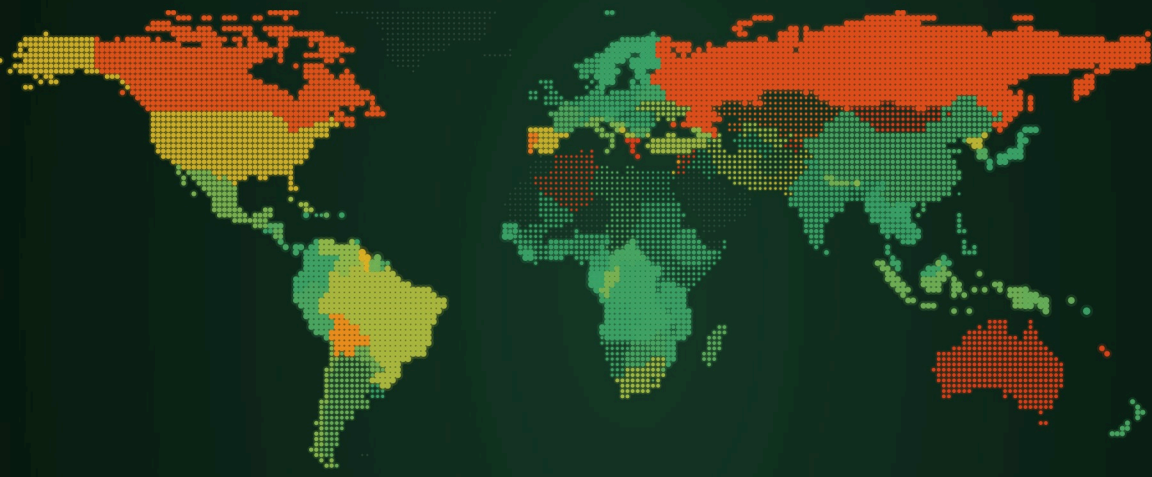
FORESTS · FIRE · CARBON · MAPS · SCENARIOS TO 2040



Share of tree cover loss caused by fire, 2015 to 2024: low high
Dot size: forest share of land area

THE FIRE LINE

The World's Forests: Twenty Years of Evidence, the Map of Loss and Projections to 2040

2005 · 2026 · 2040

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THE FIRE LINE

The World's Forests: Twenty Years of Evidence, the Map of Loss and Projections to 2040

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The Fire Line. The World's Forests: Twenty Years of Evidence, the Map of Loss and Projections to 2040.

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This book is a collective work of the contributors of Global Strategy Files. The assembly of the data, the indicators defined in the book (including the fire share of tree cover loss, the reconciliation of national and satellite accounts, the zone accounts and the GSF Forest Resilience Index), the GSF Forest Model, the Monte Carlo simulation, the diagnosis and the projections to 2040 are original work of Global Strategy Files. Model parameters marked as judgments are conditional assumptions, documented in Appendix B; projections are scenarios, not forecasts.

Data were collected in November 2026 from the Food and Agriculture Organization of the United Nations (Global Forest Resources Assessment 2025 and FAOSTAT), Global Forest Watch and the University of Maryland GLAD laboratory (tree cover loss and its drivers, 2001 to 2024, and the 2025 release), the Global Wildfire Information System, the Global Carbon Budget 2026, the World Bank, Brazil's National Institute for Space Research (PRODES and DETER), Our World in Data, which redistributes several of these series, and peer-reviewed studies cited in the text. Every figure and table names its source. Maps show internationally recognized borders as drawn in Natural Earth, simplified.

First edition, November 2026.
Global Strategy Files
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Thank God, men cannot as yet fly, and lay waste the sky as well as the earth!

Henry David Thoreau, Journal, 3 January 1861

Contents

Executive Summary 10

Introduction: The Axe and the Flame 14

Key Numbers 18

Part I. The State of the Forests 20

1. The Forest Estate in 2026 21
2. Two Ledgers: Why Countries and Satellites Disagree 30
3. The Map of Loss, 2001 to 2025 38
4. The Fire Line: From the Axe to the Flame 46
5. Who Gains: The Planted North and the Greening of Asia 56

Part II. Twenty Years, Region by Region 65

6. The Amazon and Brazil: Fall, Rollback and Recovery 66
7. Southeast Asia: Palm Oil, Peat and a Turning Point 74
8. The Congo Basin: The Smallholder Frontier 81
9. The Boreal Belt: Russia, Canada and the Northern Fires 87
10. The Temperate North: Growing Forests, Growing Risks 93
11. The Dry Forest Frontier: Chaco, Miombo and the Forgotten Woodlands 98
12. Imported Deforestation: The Forests in Our Shopping Baskets 104

Part III. The Forces at Work 111

13. The Plough and the Pasture: Agriculture's Long Retreat 112
14. Heat, Drought and Fire: The Climate Takes Over 118
15. The Carbon Ledger: A Sink Under Stress 124
16. Pledges and Laws: Twenty Years of Forest Governance 131
17. Money for Standing Forests: Finance, Markets and the TFFF 138

Part IV. Projections to 2040 144

18. The GSF Forest Model: How We Project to 2040 145

19. Three Paths to 2040 151
20. Five Thousand Futures: The Monte Carlo Results 157
21. The Fire Line Crossed: When Fire Overtakes the Axe 163
22. When Does the Sink Fail? The Carbon Balance to 2040 169
23. The Map of 2040: Winners, Losers and the Shifting Centre 176

Part V. Rankings, Risks and Strategy 181

24. The GSF Forest Resilience Index 182
25. The Geopolitics of Forests 188
26. Ten Forests to Watch 193
27. Seven Signposts to 2040 199
28. Conclusions: Answering the Question, Acting Before 2040 205

Conclusion: The Destruction No One Decided 210

Appendix A. The World's 50 Largest Forest Countries 212

Appendix B. The GSF Forest Model: Equations and Parameters 214

Appendix C. Forest Zones: Country Classification 218

Appendix D. Glossary 220

Appendix E. Chronology, 2004 to 2026 222

Appendix F. Data Notes 223

Appendix G. Statistical Tables 225

Appendix H. The GSF Forest Resilience Index: Full Ranking 227

References and Sources 229

Index 233

List of Figures

Figure 1.1. The world's forest area, 1990 to 2025, and net annual change by period 22

Figure 1.2. Forest as a share of land area, 2025 23

Figure 1.3. Forest area of the fifteen largest holders, 2025 24

Figure 1.4. Forest area by climate zone, 1990, 2005 and 2025 26

Figure 2.1. The official ledger: deforestation, expansion and net forest loss 31

Figure 2.2. The satellite ledger: gross tree cover loss, 2001 to 2025 32

Figure 2.3. Gross tree cover loss (satellite) and net change in forest area (national), by country 34

Figure 3.1. Cumulative tree cover loss by country, 2001 to 2024, and share caused by wildfire 39

Figure 3.2. Average annual tree cover loss 2015 to 2024 as a share of forest area 40

Figure 3.3. The fastest-shrinking forests: annual loss rate, 2015 to 2024 41

Figure 3.4. Tree cover loss by continent, 2001 to 2024 42

Figure 4.1. Tree cover loss by dominant driver, 2001 to 2024 47

Figure 4.2. World tree cover loss from wildfire, 2001 to 2024, with exponential trend 49

Figure 4.3. Wildfire share of tree cover loss by climate zone 50

Figure 4.4. Countries crossing the fire line: fire share of loss, early versus late period 51

Figure 4.5. Share of tree cover loss caused by wildfire, 2015 to 2024 52

Figure 4.6. Forest area burned each year, 2002 to 2025 53

Figure 5.1. Largest net losses and gains in forest area, 2005 to 2025 57

Figure 5.2. Change in forest area, 2005 to 2025 58

Figure 5.3. Forest area of the European Union, the United States, China and India, index 1990 = 100 59

Figure 5.4. Europe: change in forest area, 2005 to 2025 60

Figure 5.5. The forest transition: income and forest change, 2005 to 2025 61

Figure 6.1. PRODES: annual clear-cut deforestation in the Brazilian Legal Amazon, 2004 to 2026 67

Figure 6.2. Brazil: tree cover loss by cause, 2001 to 2024 69

Figure 7.1. Indonesia and Malaysia: tree cover loss and palm oil output, 2001 to 2024 75
Figure 8.1. The Congo Basin: tree cover loss by country, 2001 to 2024 82
Figure 9.1. Russia and Canada: tree cover loss by cause, 2001 to 2024 88
Figure 9.2. The fire belts: share of tree cover loss caused by fire, 2015 to 2024 89
Figure 11.1. The dry forest frontier: forest area, 1990 to 2025 99
Figure 12.1. Imported deforestation: the largest importers, 2005 to 2023 105
Figure 12.2. Deforestation embedded in world trade, 2005 to 2023 106
Figure 12.3. Deforestation by commodity 107
Figure 14.1. Tree cover loss from wildfire in tropical countries, 2001 to 2024 120
Figure 15.1. World forest carbon fluxes: published estimate and GSF calibration 125
Figure 15.2. CO2 emissions from land-use change, 1990 to 2025 126
Figure 15.3. CO2 emissions from land-use change, largest emitters, 2025 127
Figure 16.1. Twenty years of forest governance, 2004 to 2026 132
Figure 17.1. The money for standing forests: main finance and regulatory instruments 139
Figure 18.1. The structure of the GSF Forest Model 146
Figure 19.1. World forest area under three scenarios, 2025 to 2040 151
Figure 19.2. World tree cover loss under three scenarios, 2026 to 2040 153
Figure 19.3. World gross deforestation under three scenarios, 2026 to 2040 154
Figure 20.1. World forest area, 5,000 simulations: median and uncertainty bands, 2025 to 2040 158
Figure 20.2. Distributions of key outcomes in 2040 across 5,000 simulations 159
Figure 20.3. First year in which fire causes more than half of world tree cover loss, 5,000 simulations 160
Figure 21.1. Fire share of world tree cover loss, 5,000 simulations, 2026 to 2040 163
Figure 21.2. Fire share of tree cover loss by zone, 2026 and 2040, central scenario 165
Figure 22.1. Net carbon flux of the world's forests under three scenarios, 2026 to 2040 170
Figure 22.2. Net forest carbon flux, 5,000 simulations: median and uncertainty bands, 2026 to 2040 171

Figure 22.3. Sensitivity of the 2040 net carbon flux to the model's assumptions 172
Figure 23.1. Projected change in forest area, 2025 to 2040, central scenario 176
Figure 23.2. Largest projected net losses and gains in forest area, 2025 to 2040, central scenario 177
Figure 23.3. Forest area by zone, 2025 and 2040, central scenario 179
Figure 24.1. The GSF Forest Resilience Index: top 12 and bottom 12 of 52 countries 183
Figure 24.2. The GSF Forest Resilience Index, 52 countries with at least 10 Mha of forest 185
Figure 24.3. Two kinds of forest risk: loss pressure and fire exposure 186
Figure 26.1. Ten forests to watch: tree cover loss by cause, 2001 to 2024 193
Figure 27.1. Seven signposts to 2040 200
Figure 28.1. The forests in nine numbers 206

