

DEFORESTATION: The Unkindest Cut

background reading | forests unit

The Earth is made up of many different **ecosystems**, but perhaps none more spectacular and life-sustaining than forests. We depend upon the world's forests to regulate climate, to clean air and water, to conserve precious soil and to provide habitat to much of the planet's wildlife. Forests cover 30 percent of the Earth's surface and are home to 80 percent of the world's terrestrial **biodiversity**.¹

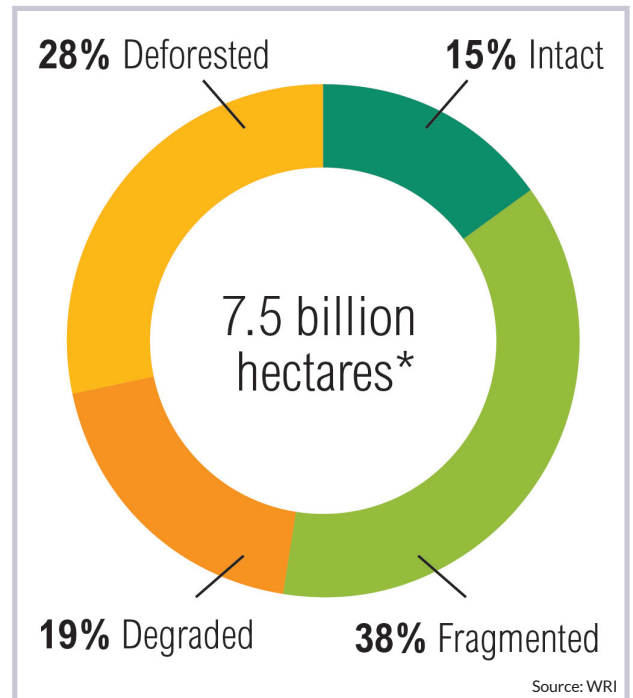
Since the Industrial Revolution, forests of all types have given way to population pressures, causing irreversible damage to an integral part of our biosphere. According to the World Resources Institute, nearly half of Earth's forests have already been cleared or degraded to make way for agriculture and other human uses. Most of what remains has been fragmented, leaving only about 15 percent intact.²

Globally, forest gains and losses occur continuously as older forests are cut and new ones are planted. With reforestation efforts over the past 30 years, the rate of forest loss has actually been significantly reduced from 7.8 million hectares per year in 1990-2010 to 4.7 million hectares per year in 2010-2020.³ That still represents a net loss of forest land equal to the size of Greece every year. Moving forward, sustainable forest management has to provide for the needs of a growing population without degrading vital forest ecosystems.

Trouble in the tropics

Of greatest global concern is the loss of the Earth's **tropical rainforests**. Tropical rainforests are defined primarily by two factors: location (between the Tropics of Capricorn and Cancer) and level of rainfall. Rainforests receive 4-8 meters of rain each year. The 5 meters of annual rainfall in Borneo is five times the annual rainfall in New York City. Due to a constant climate, tropical rainforests grow all year long. The largest unbroken stretch of rainforest is found in the Amazon River basin of South America. Nearly two-thirds of this forest lie in Brazil, which holds about one-third of the world's remaining tropical rainforests. Another 20 percent of the world's rainforests are in Indonesia and Africa's Congo Basin, while the balance of them are scattered around the tropical regions of the globe.

Tropical forests are home to 50 million indigenous people, who rely on the forests for their livelihood and sustenance.⁴ Yet, every community in the world feels the effects of rainforest destruction. Although tropical forests cover less than seven percent of the global land surface, they house more than half the species of all living things. Rainforests are a treasure trove of foods, medicines and other resources we have only begun to discover. Less than one percent of rainforest species have even been studied for their potential usefulness.



Most of the world's forest lost over the past 30 years has been in tropical areas where world population has grown by 50 percent since 1990. Each year, some 70,000 km² of rainforests are destroyed, an area equal to half the state of Florida.⁵ In fact, all the primary rainforests in India, Bangladesh, Sri Lanka and Haiti have been destroyed; the Ivory Coast rainforests have been completely logged out; and the Philippines and Thailand have depleted half of their rainforests since 1960. Of the 8 million square miles of tropical forests that once circled the globe, less than half remain.



Rainforests in Brazil facing deforestation.

