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FOREST DECLARATION ASSESSMENT

Overarching Forest Goals:

Theme 1 Assessment

[v5.0, 18 Oct 2022]

THEME 1:

OVERARCHING FOREST GOALS

Theme 1 covers the overarching forest goals of: 1) ending the loss and degradation of natural forests by 2030, and 2) restoring 350 million hectares of degraded landscapes and forestlands by 2030. This report assesses progress toward these targets. The current assessment builds on previous New York Declaration on Forests Goal 1 and Goal 5 progress reports, provides updates using the latest available data.

The Forest Declaration Assessment (formerly the New York Declaration on Forests (NYDF) Progress Assessment) is an independent, civil society-led initiative to assess progress toward the global goals of halting deforestation and restoring 350 million hectares of degraded land by 2030 as set out in international declarations such as the New York Declaration on Forests (2014) and the Glasgow Leaders' Declaration on Forests and Land Use (2021). Globally, terrestrial and coastal ecosystems including savannas, grasslands, scrublands, and wetlands are all under threat of conversion and degradation. Countering this threat for all ecosystems is essential to meeting global climate and biodiversity goals. This annual assessment of global progress for 2022, however, focuses specifically on forest ecosystems. It is published as a set of four reports covering different themes: Overarching forest goals, Sustainable production and development, Finance for forests, and Forest governance.

Achieving global mitigation results in line with the aim of limiting global temperature rise to 1.5°C, as articulated in the Paris Agreement, will require a drastic reduction in natural forest loss and degradation and a commensurate increase in restoration and reforestation activities, which must be pursued through equitable and inclusive measures. Nothing less than a radical transformation of development pathways, finance flows, and governance effectiveness and enforcement will be required to shift the world's forest trajectory to attain the 2030 goals. The 2022 Forest Declaration Assessment evaluates recent progress toward the 2030 goals and answer the question: ***"Are we on track?"***

Key Messages

Forests are fundamental to regulating and stabilizing the global climate. Meeting the Paris Agreement's ambition of limiting global warming to no more than 1.5°C will require global greenhouse gas (GHG) emissions to reach net-zero by the second half of this century. Eliminating deforestation by 2030 is a major milestone towards achieving the 2050 net zero target. Land use change, including deforestation and degradation, account for 10–12 percent of global GHG emissions. Protecting forests also comes with clear benefits for people, biodiversity, and sustainable development.

Halting deforestation and forest degradation as soon as possible, and no later than 2030, will substantially reduce the release of terrestrial GHG emissions to the atmosphere. And restoration of forests and other ecosystems can return significant amounts of carbon to stored biomass and help us realize our collective 2030 targets.

Only eight years remain to realize the twin global goals of halting and reversing deforestation by 2030. Despite encouraging signs, not a single global indicator is on track to meet the 2030 goals of stopping forest loss and degradation, and restoring 350 million hectares of forest landscape.

Deforestation rates around the world declined modestly in 2021, by 6.3 percent compared to a baseline of 2018-20. In the humid tropics, loss of irreplaceable primary forest decreased by only 3.1 percent. This is well short of the 10 percent annual reduction needed to be on track to halt deforestation completely by 2030. Although still increasing, global forest degradation rates in 2021 have been slowing down compared to the 2018-20 baseline – but not fast enough to be considered on track to meet the 2030 target. There is also a significant year-to-year fluctuation in both deforestation and degradation indexes, which makes trends hard to detect over short periods of time. Future assessments will continue to monitor these processes to confirm detected progress.

Tropical Asia is the only region currently on track to halt deforestation by 2030. While deforestation rates in Tropical Latin America and Africa decreased in 2021 relative to from the 2018 to 2020 baseline, those reductions are still insufficient to meet the 2030 goal. Each year that passes without sufficient progress makes it increasingly difficult to meet global forest protection goals -- and increases the annual reductions required in future years.

Notable progress in afforestation and reforestation efforts over the last two decades have resulted in new forest areas the size of Peru, with net gains of forest cover in 36 countries. However, losses exceeded gains over the same period, resulting in a net loss of 100 million hectares globally. It should be noted that forest cover gains, through reforestation and afforestation activities, do not fully offset forest losses in terms of carbon storage, biodiversity, or ecosystem services. Therefore, highest priority efforts should be directed towards safeguarding primary forests from losses in the first place.

INTRODUCTION

Why track overarching forests goals?

Forests are fundamental to regulating and stabilizing the global climate. Meeting the Paris Agreement's ambition of limiting global warming to no more than 1.5°C will require global greenhouse gas (GHG) emissions to reach net-zero by the second half of this century.[1] Eliminating deforestation[a] by 2030 is fundamental to achieving the 2050 net zero target. Land use change, including deforestation and degradation, accounts for about 10 -12 percent of global GHG emissions.[2] Despite this, forests are also a significant natural carbon sink, contributing net carbon removals from the atmosphere of up to 7.6 gigatons CO_2 equivalents ($GtCO_2e$) per year between 2001 and 2020.[3] While forests are still a net carbon sink globally, it is concerning that the difference between carbon removals and emissions from deforestation/degradation is weakening in some regions, a phenomenon particularly evident in the Amazon.[4]

Halting deforestation and forest degradation as soon as possible – and no later than 2030 – will substantially reduce the release of terrestrial GHG emissions to the atmosphere. Meanwhile, restoration of forests and other ecosystems – through activities like reforestation, assisted natural regeneration, and improved forest management – can return significant amounts of carbon to stored biomass. Primary forest is, however, irreplaceable. No level of reforestation or afforestation can equate lost primary forest; degraded and deforested land can be restored, but the quality of carbon storage, biodiversity, and associated ecosystem services may never fully recover.[5] Together with agriculture and other land use activities, reforestation, assisted natural regeneration and improved forest management practices could contribute an estimated reduction of 8-14 GtCO2e per year between 2020 and 2050, at a cost of less than USD 100 per ton.[6] Protecting forests also comes with clear benefits for people, biodiversity, and sustainable development.[7]

What are the building blocks for progress on 2030 forest goals?

Forest goals enshrined in the New York Declaration on Forests, the Glasgow Leaders' Declaration on Forests and Land Use, the Bonn Challenge, and other pledges recognize that halting deforestation and restoring forests requires a wide array of actors and the need to balance environmental, social, and economic interests. These goals provide the most concrete statements of global ambition to protect and restore forests – which are critical to meeting the aspirations of the Paris Agreement, the Sustainable Development Goals (SDGs) and many other global ambitions. The actions covered by the other theme reports – building sustainable production models, marshalling sufficient finance for forests, and implementing strong and effective forest governance measures – are essential building blocks for delivering on global forest goals.

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[a] Deforestation refers to a tree cover loss event that is: permanent in nature, e.g., when forest is converted to cropland or cleared for development; or when it occurs within humid tropical primary forest boundaries. See Annex A for a full list of key terms.

How are we assessing progress?

This report provides a summary of global progress on halting deforestation and degradation, and advancing forest restoration globally. To track progress toward these goals we use indicators of gross deforestation, humid tropical forest loss, emissions from forests, forest landscape integrity, and tree cover gain (Annex C: Methodology). It's worth noting that. Because all forest change indicators fluctuate quite strongly from year to year, a clearer picture of progress or lack thereof will emerge as more years of data after the baseline become available. The forest loss and degradation sections of this assessment largely focus on change from a baseline period of 2018-2020- to 2021, and although we see several promising changes in the right direction, the most reliable trends to take note of are those that have been sustained for several years in succession. Additional methodological notes and analysis are available in the Technical Annex [link will be added in final version].

This report focuses almost exclusively on forests, excluding other ecosystems, as the current mandate of the Forest Declaration Assessment is to track progress toward the 2030 forest goals. This focus reflects both the Forest Declaration Assessment's history as an initiative to track progress on the New York Declaration on Forests, as well as the disparate attention that forests have received on the international stage compared to other biomes.[8] This focus does not imply that other ecosystems are not also important for meeting climate change and biodiversity goals.

This report does not detail the causes of, or recommend solutions for, tackling deforestation and forest degradation; these topics are covered in three complementary thematic reports on sustainable production & development; forest finance; and forest governance. Country-level examples and case studies are included, taken from assessments of progress conducted by the Forest Declaration Assessment team for 13 countries[b] in 2022. Finally, this report focuses primarily on developing countries, due to the impact of tropical forests on climate and biodiversity. We aim to include the global north more prominently in future years' assessments.

[b] Cambodia, Cameroon, Canada, Colombia, Democratic Republic of the Congo, Dominica, Ecuador, Gabon, Indonesia, Kenya, Liberia, Republic of the Congo, and Vietnam.

FINDINGS

What progress has been made?

None of the indicators assessed suggest that we are on track to meet the goals of halting forest loss or degradation, or restoring 350 million hectares by 2030.[c] Each year that passes without sufficient progress makes it increasingly difficult to meet global forests goals by 2030.