List of Tables

Table 0.1. The world's forests: key numbers, 2005, 2025 and 2040 18
Table 1.1. Forest area by continent, 1990 to 2025, million hectares 25
Table 2.1. Two ledgers for the largest forest countries, million hectares a year 34
Table 3.1. The ten largest losses of tree cover, 2001 to 2024 40
Table 4.1. Drivers of tree cover loss, share of world total 47
Table 5.1. The forest transition in numbers, 2005 to 2025 61
Table 8.1. The Congo Basin forests, 2005 to 2025 83
Table 11.1. The dry forest frontier, 2005 to 2025 100
Table 12.1. The largest importers of deforestation, 2005 and 2023 106
Table 13.1. Land, food and people, 1990 to 2023 113
Table 17.1. The TFFF from launch to November 2026 141
Table 18.1. The three scenarios of the GSF Forest Model 148
Table 19.1. The three paths: key results for 2030 and 2040 152
Table 20.1. Monte Carlo results for 2040 159
Table 21.1. Fire share of tree cover loss by zone, in percent 165
Table 22.1. Forest carbon balance, billion tonnes of CO2e a year 170
Table 22.2. Sensitivity of the 2040 net flux, central scenario (base: -4.11) 173
Table 23.1. Projected net change in forest area, 2025 to 2040 178
Table 24.1. GSF Forest Resilience Index: top ten and bottom ten 184
Table 26.1. Ten forests to watch: key figures 194
Table A.1. The 50 largest forest countries 212
Table B.1. Deterministic scenario parameters 215
Table E.1. Key events for the world's forests 222
Table G.1. World tree cover loss, fire and land-use emissions, 2001 to 2024 225
Table G.2. World forest area and net change, FAO, 1990 to 2025 226
Table G.3. GSF Forest Model, central scenario (Fire Line), 2026 to 2040 226
Table H.1. GSF Forest Resilience Index, 52 countries 227

Executive Summary

The world's forests are counted in two ledgers, and in 2026 the two ledgers tell opposite stories. The official ledger, compiled by the Food and Agriculture Organization of the United Nations (FAO) from national reports, shows a slow improvement. Deforestation fell from 17.6 million hectares a year in the 1990s to 10.9 million hectares a year in 2015 to 2025, and net forest loss fell from 10.7 to 4.1 million hectares a year. The satellite ledger, compiled by the University of Maryland and Global Forest Watch from Landsat imagery, shows the opposite. Gross tree cover loss averaged 17.1 million hectares a year in 2001 to 2010 and 25.9 million hectares a year in 2015 to 2024, with a record of 29.6 million hectares in 2024.

This book argues that both ledgers are right, and that the gap between them is the most important fact about the world's forests today. The axe is retreating. The flame is advancing. Deforestation, the deliberate conversion of forest to farms, pasture, mines and towns, is slowing in most of the world. Destruction by fire, drought and heat, which no government decides and few governments can stop, is rising fast. We call the moment when the second force overtakes the first the fire line, and we find that the world crossed it in 2023.

Ten findings

1. The world has 4,140 million hectares of forest, and is still losing it. Forests cover about 32% of the land, or half a hectare per person. Five countries (Russia, Brazil, Canada, the United States and China) hold 53.7% of the total. Between 2005 and 2025 the world lost 79 million hectares net, roughly the area of Türkiye.

2. The loss is tropical, the gain is northern. Countries in the tropical belt lost 325 million hectares of forest between 1990 and 2025. Temperate countries gained 94 million and boreal countries 30 million. China alone added 38 million hectares between 2005 and 2025; Brazil lost 57 million.

3. Satellites see six times more destruction than the net figures suggest. Over 2015 to 2024, satellites recorded 25.9 million hectares of gross tree cover loss a year, against a net forest loss of 4.1 million hectares in the national accounts. The difference is regrowth, plantation harvests that are replanted, and definitions. Neither number is wrong; each answers a different question.

4. Fire has become the leading destroyer of tree cover. Wildfire caused 23.4% of tree cover loss in 2001 to 2010, 33.5% in 2015 to 2024 and 46.9% in 2024. In 2023 and 2024, for the first time in the satellite record, fire destroyed more tree cover worldwide than all forms of agriculture combined. Fire-driven loss has grown by 5.2% a year since 2001.

5. The fire line runs through every climate zone. The fire share of loss rose from 58% to 67% in boreal countries, from 33% to 60% in subtropical countries, and from 2.4% to 12% in tropical countries, where rainforests did not evolve with fire. Brazil's fire share rose from 3% to 24%, Bolivia's from 9% to 50%.

6. Policy works against the axe. The official rate of clear-cut deforestation in the Brazilian Amazon fell from 27,772 km2 in 2004 to 3,335 km2 in the year to July 2026, the lowest since records began in 1988. Brazil cut non-fire primary forest loss by 41% in 2025. Monitoring, enforcement, credit rules and market pressure can stop deliberate clearing.

7. Policy struggles against the flame. Fire seasons are driven by heat and drought. Canada burned a record area in 2023 and its second-largest in 2025; the European Union recorded its worst fire season in 2025; Bolivia lost 1.5 million hectares of primary

forest in 2024, mostly to fire. Fire suppression and land management can reduce losses, but no national plan controls the weather.

8. The forest carbon sink is under stress. Forests absorbed a net 7.6 billion tonnes of CO2 equivalent a year in 2001 to 2019. At the disturbance levels of 2015 to 2024, the GSF Forest Model estimates a net sink of about 4.6 billion tonnes. The sink still exists, but it is weaker, and fire is the main reason.

9. To 2040, the world loses another 47 million hectares in our central scenario. The GSF Forest Model projects 4,087 million hectares of forest in 2040, against 4,134 million in 2025 for the countries modelled (90% interval: 4,042 to 4,125). The tropics lose 92 million hectares, the temperate and boreal north gains 43 million. Fire causes 48.5% of tree cover loss by 2040. In 85.5% of 5,000 simulations, there is at least one year before 2041 in which fire causes more than half of all tree cover loss.

10. The carbon balance depends more on the axe than on the flame. In the central scenario the net forest sink weakens only slightly, to 4.1 billion tonnes a year in 2040, because declining deforestation offsets rising fire. In a scenario where deforestation stops falling and fire keeps growing at its recent pace, forests become a small net source of carbon by 2040. The sink halves before 2041 in 57% of simulations. Sensitivity analysis shows that the pace of decline in tropical deforestation is the single largest lever on the 2040 carbon balance, larger than the growth of fire.

What it means

For governments, the lesson is that two different forest policies are needed. Against deforestation, the tools are known and they work: monitoring, enforcement, land rights, credit conditions and trade rules such as the European Union regulation that applies from 30 December 2026. Against fire, the tools are preven-

tion, landscape management, firefighting capacity and, above all, the climate itself. The first policy is a national choice. The second is a global one.

For investors and companies, the risk is shifting from reputation to physics. A supply chain can be made deforestation-free by contract. It cannot be made fire-free. Timber, pulp, carbon credits and insurance in fire-prone regions now carry a risk that grows every year.

For the climate, the warning is simple. Forests have been a quiet ally, absorbing a large share of human emissions. That help is no longer guaranteed. The world can still keep it, but only by ending tropical deforestation fast enough to compensate for the fires that a warmer world will bring.

Introduction: The Axe and the Flame

On 16 October 2026 the government of Brazil announced that the Amazon had lost 3,335 square kilometres of forest to clear-cutting in the twelve months to July, the lowest figure since its satellite monitoring began in 1988. Six months earlier, the University of Maryland and Global Forest Watch had published their own count for 2025: tropical rainforest loss had fallen by 36% from the record of 2024. Read from these two announcements, the world's forests are finally being saved.

Read from the same data a year earlier, the picture was the opposite. In 2024 the world lost 29.6 million hectares of tree cover, the highest figure ever recorded by satellite, and 6.7 million hectares of tropical primary forest, also a record. Canada had just come through the worst fire season in its history in 2023 and was heading for the second worst in 2025. The European Union would record its most destructive fire season in 2025. Bolivia burned on a scale never seen before.

Both pictures are true. The aim of this book is to explain why, to measure each part of the change over the last twenty years, and to project where the world's forests will stand in 2040.

The question

The central question of this book can be stated in one sentence. Are the world's forests shifting from destruction decided by people to destruction suffered because of the climate, and at what horizon will they stop absorbing more carbon than they release?

The question matters because the two kinds of destruction call for different responses. Deforestation is a decision. Someone clears a forest to plant soy, raise cattle, grow oil palm or cocoa, open a mine or build a road. Decisions respond to prices, laws,

credit, monitoring and enforcement. Twenty years of evidence, above all from Brazil, show that they can be changed. Fire is different. Most forest fires are lit by people, but their size depends on heat, drought, wind and fuel. A fire season like Canada's in 2023 or Bolivia's in 2024 cannot be stopped by a decree.

The question also matters for the climate. Forests absorb a large part of the carbon dioxide that humanity emits. A forest that burns releases its carbon at once, and may not grow back for decades, or ever. If fire becomes the main destroyer of forests, the world's largest land-based carbon sink becomes less reliable, and the climate targets that depend on it become harder to reach.

Nine research questions

The book answers nine questions.

1. Why do the official accounts and the satellite records disagree, and how can the two be reconciled, country by country, over twenty years?
2. What share of forest loss comes from agriculture, logging, mining and settlements, and what share from fire and other disturbances, and how has the mix changed between 2001 and 2024?
3. Which countries have really reduced deforestation, and what do their policies have in common?
4. Is the boreal forest of Canada and Russia becoming the new front of loss?
5. Are the Amazon, the Congo Basin and Southeast Asia approaching a point where rainforest turns into degraded forest or savanna?
6. Do plantations and reforestation in China, India and Europe compensate for the loss of natural forests?
7. Who gains and who loses from the forest economy: commodities, imported deforestation, carbon finance and

new trade rules?

8. What will the map of forests look like in 2040 under three scenarios and thousands of simulations?
9. Which signposts should be watched, and which policies really change the trajectory?

The method

Every figure in this book comes from an identified source or from a Global Strategy Files calculation based on one. The main sources are the FAO Global Forest Resources Assessment 2025, published in October 2025 with data for 236 countries and areas; the tree cover loss data of the University of Maryland GLAD laboratory, published by Global Forest Watch, for 2001 to 2024 and the summary release for 2025; the dataset of dominant drivers of tree cover loss; the Global Wildfire Information System; the Global Carbon Budget 2026; FAOSTAT for commodities; and Brazil's PRODES and DETER systems. Our World in Data redistributes several of these series in a consistent format, and we use its versions where available.

