#NDCsWeWant

ENHANCING FOREST TARGETS AND MEASURES IN NATIONALLY DETERMINED CONTRIBUTIONS (NDCs)

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1. SETTING THE STAGE

Forests provide ecosystem services that are vital to human well-being and sustainable development.

They regulate water, nutrients and the planet's carbon cycles, and support around 80% of all species living on land.[1] More than 1.6 billion people directly depend on forests and related ecosystem services for their livelihood.[2] Forests also act as the stabilizing force for the global climate by absorbing and storing carbon. However, despite their importance, forests continue to be exploited and destroyed at high rates. The 2020 Forest Resources Assessment by the Food and Agriculture Organization of the United Nations estimates that we lose an average of 10 million hectares – an area comparable to the size of Iceland – of natural forests every year.[3] Forest loss and degradation are driven mainly by commercial agriculture, mining and extractives, infrastructure and illegal logging.

The importance of forest protection, their sustainable use and forest restoration is recognized in a number of international commitments and pledges, such as the Sustainable Development Goals (SDGs), the New York Declaration on Forests (NYDF), the United Nations Convention on Biological Diversity (CBD), the Bonn Challenge and the Aichi Biodiversity Targets. The Paris Agreement recognizes the potential of forests as a key strategy for climate change mitigation[4] and, through reference to the United Nations Framework Convention on Climate Change (UNFCCC) and decisions adopted thereunder, establishes a legal framework for actions to conserve and enhance forest sinks and to reduce emissions from deforestation and forest degradation (REDD+). Their importance is also reflected in national plans for mitigation and adaptation, with 137 out of 165 Nationally Determined Contributions (NDCs) recognizing forests as a key sector.[5]

So far progress under these commitments and pledges has been very limited. The endorsers of the NYDF have failed to reach their target to halve forest loss by 2020. The global community is not on track to meet SDG 15 'Life on Land' and has not achieved any of the Aichi Biodiversity Targets.[6,7]

Meanwhile, the collective level of ambition in the first round of NDCs submitted under the Paris Agreement is too low and does not match the target to limit temperature increase to 1.5°C by the end of the century. Only 15% of global greenhouse gas (GHG) emissions are covered by ambitious goals for net-zero reduction, and the full implementation of current commitments would still lead to a global temperature increase between 2.7°C and 3.7°C by the end of the century.[8] Neither does the level of implementation match existing ambitions: annual global GHG emissions increased to an all-time high in 2018,[9] and there is no sign of emissions peaking in the next few years.[10]

Given this limited progress and the gap in ambition across different sectors, the upcoming revision of the NDCs provides a unique opportunity to demonstrate renewed political will and leadership to protect forests and natural ecosystems for sustainable development, including climate change mitigation and adaptation. Forests provide cost-effective mitigation opportunities to remove and store carbon at large scales, to complement the massive emissions reductions required in other sectors.[11]

In this context, this paper provides recommendations for how government decision-makers can incorporate the full potential of forests for climate change mitigation and adaptation in NDCs under the Paris Agreement. It seeks to inform policymakers in developing measurable policies and actions for NDCs and other national climate strategies and policy documents.

The paper is structured as follows:

- **Section 2** summarizes evidence on the potential contribution of forests to climate change mitigation and adaptation, including co-benefits, trade-offs and synergies with other international commitments.
- **Section 3** reviews available assessments of the role of forests in the first round of NDC submissions and summarizes our findings of updated NDCs submitted in 2020.
- **Section 4** provides a checklist and recommendations to enhance NDCs for forests.
- **Section 5** offers concrete examples of policy instruments and actions to implement enhanced NDCs in the forest sector.

1   United Nations Sustainable Development Goals. 2020. SDG Goal 15: Life on Land. Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss. https://www.un.org/sustainabledevelopment/biodiversity/.
2   International Union for Conservation of Nature (IUCN). 2017. *Forests and Climate Change* [Issues Brief]. https://www.iucn.org/sites/dev/files/forests_and_climate_change_issues_brief.pdf.
3   Food and Agriculture Organization of the United Nations (FAO). (2020). Global Forest Resources Assessment 2020 [Main Report]. Rome, Italy.
4   Referencing the UNFCCC itself and previous COP decisions.
5   International Union for Conservation of Nature (IUCN) and Climate Focus. 2018. Increasing ambition and action on NDCs through Forest Landscape Restoration (FLR). https://www.iucn.org/theme/forests/our-work/forest-landscape-restoration/increasing-ambition-action-ndcs-through-flr.
6   UN Department of Economic and Social Affairs' Office of Intergovernmental Support and Coordination for Sustainable Development (UN-DESA/OISC). 2018. *2018 HLPF Background Note: Review of progress towards achieving SDG 15*. https://sustainabledevelopment.un.org/content/documents/200087.8_Formatted_Background_NoteSDG_15.pdf.
7   Secretariat of the Convention on Biological Diversity. 2020. *Global Biodiversity Outlook 5*. https://www.cbd.int/gbo/gbo5/publication/gbo-5-en.pdf.
8   United Nations Environment Programme. 2019. *The Emissions Gap Report 2019*. Nairobi, Kenya.
9   Millar, R.J., Fuglestvedt, J.S., Friedlingstein, P., Rogelj, J., Grubb, M.J., Matthews, H.D. *et al.* 2017. Emission budgets and pathways consistent with limiting warming to 1.5 °C. *Nature Geoscience*, *10*(10), 741–747.and continue thereafter on a much steeper decline, which would be historically unprecedented but consistent with a standard ambitious mitigation scenario (RCP2.6
10   Peters, G.P., Andrew, R.M., Canadell, J.G., Friedlingstein, P., Jackson, R.B., Korsbakken, J.I. *et al.* 2020. Carbon dioxide emissions continue to grow amidst slowly emerging climate policies. *Nature Climate Change*, *10*(1), 3–6.
11   Intergovernmental Panel on Climate Change. 2019. *Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems* [Summary for Policy Makers]. IPCC.

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2. CLIMATE CHANGE MITIGATION AND ADAPTATION OPPORTUNITIES IN THE FOREST SECTOR

This section presents three opportunities in the forest sector that can contribute to mitigation and adaptation while combating degradation, desertification and enhancing food security, based on the *IPCC Special Report on Climate Change and Land 2019*:

1. Reduced deforestation and forest degradation
2. Improved forest management and agroforestry
3. Afforestation, reforestation and forest restoration.

These opportunities differ in their mitigation potential and cost-effectiveness, but they involve the same or similar co-benefits, trade-offs and synergies with international commitments. The following paragraphs provide a summary of these opportunities, while details are presented in Table 1.

Table 1. Climate change mitigation and adaptation opportunities and options in the forest sector. Sources: IPCC (2019) and Roe *et al.* (2019) unless otherwise referenced.

OPPORTUNITIES IN THE FOREST SECTOR	MITIGATION POTENTIAL	COST-EFFECTIVENESS	ADAPTATION POTENTIAL AND OTHER SOCIAL AND ENVIRONMENTAL BENEFITS	RISKS AND TRADE-OFFS
Reduced deforestation and forest degradation	0.4 to 5.8GtCO$_2$ per year	Low cost: USD20 tCO2/e	• Biodiversity • Water filtration, flood control and reduced water pollution • Air filtration and reduced pollution • Resilience (enhanced adaptation capacity) • Food security through increased yields and available land • Livelihoods through improved incomes and jobs	• Livelihood risks for smallholders relying on deforested land • Trade-offs for economic development, e.g. in driver sectors agriculture, infrastructure, settlements, mining
Improved forest management and agroforestry	0.4 to 2.1GtCO$_2$ per year from improved management 0.1 to 5.7GtCO$_2$ per year from agroforestry	Agroforestry: Low cost: <USD10 tCO2/e or <USD20 tCO2/ha		• Land requirements • Net-positive warming effect from albedo in high latitudes • Permanence • Nutrient and water requirements
Afforestation, reforestation and forest restoration	4.9GtCO$_2$ per year for afforestation[12] 2.43GtCO$_2$ per year from restoration of natural forests[13]	Medium cost: USD 10-100 tCO2/e or USD 20-200/ha Medium cost: USD200 tCO2/e		

SYNERGIES WITH INTERNATIONAL COMMITMENTS			
OPPORTUNITIES IN THE FOREST SECTOR	SDGS	NYDF	AICHI TARGETS
Reduce deforestation and forest degradation	• Target 6: Clean water and sanitation • Target 12: Responsible consumption and production • Target 13: Climate action • Target 15: Life on land	Goals 1, 2, 3, 4, 8, 9 and 10	Target 5: "By 2020, rate of loss of all natural habitats… is at least halved… and degradation and fragmentation is significantly reduced"
Improved forest management and agroforestry	Target 15 (see above) Target 13 (see above) Target 1: Poverty Reduction Target 2: Zero Hunger	Goals 2, 4, 8, 9 and 10	
Afforestation, reforestation and forest restoration	Target 6 (see above) Target 15 (see above)	Goals 5, 8, 9 and 10	Target 15: "By 2020… restoration of at least 15% of degraded ecosystems"

12 Doelman, J.C., Stehfest, E., Vuuren, D.P., Tabeau, A., Hof, A.F., Braakhekke, M.C. *et al.* 2020. Afforestation for climate change mitigation: Potentials, risks and trade-offs. *Global Change Biology*, *26*(3), 1576–1591.
13 Cook-Patton, S.C., Leavitt, S.M., Gibbs, D., Harris, N.L., Lister, K., Anderson-Teixeira, K.J. *et al.* 2020. Mapping carbon accumulation potential from global natural forest regrowth. *Nature*, *585*(7826), 545–550.

