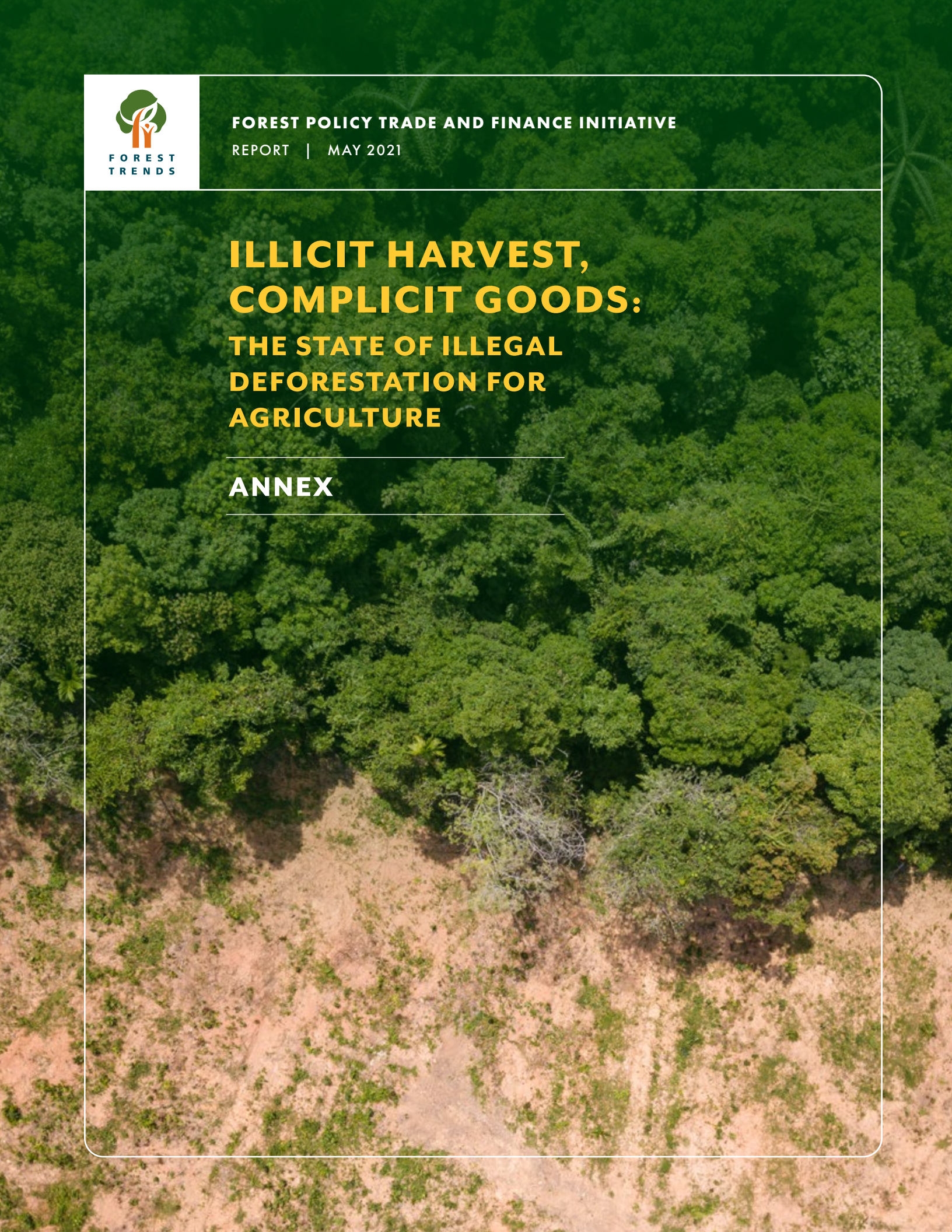


FOREST TRENDS

FOREST POLICY TRADE AND FINANCE INITIATIVE

REPORT | MAY 2021

ILLICIT HARVEST, COMPLICIT GOODS:

THE STATE OF ILLEGAL DEFORESTATION FOR AGRICULTURE

ANNEX

Table of Contents

Acronyms

AFD	Agence Française de Développement (French Development Agency)
APP	Permanent Preservation Areas (Brazil)
APP	Asia Pulp & Paper
BFC	Brazilian Forest Code
BPK	Badan Pemeriksa Keuangan (Supreme Audit Agency of Indonesia)
BRG	Badan Restorasi Gambut (Peat Restoration Agency, Indonesia)
BRGM	Peat and Mangrove Restoration Agency (Indonesia)
CAR	Cadastro Ambiental Rural (Rural Environmental Registry of Brazil)
CDC Group	British development bank, formerly the Commonwealth Development Corporation
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CO_2	Carbon dioxide
CO_2e	Carbon dioxide-equivalent (all gases)
CONAFOR	Comisión Nacional Forestal (The National Forestry Commission of Mexico)
DETER	Deforestation Detection in Real Time, an environment monitoring programme of the Government of Brazil
DRAU	Dirección Regional Sectorial Agricultura Ucayali (the Regional Sectoral Agriculture Directorate of Ucayali in Peru)
DRC	Democratic Republic of Congo
EAO	Ethnic Armed Organizations (Myanmar)
EIA	Environmental Investigation Agency
ELC	Economic Land Concession (Cambodia)
EU	European Union
EUTR	European Union Timber Regulation
FAO FRA	Food and Agriculture Organisation of the United Nations — Global Forest Resources Assessment
FCA	Forest Clearance Authority (Papua New Guinea)
FCPF	Forest Carbon Partnership Facility
FELDA	The Federal Land Development Authority of Malaysia
FLEGT	Forest Law Enforcement, Governance and Trade
FMC	Forest Management Contract (Liberia)
FPIC	Free, Prior, and Informed Consent
FRC	Forest Risk Commodity
FSC	Forest Stewardship Council
G20	Group of Twenty Finance Ministers and Central Bank Governors from 19 countries and the European Union
GAIN	Global Agricultural Information Network of USDA
GELOSE	Gestion Locale Sécurisée (Madagascar)
GHG	Greenhouse gas(es)
GLAD	Global Land Analysis and Discovery Lab, University of Maryland, USA
GFW	Global Forest Watch
Gt	Gigaton
HCS	High Carbon Stock
HCV	High Conservation Value
HS	Harmonized System codes
ha	Hectare
HTI	Industrial Forest Plantation (Indonesia)
IBAMA	Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (Brazilian Institute of Environment and Renewable Natural Resources)
IBGE	Instituto Brasileiro de Geografia e Estatística (Brazilian Institute of Geography and Statistics)
IDEAM	Institute of Hydrology, Meteorology and Environmental Studies (Colombia)
IMAZON	Instituto do Homem e Meio Ambiente da Amazônia (Institute of Man and Environment of the Amazon in Brazil)
ISPO	Indonesian Sustainable Palm Oil
KHG	Kesatuan Hidrologis Gambut (peat hydrological units, Indonesia)
KIA	Kachin Independence Army (Myanmar)
KPK	Komisi Pemberantasan Korupsi (Corruption Eradication Commission of Indonesia)
ILO C169	International Labour Organization (ILO) Convention 169
ILUC	Indirect land-use change
ITTO	International Tropical Timber Organisation
INPE	Instituto Nacional de Pesquisas Espaciais (National Institute for Space Research, Brazil)
LAC	Latin America and the Caribbean
LICADHO	Cambodian League for the Promotion and Defense of Human Rights