On these foundations, Global Strategy Files built four original tools. The first is a reconciliation of the two ledgers, country by country. The second is a set of zone accounts that group countries into tropical, subtropical, temperate and boreal zones and track the fire share of loss in each. The third is the GSF Forest Model, a country-level projection to 2040 with three scenarios and 5,000 Monte Carlo simulations, which tracks forest area, tree cover loss by cause, and the carbon balance. The fourth is the GSF Forest Resilience Index, which ranks 52 countries with at least 10 million hectares of forest.

How the book is organized

Part I sets out the state of the world's forests in 2026: the forest estate, the two ledgers, the map of loss, the fire line and the gainers. Part II follows the last twenty years region by region: the Amazon, Southeast Asia, the Congo Basin, the boreal belt, the temperate north, the dry-forest frontier and the trade in deforestation. Part III examines the forces at work: agriculture, climate and fire, carbon, governance and money. Part IV presents the GSF Forest Model and its projections to 2040. Part V draws the strategic conclusions: the resilience index, the geopolitics of forests, ten countries to watch, seven signposts and the place of forests in the world of 2040.

A note on words. *Forest* means land with trees, as defined by FAO: at least half a hectare, trees taller than five metres and canopy cover above 10%. *Tree cover loss* is the satellite measure of the removal or death of trees taller than five metres; it includes clearing, logging, fire and storms, whether or not the forest grows back. *Deforestation* is the permanent conversion of forest to another land use. *Fire share* is the share of tree cover loss caused by wildfire. Projections are scenarios, not forecasts: they show what follows from stated assumptions.

Key Numbers

Table 0.1. The world's forests: key numbers, 2005, 2025 and 2040

Indicator	2005	2024 to 2025	2040, central
Forest area, Mha	4,219	4,140	4,087
Share in tropical countries	45.2%	42.4%	40.7%
Five largest holders' share	52.6%	53.7%	54.2%
Gross tree cover loss, Mha	18.0 (2005)	29.6 (2024); 25.5 (2025)	27.3
Fire share of loss	23.4% (2001 to 2010)	46.9% (2024)	48.5%
Deforestation, Mha a year	13.6 (2000 to 2015)	10.9 (2015 to 2025)	7.5
Net forest loss, Mha a year	3.6 (2000 to 2010)	4.1 (2015 to 2025)	3.1 (2026 to 2040)
Land-use CO2 emissions, Gt	6.1 (2005 to 2014)	4.4 (2025)	Not projected
Net forest carbon flux, GtCO2e	-7.6 (2001 to 2019)	-4.6 (GSF estimate)	-4.1
Imported deforestation, Mha	1.59 (2005)	1.37 (2023)	Not projected

Source: FAO FRA 2025; Global Forest Watch and University of Maryland; WRI release of 29 April 2026; Global Carbon Budget 2026; Harris et al. (2021); Singh et al. (2026); GSF Forest Model. Negative carbon flux means net uptake.

The numbers in Table 0.1 summarize the argument of the book. Forest area keeps falling, slowly. Gross destruction rises, and its cause shifts from clearing to fire. Deforestation falls in the central scenario, but the carbon sink does not recover, because fire takes back part of the gain.

Twelve numbers to remember

- **4,140 million hectares**: the world's forest area in 2025, about 32% of the land and half a hectare per person.

- **53.7%**: the share of the world's forests held by Russia, Brazil, Canada, the United States and China.
- **325 million hectares**: forest lost by tropical countries since 1990, while temperate and boreal countries gained 124 million.
- **515 million hectares**: cumulative tree cover loss recorded by satellite between 2001 and 2024, of which 152 million was caused by fire.
- **29.6 million hectares**: tree cover loss in 2024, the highest on record.
- **46.9%**: the share of tree cover loss caused by fire in 2024, against 23.4% in 2001 to 2010.
- **2023**: the first year in which fire destroyed more tree cover worldwide than all agriculture combined.
- **3,335 km2**: clear-cut deforestation in the Brazilian Amazon in the year to July 2026, the lowest since 1988.
- **38 million hectares**: forest gained by China between 2005 and 2025, the largest gain of any country.
- **4,087 million hectares**: the world's forest area in 2040 in the GSF central scenario.
- **85.5%**: the share of 5,000 simulations in which fire causes more than half of world tree cover loss in at least one year before 2041.
- **57%**: the share of simulations in which the net forest carbon sink falls to half its current level before 2041.

PART I

The State of the Forests

Where the world's forests stand in 2026: the forest estate, the two ledgers that measure it, the map of loss, the rise of fire and the countries that gain.

CHAPTER 1

The Forest Estate in 2026

In this chapter

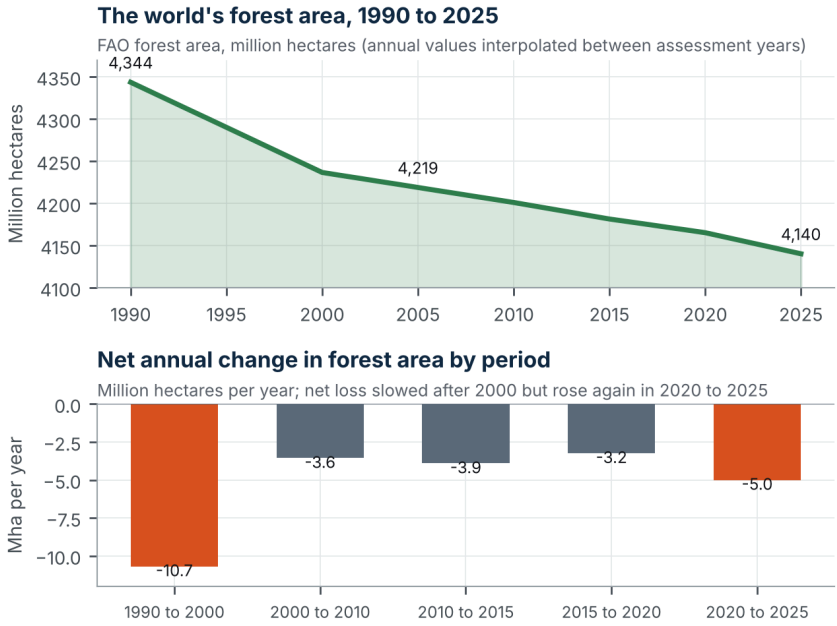
- How much forest the world has, where it is and who holds it.
- How the forest estate has changed since 1990.
- Why the distribution of forests matters for everything that follows.

Four billion hectares

The world has 4,140 million hectares of forest. The figure comes from the 2025 edition of the FAO Global Forest Resources Assessment, the fifth-yearly census of the world's forests, which compiles reports from national correspondents in 197 countries and areas. Forests cover about 32% of the planet's land, or half a hectare for each person alive. They hold a growing stock of 630 billion cubic metres of wood and a carbon stock of 714 billion tonnes, according to the same assessment.

The number is large but it is shrinking. In 1990 the world had 4,344 million hectares of forest. By 2005 it had 4,219 million and by 2025 4,140 million (Figure 1.1). Over thirty-five years the world has lost 203 million hectares net, an area roughly the size of Mexico. The pace of loss has changed a great deal. In the 1990s the net loss averaged 10.7 million hectares a year. Between 2000 and 2020 it fell to between 3.2 and 3.9 million hectares a year. In the last five years, from 2020 to 2025, the country data compiled in the assessment show a net loss of 5.0 million hectares a year,

higher than in any five-year period since 2000. Over the decade 2015 to 2025 as a whole, the average is 4.1 million hectares a year.



Source: FAO, Global Forest Resources Assessment 2025 (via Our World in Data); Global Strategy Files analysis

Figure 1.1. The world's forest area, 1990 to 2025, and net annual change by period

The rise in net loss in 2020 to 2025 is not the same thing as a rise in deforestation. As Chapter 2 shows, FAO finds that gross deforestation continued to fall. What fell faster was forest expansion: the natural regrowth and planting that offset part of the clearing. Expansion averaged 9.9 million hectares a year in 2000 to 2015 and 6.8 million in 2015 to 2025. Less regrowth, rather than more clearing, explains most of the recent rise in net loss.

Where the forests are

Forests are distributed very unevenly, and the distribution shapes every question in this book. Figure 1.2 shows the share of each country's land covered by forest. The great forest belts stand

out: the boreal forest that stretches across Russia, Scandinavia, Canada and Alaska; the tropical rainforests of the Amazon, the Congo Basin and Southeast Asia; the temperate forests of the eastern United States, Europe and East Asia; and the dry forests and woodlands of southern Africa, the Gran Chaco and northern Australia.

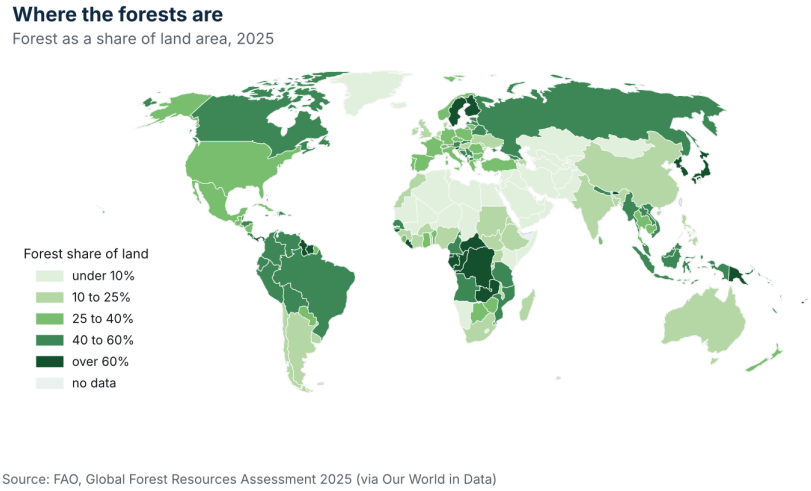


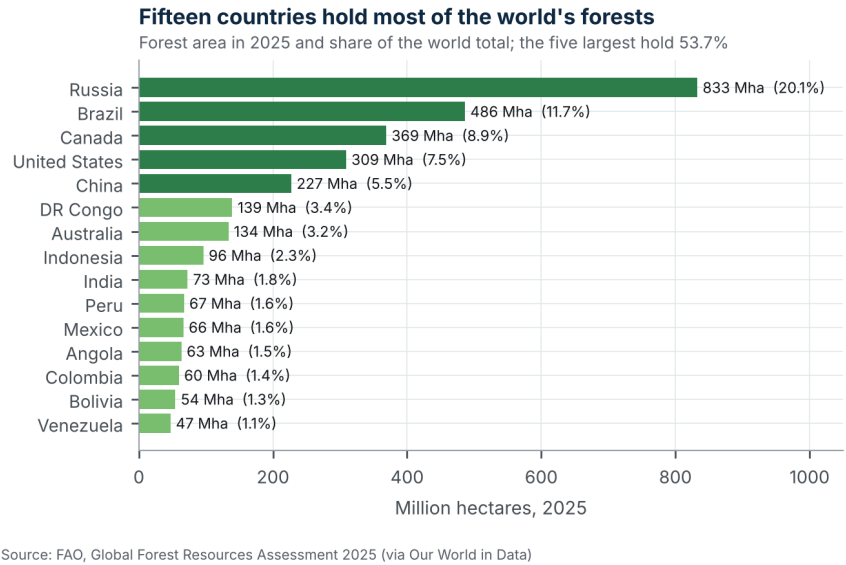
Figure 1.2. Forest as a share of land area, 2025

Some small tropical countries are almost entirely forested: Gabon and Suriname at 91%, Guyana at 87%. Among the large countries, Brazil is 58% forest, Russia 51%, Indonesia 51%, Canada 42%, the United States 34%, India 25% and China 24%. Finland, at 74%, and Sweden and Japan, at 68%, are the most forested rich countries.