2.1 MITIGATION POTENTIAL

Forests provide an essential opportunity for climate change mitigation and for building resilience against the effects of climate change. Since 1990, global deforestation has emitted 3.7 Gigatons of CO_2 ($GtCO_2$) every year; while the remaining forests have removed $3.3GtCO_2$ of CO_2 from the atmosphere every year, resulting in annual average net emissions of $0.4GtCO_2$.[14]

Despite a large variability in estimates, there is agreement that forests offer significant mitigation potential. Roe *et al.* (2019) estimate that by reducing deforestation and forest degradation, improving forest management and adopting agroforestry, and promoting afforestation, reforestation and restoration, the forest sector could contribute almost 18% of the mitigation needed to reach the Paris Agreement's 1.5°C target.[15,16] Measures to reduce deforestation and forest degradation could reduce emissions by up to $3.6GtCO_2$ per year. Activities that enhance forest stocks – such as reforestation, forest management and agroforestry – could sequester emissions of up to $4.6GtCO_2$ per year.[17]
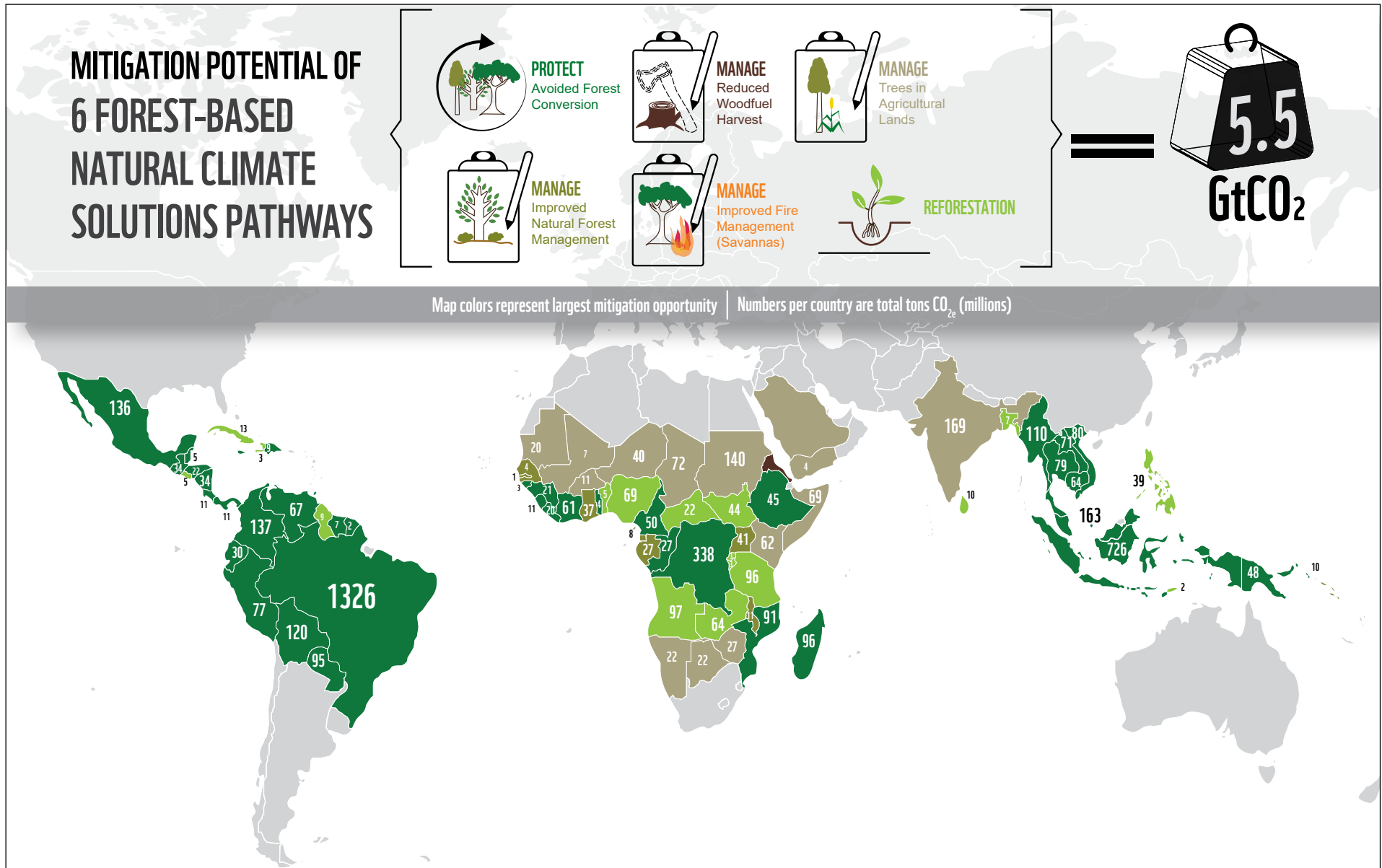
The *IPCC Special Report on Climate Change and Land 2019* estimates that reducing deforestation and forest degradation alone could cut global GHG emissions by between 0.4 to $5.8GtCO_2$ per year,[18] with the highest potential being in tropical forest countries. Agroforestry, which combines woody biomass such as trees or shrubs with crops or livestock and can include fruit or timber trees for harvest, could mitigate between 0.55 and $1.04GtCO_2$ per year. Compared to annual cropping systems, agroforestry has the potential to avoid N_2O and CO_2 emissions from soils and can increase the strength of methane sinks.[19]

Based on a more recent global assessment, forest-based natural climate solutions in tropical countries can mitigate 5.5 $GtCO_2$ per year, although the potential varies widely across countries (Figure 1).[20] The largest mitigation potential is in Brazil, Indonesia, Democratic Republic of the Congo (DRC), India and Malaysia. Other countries in subtropical and temperate regions also have important potential for mitigation in the sector.

Based on our review of country-level or regional assessments, Russia, Canada, the United States and the European Union (EU) have a combined mitigation potential of more than $2.7GtCO_2$ per year.[21] In Russia, the forest sector (including the use of harvested wood products) could mitigate more than 0.7 $GtCO_2$ per year.[22] Similarly, in Canada, improved forest management and harvested wood products could contribute up to $1.16GtCO_2$ per year in carbon savings.[23] Improved management of natural forests and reforestation in the US have a combined mitigation potential of $0.42GtCO_2$ per year.[24] In the EU, measures such as improved forest management, reforestation and energy substitution in wood production could mitigate $0.44GtCO_2$ per year.[25]

14   Tubiello, F.N., Pekkarinen, A., Marklund, L., Wanner, N., Conchedda, G., Federici, S. *et al.* 2020. *Carbon Emissions and Removals by Forests: New Estimates 1990–2020* [Preprint]. Retrieved 13 October 2020, from https://essd.copernicus.org/preprints/essd-2020-203/.

15   Roe, S., Streck, C., Obersteiner, M., Frank, S., Griscom, B., Drouet, L. *et al.* 2019. Contribution of the land sector to a 1.5°C world. *Nature Climate Change*. Retrieved from https://doi.org/10.1038/s41558-019-0591-9.and develop a land-sector roadmap of priority measures and regions that can help to achieve the 1.5 °C temperature goal. Transforming the land sector and deploying measures in agriculture, forestry, wetlands and bioenergy could feasibly and sustainably contribute about 30%, or 15 billion tonnes of carbon dioxide equivalent (GtCO2e

16   Mitigation potential was determined by first qualitatively weighing associated risks and co-benefits, and then identifying feasible estimates (plausible, cost-effective, sustainable, desirable) in a bottom-up assessment based on a literature review. Given the interaction effects of land-based mitigation activities (e.g. land competition, prices, yields) on ecosystem services (e.g. water, air, biodiversity and resilience) and on biophysical impacts (e.g. radiative cooling/warming and albedo), measures were prioritized that minimize risks, maximize co-benefits and overlap with SDGs, the New York Declaration on Forests (NYDF) and United Nations Convention on Biological Diversity (UNCBD) and Aichi Targets. The measures were individually accounted for to avoid double counting of emissions reductions.

17   Roe, S. *et al.* 2019."properties":{"formattedCitation":"Roe, S. et al. (2019

18   IPCC. 2019.

19   Jia, G., Shevliakova, E., Artaxo, P., De Noblet-Ducoudré, N., Houghton, R. and J. House 2019. Land-Climate Interactions. *In: Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems*. https://www.ipcc.ch/site/assets/uploads/2019/08/2c.-Chapter-2_FINAL.pdf.

20   Some of the key assumptions and data sources: For avoided deforestation, forest is defined as > ca 30% tree cover; excludes loss of 'managed forest' except for the inclusion of emissions due to conversion to subsistence agriculture; forested peatlands and mangroves excluded to avoid double counting; determined as avoiding emissions from baseline forest conversion rate (2000–2012). For managed forests, the study used country-level biophysical potential as avoidable selective logging emissions in natural forests which includes multiple forms of improved natural forest management: reduced-impact logging for climate (RIL-C), extended harvest cycles, increased post-harvest sequestration rates and set-asides from logging activity; does not include avoidable illegal logging emissions; cost constraints derived from. For restoration, the study extracted country-level mitigation potential at US$100 Mg CO_2^{-1} yr^{-1} threshold using spatially explicit pantropical marginal abatement cost curve model, calculated as mean annual additional sequestration over the time period 2030–2050; defined as shift from non-forest cover to forest cover at 30% tree-cover threshold; includes 'afforestation' with native trees

21   It is important to note that the underlying assumptions in calculations of mitigation potential vary across different studies.

22   Romanovskaya, A.A., Korotkov, V.N., Polumieva, P.D., Trunov, A.A., Vertyankina, V. Yu. and R.T. Karaban. 2020. Greenhouse gas fluxes and mitigation potential for managed lands in the Russian Federation. *Mitigation and Adaptation Strategies for Global Change*, *25*(4), 661–687.