Forests to farms

The number one driver of tropical **deforestation** is agricultural development. Every year, tropical countries lose millions of hectares of forest, while gaining huge swaths of agricultural land. This massive land conversion is driven by population growth and changing food consumption patterns. The types of agriculture varies by region. In Latin America, most of the deforestation is for commercial agriculture – cattle ranching, soybean farming and oil palm plantations. In Southeast Asia, oil palm plantations and biofuels dominate the agricultural landscape. Deforestation in Africa is primarily the result of small-scale subsistence agriculture.

Cattle

The world's appetite for meat has grown in recent decades as more people are able to afford a diet rich in animal protein. Unfortunately, cattle require large amounts of land to generate relatively small amounts of food. In South America, where beef's destructive impact is most evident, cattle pastures were responsible for 71 percent of deforestation between 1990 and 2005. Though cattle pastures occupy the majority of agricultural land, they provide food for less than 10 percent of the world's population. This means that much of the deforestation occurring in certain regions like South America is due to diet preference rather than feeding the planet's population.⁶ Brazil, home to the largest swath of rainforest, is also the world's largest beef exporter. About one-fourth of Brazil's beef is produced on Amazonian land that was once tropical forest.

Soybeans

Another major cause of Amazonian destruction is soybean production. Brazil produces just under one-third of the world's soybeans. The majority of this (70-90 percent) is grown for exports around the world and used for animal feed.⁷ In 2006, the environmental advocacy group Greenpeace released research showing that fast-food chains and supermarkets worldwide were selling meat fed on



soybeans grown on deforested land. The outcry that ensued led to Brazil's Soy Moratorium, an agreement to halt soy expansion into the rainforest. Bending to societal pressures, the government and industry found ways to use other, less environmentally sensitive land and has still been able to increase soybean yields. However, in recent years, and particularly under the Bolsonaro administration, these laws protecting the Amazon from agricultural deforestation have been largely disregarded or not enforced. A 2019 study found that one-fifth of Brazilian soybeans exported to Europe are a result of deforested land.⁸

Palm oil

In Indonesia and Malaysia, oil palm plantations have replaced much of the indigenous tropical forests. Though oil palms are grown in other parts of the world, these two countries claim over two-thirds of the crop. Palm oil production has doubled in the past decade and now dominates the market for vegetable-based oil.⁹ Over the past two decades, Indonesia alone lost more than 26 million hectares of rainforest due to palm oil production – an area roughly the size of the United Kingdom.¹⁰ Not only is oil palm cultivation responsible for deforestation, it is also a significant cause of **greenhouse gas** emissions. Oil palm plantations are built on land converted from swamp forest. When these wetlands are drained, their carbon-rich peat soils decay, releasing large amounts of **carbon dioxide (CO₂)** and **methane**. To make matters worse, fire is the most common method of preparing the land for planting. The deforestation and drained wetlands leave the land more susceptible to continuous burning. Each year 110,000 deaths in Southeast Asia are attributed to particulate matter exposure from these fires.¹¹ As with soybeans, a market must be created for palm oil produced without further deforestation or drainage of peatlands, in order to prevent more tropical forest clearing.

The forest for the trees

Timber

Timber cutting is yet another major contributor to tropical deforestation. Demand for furniture, paper, building materials and other wood products continues to increase with population growth and rising affluence. From 2009 to 2019, production of paper was up 21 percent and production of lumber was up 12 percent.¹² Tropical forests provide about one-fifth of all the wood exported worldwide for industrial uses. In the process of harvesting timber, industries build roads to facilitate retrieval of the wood deeper in the rainforest. These roads open once-impenetrable forests to exploitation by miners, hunters, ranchers and farmers.



Deforestation in the Amazon Rainforest.

Some methods of cutting timber have more harmful impacts on the environment than others. In the process of **clearcutting**, all the trees on an area of land are cut down. This destroys the habitat of many species. Even if trees are replanted, often only one or two species of trees are reintroduced. The former wealth of biodiversity never returns. Frequently, timber is harvested by **selective cutting**, a process through which harvesters cut only the

trees they wish to sell, leaving the rest of the forest intact. While still destructive, selective cutting is less harmful to the forest ecology than clearcutting.