LR	Legal Reserve (Brazil)
LUC	Land-use change
m3	cubic meter
MAAP	The Monitoring of the Andean Amazon Project, an initiative of Amazon Conservation
MARD	Ministry of Agriculture and Rural Development (Vietnam)
masl	meters above sea level
Mha	Million hectares
MoEF	Ministry of Environment and Forestry (Indonesia)
Mt	million metric tonnes
MTE	Myanmar Timber Enterprise
NCR	Native Customary Rights (Malaysia)
NDPE	No Deforestation, No Peat, No Exploitation
NTFP	Non-Timber Forest Products
OEC	Observatory of Economic Complexity
PA	Protected Area
PDR	Lao People's Democratic Republic (Laos)
PNCAT	Patrimonio Natural y Cultural Ayoreo Totobiegosode (Natural and Cultural Patrimony of the Ayoreo Totobiegosode, Paraguay)
PPCDAm	Plan for the Prevention and Control of Deforestation in the Legal Amazon (Brazil)
PRF	Permanent Reserve Forests (Malaysia)
PRODES	Programa de Cálculo do Desflorestamento da Amazônia (deforestation monitoring service, Brazil)
PNG	Papua New Guinea
RAPP	Riau Andalan Pulp and Paper, a subsidiary of the Royal Golden Eagle group (Indonesia)
REDD+	Reducing Emissions from Deforestation and forest Degradation plus the sustainable management of forests
RFD	Royal Forest Department of Thailand
RPEG	Rencana Pemulihan Ekosistem Gambut (Peat Ecosystem Restoration Plans, Indonesia)
RSPO	Roundtable on Sustainable Palm Oil
SABL	Special-purpose Agricultural and Business Leases (Papua New Guinea)
SBY	Indonesia's former-President, Susilo Bambang Yudhoyono
SEEG	Greenhouse Gas Emissions and Removal Estimation System (Brazil)
SocFin	Société Financière des Caoutchoucs (Sierra Leone)
SUHAKAM	Malaysian Human Rights Commission
TA	Timber authorities (Papua New Guinea)
UNAP	Unión de Nativos Ayoreo de Paraguay (The Union of Ayoreo Natives of Paraguay)
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
UNODC	United Nations Office on Drugs and Crime
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
VOI	Vondron'Olona Ifotony (local community forest management groups, Madagascar)
VPA	FLEGT Voluntary Partnership Agreement
WB	World Bank
WRI	World Resources Institute
WWF	World Wildlife Fund

Glossary

>50% canopy: Tree cover of 51 percent or more is the threshold used in this report to define forest areas to keep a focus on well forested landscapes that provide important ecosystem services locally (e.g., pollination, maintaining water cycles, etc.) and globally (especially as carbon sinks helping mitigate climate change).

>50% tree cover loss: The loss of more than 50 percent of forest canopy.

Agribusiness: Large-scale agricultural businesses and their supply chains.

Agro-commodities: Commercially produced agricultural commodities, including crops, livestock, and products from tree plantations.

Agro-conversion: Loss of forest driven by commercial agriculture.

Amazonia: Brazil's Legal Amazon (see below).

Biodiversity hotspot: Region meeting two criteria of containing 1) at least 1,500 endemic vascular plants and 2) 30 percent or less of its original natural vegetation. Thirty-six biologically rich, threatened regions are globally recognized as biodiversity hotspots and comprise 2.4 percent of the Earth's surface (Conservation International 2020).

Brazil's environmental debt: Areas defined under the Brazil 1965 Forest Code as Legal Reserve and Riparian Preservation Areas that were deforested illegally before 2008 and would have required restoration at the landowner's expense (Soares-Filho et al. 2014).

Caatinga: Semi-arid biome in Northeastern Brazil, bordered by the Amazon, Cerrado, and Atlantic Forest biomes.

Central Africa: Countries of Angola, Burundi, Cameroon, the Central African Republic, Chad, Democratic Republic of Congo (DRC), Equatorial Guinea, Gabon, Rwanda, and the Republic of Congo.

Cerrado: Wooded savanna covering 12 vegetation types in Central Brazil and parts of Bolivia and Paraguay. It borders the Amazon, Caatinga, Atlantic Forest, and Pantanal biomes.

