7
Indonesia	x	43.253	275.7
DRC	x	x	171.6
Peru	x	x	121.5
Colombia	0.029	5.4	92.8
Bolivia	x	x	82.8
PNG	0.026	5.0	70.9
Congo Rep	x	0.3	64.4
Venezuela	x	x	63.4
Malaysia	x	x	48.9
Zambia	x	x	29.1
Myanmar	0.140	x	26.7
Mexico	0.150	x	23.4
Guyana	0.200	4.9	23.4
Cameroon	x	x	23.3

Busch, J. *et al.* Potential for low-cost carbon dioxide removal through tropical reforestation. *Nat. Clim. Change* **9**, 436–466 (2019).

Austin, K. G. *et al.* The economic costs of planting, preserving, and managing the world's forests to mitigate climate change. *Nat. Commun.* **11**, 5946 (2020)

TABLE 4. NDC targets and economic mitigation potential for afforestation/ reforestation for Top 15 countries

Country	Afforestation/Reforestation		
	NDC target (Mha) (per year)	NDC target (MtCO$_2$) (per year)	Mitigation potential (MtCO$_2$/year) at USD 20 /tCO$_2$ (Busch et al. 2019)
Brazil	x	x	42
Indonesia	x	x	11.6
DRC	0.6	0.6	9
Mexico	x	x	6.7
Angola	0.05	0.2	6.7
Colombia	0.08	1.7	6.5
India	x	200.0	6.4
Tanzania	x	x	6.2
Mozambique	x	x	5.3
Thailand	x	x	5
Zambia	x	x	4.4
Myanmar	x	x	4.4
Bolivia	2.2	x	4.2
Venezuela	x	x	4.1
Ethiopia	x	29.0	4.1

TABLE 5. NDC targets and economic mitigation potential for improved forest management for Top 15 countries

Country	Improved forest management		
	NDC target (Mha) (per year)	NDC target (MtCO$_2$) (per year)	Mitigation potential (MtCO$_2$/year) at USD 20–50/tCO$_2$ (Austin et al. 2020)
South Africa	x	x	81.9
Japan	x	x	42.0
China	x	x	40.3
Belarus	x	x	38.5
Brazil	x	x	37.6
United States	x	x	37.6
Ukraine	x	x	32.3
Chile	0.02	1.2	26.3
Canada	x	x	25.4
Mexico	x	x	21.8
Uganda	x	x	21.8
Russia	x	x	17.8
Tanzania	x	x	15.5
Indonesia	x	x	15.4
Ghana	0.005	x	13.6
Bolivia	1.7	x	0.5
Cameroon	x	x	0.1

Busch, J. *et al.* Potential for low-cost carbon dioxide removal through tropical reforestation. *Nat. Clim. Change* **9**, 436–466 (2019).

Austin, K. G. *et al.* The economic costs of planting, preserving, and managing the world's forests to mitigate climate change. *Nat. Commun.* **11**, 5946 (2020)

Busch, J. *et al.* Potential for low-cost carbon dioxide removal through tropical reforestation. *Nat. Clim. Change* **9**, 436–466 (2019).

Austin, K. G. *et al.* The economic costs of planting, preserving, and managing the world's forests to mitigate climate change. *Nat. Commun.* **11**, 5946 (2020)

We also reviewed NDC documents for the mention of the role of IPLCs in forest mitigation. NDCs were screened for whether they fully, partially, or have no mention of IPLCs:

1. **NDC fully mentions IPLCs: If there is clear mention of IPLCs in relation to the implementation of forest related measures, including concrete policies/measures that the country has implemented or intends to implement.**

   For example, in Nigeria's first NDC: "Strengthen the implementation of the national Community-Based Forest Resources Management Programme," or in Lao PDR's first NDC: "Increase awareness and technical capacity of village forest volunteers on climate resilient natural forest management, agro-forestry and plantation technologies."