23   Smyth, C.E., Stinson, G., Neilson, E., Lemprière, T.C., Hafer, M., Rampley, G.J., *et al.* 2014. Quantifying the biophysical climate change mitigation potential of Canada's forest sector. *Biogeosciences*, *11*(13), 3515–3529.but challenging to quantify at a national scale. Forests and their carbon (C

24   Griscom, B.W., Adams, J., Ellis, P.W., Houghton, R.A., Lomax, G., Miteva, D.A. *et al.* (2017). Natural climate solutions. *Proceedings of the National Academy of Sciences*, *114*(44), 11645–11650.confusion persists about the specific set of land stewardship options available and their mitigation potential. To address this, we identify and quantify "natural climate solutions" (NCS

25   Nabuurs, G.-J., Delacote, P., Ellison, D., Hanewinkel, M., Hetemäki, L. and M. Lindner. 2017. By 2050 the Mitigation Effects of EU Forests Could Nearly Double through Climate Smart Forestry. *Forests*, *8*(12), 484.

MITIGATION POTENTIAL OF 6 FOREST-BASED NATURAL CLIMATE SOLUTIONS PATHWAYS

PROTECT Avoided Forest Conversion

MANAGE Reduced Woodfuel Harvest

MANAGE Trees in Agricultural Lands

MANAGE Improved Natural Forest Management

MANAGE Improved Fire Management (Savannas)

REFORESTATION

= 5.5 GtCO$_2$

Map colors represent largest mitigation opportunity | Numbers per country are total tons CO$_{2e}$ (millions)

Figure 1. Among 79 tropical forest countries, forest-based natural climate solution pathways have a total mitigation potential of 5.5GtCO$_2$ per year which could be achieved at 'cost-effective' levels of less than USD100 per tCO$_2$ per year.

Based on data from Griscom et al. 2020.

2.2 ADAPTATION AND OTHER CO-BENEFITS

Reducing deforestation and protecting forests can reduce the vulnerability of ecosystems and their services to climate change threats, and it can improve human resilience too.[26] Maintaining forest cover also limits infectious diseases and reduces healthcare costs, while reducing the risk of floods, extreme weather and air pollution.[27] Sustainable forest management – using practices such as extending rotation cycles between harvests, reducing damage to the remaining trees when harvesting, reducing logging waste, reduced impact logging, implementing soil conservation practices, fertilization, and using wood more efficiently – can contribute to reducing the negative impacts of multiple stressors, including climate change, on ecosystems and societies.

Afforestation, when carried out using good management practices such as the New Generation Plantations (NGP) principles, provides a source of renewable materials for a circular bio economy. Wood materials can be used multiple times before being burned for energy and the CO_2 released can be reabsorbed by reforestation. Using wood in this way will help to optimize the use of most suitable materials on a case-by-case basis, maximizing the substitution of high-carbon materials while minimizing unintended consequences such as single-use plastic.

Similarly, when planned and managed well, reforestation can contribute to climate change adaptation by reducing the vulnerability of people and ecosystems to current and future climate hazards.[28] On the other hand forests themselves are at risk from climate change, so any adaptation plan should implement measures to reduce the negative impacts of climate change on forests.[29]

2.3 TRADE-OFFS AND RISKS

Each of the opportunities also involves certain trade-offs, in particular where their implementation directly affects livelihoods or limits opportunities for economic development.[30] For example, forests that are protected can no longer be developed for agriculture and infrastructure, which are important for economic development, food security and human well-being. Afforestation programmes, especially when based on exotic species that are not suitable for local conditions, can reduce water availability: this can lead to conflicts with other land uses, and also increases the risk of displacement of natural non-forest ecosystems which will likely reduce climate adaptation and biodiversity benefits. Measures to increase forest productivity can lead to reductions in biodiversity: for example, when the increase is achieved by periodic thinning, this reduces the amount of dead organic matter that can provide habitat.[31] Decision-makers should carefully weigh these trade-offs between forest goals and other SDGs, and consider adjustments in their planning to avoid negative impacts or include options for remedial measures to mitigate any impacts that cannot be avoided.

2.4 COST-EFFECTIVENESS

At a range of USD10-100 per tCO_2, all options in the forest sector are cost-effective and ready for implementation in many regions (see Table 1). Globally, forest sector mitigation options are more cost-effective than emerging technologies such as bioenergy with carbon capture and storage, the costs of which range from ~USD40 to over USD1,000 per tCO_2.[32] For example, reducing deforestation could mitigate 1.2$GtCO_2$ annually between 2016-50 at an average cost of USD20 per tCO_2.[33] Cost-effectiveness however varies widely when we consider the economic situation of different countries. As an illustration, the cost of mitigation options in the forest sector could be as high as 46% of GDP for DRC and as low as 1% of GDP for India.[34]

2.5 INSTITUTIONAL REQUIREMENTS AND OTHER ENABLING CONDITIONS

Implementing these opportunities in the forest sector requires the setup of policies, institutions and governance systems at all scales. Land use and management decisions are made from local to national level, and both climate and land policies often span multiple sectors, departments and agencies. Therefore, strengthened multi-level and cross-sectoral governance can enable effective implementation of mitigation and adaptation activities in the forest sector.[35]

26   IPCC. 2019.
27   IPCC. 2019.
28   IPCC. 2019.
29   Anderegg, W.R.L., Trugman, A.T., Badgley, G., Anderson, C.M., Bartuska, A., Ciais, P. *et al.* 2020. Climate-driven risks to the climate mitigation potential of forests. *Science, 368*(6497), eaaz7005.
30   IPCC. 2019.
31   Olsson, L., Barbosa, S., Bhadwal, A., Cowie, K., Delusca, D., Flores-Renteria, K. *et al.* 2019. Land Degradation. *In: Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems.* https://www.ipcc.ch/site/assets/uploads/sites/4/2019/11/07_Chapter-4.pdf.
32   Griscom, B.W., Adams, J., Ellis, P.W., Houghton, R.A., Lomax, G., Miteva, D.A. *et al.* 2017. Natural climate solutions. *Proceedings of the National Academy of Sciences, 114*(44), 11645–11650.confusion persists about the specific set of land stewardship options available and their mitigation potential. To address this, we identify and quantify "natural climate solutions" (NCS
33   Busch, J., Engelmann, J., Cook-Patton, S., Griscom, B., Kroeger, T., Possingham, H. *et al.* 2019. Potential for low-cost carbon dioxide removal through tropical reforestation. *Nature Climate Change, 9*, 436–466. https://doi.org/10.1038/s41558-019-0485-x.
34   Griscom, B.W., Busch, J., Cook-Patton, S.C., Ellis, P.W., Funk, J., Leavitt, S.M. *et al.* 2020. National mitigation potential from natural climate solutions in the tropics. *Philosophical Transactions of the Royal Society B: Biological Sciences, 375*(1794), 20190126. https://doi.org/10.1098/rstb.2019.0126.
35   IPCC. 2019.

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Cross-sectoral coordination is also essential to ensure that policies are planned not just by forest authorities, but also by agencies regulating activities in sectors that influence forests and drive deforestation such as agriculture, urban development and infrastructure, mining and extractives, and rural development. Such coordination supports coherence and synergies not only between different sectors but also in the creation of relevant institutions for implementation, financing and monitoring. Cross-sectoral coordination can also help address trade-offs and maximize co-benefits by enabling decision-makers to identify risks and weigh potential trade-offs between forest and climate goals on the one hand, and other economic or social goals on the other. Moreover, it is important to seek alignment of national policies with policies and development plans at the subnational level. In addition, it is important to effectively and adequately inform and engage all affected stakeholders – in particular Indigenous peoples and local communities (IPLCs), women and marginalized groups – that rely on forests for their livelihood, home and traditions, and whose rights are affected by policies to enhance governance and effective decision-making.[36]

The mitigation and adaptation opportunities listed in Table 1 above also require financial resources. For many developing countries, especially those in tropical forest regions, opportunities are constrained by the limited financial capacities of governments.[37] The expected costs of implementing measures are likely to affect the willingness of governments to pursue these interventions in their national climate commitments, and they may require financial support from other countries or international financial institutions or private sector entities.[38]

While forest countries need to take action, consumer countries share the responsibility and can play an important role in realizing the mitigation and adaptation potential of the forest sector. More than $1 GtCO_2$ per year of tropical deforestation emissions are caused by internationally traded agricultural commodities, mainly beef and oilseeds such as soybeans.[39] In many countries, the emissions from deforestation embedded in the commodities they import from tropical forest countries are almost as high as their domestic agricultural emissions.[40] For example, deforestation makes up a third of the emissions of an average diet in the EU.[41] Consumer countries should therefore address and regulate the import of forest-risk commodities and increase consumer awareness around sustainable commodities to reduce pressure on forests in producer countries.