Chaco: Sparsely populated, hot, and semi-arid lowland forest ecosystem of the Río de la Plata basin, divided among eastern Bolivia, Paraguay, northern Argentina, and a portion of the Brazilian states of Mato Grosso and Mato Grosso do Sul. Second largest forest system in South America, after the Amazon.

Chiquitano: Dry forests of Bolivia and Brazil with trees that lose their leaves during the dry season and are generally resistant to flooding and fire.

Congo Basin/Congo River Basin: Countries of Cameroon, the Central African Republic, the Democratic Republic of Congo (DRC), Equatorial Guinea, Gabon, and the Republic of Congo.

CO_2e emissions: This report quantifies the amount of greenhouse gas emissions (expressed in mega-tonnes (Mt) of carbon dioxide equivalent emissions) caused by tree cover loss, as reported by Global Forest Watch (2020, using methodology from Harris et al. 2021).

Commercial agriculture: Large- or small-scale, including crops, pasture (mainly cattle), and monoculture tree plantations. Excludes subsistence farming.

Community forestry: Forest operations where the local community plays a significant role in land use decision-making and forest management. Communities may, depending on national legislation, possess a bundle of rights (usually access, use, management, or full ownership) to land under community forestry.

Concession: A grant of land or property by a government or some other controlling authority to another legal entity (usually a large company) in return for payment or services. Sometimes concessions are allocated through a competitive process, such as auctions.

Conversion timber/wood: Timber generated during the conversion of natural forest areas to non-forest or plantation use, such as the clearance of a forest to make way for commercial agriculture.

Deforestation: Complete removal of forest cover, which is defined in this Glossary as the removal of at least 51 percent of forest cover.

Deforestation alert: A report on a disturbance in the forest canopy that indicates a likely deforestation event.

Embodied deforestation: The amount of deforestation linked to the production of a given amount of an agricultural commodity.

Endemic species: Plants and animals that are naturally found in only one geographic region on Earth.

Environmental Impact Assessment: A regulatory process used to predict the environmental consequences of a plan, policy, program, or project, and develop a time-bound plan with specific objectives to mitigate these consequences.

Forest/Forest cover: Forest areas with greater than 50 percent tree cover that are greater than five meters tall.

Forest degradation: The process of human-caused loss of forest biomass, resources, and environmental services without a complete loss of forest cover.

Forest loss: The complete removal of forest cover (which is defined as forest areas with greater than 50 percent tree cover).

Fraud: In law, the act of intentionally deceiving someone in order to gain an unfair or illegal advantage (financial, political, or otherwise). Countries usually consider such offenses to be criminal or a violation of civil law.

Free, Prior, Informed Consent (FPIC): The right of communities (particularly of indigenous peoples) to give or withhold their "consent" for any action that would affect their lands, territories, or rights (including those that affect customary ownership, occupation or other use). "Free" indicates that consent cannot be given under force or threat. "Prior" indicates that relevant information must be provided with enough time to review it before consent is decided. "Informed" means that the information provided is timely, detailed, emphasizes both the potential positive and negative impacts of the activity, and is presented in a language and format understood by the community. "Consent" refers to the right of the community to agree or not agree to the project before it commences (UNDRIP 2013).

Gross deforestation: Loss of forest cover, without consideration of regrowth or reforestation.

Illegal deforestation: Conversion of forest that takes place in contravention of a country's legislative framework (laws, regulations, instructions, and any other legal instrument that penalizes non-compliance) at the time the deforestation took place. For purposes of this report, conversions that were "legalized" after the fact (through amnesties, legal amendments, for example), after prosecution, or by paying a fine, are not considered to have been conducted in compliance with the rule of law. This report does not include breaches of international

law or customary law unless they are included in national statutory or case laws. This definition encompasses two general categories: illegalities in licensing and illegalities in forest clearance.