2. **NDC partially mentions IPLCs: If IPLCs are mentioned in relation to forests, but without specifying concrete policies/measures.**

   For example, in Bhutan's first NDC the term 'community forests' is mentioned but not elaborated on/defined. Or in Morocco's first NDC: "Forest ecosystems serve an important purpose for the country and the lives of vulnerable populations. A great anthropogenic stress is induced on these ecosystems, a stress that Morocco strives to bring back to levels cognizant to their production capacity, through a participative approach with local communities."

3. **No mention: If IPLCs are not mentioned at all in NDC, or IPLCs are mentioned, but not in relation to forests.**

   For example, in Canada's first NDC: "With the understanding that Indigenous Peoples and coastal and northern regions are particularly vulnerable to climate impacts, action is also being taken to help these communities thrive."

Chapter 3

This chapter takes stock of the finance need for forest mitigation activities and the public finance flows towards them. To assess the finance need for forest mitigation, we draw on recent estimates in the literature. To estimate finance flows, we focus on government-sourced international and domestic public finance, consistent with the Goals 8 and 9 NYDF assessment frameworks. For international finance flows, we draw on overseas development assistance data from the OECD and REDD+ funding to date. For domestic finance flows, we draw on 16 REDD+ countries' investment plans and domestic funding for the agriculture and forestry sector.

Finance need for forest mitigation

There are various approaches to determining what is needed to restore, enhance, or protect forests, and consequently different methodologies to estimate finance need. Estimates may also consider different time periods or cost of mitigation per ton of carbon. There is also uncertainty in relation to the mitigation potential of the forest sector specifically and the land use sector more broadly. Hence, finance need estimates based on carbon price are also likely to differ depending on which mitigation potential is considered, the role of other sectors in achieving interim climate targets and the change in price of carbon over time.

We estimate the finance needed to protect, restore, and enhance forests globally at the scale and pace needed to achieve the goals of the Paris Agreement globally to range from USD 45–460 billion per year. This is an indicative figure, based on several sources, and therefore risks overlap. No one source provides an estimate of the total need for forests globally across the whole package of interventions (reducing deforestation, restoration, A/R, and SFM). We arrived at this range by combining various sources depending on activities covered in their estimates **(Table 3)**.

The upper bound considers estimations of the finance need for reducing deforestation by 45 percent by 2050 (USD 180 billion per year) and A/R, silvo-pasture, mangrove, and peatland restoration (USD 280 billion per year). The lower bound is based on the lowest estimate we found of additional financing needed that covers forest restoration, REDD+, and forest management (USD 45–65 billion per year). However, this lower bound does not include A/R and is therefore likely an underestimate.

Table 3 provides a summary of sources reviewed as part of the analysis on finance need for forests in this chapter. Some of the sources do not clarify specific activities the financing need estimate would cover.

TABLE 3. **Full list of sources reviewed as part of finance need analysis**

Source	Timeframe	Scale	Activities covered	Notes	Estimate
FOLU (2021)[28]	2030	Global	Forest restoration, REDD+ and forest management	Majority to be used for helping forest country governments to deliver changes in policy, regulation and fiscal incentives that address the root causes of deforestation, and to help businesses and communities build "forest positive" value chains that enhance local livelihoods.	Additional USD 45–65 billion per year
NYDF Assessment (2020)[29]	2050	Tropical countries	Reduced deforestation	An estimated USD 5.4 trillion is needed to reduce emissions from tropical deforestation by 42% by 2050. Estimate was calculated for per year basis.	USD 180 billion per year
UNEP (2021)[30]	2050	Global	A/R, silvopasture, mangrove and peatland restoration	USD 8,130 billion total cumulative investment need for activities between (2021–2050). Estimate was calculated for per year basis. Half of the estimated financing needs are for the management, preservation and restoration of forests through reforestation and afforestation; over one third for silvopasture, and the remainder for peatland and mangrove restoration.	USD 280 billion/year
GCF (2021)[31]	2020–2025 2026–2030	Developing countries	Adaptation and mitigation in forestry and land use (reforestation, peatlands, silvopasture, etc.)	The greatest mitigation potential foreseen under this target comes from agroforestry, followed by reforestation and silvopasture, with smaller potentials from wetland, peatland and ecosystem restoration activities.	USD 151 billion per year in 2020–2025 USD 192 billion per year in 2026–2030
Deutz et al. (2020)[210]	2030	Global	Forests and protected areas	A combination of transitioning the agricultural sector to conservation agriculture practices; transitioning the forestry sector to sustainable forest management practices; and restoring degraded coastal ecosystems, including mangroves.	Biodiversity financing gap of between USD 168–224 billion per year
McKinsey & Company (2021)[211]	2030	Global	Avoided deforestation and reforestation	The bulk of mitigation needs can be met through four NBS methods: avoided deforestation and peatland impact, peatland restoration, reforestation and cover crops.	USD 90 billion