36   IPCC. 2019.
37   Griscom *et al.* 2020.
38   Griscom *et al.* 2020. Supplementary data.
39   Pendrill, F., Persson, U.M., Godar, J., Kastner, T., Moran, D., Schmidt, S. *et al.* 2019. Agricultural and forestry trade drives large share of tropical deforestation emissions. *Global Environmental Change*, *56*, 1–10. https://doi.org/10.1016/j.gloenvcha.2019.03.002.
40   Pendrill *et al.* 2019.
41   Sandström, V., Valin, H., Krisztin, T., Havlík, P., Herrero, M. and T. Kastner. 2018. The role of trade in the greenhouse gas footprints of EU diets. *Global Food Security*, *19*, 48–55. https://doi.org/10.1016/j.gfs.2018.08.007.because imported food is produced with different production efficiencies and sourcing regions differ in land use histories. We analyze how trade and countries of origin impact GHG footprint calculation for EU food consumption. We find that food consumption footprints can differ considerably between the EU countries with estimates varying from 610 to 1460 CO2-eq. cap−1 yr−1. These estimates include the GHG emissions from primary production, international trade and land use change. The share of animal products in the diet is the most important factor determining the footprint of food consumption. Embedded land use change in imports also plays a major role. Transition towards more plant-based diets has a great potential for climate change mitigation.","container-title":"Global Food Security","DOI":"10.1016/j.gfs.2018.08.007","ISSN":"2211-9124","journalAbbreviation":"Global Food Security","page":"48-55","title":"The role of trade in the greenhouse gas footprints of EU diets","volume":"19","author":[{"family":"Sandström","given":"Vilma"},{"family":"Valin","given":"Hugo"},{"family":"Krisztin","given":"Tamás"},{"family":"Havlík","given":"Petr"},{"family":"Herrero","given":"Mario"},{"family":"Kastner","given":"Thomas"}],"issued":{"date-parts":[["2018",12,1]]}}}],"schema":"https://github.com/citation-style-language/schema/raw/master/csl-citation.json"}

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3. NATIONAL AMBITIONS FOR CLIMATE CHANGE MITIGATION IN THE FOREST SECTOR

The ambitious goals of the Paris Agreement require similarly ambitious mitigation targets and actions from all countries. Parties determine their intended actions at the country level and communicate them through their NDCs. The Paris Agreement and accompanying decision 4/CMA.1 distinguish the following responsibilities, leaving it to countries to decide on the level of additional detail they want to provide in these documents:

- Developed country parties should continue taking the lead by undertaking economy-wide absolute emission reduction targets.
- Developing country parties should continue enhancing their mitigation efforts and are encouraged to move over time towards economy-wide emission reduction or limitation targets in the light of different national circumstances.
- Least developed countries and small island developing states may prepare and communicate strategies, plans and actions for low GHG emissions development reflecting their special circumstances.

3.1 FOREST SECTOR TARGETS IN THE FIRST ROUND OF NDCs

In the first round of NDC submissions, the forest sector emerged as a key sector. Among 165 national or regional NDCs reviewed in 2018, 137 refer to the importance of the forest sector and 127 include some form of forest-related quantitative or qualitative targets and actions.[42] Forty-five NDCs include quantitative GHG or hectare targets for mitigation and adaptation in the forest sector.[43]

Twenty countries refer to monitoring, reporting and verification (MRV) systems and capacities developed for their REDD+ programmes in their NDCs, and recognize the importance of improving MRV for implementing and reporting on forest-related targets.[44] For example, Costa Rica's NDC states that the country will "continue with improvements in metrics [in the AFOLU sectors], deriving verifiable information through pilot actions such as (...) the National REDD+ Strategy" to better and more accurately define its sectoral contributions towards the NDC – and thus ensure methodological consistency between related initiatives. A similar commitment is presented in Papua New Guinea's NDC, according to which the collection of forestry emissions measures will contribute to "a more accurate estimation of the potential emission reductions and enhanced removals that Papua New Guinea can achieve in its forestry sector through REDD+ implementation".

While 137 NDCs include forests, the real potential of forests for combatting climate change is still largely untapped. It is also not clear how MRV systems account for the forest sector in economy-wide and/or sectoral targets, which land use and land-use change categories (and which pools within these categories) are included in the target, and whether they are consistent with the national GHG inventories. Similarly, it remains unclear how baselines and targets for forests and land-use change are set and how progress will be monitored.

Box 1. Examples of integration of MRV in NDCs

Despite being in the early stages of MRV framework development, Guinea, Sudan and Bhutan mentioned in their NDCs that a forest inventory would be carried out and a Forest Reference (Emissions) Level (FREL/FRL) established ahead of a REDD+ Strategy proposal, highlighting the role of the MRV mechanism as an enabler for monitoring and assessment of forest cover over time. Other countries, such as Cambodia, Costa Rica and Indonesia, mention that the MRV capacities and systems developed in the framework of REDD+ National Forest Monitoring System (NFMS), FREL/FRL, Safeguards Information System (SIS), etc.) would be used to define sectoral contributions and account for the emissions reduced through forest-related actions (including REDD+ performance).

Some NDCs, including those of Guyana, Papua New Guinea (PNG) and Cambodia, state that the development and implementation of an MRV system for REDD+ is conditional upon external financial and/or technical support. More particularly, PNG highlights the fact that the immediate lack of data on forestry emissions and removal will require further international support for effective national-scale REDD+ implementation, as extensive capacity-building, technology transfer and technical assistance is required to implement effective actions and ensure the collection of accurate data.

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42   IUCN and Climate Focus. 2018.
43   IUCN and Climate Focus. 2018.
44   Out of 67 forest countries that have either mentioned REDD+ specifically in their NDCs and/or participate in Forests Carbon Partnership Facility (FCPF) for results-based payment from REDD+. REDD+ stands for Reducing Emissions from Deforestation and Forest Degradation and fostering conservation, sustainable management of forests and enhancement of forest carbon stocks.

3.2 FOREST SECTOR TARGETS IN UPDATED NDCs

According to the World Resources Institute's 2020 NDC Tracker, 104 countries so far have stated their intention to enhance ambition or action in their NDCs.[45] A further 33 countries and regions including the EU have stated their intention to update NDCs in 2020. However, as of August 2020, only 12 countries had submitted an updated NDC, and one country had submitted its first NDC. Based on our analysis, 10 of these 12 NDCs made improvements with respect to their forest sector components. These NDCs include more ambitious GHG and non-GHG targets, more clarity on strategies and measures to achieve these targets, and more details on costs, financing sources and co-benefits of measures in the forests sector (Box 2). However, when it comes to establishing a clear mechanism to track and monitor implementation, none of the revised NDCs provide sufficient details.

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Box 2. Examples of improvements in the updated NDCs

Among the updated and revised NDCs, Suriname, Rwanda, Moldova, Jamaica, Chile and Ecuador have all increased their ambitions overall, as well as clarifying the role of forests and land use in contributing to their mitigation goals and adaptation plans.

Suriname's NDC strengthened ambition in the forest sector by increasing the percentage of forests and wetlands under protection from 14% to at least 17% of the terrestrial area. The revised NDC also provides additional information on implementation costs, duration, location, objectives and type of finance.

Rwanda's revised NDC establishes measures for mitigation and adaptation that aim at ensuring the sustainable use of ecosystems, with a focus on climate resilience. Rwanda's first NDC already stated the country's vision of becoming a climate-resilient economy, for example through the mention of its participation in REDD+ mechanisms. In its second NDC, conservation and payment for ecosystem services are listed as priorities for adaptation and resilience, along with sustainable forest management and forestry.

Moldova's revised NDC incorporates nature-based solutions into its adaptation planning and policy development. These include afforestation/reforestation, an ecosystem-based approach for forests, agroforestry and silvopastoral practices, sustainable management of forests and ecosystem services, and the restoration of degraded pastures.

Other countries also strengthened forest sector targets and activities in their NDCs. The level of ambition in Jamaica's unconditional commitment, for example, has increased by more than 60% compared to its previous NDC. Adaptation co-benefits of the preservation of forest cover are also highlighted. Ecuador builds on a strong first NDC that sets conditional targets for conservation, reforestation and forest restoration measures until 2025. The National Forestry Restoration Programme is one example: it aims to restore 500,000ha by 2017 and an additional area of 100,000ha annually until 2025. Chile's revised NDC doubles the ambition of the previous target and makes it unconditional on external finance: it now targets the management and recovery of 200,000ha and the reforestation of 200,000ha of forest by 2030, reducing emissions from deforestation and land degradation by 25% by 2030 compared to the 2001-2013 emissions average.

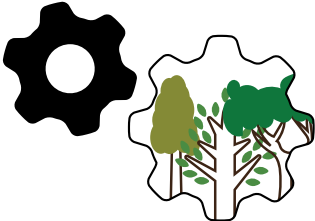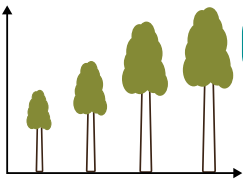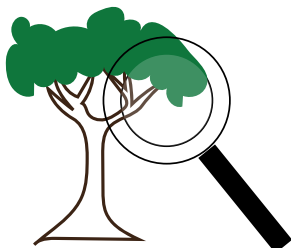45   World Resources Institute. 2020. Climate Watch 2020 NDC Tracker. https://www.climatewatchdata.org/2020-ndc-tracker.

4. RECOMMENDATIONS FOR ENHANCING FOREST SECTOR TARGETS AND MEASURES IN NDCs

4.1 A CHECKLIST FOR ENHANCING NDCs

According to a framework developed by WWF, enhancement in the context of NDCs entails increasing ambition, promoting systemic change, ensuring inclusiveness and the participation of all stakeholders, contributing to the SDGs, and developing a system that allows for progress to be tracked and verified.[46] WWF provides a checklist of 20 criteria under five areas to be included in the enhanced NDCs. Strengthening these five areas in the enhanced NDCs is expected to foster systemic change for climate change mitigation and adaptation (Table 2).

Table 2. WWF checklist for enhancing NDCs

AREA	RECOMMENDATION FOR ENHANCEMENT
Ambition	o Strengthen mitigation targets o Align carbon budgets with 1.5°C world and net-zero long-term strategies o Include adaptation objectives and finance goals
Fostering systemic change	o Establish a framework and targets to shift sectors and systems towards a low-carbon future o Ensure a just transition for workers and communities in carbon-intensive sectors o Include enabling sectors, such as education, health and social development
Inclusiveness and participation	o Include mechanisms to ensure the involvement of civil society, business, the financial sector, subnational governments and citizens in the NDC revision process o Establish a governance structure
Contribution to sustainable development	o Recognize linkages with the SDGs o Use nature-based solutions to climate change to complement (rather than replace) ambitious emissions reduction targets
Tracking progress	o Establish a national system that allows for progress to be tracked and verified o Track the contributions of the whole spectrum of actors taking action (civil society, business, subnational governments, other institutions, citizens etc)

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46   World Wildlife Fund. 2020. *WWF Checklist for the NDCs We Want.* https://wwfeu.awsassets.panda.org/downloads/wwf_ndcs_we_want_checklist.pdf.