Who holds the forests

Five countries hold more than half of the world's forests (Figure 1.3). Russia alone has 833 million hectares, 20.1% of the world total. Brazil follows with 486 million hectares (11.7%), Canada with 369 million (8.9%), the United States with 309 million (7.5%) and China with 227 million (5.5%). Together these five hold 53.7% of

the world's forests. The ten largest holders, adding the Democratic Republic of the Congo, Australia, Indonesia, India and Peru, hold 66.0%.



Source: FAO, Global Forest Resources Assessment 2025 (via Our World in Data)

Figure 1.3. Forest area of the fifteen largest holders, 2025

This concentration has a strategic meaning. The future of the world's forests will be decided in a small number of capitals. Three of the five largest holders are rich countries with large northern forests (Russia, Canada and the United States), where the main threats are fire, insects and the pressures of a warming climate. One is a tropical giant (Brazil), where the main threat for twenty years was clearing for agriculture. One is a country that has added more forest than any other (China), mostly by planting. Each of the five follows a different trajectory, and the world total is the sum of these very different stories.

Table 1.1. Forest area by continent, 1990 to 2025, million hectares

Continent	1990	2005	2025	Change since 1990
Europe (incl. Russia)	997.9	1,013.5	1,039.1	+41.2
South America	969.8	873.4	793.5	-176.3
North America	768.9	768.7	772.4	+3.5
Africa	764.4	714.8	647.7	-116.7
Asia	573.8	583.3	621.6	+47.8
Oceania	183.3	181.0	182.7	-0.6

Source: FAO FRA 2025 (via Our World in Data); continent classification of Our World in Data; Global Strategy Files calculation. Small territories not classified are omitted.

Table 1.1 shows the continental picture. Two continents have lost a large part of their forests since 1990: South America lost 176 million hectares (18%) and Africa 117 million hectares (15%). Europe, including Russia, gained 41 million hectares and Asia 48 million. North America and Oceania were almost stable. The world's forest map is being redrawn: the southern tropics shrink, the north and Asia grow.

The tropical, the boreal and the rest

For the analysis in this book, Global Strategy Files groups countries into four climate zones according to the latitude of their territory: tropical (within the tropics), subtropical (between the tropics and 35 degrees of latitude), temperate (beyond 35 degrees) and boreal (Russia, Canada and the Nordic and Baltic countries). The grouping is approximate, since many large countries span several zones, but it captures the essential contrast.

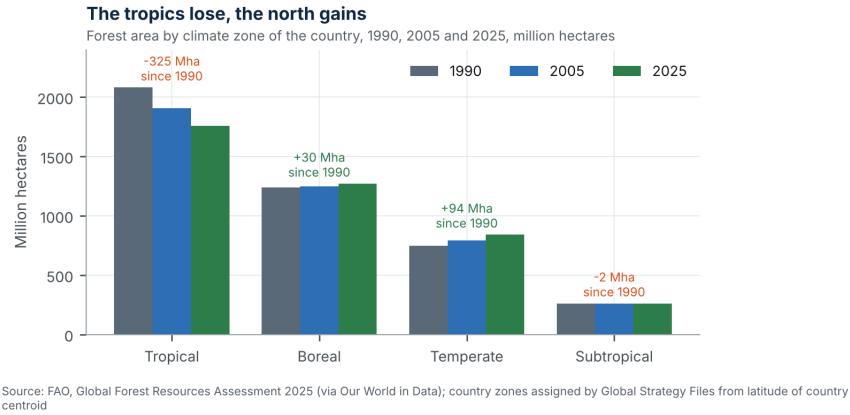


Figure 1.4. Forest area by climate zone, 1990, 2005 and 2025

Figure 1.4 shows the result. Tropical countries held 2,080 million hectares of forest in 1990 and 1,756 million in 2025, a loss of 325 million hectares. Boreal countries gained 30 million hectares and temperate countries 94 million. The subtropical group was stable. In 1990 tropical countries held 48% of the world's forests; in 2025 they held 42%.

This shift matters for three reasons. First, tropical forests are the richest in species: they host at least half of all known plant and animal species on a small fraction of the land. A hectare of rainforest lost is not compensated, for biodiversity, by a hectare of new forest in Europe or China. Second, tropical forests store more carbon per hectare than most other forests; a hectare of Amazon rainforest holds several times more carbon than a hectare of young plantation. Third, the people who depend most directly on forests for food, income and shelter live mainly in tropical countries. The shift of the forest estate from south to north is a loss of natural wealth for the countries that can least afford it.

Natural forests and planted forests

FAO distinguishes naturally regenerating forests from planted forests. In 2025, naturally regenerating forests covered 3,830 million hectares, 92% of the total. They have declined by 324 million hectares since 1990, although the rate of loss has slowed. Planted forests covered about 312 million hectares, or 8% of the total, and continue to expand, although more slowly than before. Primary forests, the subset of natural forests with no visible trace of human activity, covered at least 1,180 million hectares, about one-third of the forest area reported, and their loss rate has roughly halved since the early 2000s.

The distinction is essential. A world that loses natural forest in the tropics and gains plantations in China or Europe can show a stable total forest area while losing much of what makes forests valuable. Chapter 5 returns to this question.

Protected and managed

Two other figures from the 2025 assessment describe the institutional state of forests. Legally protected areas cover 813 million hectares of forest, about 20% of the total, an increase of 251 million hectares since 1990. Forests under long-term management plans cover 2,130 million hectares, 55% of the total. Seventy-one per cent of forests are publicly owned and 24% privately owned. These numbers show progress in governance. They do not show whether the governance works on the ground; the rest of this book measures that.

GSF analysis: the concentration of the forest estate

How concentrated is the world's forest estate, and is it becoming more so? A simple measure is the share held by the five largest holders. In 2005 it was 52.6%; in 2025 it was 53.7%; in our central scenario for 2040 it reaches 54.2%. The rise is slow but steady,

and its source is clear: Russia and China gain forest while the tropical countries outside the top five lose it. The world's forests are concentrating in a few large, mostly northern states.

The implication is that the global fate of forests depends increasingly on two very different kinds of risk. In the tropics, the risk is clearing, and it can be managed by policy. In the north, the risk is fire and climate, and policy has less control over it. As the estate concentrates northward, the second kind of risk grows in weight.

Original findings

The net loss rose again in 2020 to 2025. The country data in the 2025 assessment show a net loss of 5.0 million hectares a year in 2020 to 2025, against 3.2 million in 2015 to 2020. The main reason is slower forest expansion, not faster clearing.

The forest estate is moving north and concentrating. Tropical countries held 48% of the world's forests in 1990 and 42% in 2025. The five largest holders' share rose from 52.6% in 2005 to 53.7% in 2025.

> **What to remember**
>
> - 4,140 million hectares of forest in 2025, 32% of the land.
> - Russia, Brazil, Canada, the United States and China hold 53.7%.
> - Tropical countries lost 325 million hectares since 1990; the north gained.
> - Net loss: 10.7 Mha a year in the 1990s, 4.1 Mha a year in 2015 to 2025.

Looking ahead to 2040

In the GSF central scenario (Chapter 19), the world has 4,087 million hectares of forest in 2040, and tropical countries hold 40.7% of the total. The northward drift continues, but more slowly than in the last twenty years, because tropical deforestation keeps falling. The question is whether fire, which is now rising fastest in the north, will slow the gains there too.

CHAPTER 2

Two Ledgers: Why Countries and Satellites Disagree

In this chapter

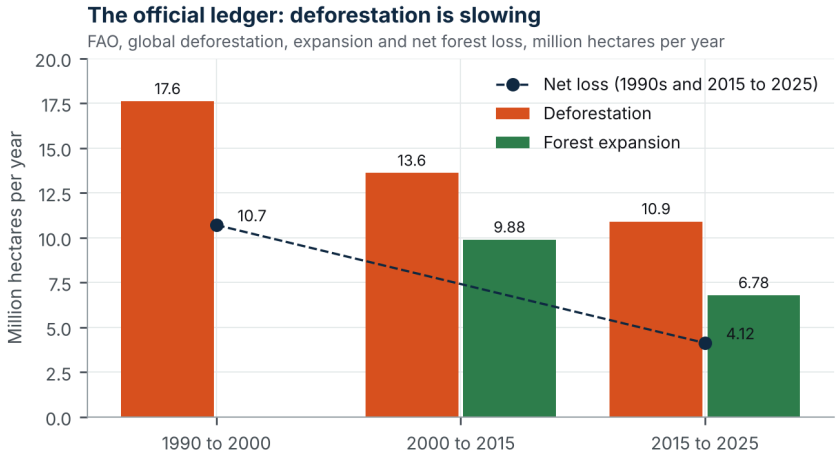
- The official ledger of forest area, built from national reports.
- The satellite ledger of tree cover loss, built from Landsat imagery.
- Why the two disagree, and how to read them together.

The official ledger

Every five years, the FAO asks each country to report the area of its forests, how much was cleared and how much regrew. The 2025 edition of the Global Forest Resources Assessment covers 236 countries and areas, with data supplied by national correspondents in 197 of them. Its definitions are land-use definitions: a forest is land that is used as forest, with trees taller than five metres and canopy cover above 10% on at least half a hectare, or with trees able to reach those thresholds. A clear-cut plantation that will be replanted remains forest. A burned forest that is expected to regrow remains forest.

On this basis, FAO reports a steady improvement (Figure 2.1). Deforestation, the conversion of forest to other land uses, averaged 17.6 million hectares a year in 1990 to 2000, 13.6 million in 2000 to 2015 and 10.9 million in 2015 to 2025. Forest expansion, the natural or human-made growth of forest on land that was not forest, averaged 9.88 million hectares a year in 2000 to 2015 and 6.78 million in 2015 to 2025. The net loss, the difference between

the two, fell from 10.7 million hectares a year in the 1990s to 4.12 million in 2015 to 2025.