There is no one solution for halting deforestation and forest degradation, or accelerating restoration around the world. Yet, coordinating actions across sectors to align policies with forest goals, to direct green finance to forests, and to improve the effectiveness of forest governance can bring private and public sector actors closer to their forest goals and pledges. In this regard, some regions and countries have had more success than others.

Some countries have implemented comprehensive forest policies, consider forests in their development and economic policies, and tackle poverty reduction and forest protection in tandem, e.g., through payment for ecosystem services or REDD+ programs. In other jurisdictions, private and public sector actors effectively collaborate to address deforestation. On the other hand, many countries still lack sufficient resources and institutional capacities for effective forest governance. In particular, more green finance is needed to unlock the full potential of forest protection interventions such as REDD+.

Country case studies throughout this brief provide a closer look at success factors for achieving forest goals in specific country contexts. Further details are covered in the other three thematic reports on sustainable production & development; forest finance; and forest governance.

Halting deforestation

The global community has rallied around the goal of "halting deforestation" by 2030. No perfect measure of deforestation exists, so this assessment uses a set of proxies. The first indicator estimates the share of global tree cover loss[9d] that is likely to have been permanently converted to a new land use, based on the driver of loss.[10] The second estimates the loss of mature, natural humid tropical primary forests.[11] The third estimates the emissions from these forest disturbances, given forests' significant contribution to meeting the Paris Agreement goals.

"Halting" deforestation is defined here as reaching zero gross deforestation[e] by 2030 – no permanent land use change from forests to non-forests, and no additional clearing of primary forests, irrespective of any gains in area

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[c] Forest restoration refers to a suite of interventions aimed at halting and reversing deforestation and forest degradation. Forest protection includes reducing deforestation and forest degradation, restoring degraded forestlands, and sustainable management of production forests, with involvement of governments, the private sector, IPLCs, and other actors. See Annex A for full list of key terms.

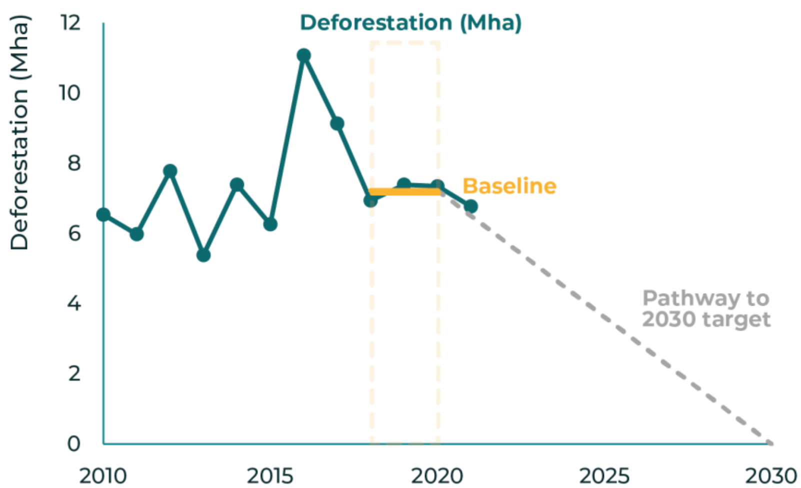
[d] Tree cover loss refers to a loss event that may or not be permanent. Non-permanent tree cover loss routinely occurs in the context of logging, fire, or swidden agriculture. Tree cover loss data is often analyzed as a first step to measure deforestation. See Annex A for a full list of key terms.

[e] The Glasgow Leaders' Declaration on Forests and Land Use does not specify whether the goal should be to reach gross or net zero deforestation by the end of the decade. The 2021-2030 benchmark presented here uses the "gross zero" interpretation. Indicators tracking a less ambitious "net zero" pathway will be developed in future

due to reforestation elsewhere. Assuming a straightforward linear pathway to 2030, reaching the 2030 target will require a 10 percent reduction in the deforestation rate each year from 2021 through 2030, compared to a baseline of the average deforestation rate from 2018-2020. Below, the 2021 deforestation rate is assessed against the 2018-2020 baseline to determine if the world is on track to meet the 2030 goals.

Global gross deforestation amounted to 6.8 million hectares in 2021 – an area that is comparable in size to the Republic of Ireland – with 3.9 $GtCO_2e$ of associated GHG emissions.[f] Despite the alarming scale of loss, the slightly reduced pace of deforestation represents an improvement in relation to the 2018-2020 baseline. Still, this improvement is insufficient for meeting the 2030 targets. The 2021 deforestation rate experienced a modest reduction of 6.3 percent compared to the 2018-2020 baseline, which is well short of the yearly 10 percent reduction required. Each year that reductions fall short increases the total reductions needed in each future year to meet the 2030 target (**Figure**).

Figure 1. Global deforestation rate over the 2010-2021 period and the pathway to reach the 2030 global gross zero deforestation target.



Note: The dashed line indicates that a reduction rate in deforestation of 10 percent per year, as compared to the 2018-2020 baseline, is necessary to reach the 2030 zero gross deforestation target. The reduction in deforestation rate of 6.3% that occurred in 2021 falls far short of the target. The data before and after 2015 are not directly comparable, as the methodology to detect the tree cover loss has been improved and may result in higher estimates of loss for recent years compared to earlier years, although this does not affect the assessment of progress since 2020.[12]

The vast majority (96%) of global deforestation takes place in tropical regions and, therefore, the vast majority (98%) of the decrease in deforestation will also need to come from those regions (**Figure 2**).

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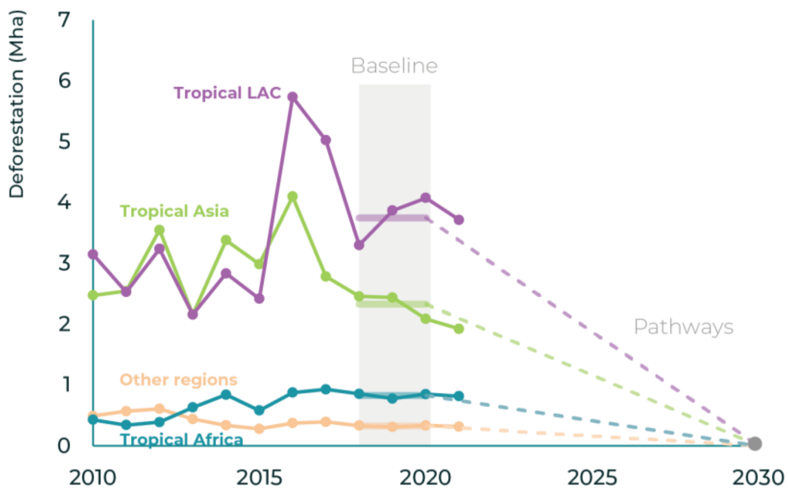
assessments as data becomes available, e.g., by using the gross forest loss and gain of the upcoming 2025 FAO Forest Resource Assessment. See Annex A for a full list of key terms.

[f] If deforestation were a country, it would globally rank third in GHG emissions after China and the US.

Figure 2. Global deforestation rate by region over the 2010-2021 period and the pathway to reach the 2030 gross zero target from the 2018-2020 baseline



Note: The data referring to other regions are used here for reference, to highlight that the bulk of deforestation takes place in only three global regions. The data before and after 2015 are not directly comparable, as the methodology to detect the tree cover loss has been improved and may result in higher estimates of loss for recent years compared to earlier years, although this does not affect the assessment of progress since 2020.[13]

Assessing regional differences

Tropical Asia experienced a decrease in forest loss from the baseline and is the only region currently on track to halt deforestation by 2030. Tropical Latin America and Africa also saw a decrease relative to the baseline, but are not yet aligned with the 2030 goal. Both regions will need to redouble their efforts in 2022 and beyond to align with the 2030 zero deforestation pathway and Tropical Asia will need to sustain the progress it has recently made.

