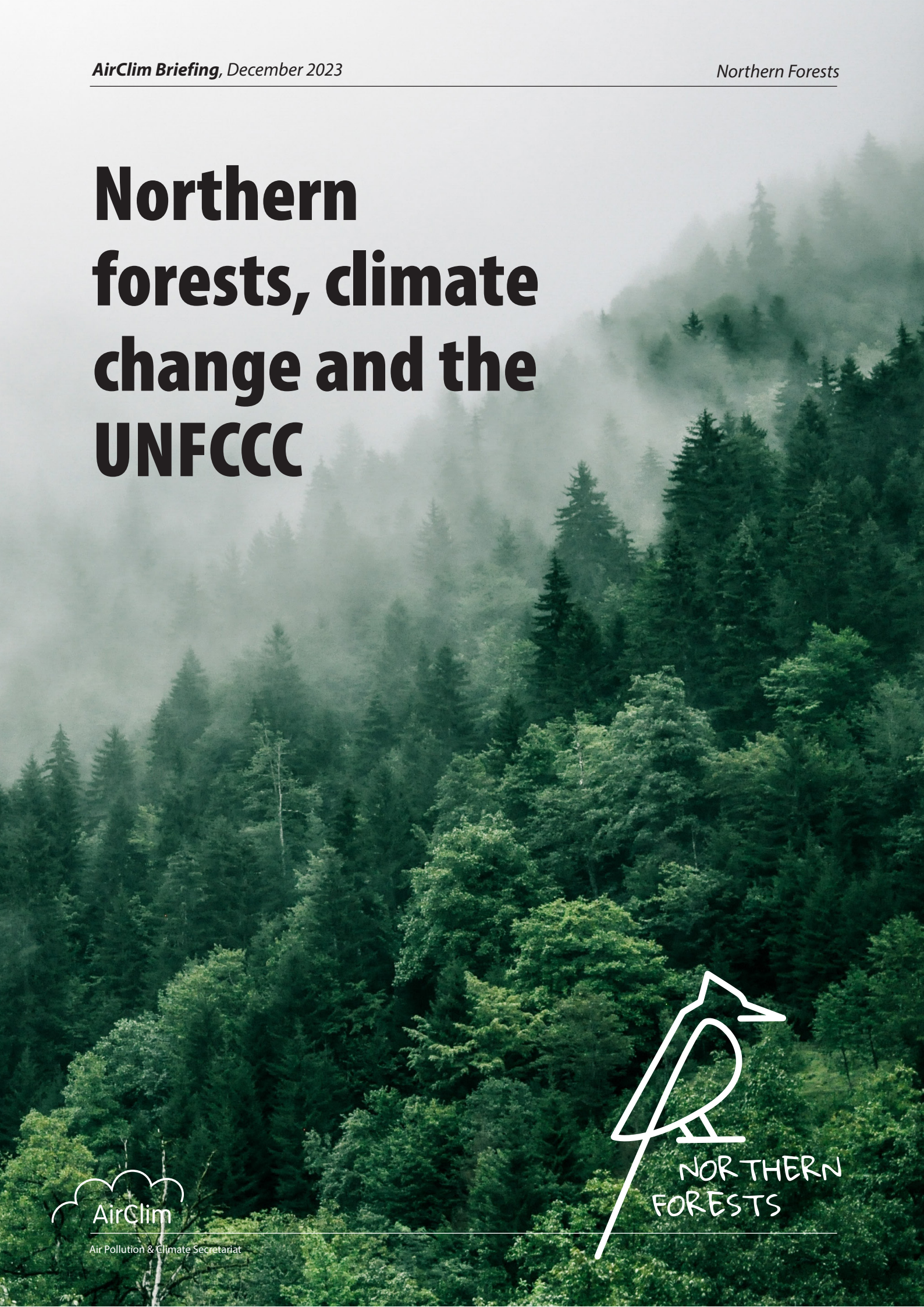
Northern forests, climate change and the UNFCCC



AirClim
Air Pollution & Climate Secretariat

Northern forests, climate change and the United Nations Framework Convention on Climate Change (UNFCCC)