Land grabs: As defined by the Tirana Declaration, large-scale land acquisitions that are one or more of the following: in violation of human rights, particularly the equal rights of women; not based on FPIC; not based on a thorough assessment, or in disregard of, social, economic, and environmental impacts, including the way they are gendered; not based on transparent contracts that specify clear and binding commitments about activities, employment, and benefit sharing, and/or; not based on effective democratic planning, independent oversight, and meaningful participation (Taylor 2012). Three categories of land grabs have been identified: 1) Tainted lands is a term employed by the UN Special Rapporteur on the Right to Food to describe land obtained "through corrupt means, such as bribing public officials or community leaders…, or failing to ensure the land was acquired by the seller through legal and transparent means"; 2) forced eviction is defined broadly by the UN Committee on Economic, Social and Cultural Rights as "the permanent or temporary removal against their will of individuals, families and/or communities from the homes and/or land which they occupy, without the provision of, and access to, appropriate forms of legal or other protection;" and 3) project-induced displacement refers to communities and individuals being forced out of their homes, and often their homelands, for the purposes of economic development.

Large-scale commercial agriculture: Corporate- or family-owned holdings that are far above the national average in size (only 3 percent of farms are larger than 10 ha worldwide) and employ a waged labour force (Lowder et al. 2016).

Legal Amazon: Brazilian states of Rondônia, Acre, Amazonas, Roraima, Pará, Amapá, Tocantins, Mato Grosso, and Maranhão west of 44º W. It includes three biomes: all of Brazil's Amazon biome, 37 percent of the Cerrado, and 40 percent of the Pantanal.

Legal Reserve (Brazil): As defined in Federal Law 12.651/2012, "areas located within a property or rural possession, defined under Art. 12, with the function of ensuring sustainable economic use of the natural resources of rural property, assisting the conservation and rehabilitation of ecological processes and promoting the conservation of biodiversity, as well as sheltering and protecting native wildlife and flora." All Brazilian rural property owners are required to keep a certain percentage of their land in forest cover or its native vegetation. These Legal Reserves should not be less than 80 percent of the total area of the property in the Amazon biome, 35 percent in the Cerrado, and 20 percent in other biomes. They must also be included in Brazil's Rural Environmental Registry (CAR).

Net deforestation: Gross deforestation minus the area in which regrowth/reforestation has occurred.

Pantanal: Wetlands biome in Brazil's Mato Grosso and Mato Grosso do Sul, bordering on Cerrado, Atlantic Forest, Chaco, and Chiquitano.

Permanent Preservation Areas (Brazil): As defined in Federal Law 12,651/2012, "a protected area covered or not by native vegetation, with the environmental function of preserving water resources, landscapes, geological stability and biodiversity, facilitating gene flows of fauna and flora, protecting the soil and ensuring welfare of human populations," which must be demarcated within all rural properties in Brazil and included in the Rural Environmental Registry (CAR).

Program to Calculate Deforestation in the Amazon (PRODES, Brazil): The government satellite monitoring program that produces data that are considered Brazil's official national statistics on deforestation. PRODES Amazon monitors clear cut deforestation between August 1 to July 31 each year in the Brazilian Legal Amazon. PRODES Cerrado monitors deforestation in the Cerrado biome, but excludes the areas overlapping the Legal Amazon. PRODES Amazon detects deforestation of areas larger than 6.25 ha in forests classified as primary

forest. PRODES Cerrado detects the deforestation of primary forest, savannas, and grasslands (or classified as such since 2000) from areas larger than one ha.

Plantation timber/wood: Forest products obtained from areas established by planting and/or artificially seeding, as opposed to those originating from natural forests.

Quilombola: Descendants of Afro-Brazilian slaves in Brazil.

Tree Cover Loss: Stand level replacement of vegetation greater than five meters tall.