CASE STUDY

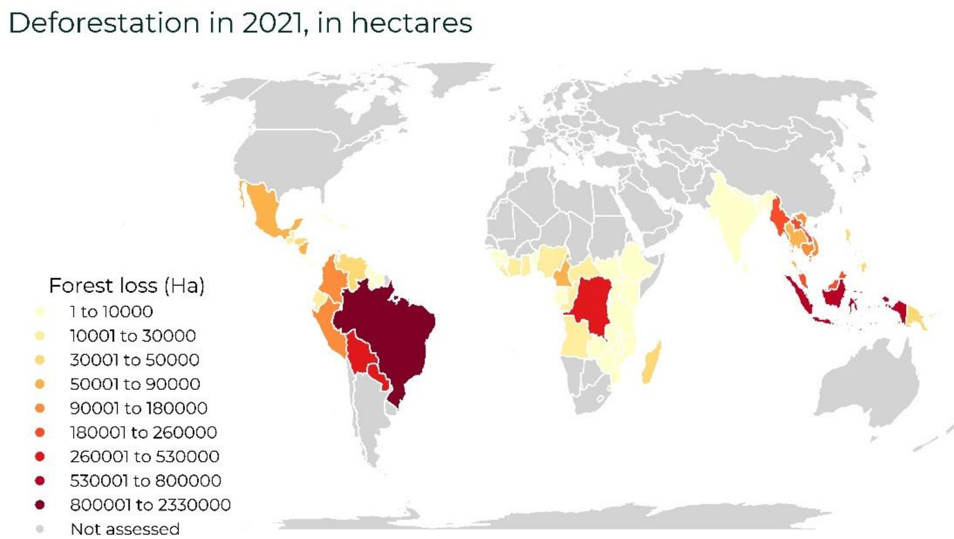
GHANA AND CÔTE D'IVOIRE

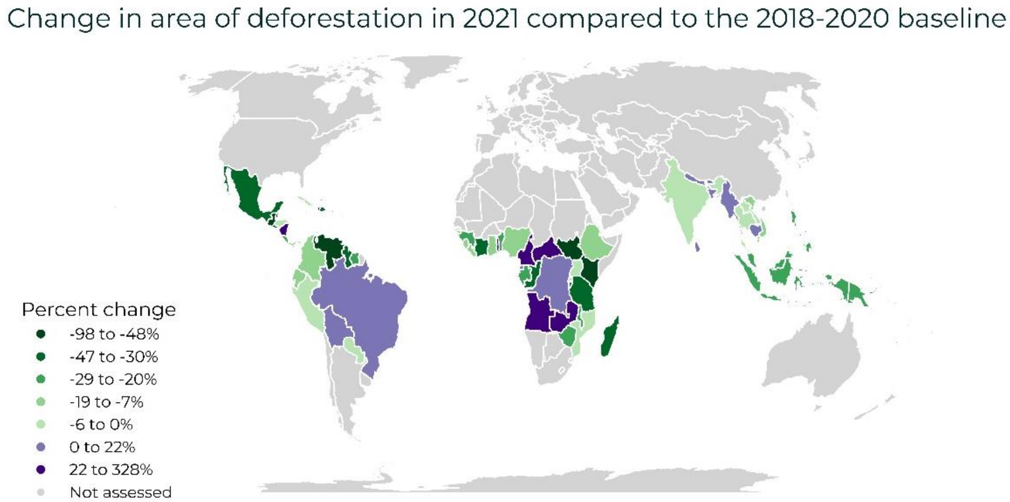
While Ghana and Côte d'Ivoire have lost significant forest cover in the past, in 2021 deforestation decreased by 13 percent and 47 percent in those countries, respectively, compared to 2018-2020. This recent success puts them on track with the 2030 pathway.[14] Since 2017, the governments of Ghana and Côte d'Ivoire have worked with 35 companies, which together account for 85 percent of the world's cocoa trade, to improve the sustainability of resource use in forest landscapes and address the underlying drivers of deforestation such as poverty. The public-private Cocoa and Forests Initiative (CFI) has worked to improve stakeholder collaboration, policies, finance for restoration, and to strengthen governance structures. Under the CFI umbrella, companies are working to improve the transparency of their supply chains and smallholders are adopting sustainable agriculture practices, such as agroforestry, while increasing productivity. While it is difficult to identify any single drivers of reduced deforestation, public-private partnerships like CFI present a compelling example for other regions on how collaboration between stakeholders can be built. Going forward, additional action is necessary to address poverty among smallholders and to disincentivize agricultural expansion into forests as a strategy to increase income.[15]

Of the 10 countries with the highest total deforestation, half saw a reduction of deforestation rates in 2021 compared to the 2018-2020 baseline. However, globally, the deforestation indicator is not on track. A key reason for this is that four out of the five top countries with largest absolute deforestation increased their deforestation rates in 2021 – namely Brazil (3% increase), Bolivia (6%), Democratic Republic of Congo (DRC) (3%), and Paraguay (1%) (**Figure 3**).

Brazil remains the largest contributor to deforestation globally. Despite Brazil's large influence and increasing deforestation trend, tropical Latin America as a whole has experienced net 0.033 Mha deforestation in 2021 compared to the 2018-2020 baseline. This decrease in deforestation can mainly be attributed to Mexico (0.038 Mha, 36% decrease), Venezuela (0.037 Mha, 54% decrease), Colombia (0.031 Mha, 16% decrease), Guatemala (0.018 Mha, 49% decrease) and Peru (0.012 Mha, 6% decrease), all of which combined resulted in a joint decrease in deforestation of 0.140 Mha. This decrease was larger than the combined increased experienced in other countries, namely Brazil (0.076 Mha, 3% increase) and Bolivia (0.030 Mha, 6% increase), where the deforestation trends are increasingly diverging from the 2030 target. In practice, increasing deforestation rates in major forest countries will make it very difficult to attain the 2030 goal globally, regardless of other countries actions.

Figure 3. 2021 deforestation by country in absolute terms (ha) (Top figure) and relative change in 2021 deforestation by country in relation to the 2018-2020 baseline scenario (Bottom figure).





Note: As countries have different sizes, their deforestation rate in absolute terms (above map) doesn't tell the whole story. Therefore, percent change in deforestation (below map) is useful. It shows deforestation relative to the forest area of the country. Countries with smaller territories or with few forested areas can therefore still be seen on the map, and countries with large forest areas are not disproportionately represented.

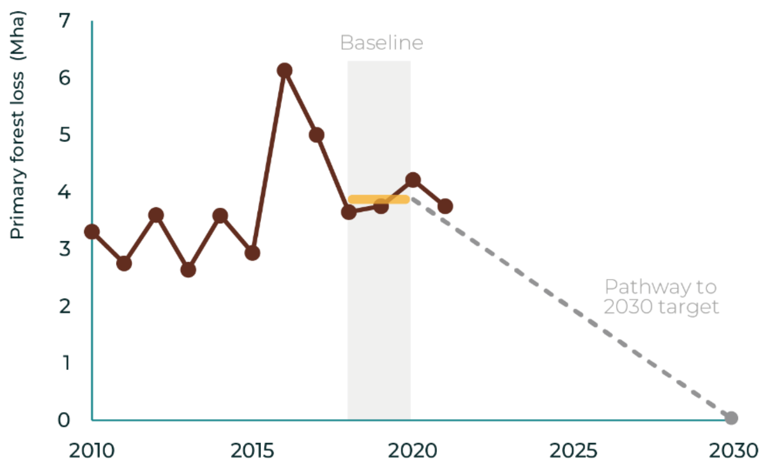
In Asia, the countries with the largest absolute increase in deforestation are Cambodia, with a 0.0090 million hectare (7.0%) increase and Myanmar with 0.0028 million hectare (2.0%) increase. In sharp contrast, Indonesia, the largest deforester in Asia (0.78 Mha in 2021), experienced a sizeable reduction of 0.26 million hectares (-25%) in deforestation in 2021 in relation to the baseline. Similarly, Malaysia, another country with substantial forest cover, experienced a relative reduction of -24% (0.08Mha) (Figure 5).

The DRC and Cameroon are the largest contributors to deforestation in Tropical Africa. While the DRC's deforestation rate increased minimally in 2021, its absolute 2021 deforestation of 0.50 million hectares accounts for over 60 percent of Tropical Africa's total deforestation. Cameroon, which in 2021 contributed 11 percent of the total deforestation in Tropical Africa, experienced a 20 percent (0.018 ha) increase in its deforestation rate in 2021.

Humid tropical primary forest loss

Humid tropical primary forests hold a disproportionate share of irrecoverable carbon and biodiversity, experience the majority of deforestation globally, and can take decades to centuries to recover from loss.[16] The trends for humid tropical forest loss in 2021 largely mirror those for global deforestation. In 2021, 3.7 million hectares of humid tropical primary forest were cleared, with 2.5 $GtCO_2e$ of associated GHG emissions. This represents a 3.1 percent reduction in deforestation compared to the 2018-2020 baseline, which is an improvement but much less than the 10 percent annual reduction benchmark (**Figure 4**). Although other types of forest are also ecologically significant and irreplaceable in meaningful timeframes, humid tropical primary forests are tracked as a 'minimum' indicator of critical forest loss.