4.2 A CHECKLIST FOR ENHANCING FOREST SECTOR TARGETS AND MEASURES IN NDCs

The following paragraphs and tables give examples of elements, processes and enabling conditions that could be included in enhanced NDCs for the forest sector, covering each of the five areas in the WWF checklist.

1. AREA OF ENHANCEMENT: INCREASE AMBITION

Many countries already recognize the value of forests for GHG mitigation and adaptation and have already included them in their NDCs, national policies, strategies and targets (see above on forests in the current NDCs). In revising their NDCs, countries can take stock of potential mitigation and adaptation response options, their co-benefits such as for the SDGs, and the costs and potential trade-offs associated with their implementation.

RECOMMENDATIONS FOR ENHANCEMENT	EXAMPLES FOR THE FOREST SECTOR
Enhance mitigation ambition and targets	• Include and improve quantitative GHG targets from forests • Include and improve measurable non-GHG targets from forests • Increase scope of targets by adding GHGs, geographic regions, types of forests and response options (e.g. reduced deforestation, restoration and agroforestry) • Consider potential of different response options such as reduced deforestation and forest degradation, improved forest management and afforestation, reforestation and restoration (See Section 2 above) • Identify and analyse persistent barriers against change in the forest sector • Include specific plans and strategies for different response options included • Use existing REDD+ capacities to gather the necessary data on the current status and past trends and drivers of forest cover change to determine a future target and to monitor implementation and progress towards such targets • Ensure forest sector targets and policies included in the NDC are coherent with those of other related sectors and make any potential trade-offs across sectors explicit • Ensure forest sector targets and policies included in the NDC are aligned with international commitments as the NYDF, SDGs, UNFF Strategic Plan on Forests, the Bonn Challenge and the Aichi Biodiversity Targets
Enhance adaptation plans	• Add an analysis of the current climate change trends, vulnerabilities and impacts in the forest sector • Assess how the forest sector could contribute to adaptation and sustainable development goals of the country • Review and add information on the current national adaptation plans and policies such as national adaptation plans, disaster risk management policies and climate change policies as well as sectoral policies and plans for sustainable development • Include short-term and long-term adaptation planning in the forest sector and barriers to their implementation • Take a holistic approach to assessing options and solutions in the forest sector to identify adaptation actions that serve to address vulnerabilities, including the ones which could potentially reduce the effectiveness of mitigation actions

Enhance finance commitments and targets	• Assess benefits and costs of actions in the forest sector • Evaluate investment requirements and the role of private and public finance for leveraging those investments • Consider market-linked opportunities (e.g. green or sustainably sourced commodities) as potential sources of financing • Define national resource allocation to forest sector policies and measures including, for example, by diverting finance from activities that drive deforestation and degradation • Clarify how much additional finance and what type of financial support is needed for specific actions, and determine the expected outcome of the support • Clarify if international sources of finance such as through REDD+ will be used.

Sources for additional information and guidance include:

United Nations Development Programme. 2019. *Accelerating Climate Ambition and Impact: Toolkit for Mainstreaming Nature-Based Solutions into Nationally Determined Contributions*. https://www.uncclearn.org/wp-content/uploads/library/toolkit_for_mainstreaming_nature-based_solutions_into_nationally_determined_contributions.pdf.

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Martin, S., Bartlett, R. and M. Kim. 2020. *Enhancing NDCs Through Nature-Based Solutions: 8 simple recommendations for integrating nature into NDCs*. https://c402277.ssl.cf1.rackcdn.com/publications/1318/files/original/enhancing_ndcs_through_nature_based_solutions.pdf?1585149353.

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Seddon, N., Sengupta, S., García-Espinosa, M., Hauler, I., Herr, D. and A.R. Rizvi. 2019. *Nature-based Solutions in Nationally Determined Contributions: Synthesis and recommendations for enhancing climate ambition and action by 2020*. https://portals.iucn.org/library/sites/library/files/documents/2019-030-En.pdf.

Sato, I., Langer, P. and F. Stolle. 2019. *Enhancing NDCs: Opportunities in the Forest and Land-Use Sector* [Working Paper]. https://files.wri.org/s3fs-public/ndc-enhancement-opportunities-forest-and-land-use-sector.pdf.

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Hood, C. and Soo, C. 2017. *Accounting for mitigation targets in Nationally Determined Contributions under the Paris Agreement* (No. COM/ENV/EPOC/IEA/SLT(2017)5). https://doi.org/10.1787/63937a2b-en.

Karttunen, K., Wolf, J., Garcia, C., Meybeck, A. and Food and Agriculture Organization of the United Nations. 2017. *Addressing agriculture, forestry and fisheries in national adaptation plans: Supplementary guidelines*. Rome, Italy: FAO.

König, S., Matson, E.D., Krilasevic, E. and M.G. Espinosa. 2019. *Estimating the mitigation potential of forest landscape restoration: Practical guidance to strengthen global climate commitments*. Gland, Switzerland: International Union for Conservation of Nature (IUCN).
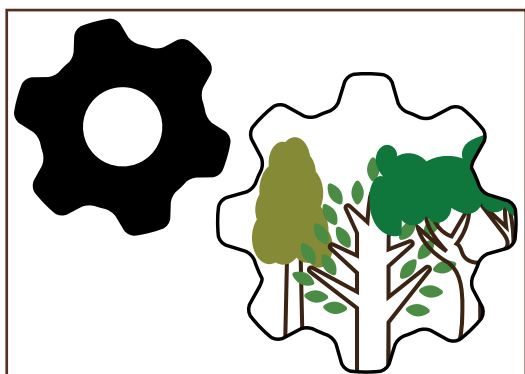
2. AREA OF ENHANCEMENT: FOSTER SYSTEMIC CHANGE

In addition to strengthening ambition and targets to leverage the potential of forests to meet climate stabilization goals, NDCs should include measures that address broader transformations needed in food systems. These include a shift away from the unsustainable diets and a reduction in the food waste and loss which are key underlying drivers of agricultural expansion and associated deforestation and forest degradation.[47] This calls for integrative assessments of alternative pathways for all sectors combined while addressing basic needs and sustainable development goals.

RECOMMENDATIONS FOR ENHANCEMENT	EXAMPLES FOR THE FOREST SECTOR
Include targets from other sectors that affect forests	• Assess drivers of deforestation and degradation such as agriculture, mining and urban development and how they were included in the first NDC • Assess how deforestation and associated emissions are embedded in imported agricultural commodities • Assess how demand-side measures can contribute to GHG reduction in the forest sector • Include and improve quantitative GHG and non-GHG targets in agriculture, mining and other sectors that drive deforestation and forest degradation • Include and improve targets across food systems, particularly to address food loss and waste and unsustainable diets
Include measures for other key structural sectors	• Assess the role of other sectors that act as enablers to achieve forest mitigation and adaptation goals such as governance, development, health and education • Assess the institutional and governance barriers to forest mitigation and adaptation goals • Include and improve measures to strengthen governance to address drivers of deforestation and degradation and to implement policies and measures • Include and improve measures in development, health and education sectors to address trade-offs between forests and these sectors and to maximize synergies
Include social and just policies and measures	• Assess human rights and labour conditions in the forest sector • Include and improve social policies to create decent work and quality jobs in the forest sector • Include and improve measures to address human rights and work conditions in the forest sector.

Sources for additional information and guidance include:

Schulte, I., Bakhtary, H., Siantidis, S., Haupt, F., Fleckenstein, M. and C. O'Connor. 2020. *Enhancing NDCs for Food Systems: Recommendations for decision-makers*. Retrieved 20 October 2020, from https://wwfeu.awsassets.panda.org/downloads/wwf_ndc_food_final_low_res.pdf.

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Initiative for Climate Action Transparency. 2020. *Sustainable Development Methodology: Assessing the environmental, social and economic impacts of policies and actions*. Retrieved 27 October 2020, from https://climateactiontransparency.org/wp-content/uploads/2020/08/Sustainable-Development-Assessment-Guide-1.pdf.

47   Roe *et al.* 2019. IPCC Special Report on Land.
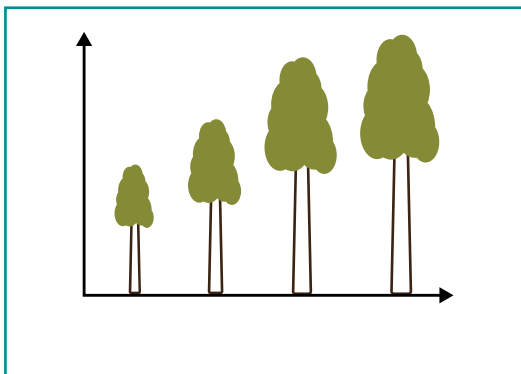
3. AREA OF ENHANCEMENT: CONTRIBUTION TO SUSTAINABLE DEVELOPMENT GOALS (SDGs)

The inclusion of linkages between mitigation and adaptation measures in forests and SDGs can help ensure and assess the alignment and integration of policies and measures in the forest sector with development needs and strategies. NDCs should therefore include information on potential synergies and unavoidable trade-offs between forests and other SDGs, and on how achieving the SDGs will impact forests and forest-related livelihoods – and how this may, in turn, enhance or undermine the contributions of forests to climate change mitigation and adaptation.