By Wendel Trio and Roger Olsson

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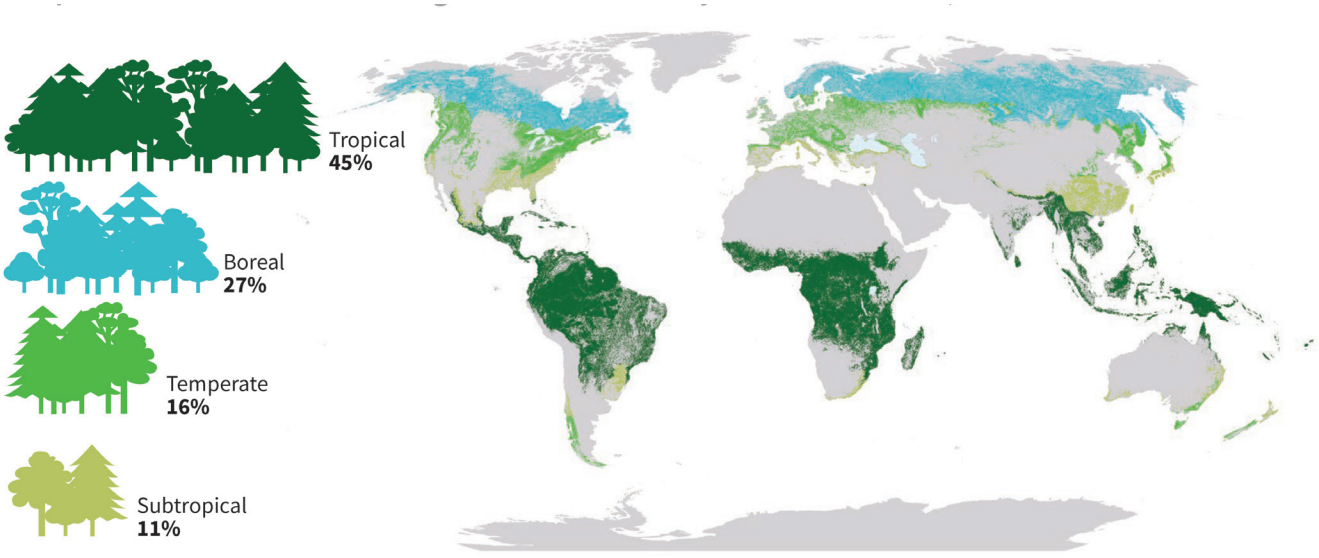
Forests and climate change mitigation

Forests have a great potential to deliver on climate mitigation (and adaptation) while at the same time providing important benefits to biodiversity and the indigenous peoples who depend on them. Forests and their soils store approximately 60% of the total carbon stock contained in terrestrial carbon pools while emissions from deforestation and forest degradation account for around 30% of global carbon emissions.

The FAO estimates the global forest area to be at 4.1 billion ha, representing 31% of total land area. Most forests are situated in the tropics (45%), followed by boreal (27%), temperate (16%) and subtropical (11%) domains. Forest loss rates differ among regions though the global trend is towards a net forest loss as the global forest area declined by more than 4% in the last 30 years.



Source: Adapted from United Nations World map, 2020.

Forests store approximately 662 Gt of carbon, equivalent to all carbon emissions from fossil fuel use this century, with almost half of this carbon stored in soils. Overall, tropical forests store most of their carbon in vegetation (biomass) while boreal and temperate forests store most of their carbon in its soils.

Northern forests

Northern forests make up a large part of the world's global forests. They include boreal and temperate forests of North America (US and Canada), Europe (the 46 Council of Europe member states), Russia and Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan). Almost all Northern forests (98%) are situated in developed countries (referred to as Annex 1 countries by the UN) and almost all (90%) Annex 1 forests are part of these Northern forests. Three countries, Russia, Canada and the US make up for 86% of all Northern forests. Adding the EU27 to this group brings the total to 96%.

Historically most of the attention for forests in the international climate debate has gone to tropical forests, and in particular to the provision of financial support for forest conservation in developing countries through the REDD+ mechanism (see below) or through carbon offsetting initiatives. This is in line with most international agreements on forests which have traditionally focused on deforestation, which is narrowly defined to refer to the removal of a forest for agriculture or other types of non-forest land use. The types of forest management activities that are practiced in many Northern forests, based on clearcutting and replanting of forests, have received far less attention. On top, the provision of financial resources by developed countries to protect tropical forests has created a certain level of accountability for forest protection in developing countries, while developed countries have made little progress in recognizing and addressing the drivers of forest degradation in their countries. There is a clear need to recognise the negative climate impact of present predominant forest management in Northern forests and a strong urge to improve protection and restoration of Northern forests given their important role in tackling climate change and protecting biodiversity while ensuring indigenous peoples' rights.