Source: FAO, Global Forest Resources Assessment 2025, key findings (October 2025)

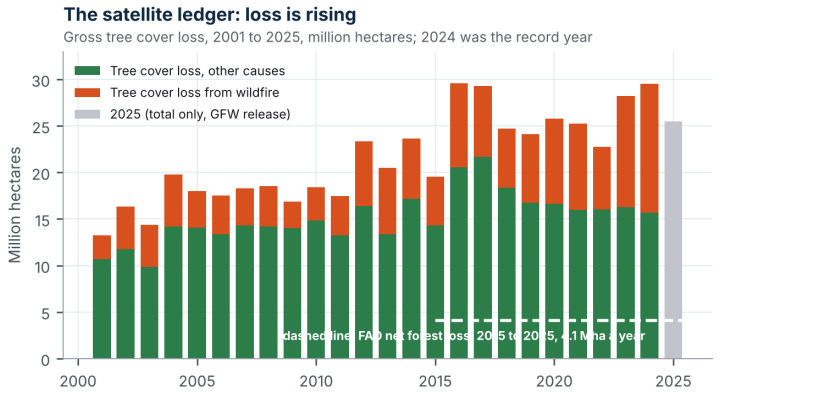
Figure 2.1. The official ledger: deforestation, expansion and net forest loss

FAO itself calls the current rate of deforestation "still too high", and notes that the world is not on track to meet its global forest targets. But the direction in the official ledger is clear: deforestation has fallen by 38% since the 1990s.

The satellite ledger

The second ledger comes from space. Since 2013 the Global Land Analysis and Discovery laboratory of the University of Maryland has mapped tree cover loss every year at 30-metre resolution from Landsat imagery, with data now running from 2001 to 2025. Global Forest Watch, run by the World Resources Institute, publishes the results. Its definition is a land-cover definition: tree cover loss is the removal or death of trees taller than five metres, whatever the cause and whatever happens next. A clear-cut plantation counts as loss. A burned forest counts as loss. Regrowth is tracked separately and is not netted out.

On this basis, the picture is the reverse (Figure 2.2). Gross tree cover loss averaged 16.4 million hectares a year in 2001 to 2005, 17.9 million in 2006 to 2010, 20.9 million in 2011 to 2015, 26.7 million in 2016 to 2020 and 26.5 million in 2021 to 2024. The record year was 2024, with 29.6 million hectares in the version of the data distributed by Our World in Data, and about 30 million in the Global Forest Watch release. In 2025 the total fell to 25.5 million hectares.



Source: Global Forest Watch and University of Maryland GLAD lab, tree cover loss 2001 to 2024 (via Our World in Data); WRI release of 29 April 2026 for 2025; FAO FRA 2025

Figure 2.2. The satellite ledger: gross tree cover loss, 2001 to 2025

Over 2015 to 2024, the satellites recorded an average of 25.9 million hectares of tree cover loss a year. Over 2015 to 2025, the national accounts recorded an average net forest loss of 4.1 million hectares a year. The satellite figure is six times larger, and it rises while the official figure falls.

Why the ledgers disagree

The difference is not an error in either ledger. It has four sources.

Gross against net. The official ledger nets clearing against regrowth. The satellite loss data do not. A country that clears one million hectares and sees one million hectares regrow shows

zero net loss in the official ledger and one million hectares of loss in the satellite ledger.

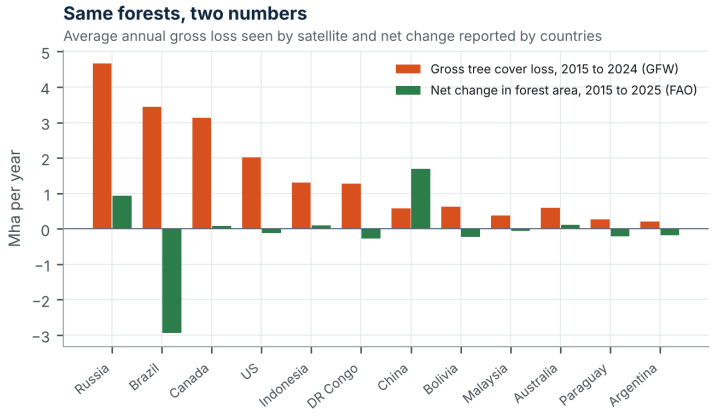
Land use against land cover. The official ledger counts land that is used as forest, even if its trees have been cut or burned, as long as they are expected to grow back. The satellite ledger counts the trees themselves. Plantation forestry, which harvests and replants on cycles of seven to forty years, generates large tree cover loss and no deforestation. So does fire in boreal forests, which normally regrow.

Definitions of tree cover. Satellites record trees over five metres tall in any setting, including tree crops such as oil palm and rubber, and trees outside forests. Conversely, they may miss slow degradation that thins a forest without removing the canopy.

National reporting. The official ledger depends on the capacity and choices of national agencies. Some countries use detailed national inventories and satellite monitoring of their own; others extrapolate old surveys. Revisions between assessments can be large.

Country by country

Figure 2.3 compares the two ledgers for the countries with the largest tree cover loss. The contrast is striking.



Source: Global Forest Watch and University of Maryland GLAD lab, tree cover loss 2001 to 2024 (via Our World in Data); FAO, Global Forest Resources Assessment 2025 (via Our World in Data); Global Strategy Files analysis

Figure 2.3. Gross tree cover loss (satellite) and net change in forest area (national), by country

Table 2.1. Two ledgers for the largest forest countries, million hectares a year

Country	Gross loss, 2015 to 2024	Net change, 2015 to 2025	Main reason for the gap
Russia	4.66	+0.94	Boreal fire and logging, regrowth
Brazil	3.45	-2.94	Clearing (gap is smaller)
Canada	3.14	+0.08	Boreal fire and logging, regrowth
United States	2.02	-0.12	Plantation harvest and fire
Indonesia	1.31	+0.09	Plantations and tree crops
DR Congo	1.28	-0.28	Shifting cultivation, fallow regrowth
China	0.58	+1.69	Planting exceeds harvest
Bolivia	0.63	-0.23	Fire and clearing

Source: Global Forest Watch and University of Maryland; FAO FRA 2025 (via Our World in Data); Global Strategy Files calculation and interpretation.

In Russia and Canada, satellites record 7.8 million hectares a year of tree cover loss between them, while the national accounts show a slight gain in forest area. Most of the loss is fire and logging in boreal forests that are expected to regrow, and that there-

fore remain forest in land-use terms. In Brazil, by contrast, the two ledgers are much closer: 3.45 million hectares of gross loss against 2.94 million hectares of net loss, because most of the loss there is permanent conversion to pasture and cropland. In China, the official ledger shows a net gain of 1.7 million hectares a year, three times the gross tree cover loss, because planting far exceeds harvesting.

Which ledger to believe

Neither ledger answers every question, and each is wrong only when it is used to answer the other's question.

The official ledger answers the question: how much land is used as forest, and is that area shrinking? It is the right measure for land-use planning, for national forest policy and for the long-run balance between forest and agriculture.

The satellite ledger answers the question: how many trees are being removed or killed each year, and where? It is the right measure for detecting new clearing, for tracking fires, for estimating emissions in the year they occur, and for enforcement.

For the climate, both matter. A forest that burns and regrows is not lost as land, but its carbon is released at once and recovered only over decades. A world in which more forests burn each year can keep a stable forest area and still lose carbon. This is why the gap between the two ledgers is the main subject of this book: it measures the growing part of forest destruction that the official accounts treat as temporary, and that the climate cannot ignore.

Permanent loss: a third measure

Between the two ledgers lies a third: an estimate of permanent forest loss, derived from the satellite data by excluding losses that are expected to regrow. The Forest Declaration Assessment, a coalition of research groups that tracks the global pledges to

end deforestation, uses this approach. It found that the world permanently lost about 8.1 million hectares of forest in 2024, a level 63% above the trajectory needed to halt deforestation by 2030, and, in its 2026 edition, about 7 million hectares in 2025, a fall of 15% that still leaves the world off track. This figure is close to, though lower than, the FAO deforestation rate, and it confirms that permanent clearing has not yet fallen fast enough to meet the global goal.

GSF analysis: the hidden turnover

The gap between gross loss and net loss can be called the turnover of the world's forests: the area that is cut, burned or killed each year and that grows back, or is counted as forest while it does. On the figures above, the turnover rose from about 13 million hectares a year in the early 2000s to more than 21 million in 2015 to 2024. Almost all of the rise comes from two sources: fire, especially in the boreal and subtropical zones, and plantation forestry in a few countries.

A rising turnover has two consequences that the official accounts do not show. First, it increases emissions in the short run, since carbon is released at the moment of loss and recaptured only gradually. Second, it makes the forest estate younger. A forest that burns every few decades, or a plantation harvested every ten years, never reaches the carbon density, the structure or the biodiversity of an old forest. The world's forests are not only shrinking in the tropics; they are also becoming younger and more disturbed in the north.

Original findings

The two ledgers diverge. Gross tree cover loss rose by 51% between 2001 to 2010 and 2015 to 2024, while the official net forest loss fell. The gap between them, the turnover, rose by about 70%.

Russia and Canada account for most of the gap. They recorded 7.8 million hectares a year of tree cover loss in 2015 to 2024 and a slight net gain in forest area. Brazil is the large country where the two ledgers agree most closely, because its losses are mostly permanent.

> **What to remember**
>
> - Official deforestation: 17.6 Mha a year in the 1990s, 10.9 Mha a year in 2015 to 2025.
> - Satellite tree cover loss: 17.1 Mha a year in 2001 to 2010, 25.9 Mha a year in 2015 to 2024.
> - The gap is regrowth, plantation harvest and fire, not error.
> - Permanent loss in 2024: about 8.1 Mha, 63% above the path to zero by 2030.

Looking ahead to 2040

In the GSF Forest Model, both ledgers are projected. Deforestation, which drives the official ledger, falls in the central scenario from 10.9 to 7.5 million hectares a year by 2040. Tree cover loss, which drives the satellite ledger, rises slightly, from 25.9 to 27.3 million hectares a year, because fire grows. The two ledgers keep diverging.

CHAPTER 3

The Map of Loss, 2001 to 2025

In this chapter

- Where tree cover was lost between 2001 and 2025.
- The twenty countries that account for four fifths of the loss.
- The countries where forests shrink fastest relative to their size.