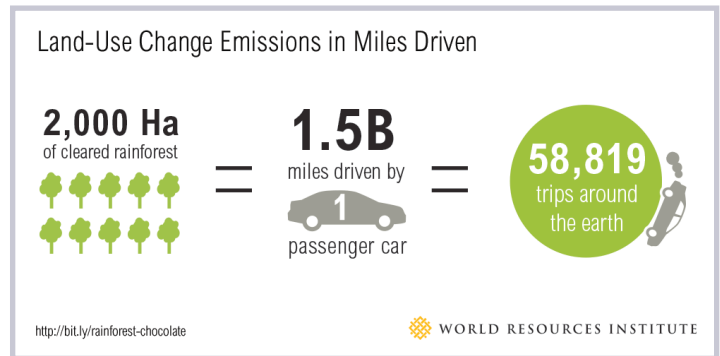
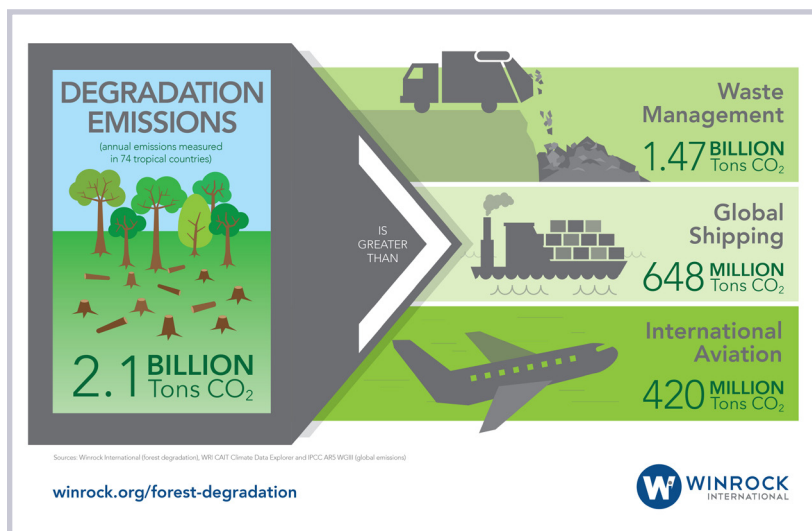
While most of the world’s timber comes from outside tropical regions, some highly sought-after wood is native to tropical rainforests. Rosewood, for example, is a tropical hardwood popular in the furniture trade that is illegally trafficked around the globe. The UN Organization on Drugs and Crime’s recent *World Wildlife Crime Report* concluded that seizures of illegally harvested rosewood between 2005 and 2014 comprised 35 percent of the value of all wildlife seizures during that period – an amount equal to the value of all seizures of elephant ivory, rhino horn, pangolins, big cats, corals and marine turtles combined.¹³

Fuelwood

Another cause of deforestation, particularly in localized parts of Africa and Asia, is the demand for fuelwood and charcoal. Two in five of the world’s people depend on wood for fuel to cook and to heat their homes. The endless search for wood dominates the lives of millions of women and children who spend anywhere from 100 to 300 days each year looking for fuelwood.

Lungs of the Earth

Tropical rainforests have often been called the “lungs of the Earth” because of their role in regulating the world’s climate. While oceans (which cover 70 percent of the Earth) actually play a greater role in producing oxygen and absorbing CO₂, rainforests are also key players in this atmospheric exchange. A broad uprising of air follows the rainforests around the equator, driven partly by heat absorbed by tropical forests. This massive uprising helps drive the circulation patterns of the entire global atmosphere. Tropical deforestation can disrupt this process, resulting in reduced rainfall and altered weather conditions over a large portion of the globe.



All deforestation adds to the atmospheric pool of rising carbon dioxide emissions, hastening the process of **global warming**. An intact forest naturally removes carbon dioxide from the air and stores it through the process of photosynthesis. When trees are burned or cut down and left to lie, much of the carbon returns to the atmosphere as carbon dioxide. Tropical deforestation releases 1.5 billion tons of carbon dioxide every year – that’s 15 percent of the total global CO₂ emissions.¹⁴ In addition to emissions from deforestation, parts of the Amazon are dying due to dryer and hotter conditions. This, in turn, releases more carbon into the atmosphere as more trees are killed by increasing temperatures.¹⁵

In December 2015, the nations of the world met in Paris to hammer out a historic agreement to mitigate climate change by reducing the emission of greenhouse gases. A key provision in the Paris Agreement was REDD+ (Reducing Emissions from Deforestation and Degradation). REDD+ provides incentives to reduce emission by tackling the drivers of forest loss and by taking proactive measures to conserve and restore forests around the globe.

Threatened biodiversity

One of the catastrophic consequences of continued deforestation and forest fragmentation is mass species extinction, especially in the tropical rainforests, home to 50 to 70 percent of all the species on the planet. In fact, the United Nations estimates that approximately 1 million animal and plant species are threatened with extinction.¹⁶ Many species are so specialized to microhabitats within the forest that they can only be found in small areas. This specialization makes them vulnerable to extinction.