RECOMMENDATIONS FOR ENHANCEMENT	EXAMPLES FOR THE FOREST SECTOR
Contribution to Sustainable Development Goals	• Review current and planned mitigation and adaptation targets, policies and measures in the forest sector against SDGs / existing national sustainable development plans or strategies • Include and improve information in the NDC on the linkages between current and planned policies and measures and how they relate to development needs and measures of the country, the co-benefits and trade-offs, and how they are addressed –and capture findings in Voluntary National Reviews (VNRs) on the implementation of the 2030 Agenda.

Sources for additional information and guidance include:

Baldwin-Cantello, W. et at. 2020. Triple Challenge: synergies, trade-offs and integrated responses to meet our food, climate and biodiversity goals. WWF-UK, Woking. https://www.wwf.org.uk/sites/default/files/publications/Oct20/WWF%20TRIPLE%20CHALLENGE%20REPORT_1.pdf

Crumpler, K., Bloise, M., Meybeck, A., Salvatore, M. and M. Bernoux. 2019. *Linking Nationally Determined Contributions and the Sustainable Development Goals through Agriculture: A methodological framework* (Working Paper No. 75; p. 40). http://www.fao.org/3/ca5003en/ca5003en.pdf.

Karttunen, K., Wolf, J., Garcia, C., Meybeck, A. and Food and Agriculture Organization of the United Nations. 2017. *Addressing agriculture, forestry and fisheries in national adaptation plans: Supplementary guidelines*. Rome, Italy: FAO.

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Food and Agriculture Organization of the United Nations. 2020. *Strengthening civic spaces in spatial planning processes: A technical guide on regulated spatial planning and tenure to balance societal priorities in the use of land, fisheries and forests* (Technical Guide No. 12). Rome, Italy.

Initiative for Climate Action Transparency. 2020. *Sustainable Development Methodology: Assessing the environmental, social and economic impacts of policies and actions*. Retrieved 27 October 2020, from https://climateactiontransparency.org/wp-content/uploads/2020/08/Sustainable-Development-Assessment-Guide-1.pdf.

4. AREA OF ENHANCEMENT: IMPROVE INCLUSIVENESS AND PARTICIPATION

Cross-sectoral coordination is essential for enhancing NDCs to ensure that policies are planned by forest authorities as well as agencies regulating activities in sectors that influence forests and drive deforestation, such as agriculture, urban development and infrastructure, mining and extractives, and rural development. Such coordination supports coherence and synergies not only between different sectors but also in the creation of relevant institutions for implementation, financing and monitoring.

A particular focus should be given to tailor NDCs to the needs of those most affected by forest sector plans: populations – in particular IPLCs, women or marginalized groups – that rely on forests for their livelihood, home and traditions and whose rights would be affected by planned activities. In addition, participative approaches are important for the involvement of stakeholders such as private sector actors and civil society in the discussion process. These approaches can help identify and avoid adverse and inequitable outcomes and also ensure the creation of gender-responsive approaches.

RECOMMENDATIONS FOR ENHANCEMENT	EXAMPLES FOR THE FOREST SECTOR
Improve institutional arrangements	• Align with existing policies and development plans both at national and subnational levels • Include transparent processes to involve civil society, IPLCs, business, financial sector and subnational governments to strengthen the quality of policy measures and their implementation • Include participatory approaches to identify and avoid adverse and inequitable outcomes and also ensure the creation of gender-responsive approaches
Disclose information on NDC revisions	• Establish a platform to share information on the NDC revision process and content with the public • Invite inputs from the public and stakeholders in the forest and other relevant sectors on NDC ambition, targets and other content • Disclose how public and stakeholder inputs were considered in the revision process

Sources for additional information and guidance include:

Beaujon Marin, A. and Kuriakose, A.T. 2017. *Gender and Sustainable Forest Management: Entry points for design and implementation*. Climate Investment Funds.

Food and Agriculture Organization of the United Nations. 2013. *Governing land for women and men: a technical guide to support the achievement of responsible gender-equitable governance of land tenure* (Technical Guide No. 1). Rome, Italy: FAO.

Chakrabarti, S. 2015. The Policy Advantage: Enabling Smallholders' Adaptation Priorities to Be Realized. https://www.ssrn.com/abstract=3671545.

Food and Agriculture Organization of the United Nations. 2020. *Strengthening civic spaces in spatial planning processes: A technical guide on regulated spatial planning and tenure to balance societal priorities in the use of land, fisheries and forests* (Technical Guide No. 12). Rome, Italy.

International Institute for Environment and Development and Food and Agriculture Organization of the United Nations. 2013. *Improving Governance of Forest Tenure: A practical guide* (Technical Guide No. 2). Rome, Italy and London, UK.

Colchester, M. and Chao, S. 2014. *Respecting free, prior, and informed consent: practical guidance for governments, companies, NGOs, indigenous peoples and local communities in relation to land acquisition* (Technical Guide No. 3). Rome, Italy: FAO.

Gilmour, D. 2016. *Forty years of community-based forestry: a review of its extent and effectiveness* (No. 176). http://www.fao.org/3/a-i5415e.pdf.
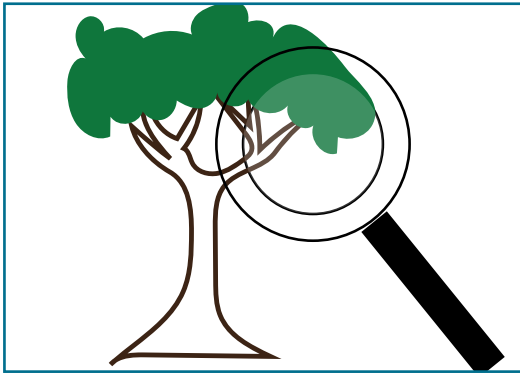
5.   AREA OF ENHANCEMENT: IMPROVE PROGRESS TRACKING

The enhanced transparency framework established under the Paris Agreement requires national MRV systems to enable systematic data collection and progress tracking toward NDC targets. Countries can use existing capacities and established systems not only during the NDC enhancement process, e.g. to plan baseline and mitigation scenarios, but also to establish systems for tracking progress toward NDC targets in the forest sector.

Many countries have already established forest monitoring systems and capacities as part of the REDD+ readiness process to access REDD+ finance. They can use these capacities to gather the necessary data on the current status and past trends and drivers of forest cover change to determine future targets and to monitor implementation and progress towards such targets. For example, since its launch in 2008, UN-REDD has supported 65 countries to implement the Warsaw Framework for REDD+ and establish reference emission levels and MRV systems. In addition, countries have developed national GHG inventories through their reports to the UNFCCC. In most countries, REDD+ and GHG inventory systems are not yet aligned. REDD+ reporting is based on land cover data, without linking changes to land use or GHG categories, while GHG targets in NDCs are based on GHGs (e.g. methane and CO_2) only.

Countries should use national forest and land-use data, taking a bottom-up approach, to estimate the mitigation potential of forest-related interventions and should seek to align their REDD+ reporting with national GHG estimations. The alternative – using global data – often fails to reflect the country context of the sector. Currently, there is a discrepancy of 4GtCO2 per year between GHG emission estimates by global models and national-level data, which can be explained by conceptual differences in forest sink estimations such as the representation of environmental change impacts and the areas categorized as managed.[48]

RECOMMENDATIONS FOR ENHANCEMENT	EXAMPLES FOR THE FOREST SECTOR
Monitor and report progress	• Assess MRV systems, processes and capacities in the forest sector including systems established in the context of GHG monitoring and REDD+ and how they can be used for the purposes of tracking progress toward NDCs by developing strategies for alignment and addressing overlaps • Set clear targets, milestones and indicators for mitigation and adaptation goals based on existing MRV capacities, covering input/activity, output and outcome indicators (Box 3).

Box 3. An illustrative example of measuring progress toward forest targets in NDCs.

POLICY INSTRUMENT	INDICATORS TO MEASURE PROGRESS OF POLICIES/MEASURES		
	Input/Activity	**Outputs**	**Outcomes**
Designation of protected areas	Budget for forest law enforcement increased by x% Establish community forest areas inside protected forests	# of forest protection officers increased by x#/% by year y x# of hectares of community forest areas established inside protected forests	Sectoral, non-GHG x# hectares of forests protected GHG x# tons of GHG avoided from deforestation

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48   Grassi, G., House, J., Kurz, W.A., Cescatti, A., Houghton, R.A., Peters, G.P. *et al.* 2018. Reconciling global-model estimates and country reporting of anthropogenic forest CO_2 sinks. *Nature Climate Change*, *8*(10), 914–920.there is a discrepancy of about 4 GtCO2 yr−1 in global anthropogenic net land-use emissions between global models (reflected in IPCC assessment reports

Sources for additional information and guidance include:

Lee, D. and Sanz, M.J. 2017. *UNFCCC Accounting for Forests: What's in and what's out of NDCs and REDD+*. Climate and Land Use Alliance.

Grassi, G., Pilli, R., House, J., Federici, S. and W.A. Kurz. 2018. Science-based approach for credible accounting of mitigation in managed forests. *Carbon Balance and Management, 13*(1), 8. https://doi.org/10.1186/s13021-018-0096-2.

Herold, A. and Böttcher, H. (2018). *Accounting of the land-use sector in nationally determined contributions (NDCs) under the Paris Agreement*. https://www.transparency-partnership.net/system/files/document/Guide%20Accounting%20of%20land-use%20sector%20in%20NDCs(vf)_20181010.pdf.