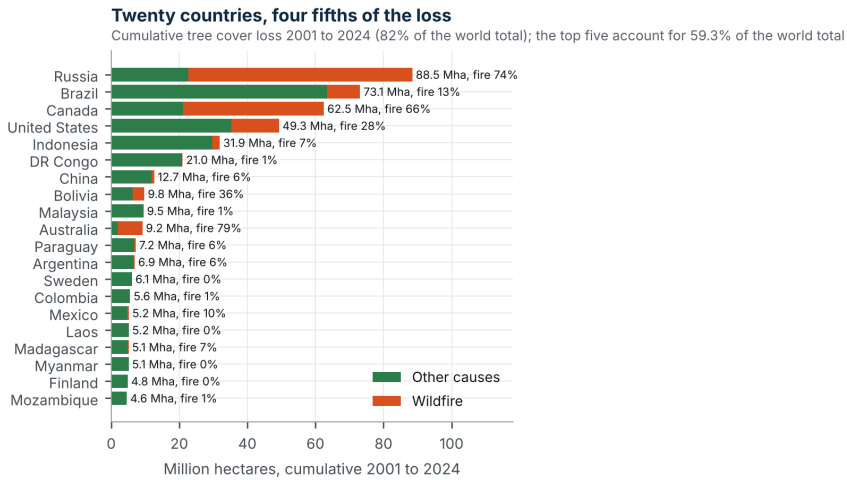
Half a billion hectares

Between 2001 and 2024, satellites recorded 515 million hectares of tree cover loss worldwide, an area larger than the European Union. Not all of it was permanent: much was regrowth after fire or harvest. But all of it represents trees that were cut, burned or killed, and carbon that was released into the atmosphere in the year of loss. Adding the 25.5 million hectares of 2025, the total for the quarter century approaches 541 million hectares, consistent with the figure of about 540 million hectares published by Global Forest Watch.

The loss was not spread evenly. Tropical countries accounted for 243 million hectares (47%), boreal countries for 165 million (32%), temperate countries for 90 million (18%) and subtropical countries for 17 million (3%). In the tropics, the dominant causes were agriculture and shifting cultivation. In the boreal zone, they were fire and logging. The map of loss is therefore two maps superimposed: a map of clearing centred on the tropics, and a map of fire centred on the north.

Twenty countries

Figure 3.1 ranks the twenty countries with the largest cumulative tree cover loss in 2001 to 2024, and shows the share caused by wildfire. Together these twenty countries account for 82% of the world total. The top five, Russia, Brazil, Canada, the United States and Indonesia, account for 59.3%.



Source: Global Forest Watch and University of Maryland GLAD lab, tree cover loss 2001 to 2024 (via Our World in Data); Global Strategy Files analysis

Figure 3.1. Cumulative tree cover loss by country, 2001 to 2024, and share caused by wildfire

The ranking mixes two very different groups. Russia (88.5 million hectares, 74% from fire), Canada (62.5 million, 66% from fire), the United States (49.3 million, 28% from fire) and Australia (9.2 million, 79% from fire) lose tree cover mainly to fire and to logging in managed forests. Brazil (73.1 million hectares, 13% from fire), Indonesia (31.9 million, 7%), the Democratic Republic of the Congo (21.0 million, 1%), Malaysia (9.5 million, 1%), Paraguay (7.2 million, 6%) and Argentina (6.9 million, 6%) lose tree cover mainly to agriculture, tree crops and shifting cultivation. Bolivia (9.8 million hectares, 36% from fire) sits between the two groups, and is moving from the second to the first.

Table 3.1. The ten largest losses of tree cover, 2001 to 2024

Country	Loss, Mha	Fire share	Zone
Russia	88.5	74%	Boreal
Brazil	73.1	13%	Tropical
Canada	62.5	66%	Boreal
United States	49.3	28%	Temperate
Indonesia	31.9	7%	Tropical
DR Congo	21.0	1%	Tropical
China	12.7	6%	Temperate
Bolivia	9.8	36%	Tropical
Malaysia	9.5	1%	Tropical
Australia	9.2	79%	Subtropical

Source: Global Forest Watch and University of Maryland (via Our World in Data); Global Strategy Files calculation.

The rate of loss

Absolute numbers favour large countries. A more telling measure is the rate of loss: the average annual tree cover loss as a share of the country's forest area. Figure 3.2 maps this rate for 2015 to 2024 and Figure 3.3 ranks the countries with the highest rates among those with at least two million hectares of forest.

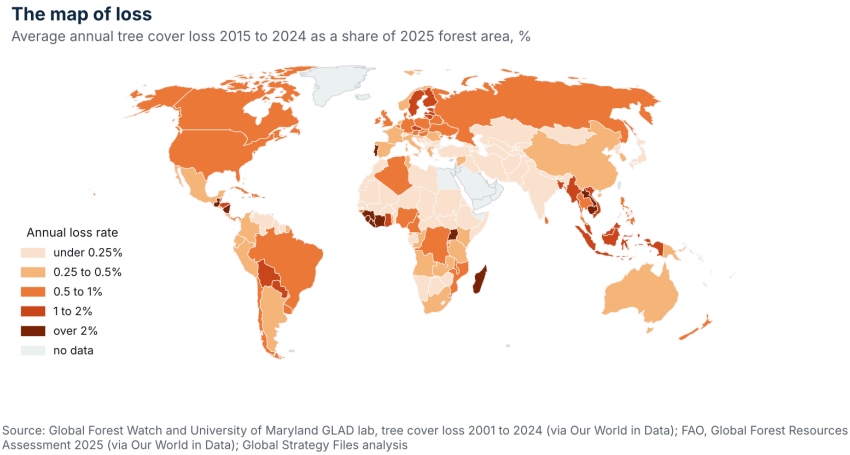
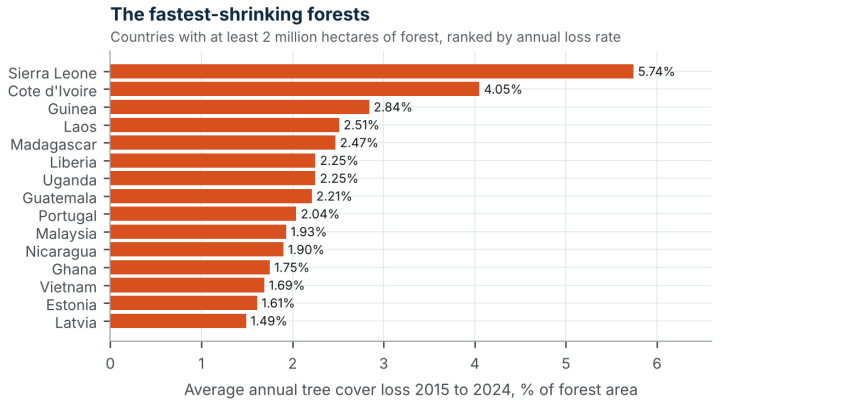


Figure 3.2. Average annual tree cover loss 2015 to 2024 as a share of forest area



Source: Global Forest Watch and University of Maryland GLAD lab, tree cover loss 2001 to 2024 (via Our World in Data); FAO, Global Forest Resources Assessment 2025 (via Our World in Data); Global Strategy Files analysis

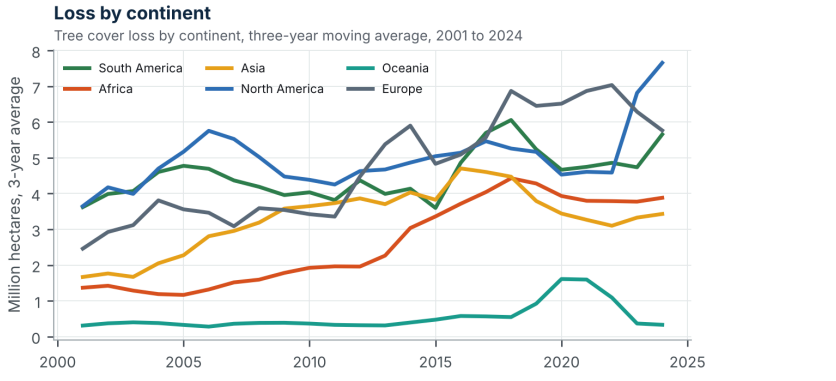
Figure 3.3. The fastest-shrinking forests: annual loss rate, 2015 to 2024

West Africa stands out. Sierra Leone lost tree cover at an average of 5.7% of its forest area each year, Côte d'Ivoire 4.1%, Guinea 2.8%, Liberia 2.3% and Ghana 1.8%. These rates reflect the expansion of cocoa, rubber and food crops into the last forest blocks of the Upper Guinean forest, and, in some cases, a forest area in the national accounts that is smaller than the area of tree cover seen by satellite, which inflates the ratio. In Southeast Asia, Laos (2.5%), Malaysia (1.9%) and Vietnam (1.7%) combine clearing with intensive plantation forestry. In East Africa, Madagascar (2.5%) and Uganda (2.3%) lose forest to small-scale agriculture and charcoal. In Central America, Guatemala (2.2%) and Nicaragua (1.9%) lose forest to cattle ranching and, increasingly, fire.

The list also includes Portugal (2.0%), Estonia (1.6%) and Latvia (1.5%). In these countries the high rate reflects intensive harvesting of managed forests and plantations, and in Portugal repeated large fires, rather than permanent conversion. This is a reminder that the satellite ledger measures disturbance, not deforestation.

The continental story

Figure 3.4 shows tree cover loss by continent, as a three-year moving average.



Source: Global Forest Watch and University of Maryland GLAD lab, tree cover loss 2001 to 2024 (via Our World in Data); OWID continent classification; Global Strategy Files analysis

Figure 3.4. Tree cover loss by continent, 2001 to 2024

Three trends stand out. In South America, loss rose in the 2000s, fell in the early 2010s, rose again from 2016 and stayed high, driven by Brazil and Bolivia. In Africa, loss rose steadily until 2018, almost tripling from the early 2000s, and has stayed close to that level since: the Democratic Republic of the Congo, West Africa and the miombo woodlands of southern Africa all contributed. In North America and Europe, which in Our World in Data's classification includes Russia, loss rose with the fire seasons of 2019 to 2024, with a record in Canada in 2023 and peaks in Russia in 2021 and 2024.

The record year: 2024

The year 2024 brought the largest tree cover loss ever recorded. Russia lost 5.2 million hectares, 81% of it to fire. Canada lost 5.2 million, 86% to fire. Brazil lost 4.4 million, half of it to fire. Bolivia lost 1.8 million, 80% to fire. The United States lost 1.6 million, the Democratic Republic of the Congo 1.4 million and

Indonesia 1.1 million. For the first time on record, fires rather than agriculture were the leading cause of tropical primary forest loss, accounting for nearly half of it; Global Forest Watch reported that the tropics lost 6.7 million hectares of primary rainforest, nearly double the loss of 2023.

The record was not simply bad luck. It came at the end of the hottest year on record, with an El Niño that dried out the Amazon and an extreme drought in Bolivia. It came after a decade in which fire-driven loss had already been rising. And it came in a year when clearing for agriculture was falling in Brazil. The record of 2024 was a fire record.