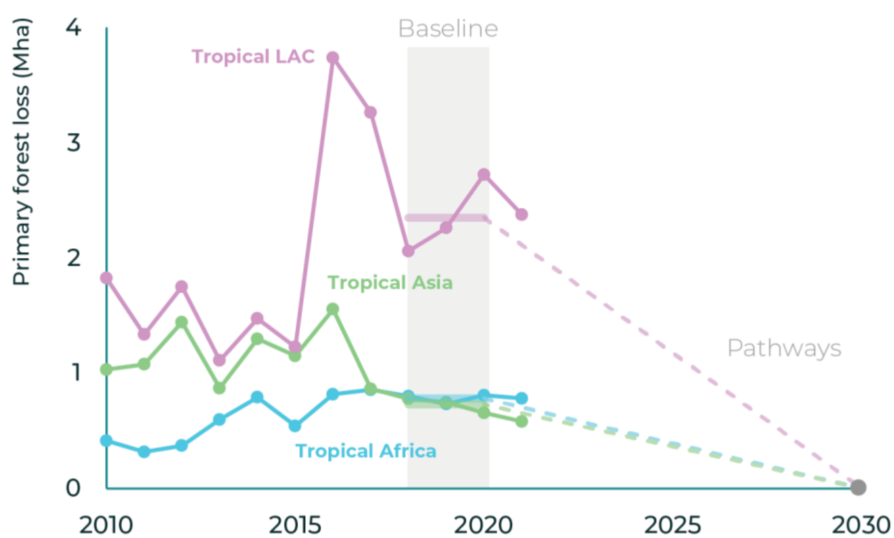
Figure 4. Global tropical humid primary forest loss over the 2010-2021 period and the pathway to reach the 2030 gross zero target from the 2018-2020 baseline.



Note: The dashed line indicates that a reduction rate in deforestation of 10 percent per year, as compared to the 2018-2020 baseline, is necessary to reach the 2030 zero gross deforestation target. The data before and after 2015 are not directly comparable, as the methodology to detect the tree cover loss has been improved and may result in higher estimates of loss for recent years compared to earlier years, although this does not affect the assessment of progress since 2020.[17]

Tropical Asian countries overall saw a 20 percent reduction in 2021 – again, this was the only region that saw a reduction in humid tropical forest loss. Asian countries have now experienced five consecutive years of decreasing primary forest loss and the region is on track to reach the 2030 target. This progress should be celebrated and used as an example for other regions. In contrast, in Africa, yearly loss has remained constant and in Latin America, has increased by 1.2 percent (**Figure 5**).

Figure 5. Tropical humid primary forest loss by region over the 2010-2021 period and the pathway to reach the 2030 gross zero target from the 2018-2020 baseline



Note: The dashed line indicates the reduction rate, as compared to the 2018-2020 baseline, that is necessary for each tropical forest region to reach the 2030 zero gross deforestation target. The data before and after 2015 are not directly comparable, as the methodology to detect the tree cover loss has been improved and may result in higher estimates of loss for recent years compared to earlier years, although this does not affect the assessment of progress since 2020.[18]

Cameroon, Bolivia, Laos, Cambodia, Brazil, and DRC all experienced increases in the rate of primary forest loss in 2021, with the four first showing over double-digit increases (see Annex F for full dataset). Only four countries reduced their rate of humid primary forest loss in 2021: Malaysia (-36%), Indonesia (-35%), Colombia (-16%), and Peru (-6%).

CASE STUDY

INDONESIA

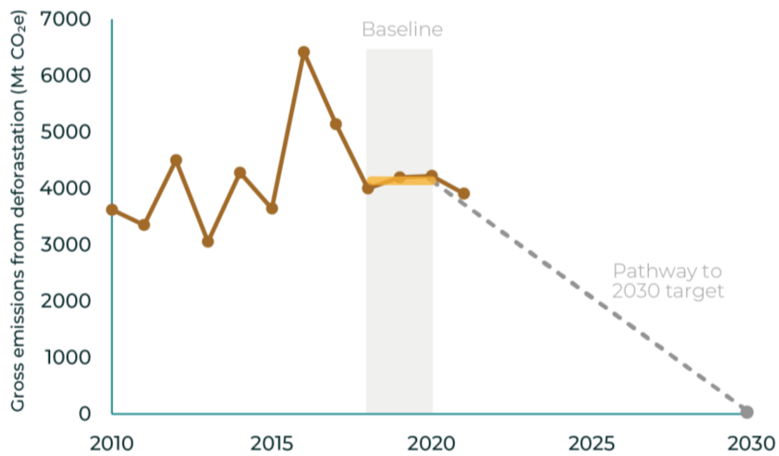
Indonesia is currently on track to meet its 2030 deforestation goal: The rate of primary forest loss has declined over the past five years and was 25 percent lower in 2021 compared to 2020.[19] Action by both corporations and the government to address deforestation from palm oil production has been key to achieving this progress. By 2020, more than 80 percent of palm oil refiners had adopted No Deforestation, No Peat and No Exploitation commitments, and in 2018, the Roundtable on Sustainable Palm Oil tightened its sustainability certification requirements to prohibit deforestation and peatland clearing.[a] Also in 2018, the government imposed a moratorium on new oil palm plantations and enhanced law enforcement.[a] As a result, deforestation linked to palm oil in 2020 reached its lowest rate in 20 years – and is continuing to fall during a period of expansion of palm oil production.[20] Indonesia has also included targets for peatland restoration in its NDC, and requires companies to report on restoration of peat ecosystems in their concession areas.[21]

However, the palm oil moratorium expired in 2021, and there is now a risk that plantation expansion and deforestation will increase in response to palm oil prices, which have been on the rise since 2020.[22] Another concern is recent changes to the forest legal framework that would undermine forest protection and previous achievements if implemented (see Forest Governance brief for more on this).

Greenhouse gas emissions from forest loss

Global average baseline gross emissions from deforestation were 4.1 GtCO_2e per year in 2018-2020. Emissions in 2021 decreased by 5.5 percent from this baseline, with a total of 3.9 GtCO_2e of emissions in 2021 from deforestation (**Figure 6**). This decrease is not on track with the 10 percent, or 0.39 GtCO_2e/year, decrease required to reach the 2030 target.

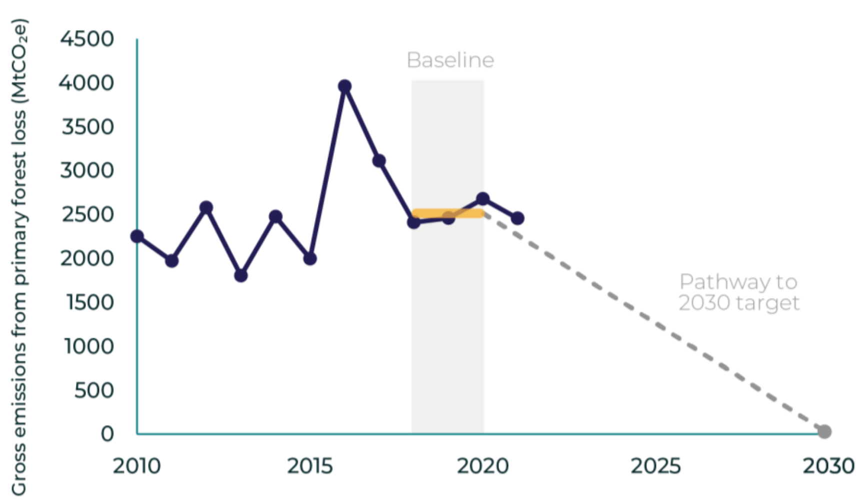
Figure 6. Global gross emissions from deforestation over the 2010-2021 period and the pathway to reach the 2030 gross zero target from the 2018-2020 baseline



Note: The dashed line indicates that a reduction rate in emissions from deforestation of 10 percent per year, as compared to the 2018-2020 baseline, is necessary to reach the 2030 zero emissions from deforestation target. The data before and after 2015 are not directly comparable, as the methodology to detect the tree cover loss has been improved and may result in higher estimates of loss for recent years compared to earlier years, although this does not affect the assessment of progress since 2020.[23]

The average 2018-2020 global baseline emissions from humid tropical primary forest loss were 2.5 $GtCO_2e$ per year. With 2.46 $GtCO_2e$ emitted due to humid primary forest loss in 2021, emissions have decreased by 2.4 percent compared to the baseline (Error! Reference source not found.**7**).