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5. EXAMPLES FOR POLICY INSTRUMENTS AND ACTIVITIES

This section provides a list of policy instruments and activities for policymakers to consider in their enhanced NDCs, and examines their implementation under different mitigation and adaptation response options in the forest sector. The recommendations in the following tables are not exhaustive and are not in a strict hierarchy. Rather, they highlight categories of policy instruments, their potential outcome and examples of relevant activities available to countries for their implementation. They should be adapted to meet the needs of each country context – policymakers will need to prioritize activities and assess which are most cost-effective depending on their specific situation.

5.1 REGULATORY INSTRUMENTS

Regulatory instruments promote measures that directly affect forests and deforestation through restrictions on their use and exploitation. These are legal, enforceable and 'command and control' type instruments aimed at reaching desired, established targets and performance standards by regulating the behaviour of individuals and organizations.[49]

RESPONSE OPTIONS IN THE FOREST SECTOR	POLICY INSTRUMENTS	OUTCOMES	EXAMPLES OF ACTIVITIES
Reduced deforestation and forest degradation **Sustainable forest management**	Regulation of conversion of forests	• Reduced and regulated forest conversion • Increased capacity of forest enforcement authorities	• Implement moratoria on conversion of primary forests to other land uses • Regulate the use of fire in forest areas • Establish systems for early detection of forest conversion and degradation • Provide training and increase budgets for forest authorities for monitoring and enforcement • Create systems for community-based forest monitoring
Reduced deforestation and degradation **Sustainable forest management**	Designation of protected areas	• Protected high-conservation and high-carbon areas • Sustainable livelihoods for IPLCs inside and outside protected areas	• Increase forest area under designated protection, in particular in areas with high carbon stocks and conservation value[50] • Strengthen protection status of protected areas and buffer zones to reduce risks of illegal encroachment and overlaps with concessions for exploitation (e.g. mining) • Strengthen participation processes and require free, prior and informed consent (FPIC) for IPLCs in the planning and designation of protected areas • Strengthen ownership (rights) and designation of IPLC territories in protected areas • Promote involvement of forest communities and IPLCs in the monitoring and protection of protected areas, and support systems for community forest management • Develop local development programmes to promote livelihoods for IPLCs affected by designations

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49   Coria, J. and Sterner, T. 2011. Natural Resource Management: Challenges and Policy Options. *Annual Review of Resource Economics*, *3*, 203–30.
50   High Carbon Stock (HCS) and High Conservation Value (HCV) are two approaches that guide the identification, mapping and protection of areas that meet a specific threshold of above ground carbon stock (HCS) and have priority ecological, biodiversity and social features (HCV).

Reduced deforestation and degradation **Sustainable forest management**	Regulation of resource allocation (e.g. timber, minerals and metals)	• Sustainable forest management and use • Protection of High Conservation Value (HCV) forests • Reduced illegal or uncontrolled deforestation • Sustainable livelihoods for local communities	• Review resource allocation regulations and procedures such as environmental impact assessments for timber, mining and other resource extraction and assess their effectiveness in mitigating negative impacts on forests – especially HCV forests – and local communities (in particular IPLCs), considering direct, indirect and cumulative impacts of activities • Ensure transparency and accountability in resource allocation, exploitation and management decisions, while promoting the involvement of civil society for independent monitoring and verification from exploration to closure of resource exploitation activities • Require adequate and effective stakeholder consultations and FPIC in decisions about resource allocation that affect their land (including land claimed under informal rights) or livelihoods • Promote the adoption of certification schemes (such as Forest Stewardship Council (FSC) for timber, Initiative for Responsible Mining Assurance certification for mining) to support sustainability of operations • Promote mechanisms and processes for the equitable and transparent distribution of costs and benefits incurred by the different stakeholders involved or affected through the sharing of revenues, incentives or indirect benefits
Reduced deforestation and degradation **Sustainable forest management**	Regulation of forest management	• Sustainable forest management and use • Protection of HCV forests • Reduced illegal or uncontrolled deforestation • Sustainable livelihoods for local communities	• Review forest management guidelines and regulations and consider promoting practices to prolong rotation cycles between timber harvests, reduce damage to remaining trees when harvesting, avoid logging waste, implement soil conservation practices and use wood more efficiently • Include requirements for setting aside HCV areas for conservation • Promote and make reduced-impact logging for climate (RIL-C), a set of timber harvesting guidelines for selectively-logged natural forests, mandatory for new concessions • Promote the creation of forest certification schemes at the jurisdictional level • Create incentives for emission reductions (e.g. from RIL-C practices) by integration in jurisdictional REDD+ programmes and relevant MRV structures or forest carbon projects and programmes
Reduced deforestation and degradation **Sustainable forest management**	Regulation of use of fire	• Reduced deforestation and forest degradation • Sustainable forest use • Improved health of local populations	• Strengthen regulatory measures to prevent and/or control the use of fire in or close to forest areas • Develop a comprehensive fire control strategy, from risk reduction, to detection and preparedness, to suppression and relief, to recovery and rehabilitation • Allocate budget on fire risk reduction and preparedness, in addition to suppression and relief • Monitor company actions to prevent use of fire for land clearing • Work with local communities to increase awareness about forest fires, their risks, and alternative land use practices • Work with local communities to build fire control capacities by providing training and equipment and integrating local ecological knowledge on fire and fire control • Improve fire monitoring by adopting forest fire observation systems • Strengthen the enforcement capacity of authorities responsible for fire control and management

5.2 LAND-USE PLANNING AND GOVERNANCE INSTRUMENTS

These are instruments that enable transparent and effective planning, decision-making and resource allocation in the forest sector.[51] This can help to use forests, land and their natural resources more effectively and efficiently. By examining all land uses in an integrated manner, land-use planning identifies the most efficient trade-offs between land-use options for different SDGs and links social and economic development with forest protection and enhancement.[52] These instruments are necessary to ensure stakeholder participation, the accountability of actors and decision-makers, and the rule of law.

RESPONSE OPTIONS IN THE FOREST SECTOR	POLICY INSTRUMENTS	OUTCOMES	EXAMPLES OF ACTIVITIES
Reduced deforestation and degradation **Sustainable forest management** **Afforestation, reforestation and restoration**	Land-use planning	• Land-use planning aligned with SDGs	• Promote integrated land-use planning in coordination with all ministries and national and subnational agencies, including for the zoning and designation of land for conservation, afforestation, reforestation, sustainable forest management, exploitation (e.g. agriculture, logging, mining) and development (e.g. infrastructure). For infrastructure mega-projects that extend across boundaries, seek international collaboration with other governments, international (non-governmental) organizations specialized in this area and multilateral development banks • Mainstream SDGs into land-use planning. Explore options for minimizing trade-offs and maximizing synergies between all SDGs, including sustainable forest use and protection • Clarify forest and land-use definitions in laws and regulations • Mobilize available scientific and local and traditional knowledge in designing and implementing landscape restoration activities • Build systems for long-term management, monitoring and evaluation of landscape restoration activities
Reduced deforestation and degradation **Sustainable forest management** **Afforestation, reforestation and restoration**	Forest monitoring systems	• Transparency in forest use and in forest cover increases and losses	• Build a national forest monitoring system to enable the assessment and monitoring of different types of forests in the country according to national definitions • Collect data on forest cover, land use activities and GHGs across sectors • Make use of available platforms such as UN-REDD and FAO's voluntary guidelines on national forest monitoring, Forest Carbon Partnership Facility guidance and resources on forest monitoring

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51   The Program on Forests (PROFOR) and Food and Agriculture Organization of the United Nations (FAO). 2011. *Framework for assessing and monitoring forest governance*. Retrieved from http://www.fao.org/climatechange/27526-0cc61ecc084048c7a9425f64942df70a8.pdf.
52   Organisation for Economic Co-operation and Development. 2020. *Towards Sustainable Land Use: Aligning Biodiversity, Climate and Food Policies*. https://doi.org/10.1787/3809b6a1-en.

Reduced deforestation and degradation **Sustainable forest management** **Afforestation, reforestation and restoration**	Forest governance	• Coherent policy implementation across sectors • Effective, efficient and transparent forest governance and law enforcement	• Promote policy alignment and coherence across sectors by creating or strengthening meaningful processes for coordination involving all relevant agencies • Increase capacity and funding for relevant ministries through training and allocation of budget, in particular forest law enforcement authorities • Establish an up-to-date, accurate information management system through which relevant government agencies can access data related to enforcement and management in the land use sector • Evaluate and strengthen effectiveness of policies and decision-making processes in the land use sector in terms of transparency, participation (in particular of IPLCs, women and marginalized groups), FPIC of local communities (in particular IPLCs) and involvement of civil society • Establish 'checks and balances' mechanisms such as the inclusion of limits to powers of forest authorities, and provisions to allow the public to legally challenge government decisions in forest resource allocation and to ensure full application of forest law and regulations • Strengthen the rule of law by implementing audits, strengthening and respecting checks and balances to address corruption • Align broader policy and development goals to forest goals • Identify and strengthen appropriate legal and policy frameworks for forests, including alignment with frameworks in driver sectors • Promote jurisdictional programmes and multi-stakeholder collaboration to achieve forest goals • Build supportive policy and regulatory frameworks for landscape restoration to restore degraded lands
Reduced deforestation and degradation **Sustainable forest management** **Afforestation, reforestation and restoration**	Processes to secure land tenure and rights	• Improved tenure security	• Set a consultative and participatory process for identifying legitimate tenure rights and extend legal protection to any legitimate rights that are not currently protected by formal law • Promote formalization of informal or customary user rights and tenure of local communities and IPs through laws and regulations while establishing clear safeguards that these processes are compatible with legitimate land rights recognized by these communities and that formalization does not harm their customary rights over land • Improve mapping and registration of lands and land use, by use of technologies such as GPS and GIS to map and register lands • Strengthen and guarantee access to judicial and administrative remedies, and when required, legal protection to IPLCs • Clarify forest tenure and carbon rights ownership and benefit-sharing in forest resource use • Establish mechanisms for resolving land and rights conflicts