The recovery of 2025

In 2025, tropical primary forest loss fell by 36% from 2024, to 4.3 million hectares, according to the data released by Global Forest Watch on 29 April 2026. Global tree cover loss fell to 25.5 million hectares. Brazil cut its non-fire primary forest loss by 41%, to its lowest level on record. Fires remained a major contributor, accounting for 42% of all tree cover loss worldwide. Canada's fires destroyed 5.3 million hectares of tree cover, and in Spain and Portugal around 60% of tree cover loss was caused by fire.

The 2025 figures show two things at once. Policy can cut clearing quickly: Brazil proved it again. And the fire problem did not go away: it moved, from the Amazon in 2024 to the boreal forest and southern Europe in 2025. Even after the fall, tropical primary forest loss in 2025 was 46% higher than a decade earlier, according to the Global Forest Review.

GSF analysis: where the loss is permanent

Combining the two ledgers country by country gives a rough measure of the share of tree cover loss that becomes permanent forest loss. We divide each country's net forest loss in the official

accounts (2015 to 2025) by its gross tree cover loss (2015 to 2024). For countries where the official forest area grows, the share is zero.

The result separates the world into three groups. In Brazil (85%), Paraguay (78%), Argentina (90%), Bolivia (37%), Colombia (56%) and Mexico (50%), a large part of tree cover loss becomes permanent loss of forest. In the Democratic Republic of the Congo (22%) and Malaysia (16%), a smaller part does, because shifting cultivation and plantations regrow. In Russia, Canada, China, Indonesia and Australia, the official forest area grew while tree cover was lost, so the permanent share is zero in the national accounts. The measure is approximate, since the two ledgers use different definitions, but it shows where the axe still dominates: in South America.

Original findings

Four fifths of the loss is in twenty countries. Twenty countries account for 82% of tree cover loss in 2001 to 2024; five account for 59%.

The highest rates of loss are in West Africa. Sierra Leone, Côte d'Ivoire, Guinea and Liberia have the highest annual rates of tree cover loss among countries with more than two million hectares of forest.

Africa's loss has tripled and not come down. African tree cover loss almost tripled between the early 2000s and the late 2010s and has stayed near that level, with no decline comparable to South America's.

What to remember

- 515 Mha of tree cover loss in 2001 to 2024; about 540 Mha with 2025.
- Tropical countries: 47% of the loss; boreal countries: 32%.
- 2024 was the record year; 2025 brought a 36% fall in tropical primary loss.
- In South America, most loss becomes permanent; in the north, it regrows.

Looking ahead to 2040

In the GSF central scenario, tree cover loss stays above 25 million hectares a year until 2040. Its geography shifts further north and toward the dry tropics: the share of loss in boreal and subtropical countries rises, while the share in the humid tropics falls as clearing declines. Chapter 23 maps the projected losses country by country.

CHAPTER 4

The Fire Line: From the Axe to the Flame

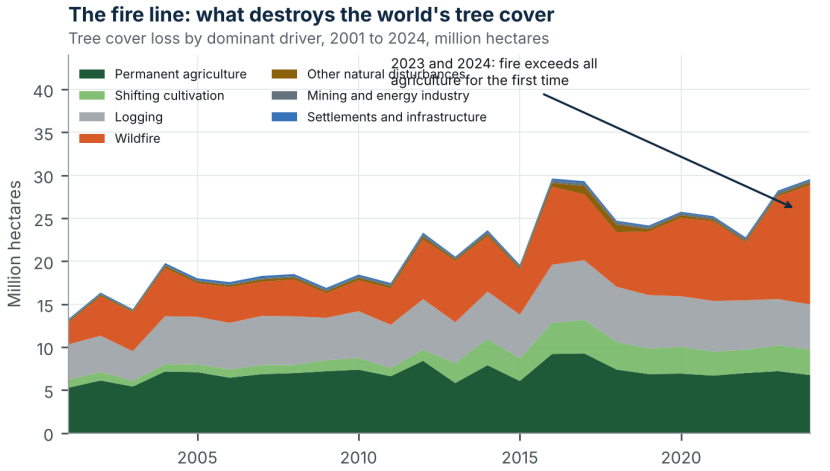
In this chapter

- What destroys the world's tree cover, and how the mix has changed since 2001.
- The fire line: the year fire overtook agriculture.
- How fire is spreading through every forest zone.

Seven causes

Since 2025, the satellite record of tree cover loss can be split by cause. A team led by researchers at the World Resources Institute and the University of Maryland classified each patch of loss between 2001 and 2024 according to its dominant driver, using machine learning trained on thousands of interpreted samples. The classification has seven categories: permanent agriculture (crops, pasture and tree crops such as oil palm), shifting cultivation (rotational farming with fallow periods, common in the tropics), logging (harvesting of natural or planted forests that are expected to regrow), wildfire, other natural disturbances (storms, floods, insects), mining and energy infrastructure, and settlements and infrastructure.

Figure 4.1 shows how much tree cover each driver destroyed every year.



Source: Global Forest Watch, dominant drivers of tree cover loss (Sims et al. 2025, via Our World in Data); Global Strategy Files analysis

Figure 4.1. Tree cover loss by dominant driver, 2001 to 2024

Over the whole period, permanent agriculture and logging were the largest drivers in most years. But the shape of the chart has changed. In 2001 to 2010, permanent agriculture caused 38.4% of tree cover loss, logging 29.2%, wildfire 23.4% and shifting cultivation 5.8%. In 2015 to 2024, wildfire caused 33.5%, permanent agriculture 28.3%, logging 23.0% and shifting cultivation 12.0%. In 2024 alone, wildfire caused 46.9%, permanent agriculture 22.8%, logging 17.8% and shifting cultivation 10.0%.

Table 4.1. Drivers of tree cover loss, share of world total

Driver	2001 to 2010	2015 to 2024	2024
Permanent agriculture	38.4%	28.3%	22.8%
Shifting cultivation	5.8%	12.0%	10.0%
Logging	29.2%	23.0%	17.8%
Wildfire	23.4%	33.5%	46.9%
Other natural disturbances	1.3%	1.6%	1.0%
Mining and energy	0.7%	1.0%	0.9%
Settlements and infrastructure	1.2%	0.7%	0.5%

Source: Global Forest Watch, dominant drivers of tree cover loss (via Our World in Data); Global Strategy Files calculation.

Crossing the line

The central fact of this book is visible in Figure 4.1. Wildfire first destroyed more tree cover than permanent agriculture in 2013. It did so again in 2019, 2020, 2021, 2023 and 2024. In 2023, for the first time in the record, wildfire destroyed more tree cover than permanent agriculture and shifting cultivation combined: 12.0 million hectares against 10.2 million. In 2024 the gap widened: 13.9 million hectares for fire against 9.7 million for all agriculture.

We call this crossing the fire line. Before it, the world's tree cover was destroyed mainly by deliberate decisions to clear land for farming. After it, the largest single cause is fire, an event that is often started by people but whose scale depends on heat, drought and wind.

The crossing is not a statistical accident. It is the result of two trends moving in opposite directions. Agriculture-driven loss peaked in 2016 and 2017, at around 13 million hectares a year, and has fallen since to around 10 million. Fire-driven loss has risen at an average of 5.2% a year since 2001 (Figure 4.2), from 3.9 million hectares a year in 2001 to 2003 to 10.9 million in 2022 to 2024, a near tripling.

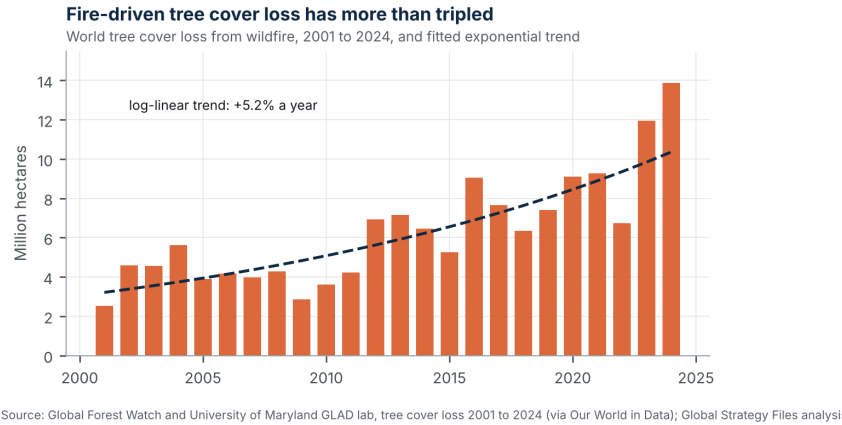


Figure 4.2. World tree cover loss from wildfire, 2001 to 2024, with exponential trend

Fire in every zone

Fire has always been part of the life of some forests. Boreal forests and many dry forests and savannas evolved with fire; their trees regenerate after it. Tropical rainforests did not: their trees have thin bark and their seeds are not adapted to burning, so a fire can kill most trees even when it moves slowly along the forest floor. The question is whether the rise of fire is concentrated in the forests that are adapted to it, or whether it is spreading into those that are not.

Figure 4.3 answers it. The fire share of tree cover loss has risen in every climate zone.

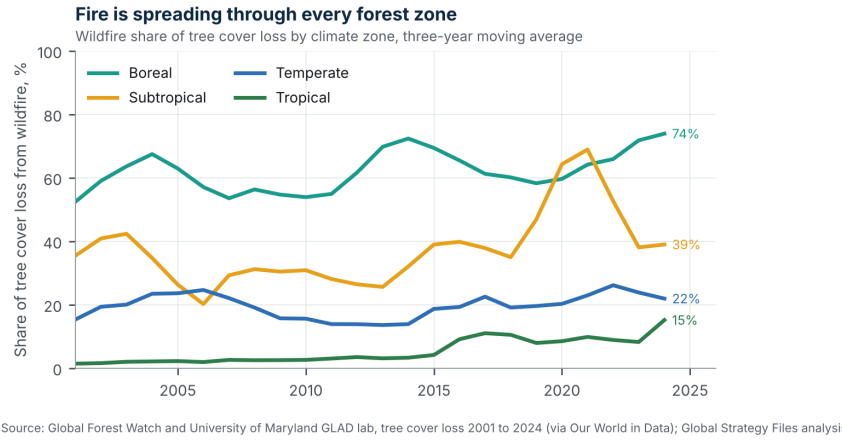


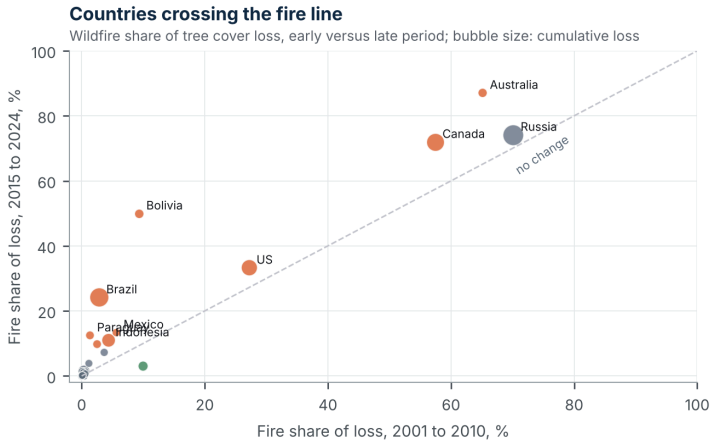
Figure 4.3. Wildfire share of tree cover loss by climate zone

In boreal countries the fire share rose from 58.3% in 2001 to 2010 to 67.2% in 2015 to 2024. In subtropical countries, a group dominated by Australia, it rose from 32.9% to 59.8%. In temperate countries it rose from 19.9% to 22.0%. In tropical countries it rose from 2.4% to 12.0%, a fivefold increase, and it reached its highest values in 2016 and 2024, the years following strong El Niño events.