Tropical forest: All forest found in tropical areas. Tropical forests represent less than 15 percent of the Earth's terrestrial surface yet support more than half of the planet's species. They also play a disproportionately large role in determining climate due to the vast amounts of carbon and water they store and exchange with the atmosphere (Reed et al. 2020).

ANNEX 1:

Latin America and Caribbean

Illicit Harvest, Complicit Goods

The State of Illegal Deforestation for Agriculture

ANNEX 1 BRAZIL CASE STUDY 2013-2019

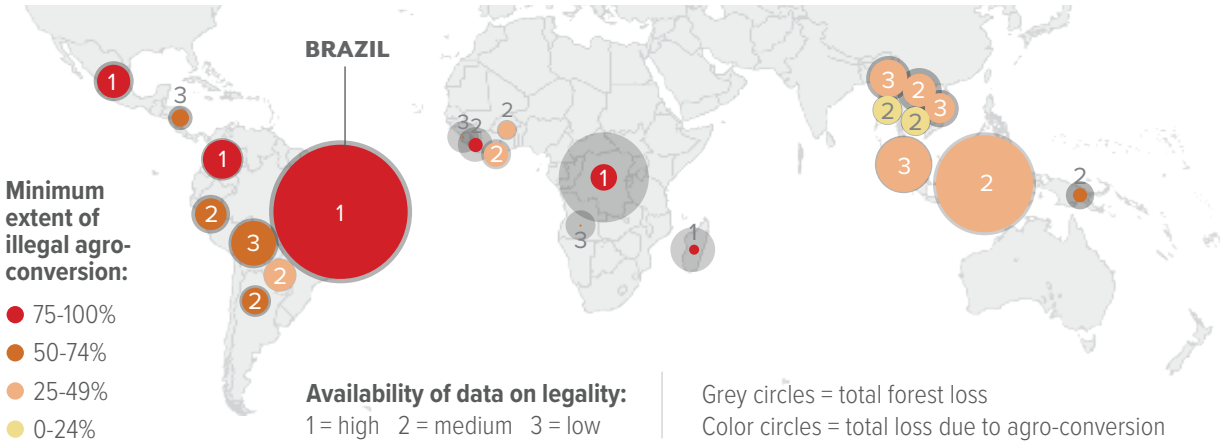
1st among all tropical countries in forest loss

26% of all forest loss across the tropics

12.9 Gt of CO_2e Total gross emissions from tree cover loss

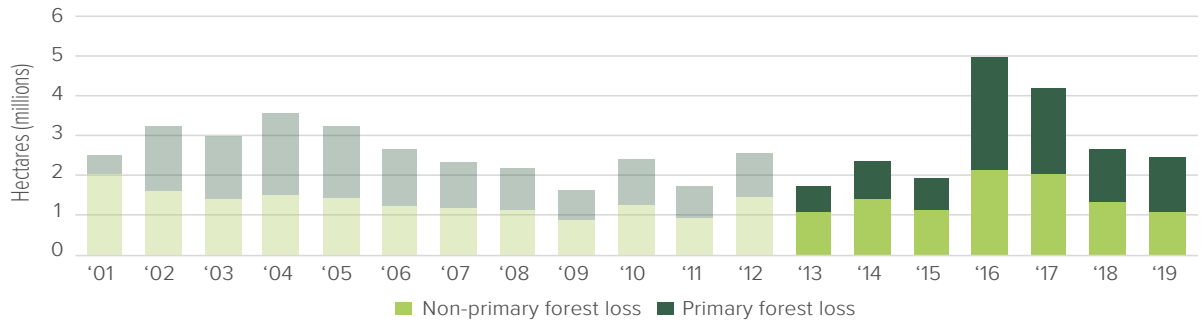
20.4 Mha total forest loss — of which **88%** due to commercial agriculture — of which at least **95%** likely illegal, **25%** likely exported

Figure 1: Relative amount of tropical forest loss driven by commercial agriculture and the extent of illegal clearing.