Global forest cover of Northern forests (by country)

	Forest cover (million ha)	percentage of total Northern forest area	percentage of global forest area
Russia	815.31	47.8%	20.1%
Canada	346.92	20.3%	8.5%
US	309.79	18.2%	7.6%
EU27	159.23	9.3%	3.9%
A1 Europe excl. EU27	48.60	2.8%	1.2%
NA1 Europe	12.19	0.7%	0.3%
Central Asia	13.01	0.8%	0.3%
Total Northern forests	1,705.07	100%	42.0%
Total World	4,058.93	-	100%

Source: FAO Global Forest Resources Assessment 2020

Northern forests represent 42% of the world's forest cover while holding nearly half of the global carbon stock. At the same time, Northern forests represent less than 20% of the global protected forest area, indicating they are way less protected than tropical forests.

Furthermore, Northern and especially boreal forests are subject to more rapid and severe effects from climate change than more southern forests. One reason for this is that warming in northern latitudes is significantly above global average.

Carbon stock Northern forests - as a percentage of global forests

	forest cover	carbon stock in forest biomass	carbon stock in forest soils	total forest carbon stock
North America	16%	19%	23%	21%
Russia	20%	15%	26%	20%
Europe	5.5%	5%	7%	6%
Northern forests	42%	39%	57%	47%

Source: FAO Global Forest Resources Assessment 2020

Primary Northern forests

In addition to their unique carbon density, Northern forests hold among the last large stretches of primary, old-growth, and mature forests (52% of the worlds primary forests are located in Northern forests), mainly in the northern parts of the boreal forest zone. These primary forests, making up one third of all Northern forests, have never been industrially logged or otherwise disturbed and have a unique and irreplaceable value for both the global climate and biodiversity.

Primary, old-growth forests generally store far more carbon (per year and hectare) than managed forests, primarily in the soil but also in trees. They sequester less carbon than younger, managed forests but still remain carbon sinks even when several hundred years old.

Unfortunately, Northern forests are also experiencing some of the world's fastest degradation, due in large part to industrial logging in primary, old-growth, and mature forests. Logging in Northern forests is the world's single largest industrial driver of gross tree cover loss. Overall in recent years, Northern forests are in decline resulting in a reduction of the removal capacity of Northern forests with some countries even seeing parts of their forests turn from a carbon sink into a carbon source of greenhouse gas emissions.

Logging old-growth forests provokes both an immediate release of carbon to the atmosphere and degrades the natural ecosystem. Degraded ecosystems are less resilient than intact natural ones, and thus less able to adapt to changing environmental conditions, such as further warming. Intact, resilient ecosystems are the superior guardians of the huge Northern forests carbon pool, which is an important reason for ensuring them effective protection from logging and other man-made disturbances.

Protected areas by region compared to overall forest cover

	forest cover (million ha)	forest cover (% global cover)	protected forests (million ha)	protected forests (% of global cover)
Africa	636.64	15.7%	157.83	21.7%
Asia	622.69	15.3%	144.20	19.9%
Central & South America	874.48	21.5%	267.61	36.9%
Oceania	185.25	4.6%	29.12	4.0%
North America	722.42	17.8%	69.27	9.5%
Russia	815.31	20.1%	18.58	2.6%
Europe	202.15	5.0%	39.20	5.4%
Northern forests	1,705.07	42.0%	127.05	17.5%

Source: FAO Global Forest Resources Assessment 2020

Managed forests and climate mitigation

Intensified rotation forest management is a strategy frequently advocated to improve the role of forests in climate mitigation. The rationale behind this is that an increase in timber production will facilitate further substitution of fossil fuels and fossil-demanding materials, such as steel and concrete. Studies supporting this view are usually based on time perspectives that cover one or more forest rotation periods, i.e. 100 years or more, which is of limited interest in a situation where the challenge is to meet targets for 2030 and 2050.

Furthermore, calculations of substitution effects are highly problematic. Life cycle analyses of wood products or wood-based fuels commonly treats uses of wood as "carbon neutral", thus neglecting emissions caused by new harvests. Calculations including that element shows that the substitution effects far from offsets the potential substitution effects. A recent study indicate that actual and projected global timber harvest 2010-2050 (under. a number of different scenarios) would imply a "carbon cost" of around 1 Gt per year.