28 Benson, S., Gilks, H. & Gent, D. Nature for Net Zero: consultation document on the need to raise corporate ambition towards naturebased net-zero emissions. (2020).

29 NYDF Assessment Partners. Goal 8 assessment: Providing finance for forest action. (2020).

30 Environment, U. N. State of Finance for Nature. *UNEP - UN Environment Programme* http://www.unep.org/resources/state-finance-nature (2021).

31 Dumas-Johansen, M., Martius, C. & Dooley, K. GCF Sector Guide: Forest and Land Use. (2021).

210 Deutz, A. *et al. Financing Nature: Closing the Global Biodiversity Financing Gap - Full report.* 256 (2020).

211 Mckinsey & Company. Consultation: Nature and net zero. (2021).

Public finance flows for forest mitigation

Public finance plays a crucial role in reducing forest emissions. It can support research and capacity building, provide direct incentives for the protection of forests, and aid the mobilization of private investment needed to address deforestation. Finance flows to forests remain difficult to accurately quantify, owing to poor transparency as well as the absence of global standards for what constitutes climate-related mitigation finance. There are also over-laps in finance flows between tracking initiatives, for example, what donor countries report as official development assistance and international REDD+ funding via multilateral climate funds.

We have data on some drivers of deforestation (e.g. agriculture) but not funding going into other driver sectors and activities, such as infrastructure development and extractives, among others. What we estimate thus rep-resents only a fraction of true grey finance. Nonetheless, indicative figures can be calculated with some certainty by assessing domestic investment plans and expenditure, in addition to bilateral and multilateral flows.

Table 4 provides the estimates of the green and grey finance estimated from both domestic and international finance flows and the sources used.

TABLE 4. Types and estimates of green vs. grey domestic and international finance flows assessed.

GREEN FINANCE	2021 (USD bn)
1. International mitigation finance for forestry in all countries[15]	7.7
International mitigation finance for forestry in countries with deforestation (Subset of the above)	4.5
2. International REDD+ finance[16]	6.7
3. Domestic REDD+ finance[17]	10.1
Total green finance (1+2+3)	**24.5**
GREY FINANCE	**2021 (USD bn)**
4. International finance for agriculture in deforestation countries[36]	39.6
5. Domestic finance for agriculture and forestry in deforestation countries[35]	135
Total grey finance (4+5)	**174.6**

15 Mitigation finance for forestry in all countries: Climate Focus compilation of bilateral and multilateral climate mitigation-related development finance flows to all countries (cumula-tive 2010–19). OECD DAC External Development Finance Statistics: Climate change.

16 International REDD+ finance: Climate Focus compilation of REDD+ readiness and implementation finance commitments (cumulative since 2010)—Data obtained directly from contacts, from publicly available reports, or from Climate Funds Update. Includes commitments from NICFI, FCPF, GCF, FIP, ISFL, UN-REDD, REDD Early Movers, CBFF.

17 Domestic REDD+ finance from government investment plans of 16 REDD+ countries. Climate Focus analysis of FCPF EPRDs (the 16 countries that budgeted for government expenditures). Note that investment plans cover different timeframes.

35 Domestic finance for agriculture and forestry in deforestation countries. Climate Focus compilation of FAOSTAT data on government expenditure for the agriculture and forestry sectors (cumulative 2010-19. No more recent data available).

36 International finance for agriculture in deforestation countries: Climate Focus analysis of development finance commitments retrieved from the OECD Creditor Reporting System database. Cumulative 2010-2019.