Source: forest loss – GFW (2020, using Hansen et al. [2013]); agro-conversion – estimates compiled by Forest Trends (2021) from multiple sources, including GFW (2020, using Curtis et al. [2018]); and illegality – estimates compiled by Forest Trends (2021). Forest loss – GFW 2020, using Hansen et al. 2013; emissions: Harris et al. 2021.

Figure 2: Annual forest loss from 2001–2019 for Brazil. This report covers the period highlighted (2013 to 2019).



Source: GFW (2020, using Hansen et al. [2013]).

BOX 1

Forest Trends Findings

- Between 2013 and 2019, commercial agriculture in Brazil was likely responsible for the clearance of more than 18 Mha of forest.
  - Given that 25% of the agro-conversion was exported, there is a risk that international buyers may be linked to the loss of more than 4.5 Mha of tropical forests.
  - At least 95% of agro-conversion is likely illegal.
- Exports in 2019 that were likely from agro-conversion include:
  - US$16.7 billion in soy
  - US$2.5 billion in beef
  - US$497 million in leather
- There is a high risk that these exports were grown on illegally cleared land.

1 Introduction

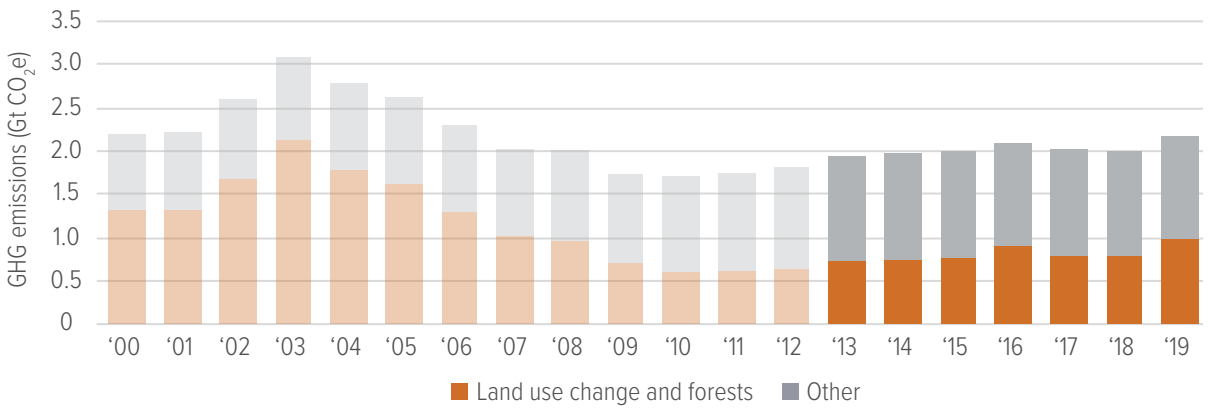
Brazil has about one-third of the world's remaining tropical forest, including 60 percent of the Amazonian rainforest. It is the most biodiverse country on Earth, with more than 34,000 species of plants, 1,813 species of birds, 1,022 amphibian species, 648 mammal species, and 814 reptile species (Butler 2020). Although it is most famous for the tropical forests of the Amazon, Brazil also has vast areas of semi-deciduous forest and the Cerrado—the most biodiverse savannah in the world, which includes both open field (*campo limpo*) and tall closed forest (da Silva n.d.).

No other country has done more to protect its forests than Brazil; 150 million hectares (Mha) of forest area are under some form of protected status – three times more than any other country, and accounting for 22 percent of protected forests worldwide (FAO 2020). Starting in the 21st century, strong actions were taken with the implementation of the National Plan to Combat Deforestation, through greater enforcement of logging laws, moratoria on deforestation adopted by soy producers in 2006 and cattle ranchers in 2009, and support for agricultural intensification rather than expansion (West and Fearnside 2021). The results have been impressive. Annual deforestation rates in the Brazilian Amazon decreased by 80 percent from 2005 to 2013 while simultaneously increasing agricultural production, and significantly reducing hunger and poverty (Carrero et al. 2020; CPI 2011; Boucher et al. 2011; Nepstad et al. 2014; PRODES 2020).