Applying this perspective on using forest biomass for substituting fossil fuel emissions the EU Forest strategy for 2030 concludes that the potential additional benefits of harvested wood products and material substitution are unlikely to compensate for the reduction in net forest carbon sinks due to increased harvesting in the short and medium term (i.e. until 2050).

Climate benefits of ecosystem based forest management

Several studies show that from a short- or medium-term perspective ecosystem-based forestry management benefits the carbon balance and carbon stock of the forest compared with rotation forestry using clear-cutting as harvesting method.

One reason for this is that clear-cutting has many adverse climate effects. When trees are logged part of the underground biomass die and start to decompose. Sunlight and increased temperatures in the top soil further increases decomposition of organic matter. This makes clear-cuts carbon sources for up to 15 or 20 years after logging, even if new forest is planted as soon as possible.

Ecosystem-based management includes working with far bigger growing stock than present rotation forestry models, while at the same time the adverse climate effect of the clear-cut area as such is avoided. In addition, ecosystem-based management is superior in terms of maintaining biodiversity and ecosystem resilience, thus improving the ability of managed forest to adopt to climate change.

Northern forest as a global tipping point

The boreal forest biome (which is a crucial part of the Northern forests) is one of the potential global tipping points identified by climate science. IPCC defines a tipping point as a critical threshold beyond which a system reorganises, often abruptly and/or irreversibly.

With further warming, disturbances such as drought, fires and insect outbreaks will increase in frequency and severity, releasing huge amount of carbon from biomass and soil. Increasing temperatures and changes in precipitation patterns may also cause large-scale ecosystem shifts, such as transition of forest into open grasslands, with additional carbon losses as a consequence.

At some level of warming – the tipping point – this will transform the boreal forest from a carbon sink to an overall carbon source. This will in turn induce further warming, creating a powerful positive feedback loop that cannot be halted or reversed, especially not since it will likely be reinforced by other tipping points such as massive permafrost meltdown.

Forests and the UNFCCC

The important role of forests in the fight against climate change has been recognised from the very beginning. The 1992 **UN Framework Convention on Climate Change** (UNFCCC) states in its Article 4.1 that governments should *"cooperate in the conservation and enhancement of sinks and reservoirs (...) including forests"*. This is supported in the 2015 **Paris Climate Agreement** which states in its Article 5 that governments *"should take action to conserve and enhance sinks and reservoirs of greenhouse gases, including forests"* and should *"take action to implement and support, including through results-based payments, the existing framework as set out in related guidance and decisions already agreed under the Convention for: policy approaches and positive incentives for activities relating to reducing emissions from deforestation and forest degradation, and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries; and alternative policy approaches, such as joint mitigation and adaptation approaches for the integral and sustainable management of forests, while reaffirming the importance of incentivizing, as appropriate, non-carbon benefits associated with such approaches."*

Two approaches have been central in the forest related work of the UNFCCC. The first one is the **REDD+** initiative, a voluntary climate change mitigation framework to encourage developing countries to reduce emissions and enhance removals of greenhouse gases through a variety of forest management options, and to provide technical and financial support for these efforts. Discussions on REDD (Reducing Emissions from Deforestation in Developing Countries) started in 2005 and when it first got adopted, at COP13 in Bali in 2007, its focus was expanded to tackle deforestation and forest degradation. In 2010 at COP16 in Cancun the framework was expanded to include actions to conserve and enhance forest carbon stocks and to promote sustainable forest management, after which it became known as REDD+.

The second approach, best known under its abbreviation **LULUCF**, comprises of a set of rules to monitor and report emissions and removals related to Land Use, Land Use Change and Forestry, in particular under the Kyoto Protocol. In general the current LULUCF rules fail to recognise the importance of protecting and restoring carbon stocks in natural ecosystems - notably primary and other natural forests as these rules ignore the importance of forest ecosystem integrity for reducing risk and improving longevity of carbon storage.