Consider Indonesia, often touted as the most species-rich country on Earth. Indonesia's rainforests are home to some of the highest levels of biological diversity in the world and the country counts the most mammal species (515), one-third of which are threatened due to deforestation. The Sumatran Tiger and Orangutan are just two of Indonesia's critically endangered mammals. About 40 percent of Indonesia's plant species exist nowhere else on Earth. As rainforests are felled to make way for oil palm plantations, the world could be losing countless numbers of species that could hold the key to cures for diseases or new food sources for our growing population. According to NASA, this genetic diversity in the planetary gene pool would be crucial for the resilience of all life on Earth in the face of rare but catastrophic environmental events, such as meteor impacts or massive, sustained volcanism.¹⁷



Keel-billed Toucans like this are threatened by the destruction of Earth's rainforests.

Deforestation = rise in infectious disease

Indigenous wildlife aren't the only species threatened by deforestation. We are now beginning to understand that the loss of forests can create breeding grounds for insect-borne and other infectious diseases that inflict humans, including malaria, dengue fever, Zika, Chikungunya and yellow fever. Researchers are now finding that the ecology of the deforested landscape – short vegetation and deep water – favors mosquito breeding. One example comes from a region of Peru, where in the 1990s, cases of malaria went from 600 per year to 120,000, just after a road was built into a virgin forest and people began clearing the land for farms. Researchers recently documented a steep rise in malaria cases in an area of Malaysian Borneo that is experiencing rapid deforestation for oil palm plantation development.¹⁸ Aside from mosquitoes, other disease vectors such as bats are responsible for transmitting the Ebola virus and Coronavirus in recent years. As deforestation increases, the human population

encroaches on what was previously bat habitat. This leads to more interactions between the species and humans, resulting in disease transmission.¹⁹

Temperate and boreal forests

Though deforestation is now most prevalent in tropical regions, that wasn't always the case. Until the late 19th century, most deforestation occurred in temperate areas in North America and Europe, spurred on by industrialization and population growth. Like tropical rainforests, **temperate forests** and **boreal forests** (found at more northern latitudes) play key roles in the water cycle, soil conservation, **carbon sequestration** and habitat protection. Today, the amount of forested land in temperate climates remains steady, or has increased with reforestation efforts.



Photo Credit: Pedro Helder da Costa Pinheiro/iStockphoto.com.

Jaguar in a Brazilian pantanal.

One concern of many environmental groups is the management of the most ancient, or old growth, forests. **Old growth forests** are typically older than 150 years, characterized by large trees, dense canopies and an abundance of diverse wildlife. Some old growth forests, like those in North America's Pacific Northwest, include trees ten feet wide, 275 feet tall, and over 1,000 years old. But, because of their size and the quality and strength of their wood, old growth trees represent valuable lumber to loggers. America's largest national forest, the Tongass National Forest in southeastern Alaska, is a temperate rainforest that is home to some of the oldest trees in North America and holds more biomass (organic matter) than any other rainforest in the world. The Audubon Society

estimates that as much as half of the forest has been logged over the years. The U.S. Forest Service now has plans to move away from old growth logging in Tongass in favor of more sustainable forest management.

Forest economics

There is a clear association between forest loss and national income. According to the UN Food and Agriculture Organization (FAO), between 2000 and 2010, high-income countries saw an increase in forested areas, while low- and middle-income countries saw a decrease. The sharpest drops were in low-income countries. Given the pressures of population growth, poverty and debt, saving these forests will be challenging.

Case studies in several countries, including The Gambia, Ghana and Vietnam, show that economic reforms can help increase food security in low-income countries, while also maintaining, or even increasing, forest cover. Effective land-use policies that recognize the full value of the forest can help reduce poverty. Transferring forest management rights to local communities helps improve access to forest benefits and gives everyone a stake in protecting the forests. As of 2016, 146 countries had policies supporting **sustainable forest management (SFM)**.²⁰ One aim of SFM is to ensure that forests provide a broad range of goods and services over the long term, including significant economic and social benefits.