Figure 7. Global gross GHG emissions from humid tropical primary forest loss over the 2010-2021 period and the pathway to reach the 2030 gross zero target from the 2018-2020 baseline



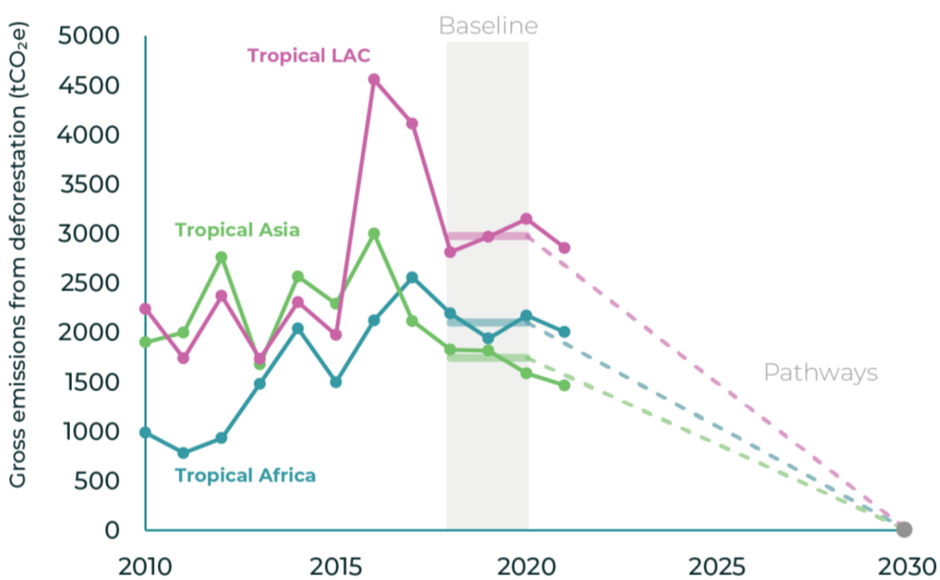
Note: The dashed line indicates that a reduction rate in emissions from deforestation of 10 percent per year, as compared to the 2018-2020 baseline, is necessary for tropical forest regions globally to reach the 2030 zero emissions from deforestation target. The data before and after 2015 are not directly comparable, as the methodology to detect the tree cover loss has been improved and may result in *higher estimates of loss for recent years compared to earlier years, although this does not affect the assessment of progress since 2020.*[24]

Consistent with their deforestation trends, Indonesia and Malaysia saw the largest reductions in emissions from deforestation in relative terms in 2021 – reducing -28 percent (450 $MtCO_2e$) and -26 percent (121 $MtCO_2e$), respectively. Meanwhile, Bolivia and Brazil presented the largest relative increases in emissions in 2021 (245 $MtCO_2e$ and 1453 $MtCO_2e$, respectively) (see Annex F for dataset).

The countries with the greatest GHG emissions increases from humid primary forests on a relative basis were Bolivia (23% increase in relation to the baseline), Cameroon (23%), Laos (16%), Cambodia (12%), and Brazil (9%). Laos has experienced an overall decrease in deforestation but has disproportionately increased its rate of loss in high-ecological value forests (Annex F).

Tropical Asian countries overall saw a reduction in emissions from deforestation in 2018-2021. As with deforestation, tropical Asia was the only region that saw a reduction in emissions from humid tropical forest loss. Asian countries have now experienced five consecutive years of decreasing emissions from primary forest loss and the region is on track to reach the 2030 target. This progress should be celebrated and used as an example for other regions. Yearly emissions from deforestation decreased slightly in Africa and Latin America in 2021. However, emissions from deforestation have generally been increasing in those regions since 2010, and both regions will need significant reductions to align with the 2030 zero emissions from deforestation target (**Figure 8**).

Figure 8. Regional gross GHG emissions from deforestation by region over the 2010-2021 period and the pathway to reach the 2030 gross zero target from the 2018-2020 baseline.



Note: The dashed lines indicate the reduction rate in emissions from deforestation, as compared to the 2018-2020 baseline, necessary for each tropical forest region to reach the 2030 zero emissions from deforestation target. The data before and after 2015 are not directly comparable, as the methodology to detect the tree cover loss has been improved and may result in higher estimates of loss for recent years compared to earlier years, although this does not affect the assessment of progress since 2020.[25]

CASE STUDY

GABON

Gabon, which has over 90% of its total area covered by forests,[26] has been able to reduce its already low rate of deforestation by 28% between 2018-2020 and 2021. In 2021, Gabon was the first country to receive payments from the Central African Forest Initiative for reducing carbon emissions from deforestation. Gabon was awarded USD 17 million for forest protection measures such as creating 13 new national parks and implementing a project to combat illegal logging.[27] These measures have also contributed to decreased tree cover loss from shifting agriculture and artisanal small-scale mining. To address the growing risk to forests from commercial agriculture, the government of Gabon in 2019 adopted the Roundtable on Sustainable Palm Oil Principles and Criteria as national standards for palm oil production[28] and mandated in 2018 that all forest concessions should be certified under Forest Stewardship Council standards by 2022.[29] Further, Gabon has created AGEOS, an agency specialized in forest mapping using tele-detection methods to monitor the forest cover in real-time.

Additionally, Gabon developed an Emerging Gabon Strategic Plan (PSGE)[30], which outlines actions to ensure sustainable resource management while also reducing poverty and accelerating economic growth. Gabon has not yet implemented a Strategic Planning and Land Use Program (PNAT). But with the help of the Central African Forest Initiative (CAFI), the country is currently developing one for an improved spatial planning system to determine which areas should be developed for agriculture, mining, infrastructure development, and conservation.

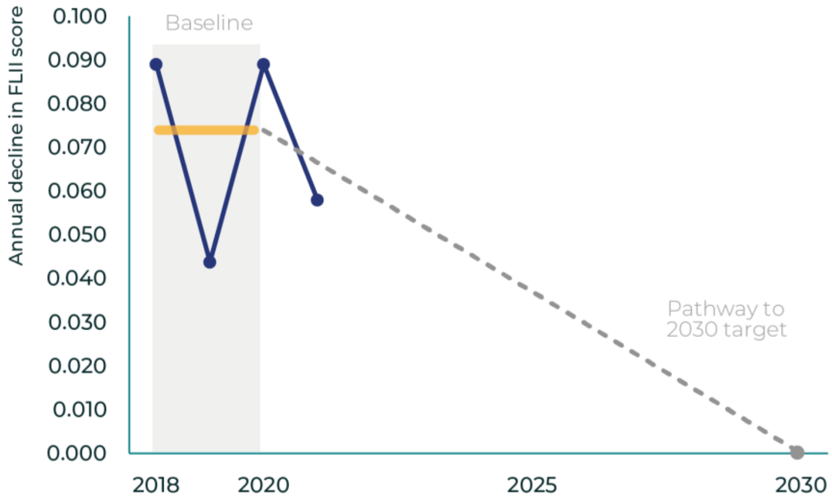
Degradation

While deforestation is the process of clearing forests permanently, forest degradation leads to a forest that still exists, but is diminished in qualities such as carbon storage, biodiversity, and other ecosystem services – and can often be a precursor to deforestation. Forest degradation can be measured in many ways. The Forest Landscape Integrity Index (FLII)[31] indicator tracks the ecological integrity of forests using data on the intensity and distribution of human pressures known to cause degradation, combined with observed losses in forest connectivity. Because the Glasgow Leaders' Declaration called for a halt (even a reversal) in land degradation by 2030, the benchmark is equivalent to a 10 percent reduction in new degradation each year compared to the 2018-2020 baseline, reaching zero new degradation by 2030.

According to the FLII indicator, degradation of forests is ongoing both globally, with an average loss of 0.074 FLII points, and in all individual regions. Yet, the global rate of degradation appears to have slowed down in 2020-21, with a loss of 0.058 FLII points, thus roughly aligning itself with the annual degradation rate target (**Figure 9**). However, annual losses show substantial year-to-year fluctuations, demanding further years of data before a clear trend can emerge.[g] Moreover, since observed rates increased in four out of eight global regions, it cannot be concluded that the world is on track for this target.

[g] Note: The analysis of the FLII presented here quantifies the relative change in integrity, but not changes in the area of forest with differing degrees of degradation. In future years we aim to also include this additional information, as well as associated emissions impact.

Figure 9. Trends in Forest Landscape Integrity Index (FLII)



Note: This figure shows the global annual decline in forest degradation rate as per the Forest Landscape Integrity Index (FLII) score. The blue line shows annual decline in FLII over the 2018-2021 period and the dotted line shows the pathway to reach the 2030 zero degradation target from the 2018-2020 baseline (orange line). As observed, degradation in 2021 decreased in relation to the baseline.

Restoration

The agreed global goal on restoration is to restore 350 million hectares of lost and degraded forest landscapes by 2030. Global data on forest cover and tree cover gain using remote sensing technology is not yet available. However, in late 2021 the University of Maryland and World Resources Institute produced new prototype data on forest cover gain for the period 2000 to 2020, which will be used in this analysis as a proxy for forest restoration.

In addition, we analyze how much forest land can be realistically restored between 2020 and 2050, measuring the potential to shift from a non-forest cover to a forest cover state one through afforestation and reforestation activities, as well as natural forest regrowth. These indicators should be interpreted as a proxy for forest restoration opportunity potential.

Tree cover gain, 2000-2020

Over the previous two decades (2000-2020), global forest cover increased by roughly 130.9 million hectares – an area slightly larger than Peru. Three quarters of the global gain was concentrated in 13 countries – the largest was observed in Russia (28.4% of the total), Canada (13.0%), the United States of America (10.7%), Brazil (6.2%), and China (5%) (**Figure 10**). China saw the largest net tree cover gains (2.1 Mha).[32,33]

However, these gains were offset by 231.4 million hectares of tree cover loss in the same countries during that period, resulting in a 100.5 million hectares net loss of forest cover overall. [h] In total, thirty-six countries gained more tree cover than they lost (**Figure 11**),[34] which demonstrates potential for scaling up restoration and reversing forest loss globally. After China, India (0.87 Mha), Uruguay (0.54

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[h] It is important to highlight that tree cover gain does not cancel out tree loss. Although forest cover gain is occurring in many places, it doesn't negate the impacts of loss — especially of primary forests.