5.3 MARKET AND INCENTIVE-BASED INSTRUMENTS

These instruments combine the conventional regulatory approaches with economic incentives, using the advantages of both to protect forests and address drivers of deforestation.[53] These can be applied at the local as well as at the international level, incentivizing sustainable forest and land use to maintain and deliver forests' ecosystem services.[54]
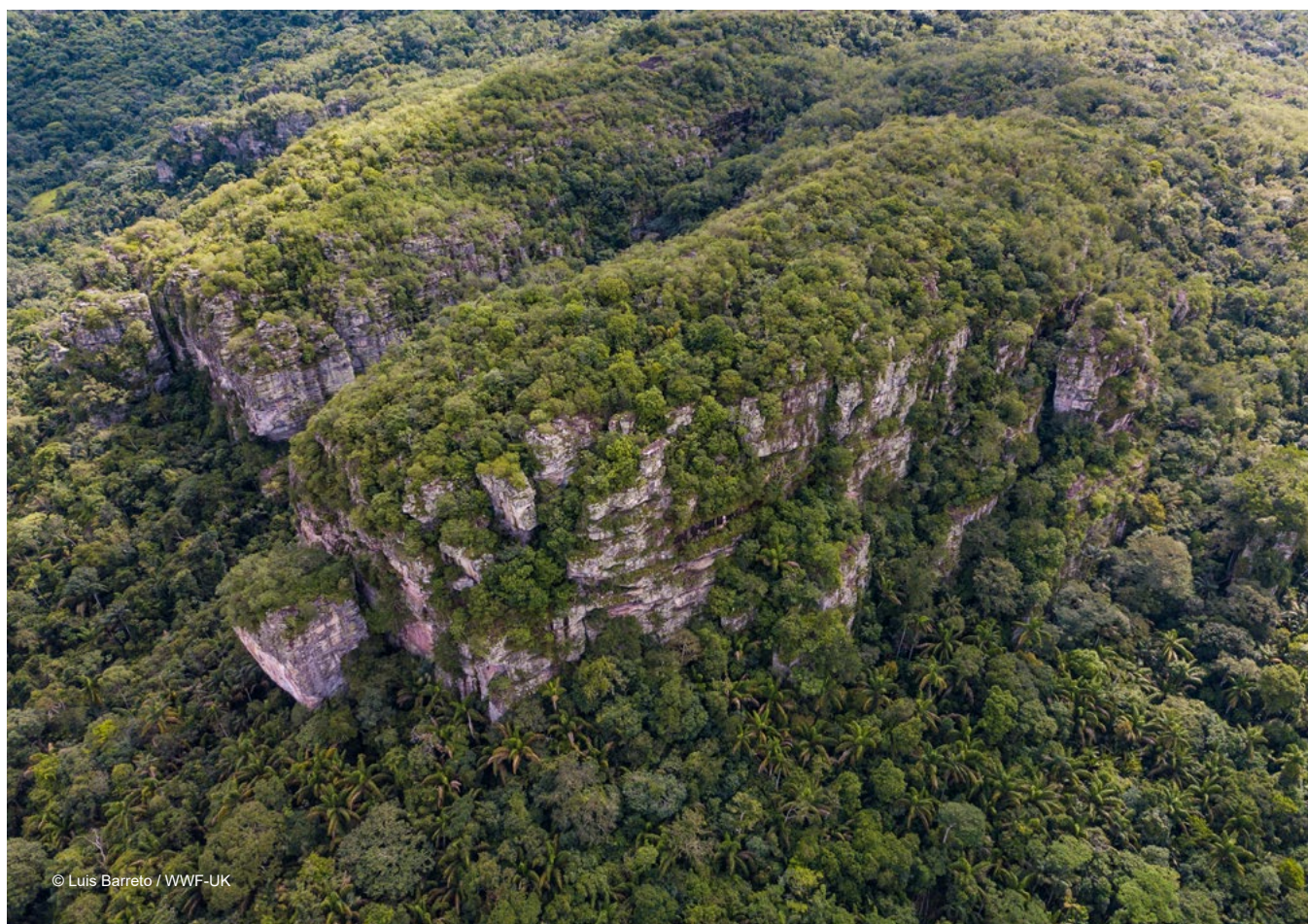
RESPONSE OPTIONS IN THE FOREST SECTOR	POLICY INSTRUMENTS	OUTCOMES	EXAMPLES OF ACTIVITIES
Reduced deforestation and degradation **Sustainable forest management** **Afforestation, reforestation and restoration**	Community forestry and payments for ecosystem services	• Sustainable use of land and forest resources • Reduced deforestation • Improved local livelihoods	• Reduce deforestation and promote sustainable livelihoods through comprehensive programmes that address both issues comprehensively and structurally, promoting productivity (e.g. in forest management, smallholder farms), securing rights, investing in community and government institutions and entrepreneurial capacities, improving market access and creating incentives for forest protection • Ensure that programmes are adjusted to local contexts and the needs of local communities, in particular IPLCs and marginalized groups • Strengthen extension services for agriculture and forest users, e.g. for agricultural intensification, diversification and forest protection for smallholder farmers • Develop incentive programmes for sustainable farming practices or alternative livelihood programmes • Create awareness programmes around forest protection and its benefits for local communities • Encourage and build partnerships with private sector actors to increase the purchase of emission reductions from payment for ecosystem services programmes and projects • Promote sustainable agricultural intensification to increase yields and reduce pressure on standing forests • Provide incentives and compensation for positive performance, supporting alternative livelihoods, accessible finance for the uptake of improved systems, partnerships that create shared value etc. • Promote native tree planting in local communities through 'payment for trees' initiatives, targeting suitable areas while ensuring local ownership of such initiatives • Create awareness among youth and children on the values of forests and restoration
Reduced deforestation and degradation **Sustainable forest management** **Afforestation, reforestation and restoration**	Promote alternatives to unsustainable wood fuel harvest	• Use of clean energy	• Create incentive programmes for alternative sources of energy, such as solar or small-scale and carefully planned hydro-dams at community level • Create incentives and technical support programmes for sustainable fuelwood plantations, agroforestry or other tree planting outside forests (e.g. hedgerows and riparian buffer strips, planting of leguminous trees during fallow periods, silvopasture) on communal land. Establish community management systems for planted trees • Create incentive and technical support programmes for agroforestry in smallholder-dominated commodity crops like rubber, banana, cocoa or coffee

53   Macdonald, D.W. and Willis, K.J. (Eds.). 2013. *Key topics in conservation biology 2.*
54   Nikolakis, W. and Innes, J.L. 2017. Evaluating incentive-based programs to support forest ecosystem services. *Environmental Conservation, 44*(1), 1–4.

Reduced deforestation and degradation **Sustainable forest management** **Afforestation, reforestation and restoration**	Promote substitution of carbon-intensive materials with wood products to increase storage of wood products in buildings	• Carbon stored in wood products and carbon sequestration during tree growth	• Establish incentive programmes for the building sector to use timber from sustainable sources • Invest in marketing campaigns to promote sustainable timber as an attractive and sustainable building material • Create programmes or regulations for public procurement that promote public investments and the transition towards the use of sustainable timber in construction
Reduced deforestation and degradation **Sustainable forest management** **Afforestation, reforestation and restoration**	Standards for sustainable and deforestation-free commodities	• Sustainable and deforestation-free land use	• Establish or adopt sustainable and deforestation-free commodity certification standards (e.g. for palm oil, soy, beef) • Develop jurisdictional certification schemes at subnational level • Define and communicate opportunities for private sector engagement at jurisdictional level • Encourage traceable and transparent agriculture and forestry supply chains • Encourage and increase ambition and time-bound and measurable implementation of private sector commitments towards zero-deforestation and public-private partnerships that spur innovation to reduce forest loss • Provide support to scale up private sector zero-deforestation certification across deforestation-risk commodities like soy, palm oil and cattle • Encourage large companies in producer countries to adopt and implement commitments and build public-private partnerships to end deforestation for commodity production • Support smallholder farmers to enable sustainable agricultural production practices • Increase investments in technologies and innovations that reduce pressures on forests, e.g. by improving supply chain efficiency and reducing waste • Build meaningful partnerships with private sector and civil society actors to enable and spur sustainable production and sourcing at jurisdictional level • Support forest certification (e.g. FSC), community forest management schemes, incentives for sustainable timber production (e.g. plantations established on degraded land)

| Reduced deforestation and degradation

Sustainable forest management

Afforestation, reforestation and restoration | Demand-side standards and regulation | • Sustainable and deforestation-free supply chains | • Evaluate and introduce policies to promote and ensure deforestation- and conversion-free commodity imports including regulation, due diligence and incentives
• Introduce and enforce regulatory measures that require companies or the financial institutions funding those companies to address forest risks in their supply chains and disclose on their efforts based on accepted standards (e.g. the Accountability Framework Initiative, CDP, certification standards)
• Develop public procurement policies that favour sustainable production (e.g. based on certification such as FSC), for example in catering of publicly funded events or public buildings
• Promote finance and technology transfer to producer countries to spur innovation in traceability of products, forest monitoring, agricultural intensification and supply chain sustainability
• Promote awareness programmes to change consumer behaviour (e.g. reduce excessive meat consumption by promoting healthier diets) and to leverage pressure on consumer goods companies to address forest risks in their supply chains
• Promote initiatives tracking deforestation risks and sustainable supply chain efforts
• Develop methodologies and capacities for attribution of deforestation impacts to specific commodities and companies
• Develop a carbon tax on deforestation risk commodities such as beef, soy and palm oil |

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