International cooperation is also required to reduce wood demand and implement sustainable forest management. In 2016, Norway announced a new zero deforestation policy. Products that contribute to deforestation will not be used in the country; only sustainably sourced products. As a high-income country, Norway also decided to pay some countries (Liberia, Guyana, and Brazil) to protect forest land. In 2015, Norway paid \$1 billion to Brazil for completing an agreement started in 2008 that saved 33,000 square miles of Amazonian rainforest and decreased deforestation in that region by 75 percent.²¹

Valuing forests for all of their public health and **ecosystem services** (regulating climate, purifying water, maintaining biodiversity, keeping disease vectors in check), and not just the value of their timber and converted land, needs to be a part of our calculus if we are going to see their preservation as a priority. The **United Nations Sustainable Development Goals** includes Goal 15 which aims to “protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.”²² This is a tall order in a short amount of time. According to the UN, this will require the mobilization of “significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation.”²³

^{1,14} World Wildlife Fund. (2021). Forest habitat. Retrieved from <https://www.worldwildlife.org/habitats/forest-habitat>

² World Resources Institute. (2021). Forests. Retrieved from <https://www.wri.org/our-work/topics/forests>

^{3,5} Food and Agriculture Organization of the United Nations. (2020). State of the World's Forests 2020. Retrieved January 2021 from http://www.fao.org/3/ca8642en/online/ca8642en.html#chapter-2_1

⁴ Rainforest Foundation. (2016). Rainforest facts. Retrieved from https://rainforestfoundation.org/wp-content/uploads/Rainforest-Facts_How-To-Help-Handout.pdf

^{6,9} Union of Concerned Scientists. (2011). Drivers of deforestation: What Is driving deforestation today? UCS Factsheet. Retrieved from <https://www.ucsusa.org>

^{7,8} Harvey, F. and Phillips, D. (2020, July 16). A fifth of Brazilian soy in Europe is result of deforestation. The Guardian. Retrieved from <https://www.theguardian.com/environment/2020/jul/16/a-fifth-of-brazilian-soy-in-europe-is-result-of-deforestation-amazon-jair-bolsonaro>

¹⁰ Global Forest Watch. “Tree cover loss in [country/province name]”. Retrieved July 22, 2020 from <https://www.globalforestwatch.org>

¹¹ Goodman, L. and Mulik, K. (2015, March). Clearing the air: Palm oil, peat destruction, and air pollution. Washington, DC: Union of Concerned Scientists. Retrieved from <https://www.ucsusa.org/sites/default/files/attach/2015/03/clearing-the-air-ucs-2015.pdf>

¹² Food and Agriculture Organization of the United Nations. Forest Product Statistics. <http://www.fao.org/forestry/statistics/80938/en/>

¹³ Clowes, A. (2016). Building a Sustainable Guitar: Rosewood. [blog post]. Retrieved from <https://www.wri.org/blog/2016/10/building-sustainable-guitar-rosewood>

¹⁵ Jacobo, J. “Forests in Brazil Emitting More Carbon than They Absorb Due to Climate Change: Study.” ABC News, ABC News Network, 18 December 2020. <https://abcnews.go.com/International/forests-brazil-emitting-carbon-absorb-due-climate-change/story?id=74716578>

¹⁶ “UN Report: Nature’s Dangerous Decline ‘Unprecedented’; Species Extinction Rates ‘Accelerating.’” Sustainable Development Goals, 6 May 2019. Retrieved January 2021 from <https://www.un.org/sustainabledevelopment/blog/2019/05/nature-decline-unprecedented-report/>

¹⁷ Lindsey, R. (2007, March 30). Tropical Deforestation. NASA, Earth Observatory. Retrieved from <https://earthobservatory.nasa.gov/features/Deforestation>

¹⁸ Robbins, J. (2016, February 23). How forest loss is leading to a rise in human disease. Yale Environment 360. Retrieved from <https://e360.yale.edu>

¹⁹ Wiggins, B. (2020, May 13). How Deforestation Increases the Risk of Disease Outbreaks Like COVID-19. Global Citizen. Retrieved from <https://www.globalcitizen.org/en/content/deforestation-pandemics-coronavirus/>

²⁰ Food and Agriculture Organization of the United Nations. (2016). State of the World's Forests 2016: Forests and agriculture: land use challenges and opportunities. Rome, Italy: FAO. pp. 1-125.

²¹ Quigley, A. (2016, June 8). “Norway adopts world’s first zero deforestation policy: What does that mean?” Christian Science Monitor. Retrieved from <https://www.csmonitor.com/Environment/2016/0608/Norway-adopts-world-s-first-zero-deforestation-policy-What-does-that-mean>

^{22,23} United Nations DESA. Sustainable development goal 15. Retrieved January 2021 from <https://sustainabledevelopment.un.org/sdg15>