Mha), Belarus (0.52 Mha), and Ukraine (0.43 Mha) presented the largest net gains. Globally, 118.6 million hectares (approximately 90%) of the total forest cover gain occurred outside known plantations.[35]

Figure 10. Tree cover gain between 2000 and 2020 (Mha). Data extracted from Potapov et al. (2022)[36]

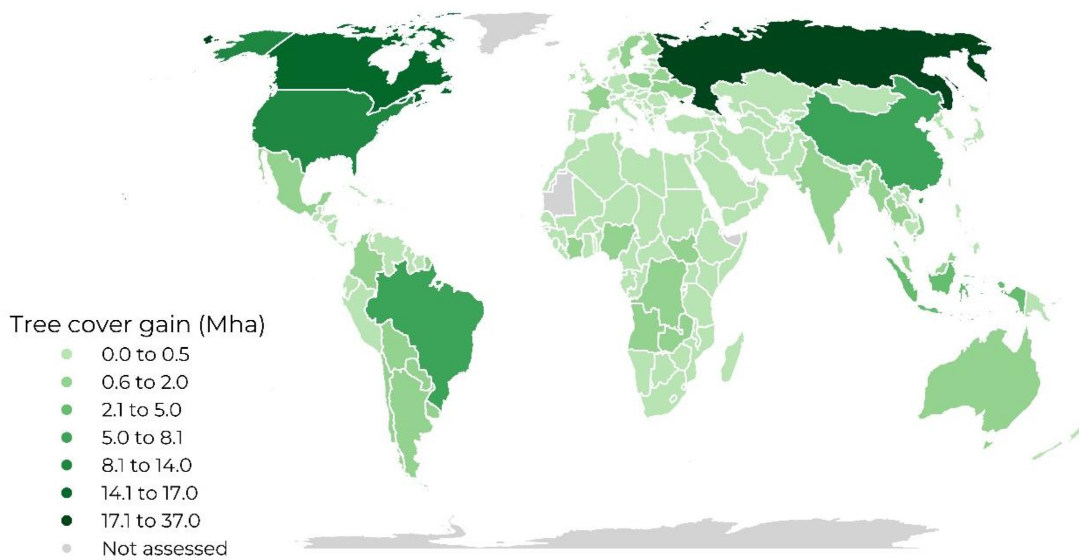
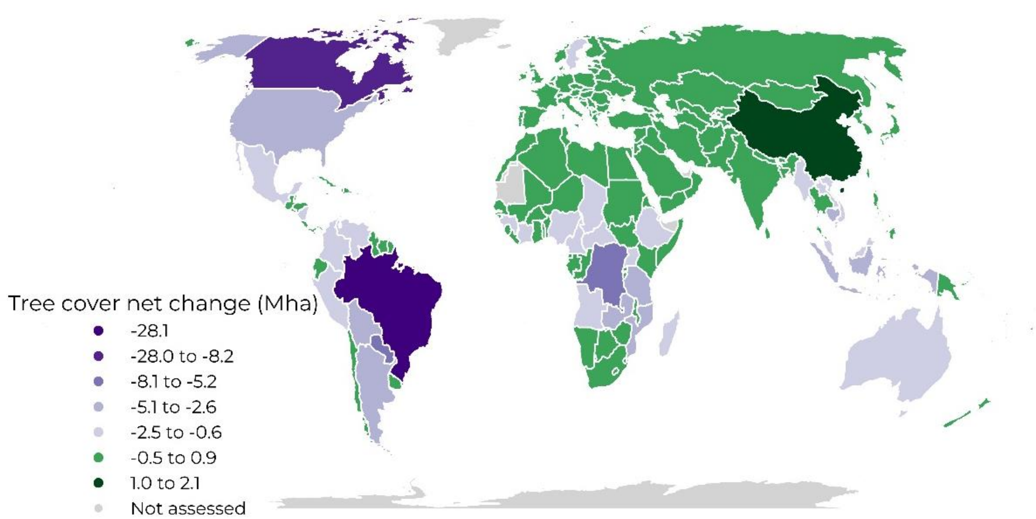


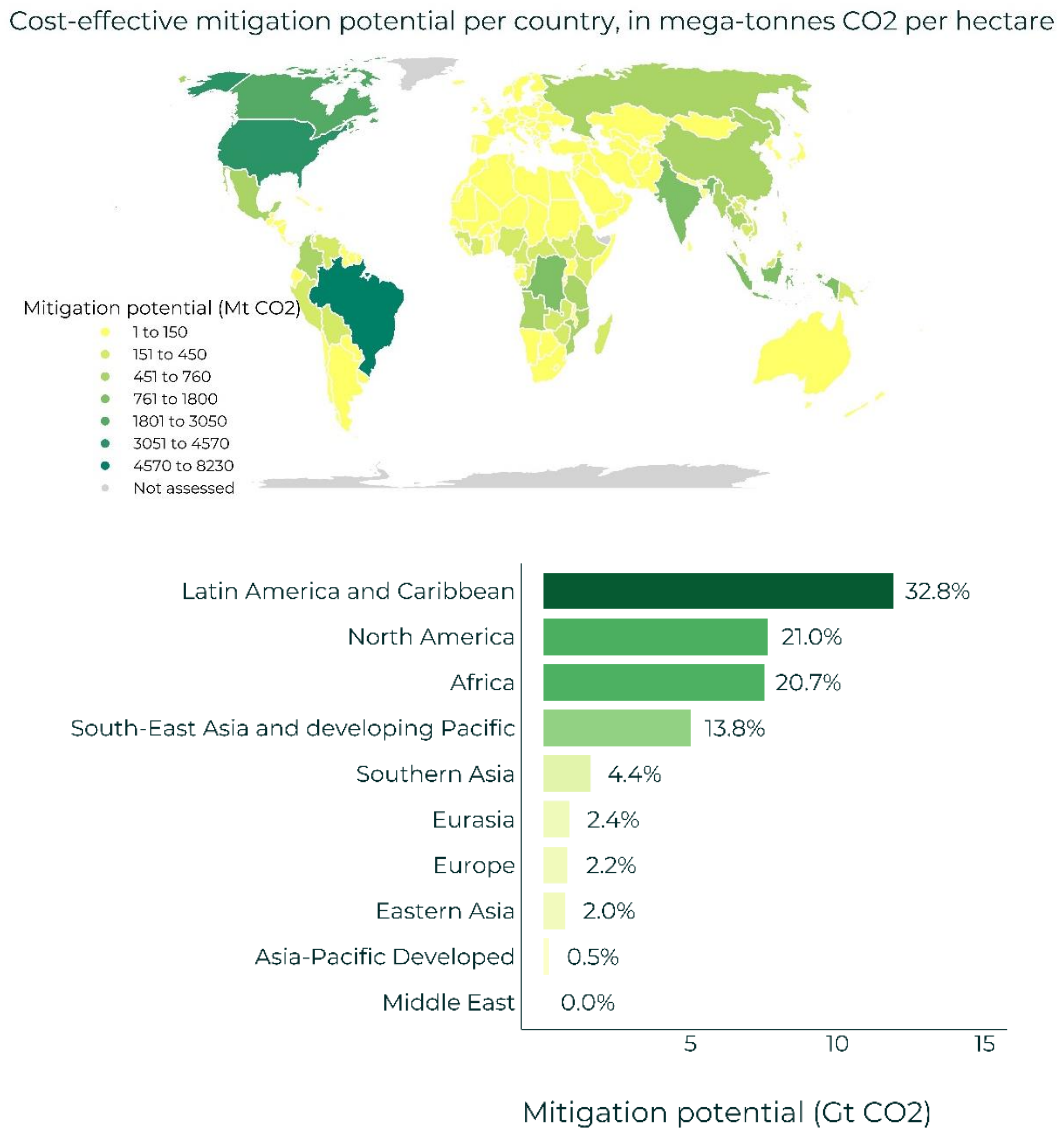
Figure 11. Tree cover net change over the 2000-2020 period



Cost-effective mitigation potential from restoration

In order to identify the pathway to the 2030 global restoration goal – and assess over the coming decade whether or not we are on track -- we look at cost-effective mitigation potential. The global cost-effective mitigation potential[i] of restoration over the 2020-2050 period amounts to 36.252 billion tons CO_2e (**Figure 12**, top). At a regional level, Latin America and the Caribbean have the largest cost-effective mitigation potential (32.8% of the global potential, equivalent to 11,898 $MtCO_2$ or 396.6 $MtCO_2$ per year), followed by North America (21%), and Africa (20.7%) (**Figure 12,** bottom).