A recent important addition to the official UNFCCC rules comes from the **Glasgow Leaders' Declaration on Forests and Land Use**, adopted during COP26 in 2021. The Declaration commits its signatories to halt and reverse forest loss and land degradation by 2030. The Declaration is supported by the **Forest & Climate Leaders' Partnership** (FCLP) which meets annually and works with existing initiatives and organisations to deliver ambition in six specific areas which underpin the commitments set out in the Declaration: (a) International collaboration on the sustainable land use economy and supply chains; (b) Mobilising public and donor finance to support implementation; (c) Shifting the private finance system; (d) Supporting Indigenous Peoples' and local communities' initiatives; (e) Strengthening and scaling carbon markets for forests; (f) Building international partnerships and incentives to preserve high-integrity forests.

Proposals for the UNFCCC

Glasgow Accountability Framework

In the margins of COP26 in Glasgow (November 2021) 145 countries signed onto The Glasgow Leaders' Declaration on Forests and Land Use. The Declaration commits its signatories to "halt and reverse forest loss and land degradation by 2030" and marks an important advancement towards aligning global climate and biodiversity targets. However its success depends on its implementation and it is essential that signatories track and report progress toward the Declaration's 2030 goals, and that governments establish clear metrics, guidelines and indicators and establish an accountability framework for all drivers of deforestation and land degradation, for developed and developing countries.

The Accountability Framework should be based on annual, country-led reporting on rates of deforestation and land degradation. As with the UNFCCC National Inventory Reports, national governments would prepare their own reports, which an FCLP-designated oversight body of scientists would review to ensure alignment with the best available science and to develop synthesized analyses that track global progress over time. It should be accompanied by a process to develop a common and comprehensive definition of "forest degradation" and a supporting reporting framework, which would become the reporting standard by 2026.

The Glasgow Declaration Accountability Framework could include government commitments to invest in monitoring of primary, old-growth, and mature forests, or the establishment of third-party monitoring of industrial development in Northern forests. This enhanced monitoring outside the tropics would present the Accountability Framework as a means of promoting greater equity between forest protection standards in developed and developing countries. The Glasgow Declaration Accountability Framework also presents an opportunity to set clear expectations towards the recognition of indigenous peoples land rights.

Operationalisation of Article 5 of the Paris Agreement

Eight years after concluding the Paris Agreement, and despite its importance, Article 5 is yet to be operationalized to the degree required to deliver on its objectives. There is clearly a need to develop common principles, approaches and safeguards to conserve and enhance biological sinks and reservoirs that are grounded in a rights-based approach and recognise the functional role of biodiversity in underpinning ecosystem integrity and the stability and longevity of ecosystem carbon storage. Given the various challenges mentioned above, operationalizing Article 5 through a much broader and comprehensive approach is paramount to establish robust enabling conditions for effective and synergistic climate and biodiversity action, including in natural forests.

As climate and biodiversity protection go hand in hand, both the CBD and UNFCCC should encourage improved protection and restoration of carbon dense natural ecosystems. In order to avoid a biased approach and ensure the functional importance of biodiversity and ecosystem integrity for the longevity and stability of the carbon sequestered and stored in forests, cooperation between the UNFCCC and CBD is paramount. To do this, it is recommended that both the CBD and UNFCCC implement a joint work pro-

gramme to fully and appropriately operationalise the ecosystem provisions of the Paris Agreement to support and guide ecosystem-based and nature- based synergistic action in National Biodiversity Strategy and Action Plans

(NBSAPs) and Nationally Determined Contributions (NDCs).

Such a work programme should: (a) explore and articulate the ways in which the biodiversity and climate crises (and solutions) amplify each other; (b) explain why protection is the priority and restoration is secondary; (c) explain the functional dependencies and linkages between biological diversity, ecosystem integrity and effective climate mitigation and adaptation; and (d) promote actions that buffer and reconnect existing biodiverse and carbon dense natural ecosystems such as support for conservation management of indigenous territories.

Forests and climate dialogue

Given the important role the world's forests play in climate change mitigation (and adaptation) it is recommended to establish, similar to the process established on oceans and climate change, a Forests and Climate Change Dialogue.

The Ocean and Climate Change Dialogue was established at COP 25 in Madrid in 2019 leading to a permanent annual Dialogue focused on strengthening ocean-based action. Besides annual meetings, the Dialogue's co-facilitators are tasked to provide an annual summary report.

The recommendation is that latest at COP30 in 2025, an annual Forest and Climate Change Dialogue is established that will discuss action to conserve and enhance sinks and reservoirs of greenhouse gases in the world's forests, in both developed and developing countries.

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