The tropical figure is the most worrying. A 12% fire share in tropical forests means that fire, not the chainsaw, now destroys one tree in eight lost in the tropics. And because rainforests do not recover from fire as boreal forests do, a large part of this loss is likely to be lasting.

Countries crossing the line

Figure 4.4 compares the fire share in each large forest country in 2001 to 2010 and in 2015 to 2024.



Source: Global Forest Watch and University of Maryland GLAD lab, tree cover loss 2001 to 2024 (via Our World in Data); Global Strategy Files analysis

Figure 4.4. Countries crossing the fire line: fire share of loss, early versus late period

Almost every large country moved above the diagonal, meaning that fire's share of its tree cover loss increased. Brazil moved from 2.8% to 24.2%. Bolivia moved from 9.3% to 50.0%: half of its tree cover loss is now caused by fire. Paraguay moved from 1.3% to 12.5%, Mexico from 5.6% to 13.4%, Indonesia from 4.3% to 11.0%. Among the fire-adapted countries, Australia moved from 65.1% to 87.1%, mostly because of the Black Summer fires of 2019 and 2020, Canada from 57.4% to 72.0% and Russia from 70.1% to 74.2%. The United States moved from 27.2% to 33.3%. One large country moved the other way: China, where the fire share fell from 9.9% to 3.1% as fire suppression improved and planted forests expanded.

Figure 4.5 maps the fire share for 2015 to 2024.

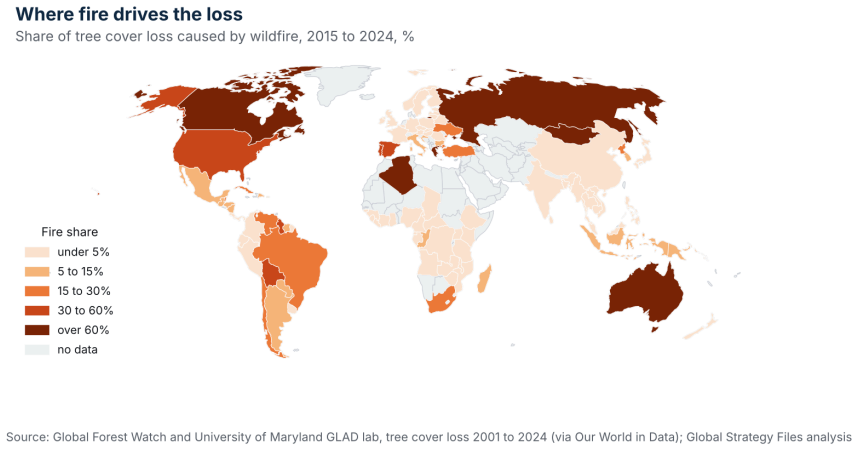
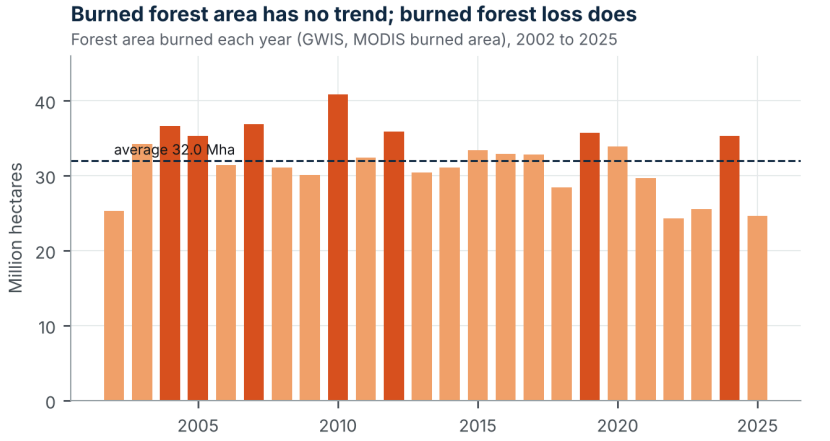


Figure 4.5. Share of tree cover loss caused by wildfire, 2015 to 2024

A paradox: burned area does not rise

One might expect the area burned each year to have risen in proportion. It has not. The Global Wildfire Information System, which maps burned area from satellite imagery, shows that the forest area burned each year has fluctuated around an average of 32 million hectares since 2002, with no clear trend (Figure 4.6). The total area burned on all land, including savannas, grasslands and croplands, has even fallen over the period, mainly because savanna fires in Africa have declined as farming expanded.



Source: Global Wildfire Information System (GWIS), burned area by land cover (via Our World in Data); Global Strategy Files analysis

Figure 4.6. Forest area burned each year, 2002 to 2025

How can burned forest area be stable while fire-driven tree cover loss rises? The answer lies in the severity of fires. A low-intensity fire that burns the undergrowth of a forest counts as burned area but kills few trees. A high-intensity crown fire kills most of them. The rise in tree cover loss from fire, without a rise in burned area, means that fires are becoming more severe and more lethal for trees: they burn hotter, in drier fuels, and they reach forests, such as humid tropical and dense boreal forests, where they kill more of what they touch. Over the three years from 2023 to 2025, fires burned more than twice as much tree cover as they did two decades earlier, according to the Global Forest Review.

This is a critical point for policy. A strategy that measures success by the number of fires or the area burned can miss what matters most: the share of the forest that dies.

Why fire is rising

Four forces drive the rise of fire, and they reinforce each other.

Heat and drought. Higher temperatures dry fuels faster and lengthen fire seasons. Climate change more than doubled the

likelihood of the extreme fire weather that drove Canada's 2023 fires in the east of the country, according to World Weather Attribution. The record heat of 2023 and 2024, combined with El Niño, produced the conditions for the Amazon and Bolivian fires of 2024.

Fragmentation and degradation. Forest edges, logged forests and degraded forests dry out faster than intact forests and burn more easily. In the tropics, clearing creates the conditions for future fires even when clearing itself declines.

Ignition. Most tropical fires are lit by people, to clear land, renew pasture or burn crop residues. When drought makes forests flammable, these fires escape into standing forest.

Fuel accumulation. In some temperate and Mediterranean regions, abandonment of farmland and decades of fire suppression have allowed fuel to build up, so that fires, when they come, are larger and hotter. The European Union recorded its most destructive fire season in 2025, with over one million hectares burned, the largest area since records began in 2006; Spain and Portugal alone accounted for nearly two-thirds.

GSF analysis: the fire line year by year

We define the fire line index as the ratio of fire-driven loss to agriculture-driven loss (permanent agriculture and shifting cultivation). When the index exceeds one, the world has crossed the fire line. The index stood at 0.53 in 2001 to 2010 on average. It rose to 0.83 in 2015 to 2024. It was 1.17 in 2023 and 1.43 in 2024.

The index is volatile, because fire varies with the weather from year to year. But its trend is unmistakable. A log-linear fit gives an annual increase of about 3%, and on that trend the index would remain above one in most years from the late 2020s onward, even without a further rise in the trend of fire, as long as

agriculture-driven loss keeps falling. The world has not only crossed the fire line once; it is likely to stay beyond it.

Original findings

The world crossed the fire line in 2023. In 2023 and 2024, wildfire destroyed more tree cover worldwide than all agriculture combined, for the first time in the satellite record.

Fire-driven loss has nearly tripled while burned forest area is flat. Fire-driven tree cover loss grew by 5.2% a year since 2001; the forest area burned did not rise. Fires are becoming more lethal for trees.

Fire is entering the rainforest. The fire share of tree cover loss in tropical countries rose fivefold, from 2.4% in 2001 to 2010 to 12.0% in 2015 to 2024.

> **What to remember**
>
> - Fire share of tree cover loss: 23.4% in 2001 to 2010, 33.5% in 2015 to 2024, 46.9% in 2024.
> - 2023: first year in which fire exceeded all agriculture.
> - Fire-driven loss: 3.9 Mha a year in 2001 to 2003, 10.9 Mha a year in 2022 to 2024.
> - The rise is in severity, not in burned area.

Looking ahead to 2040

In the GSF central scenario, the fire share of world tree cover loss rises to 48.5% by 2040, and fire causes more than half of all loss in at least one year before 2041 in 85.5% of simulations. Chapter 21 examines the projected fire share zone by zone.

End of the free excerpt

You have read the first part of *The Fire Line*. The complete book continues with twenty years of evidence region by region (the Amazon, Southeast Asia, the Congo Basin, the boreal belt, the temperate north, the dry forests and the trade in deforestation), the forces at work (agriculture, climate and fire, carbon, governance and money), the full GSF Forest Model to 2040 with three scenarios and five thousand simulations, the GSF Forest Resilience Index for 52 countries, ten forests to watch and seven signposts, plus eight appendices with country tables, model equations and statistics.

The complete book, about 235 pages with 59 charts and maps and 27 tables, is available in PDF at:

GLOBALSTRATEGYFILES.COM

The axe retreats. The fire advances.

In 2024 the world lost 29.6 million hectares of tree cover, the most ever recorded by satellite, and for the second year running fire destroyed more tree cover than all of agriculture. In 2026, clear-cutting in the Amazon fell to its lowest level since 1988. Both facts are true. This book reconstructs twenty years of evidence for every forest country, maps where forests are lost, gained and burned, and builds an original country model with three scenarios and five thousand simulations to 2040. It asks when fire will overtake the axe, and when the world's forests will stop absorbing more carbon than they release.

515 Mha
of tree cover lost worldwide between 2001 and 2024

47%
of tree cover loss caused by fire in 2024, against 23% in the 2000s

2023
first year fire destroyed more tree cover than all agriculture

86%
chance that fire causes most forest loss in some year before 2041

57%
chance that the forest carbon sink halves by 2040

86
original charts, maps and tables (59 and 27), every one sourced