Figure 12: Cost-effective mitigation potential over the 2020-2050 period

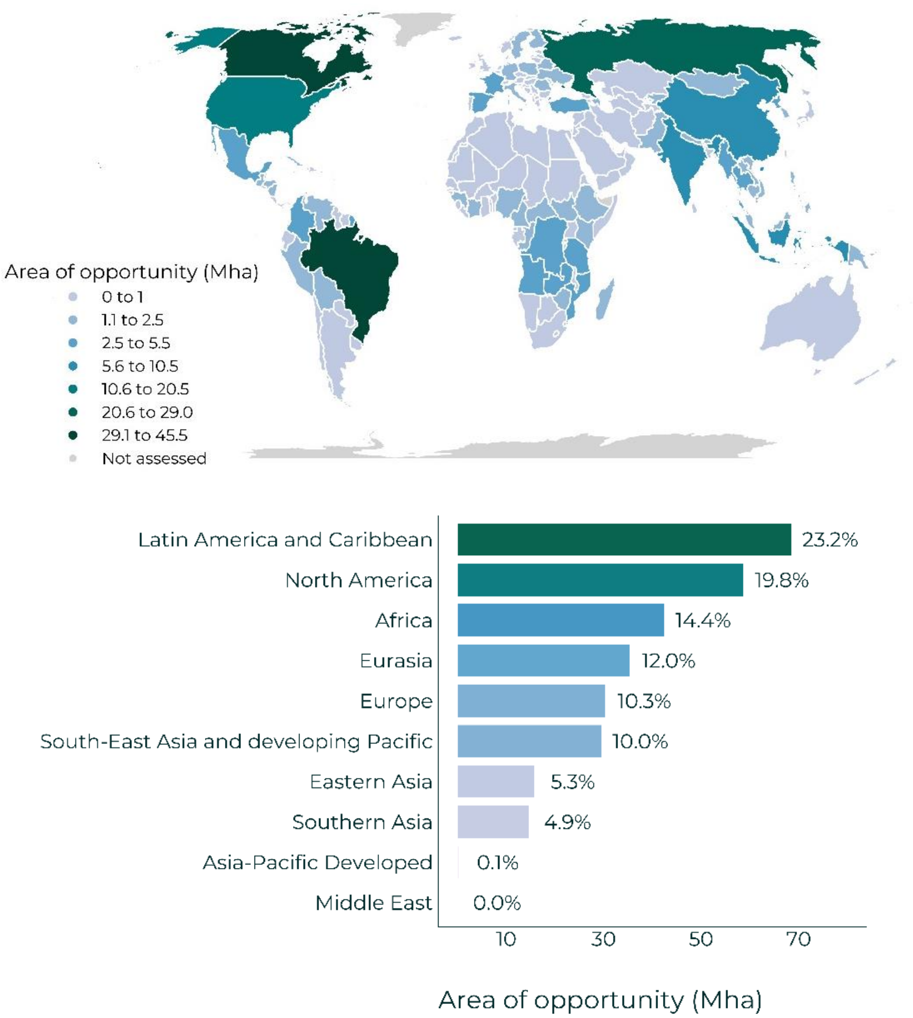


[i] Following the cost-effective definition outlined by Roe et al. (2021): the threshold of $100/$tCO_2eq$ was set by using 'the middle of the range for carbon prices in 2030 for a 1.5°C pathway, and at the low end of the range in 2050'. In simple terms, cost-effective potential can be understood as the amount of mitigation that can be reasonably expected to be unlocked given economic constraints.

The global cost-effective area of opportunity for 2020-2050 is 295.1 million hectares (**Figure 13**, top), approximately equivalent to the area of India. The majority (80%) of the mitigation potential is concentrated in only twenty-four countries. Brazil stands out, accounting for 22.7 percent of the global mitigation potential (8.232 billion tons CO_2 over the thirty-year period, or 274 million tons CO_2 per year; 45.5 million hectares of restoration area of opportunity) and together with the United States – which represents 12.6 percent (4.572 billion tons CO_2 or 152 million tons CO_2 per year; 20.4 million hectares) – add up to 35 per cent of the global figure. Other key countries are Canada (8.4% of the global total), Indonesia (5.0%), India (3.2%), and DRC (2.9%).

Differences across and within regions are substantial. Latin America and the Caribbean have the largest area of opportunity (**Figure 13**, top), accounting for 23.2 percent of the global area with potential for afforestation, reforestation, and natural forest regrowth (equivalent to 68.5 Mha). North America (19.8% or 58.6 Mha) and Africa (14.4% or 42.4 Mha) follow. Eurasia and Europe account for 22.2 percent of the area of opportunity, but host only 4.6 percent of the mitigation potential.

Figure 13: Cost-effective area of opportunity (2020-2050)



When accounting for both area of opportunity and mitigation opportunity, the best opportunities overall lie in the United States of America (233.8 t CO_2 per hectare), Brazil (181.0 t CO_2 per hectare), Indonesia (171.0 t CO_2 per hectare), DRC (215.3 t CO_2 per hectare), Angola (208.8 t CO_2 per hectare), or Tanzania (214.7 t CO_2 per hectare).

A full list of countries with their mitigation potential, area of opportunity, and mitigation density can be found in Annex F [link will be added in final version].

Annex A. Key terms

COST-EFFECTIVE RESTORATION

Interventions are considered cost-effective if the cost of mitigating one tonne of CO_2 equivalent is up to $100. The threshold of $100/t$CO_2$eq was set by using 'the middle of the range for carbon prices in 2030 for a 1.5C pathway, and at the low end of the range in 2050' (Roe et al., 2021, p. 6027).

DEFORESTATION

A tree cover loss event that is: permanent in nature, e.g., when forest is converted to cropland or cleared for development; or when it occurs within humid tropical primary forest boundaries

FOREST LANDSCAPE RESTORATION (FLR)

The long-term process of regaining ecological functionality and enhancing human well-being across deforested or degraded forest landscapes

FOREST PROTECTION

A suite of interventions aimed at halting and reversing deforestation by 2030, in line with the Paris Agreement and Glasgow Leaders' Declaration. Forest protection includes reducing deforestation and forest degradation, restoring degraded forestlands, and sustainable management of production forests, with involvement of governments, the private sector, IPLCs, and other actors.

FOREST RESTORATION AREA

Area shifting from a non-forest cover state to a forest cover one through afforestation and reforestation activities. The restoration area in this report, therefore, does not include the restoration of degraded forests or interventions in other ecosystems

GROSS ZERO DEFORESTATION

The Glasgow Leaders' Declaration on Forests and Land Use calls to "... halt and reverse forest loss and land degradation by 2030" but does not specify whether the goal should be to reach gross or net zero by the end of the decade. The 2021-2030 benchmark presented in this year's report for the different indicators uses the "gross zero" interpretation. Indicators tracking a less ambitious "net zero" pathway will be developed in future assessments as data becomes available, e.g., by using the gross forest loss and gain of the upcoming 2025 FAO Forest Resource Assessment.

TREE COVER LOSS

A loss event that may or not be permanent. Non-permanent tree cover loss routinely occurs in the context of logging, fire, or swidden agriculture. Tree cover loss data is often analyzed as a first step to measure deforestation.

Annex B. Methodology

Forest loss Indicators

The new FDA's reporting framework (Annex D) analyses forest loss and degradation indicators in two different ways: first, the 2021 data are compared to a 2018-2020 baseline, in order to assess whether there has been a short-term improvement or worsening of any given indicator. The baseline of 2018-2020 was chosen to smooth out any single-year anomalies. Second, the 2021 data is benchmarked against a future pathway that delivers the 2030 objectives, e.g., reaching zero deforestation by 2030.

While multiple reduction pathways are in principle possible, for all deforestation, tropical primary forest loss, and forest degradation indicators, a straightforward and transparent linear reduction pathway is established: each year of the decade (including 2021) requires a 10 percent reduction in loss relative to the baseline to reach zero gross loss by 2030. This is consistent with previous NYDF progress assessments, which also tracked progress against a linear reduction pathway.

The tree cover loss underlying deforestation and tropical primary forest loss was calculated using a >30 percent tree cover density threshold. Improvements in the detection of tree cover loss due to the incorporation of new satellite data and methodology changes between 2011 and 2015 may result in higher estimates of loss in recent years compared to earlier years (Weisse and Potapov 2021) but does not affect the comparison of 2021 data to the 2018-2020 baseline.

Deforestation

Deforestation (ha/yr) is estimated as the part of global tree cover loss (Hansen et al. 2013) that leads to a permanent conversion of forest to a new land use according to a map of the drivers of tree cover loss (Curtis et al., 2018). This includes all tree cover losses that are likely attributed to the production of agricultural commodities and urbanization (Curtis et al., 2018) as well as tree cover loss due to shifting agriculture in humid tropical primary forests (primary forests as mapped by Turubanova et al. 2018).

Humid tropical primary forest loss

Humid tropical primary forest loss (ha/yr) measures the tree cover loss occurring as of 2001 within humid tropical primary forests, which are defined as mature natural humid tropical forest cover that has not been completely cleared and regrown in recent history (Turubanova et al., 2018). No corresponding map of primary forest is available globally; hence, this indicator is limited to the humid tropics.

Gross GHG emissions from forests

GHG emissions from global deforestation (tonnes CO_2e/yr) are estimated by combining data on carbon stocks and tree cover loss (Harris et al., 2021, updated with tree cover loss through 2021). Our estimates of gross GHG emissions include aboveground carbon, belowground carbon, deadwood and litter carbon, as well as soil organic carbon. CO_2, CH_4, and N_2O emissions from peat drainage and forest fires are also included. Emissions are attributed to deforestation using Curtis et al. (2018) (updated through 2021) following the same categories used for the global deforestation indicator.

Gross GHG emissions from humid tropical primary forest loss (tonnes CO2e/yr) are estimated by overlaying gross emissions from Harris et al. 2021 with humid tropical primary forest extent in 2001 (Turubanova et al., 2018).

Degradation

Forest Landscape Integrity Index (FLII) provides an index of the overall level of degradation (i.e. human modification) for all forests across a continuous scale from the lowest (FLII = 0) the highest (FLII = 10) level of integrity (Grantham et al., 2020) annually from 2017. The Glasgow Leaders' Declaration calls for a halt to land degradation (including forest degradation), implicitly by 2030. Therefore, the 2030 target is set at zero further degradation (i.e. no further loss in FLII). Analogous to other indicators, the pathway to reach this 2030 target reflects a 10 percent decline each year from the baseline, which is the average annual loss of FLII units across 2018-2020.[j] The FLII uses proxies for degradation, combining observable pressures within pixels (agriculture, forest cover loss and infrastructure), inferred pressures (e.g., edge effects, overharvest) and losses in forest connectivity in the surrounding landscape to give an aggregate score.

Restoration indicators

Rate of forest cover and tree cover gain

Global data on forest cover and tree cover gain using remote sensing technology are still under development. Recent technological advancements in satellite sensors offer new possibilities for measuring tree height, which improves accuracy for estimating tree gain (and loss) globally. For instance, in late 2021 the University of Maryland and the World Resources Institute (WRI) leveraged data provided by the Global Ecosystem Dynamics Investigation Lidar (GEDI) onboard the International Space Station (ISS) to produced new prototype data on forest cover gain for the period 2000 to 2020[37]

While these methods have improved our ability to understand the changing dynamics of global forests, the data they generate does not perfectly align with the indicators employed in this Assessment to measure the rate of forest cover and tree cover gain. The dataset reveals areas where tree cover has increased, but it does not indicate if the gain in tree cover resulted from forest restoration or afforestation versus other factors, such as regeneration after natural disturbances or land abandonment. The data set reports the cumulated gain occurred between 2000 and 2020, as a single time step. Forthcoming data from University of Maryland and WRI, expected by late 2023, will improve upon this first prototype to include a time series of annual estimates, which will enable a more thorough understanding of the temporal dynamics of tree cover gain. Furthermore, the BIOMASS mission from the European Space Agency (ESA) is expected to start delivering high resolution data on above ground biomass in the first quarter of 2023.

Cost-effective potential for restoration

This assessment indicates how much can be realistically restored between 2020 and 2050, measuring the potential to shift from a non-forest cover state to a forest cover one through afforestation and reforestation activities, and through natural forest regrowth. The restoration potential data is available in terms of mitigation potential (measured in Mt CO_2), the mitigation density (Mt CO_2 ha^{-1}),[38] and the area of forest restoration opportunity (measured in hectares).[39] These indicators can be interpreted as a proxy for forest restoration opportunity potential, while keeping in mind the challenges in representing the broad scope of restoration or FLR with any single metric.

[j] Given that many Forest Landscape Restoration pledges exist a less conservative benchmark could be applied (See section Annex C). Future assessments may revise this benchmark upwards as certainty regarding methodological developments allow.

Available literature provides estimates of restoration potential both in technical and cost-effective terms.[k] The former refers to the mitigation potential achievable with available technologies, regardless of the cost of implementation. The latter considers the implementation of mitigation activities that are feasible under the price threshold of $100/tCO2$_e$[l]. As noted by Roe et al. (2021), the technical potential might not be feasible or desirable due to different economic, social, political, or environmental constraints and tradeoffs. Hence, cost-effective potential estimates are considered a more realistic and actionable target for policy,[m] and are the focus of our analysis.

The dataset is based on the cost-effective sectorial estimates from the paper Roe et al. (2021) covering the period 2020 to 2050. Roe et al. (2021) adapted existing mitigation potential estimates from afforestation, reforestation and natural forest regrowth from two existing papers:

i) Busch et al. (2019):[40]

They "produce spatially disaggregated marginal abatement cost curves for tropical reforestation by simulating the effects of payments for increased CO2 removals on land-cover change in 90 countries" (p. 463). The study defines reforestation as the transition of land from non-forested to forested at 30% tree cover. This definition includes afforestation, although they did not use the term to avoid promoting conversion of native non-forest ecosystems. Busch et al. did not distinguish between anthropogenic versus natural reforestation processes in their data.[41] through natural regrowth and plantations and the definition is inclusive of afforestation. Other biomes such as deserts and mangroves are excluded from the analysis.

Busch et al. (2019) first model the historical reforestation area (2000 – 2010) as a function of economic and biophysical driver variables. These include agricultural revenues, slope and elevation, distance from the nearest city of more than 750,000 inhabitants, the extent of protected areas and biome type. Second, they project reforestation area per decade from 2010 to 2050 and convert projections into CO2 removals in above and below-ground biomass based on the type of biome and whether reforestation is through natural regrowth or forest plantations. Finally, Busch et al. (2019) produce marginal abatement cost curves by applying a per-hectare carbon price effect to the model, which simulates payments for carbon removals.[42]

The analysis accounts for non-linear trends in land-cover change (for instance, the inverted-U-shape relationship between reforestation and deforestation), assumes a 10 percent discount rate and does not include long-lived wood products.

ii) Austin et al. (2020)

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[k] Interventions are considered cost-effective if the cost of mitigating one tonne of CO2 equivalent is up to $100. The threshold of $100/tCO2eq was set by using 'the middle of the range for carbon prices in 2030 for a 1.5C pathway, and at the low end of the range in 2050' (Roe et al., 2021, p. 6027).

[l] We follow the cost-effective definition outlined by Roe et al. (2021): the threshold of $100/t$CO_2$eq was set by using 'the middle of the range for carbon prices in 2030 for a 1.5C pathway, and at the low end of the range in 2050'. In simple terms, cost-effective potential can be understood as the amount of mitigation that can be reasonably expected to be unlocked given economic constraints.

[m] Please see Annex E for further information on the methodology and an in-depth explanation of how conservativeness has been additionally enhanced by applying an algorithm that ensures consistency between various pieces of research.

They use a Global Timber Model (GTM) to project the mitigation potential of avoided deforestation, forest management activities, increasing harvest rotations and afforestation/reforestation in response to carbon price signals across 16 regions. Afforestation/reforestation interventions include natural forest regrowth and the establishment of inventively managed timber plantations.

The GTM is a dynamic economic optimization model representing the forestry sector. It determines optimal levels of afforestation/reforestation (together with other interventions) by maximizing net welfare (i.e. producers' and consumer's surplus) and assuming future macroeconomic and environmental conditions.

The model differentiates forest types and associated biomes, accessibility to the area and management intensity. Austin et al. (2020) first establishes a baseline scenario representing the extent of future forest and land management, and associated CO_2 fluxes in above and below-ground biomass and soil carbon, in the absence of carbon price. Second, they develop scenarios under alternative carbon price scenarios and compared these projections to the baseline scenario to estimate net mitigation potential. The model assumes a 5% discount rate.

Roe et al. (2021) averages the cost-effective mitigation potential (with threshold set to \$100/tCO_2eq) from both papers, when available, or considers the only available estimate, when others are missing. These papers are held in highest regard for the provision of reliable mitigation potential estimates since they include spatial opportunity, costs, and are based on well-grounded econometric analyses. Additionally, by averaging the two most updated estimates, Roe et al. (2021) account for the factors considered in the two separate studies, and it is therefore expected to deliver very robust estimates.

Roe et al. (2021) calculates the cost-effective area of opportunity by measuring the land area associated with a given mitigation potential. Thus, the indicator on mitigation density equals the mitigation potential of each country divided by the respective area of opportunity.

The resulting dataset provides one or more indicators of restoration potential for 224 countries. Furthermore, Roe et al. (2021) provides annual estimates for both mitigation potential and area of opportunity, which we have multiplied by 30 years to obtain the overall estimate for the period 2020 to 2050. This adjustment allows for comparability between these indicators and the commitments database (see Annex E).

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