For the purposes of this study only the following were considered:

- **Forests:** areas with greater than 50% tree cover
- **Forest loss / Deforestation:** complete removal of forest cover
- **Illegal:** deforestation that was, at time that the clearing took place, in contravention of the country's legislative framework governing forest conversion

Figure 3: Brazil greenhouse gas emissions, 2000–2019 ($GtCO_2e$)



Source: SEEG 2020.

The reduction in deforestation meant that annual emissions from land-use change during 2013 to 2019 were only about one-third (38 percent) of their peak in 2003. (see Figure 3 (Greenhouse Gas Emissions and Removal Estimation System [SEEG] 2020)). If emissions had remained at peak levels, at least another 9 gigatonnes (Gt) of CO_2e would have been emitted, or an extra 1.3 $GtCO_2e$ per year. To put Brazil's dramatic emissions reductions into context, between 2018 and 2019, the total reductions of emissions from fossil fuels in the United States (US), Japan, and the European Union (EU) combined[1] were 1 $GtCO_2e$ smaller than Brazil's annual progress (BP 2020). Unfortunately, in 2019, the first year of Jair Bolsonaro's presidency, deforestation and land-use change increased Brazil's emissions by 180 $MtCO_2e$, making 2019 land-use change emissions two-thirds higher than the low point in 2010 (SEEG 2020).

Just as emissions are increasing, similarly, the gains in reducing deforestation over the first 15 years of the 21st century are being lost. According to Global Forest Watch (GFW 2020), deforestation across Brazil peaked in 2016, and the Government of Brazil reports that primary forest loss in 2020 was more than double that in 2012 (PRODES 2020). This increase in deforestation is a crisis, not just for the climate through increased emissions, but for biodiversity and for the indigenous peoples of Brazil. This case study evaluates the evidence regarding patterns of deforestation in Brazil, particularly the role of demand for agricultural commodities in driving the illegal clearing of the country's forests.

2 Deforestation Analysis

2.1 Deforestation 2013–2019

According to GFW (2020, using Hansen et al. 2013), between 2013 and 2019, forest loss in Brazil accounted for 26 percent of all tropical forest loss, with 20.4 Mha of tree cover cleared from all forest types, including secondary forests. Almost half (49 percent) of the loss was from primary forests (10 Mha).

Similarly, the Government of Brazil itself estimates losses from primary forest at 11 Mha (INPE 2020). (The difference in methodologies between GFW and INPE's PRODES are outlined in Box 2.) MapBiomas estimated that nearly all (97 percent) of the loss of primary forest in 2019 was in the Amazon and Cerrado biomes (Rezende de Azevedo et al. 2019), in the southern and eastern states of Pará, Acre, Amazonas, and Rondônia.

[1] Annual reductions of 3 percent, 3.5 percent, and 3.9 percent, respectively for a combined total annual reduction of 0.33 $GtCO_2e$.

BOX 2

Differences between PRODES and GFW numbers explained

Global Forest Watch (GFW) and the Brazilian government's PRODES forest monitoring system, run by the National Institute for Space Research (INPE), both provide reliable, timely data on forest loss, but differ in scope and methodology (Goldman and Weisse 2018).

When considering primary forest, GFW reporting is comparable to PRODES reporting (Figure 4; Turubanova et al. 2018). For the period used in this report, 2013 to 2019, PRODES's detection of primary forest loss (10.99 Mha) was 8 percent larger than that detected by GFW (10.07 Mha).

However, unlike PRODES, GFW reports also include other forest types, in addition to primary forests, in their estimates of total forest loss.

A summary of the differences between GFW and PRODES in scope and methodology include, *inter alia*:

- Different levels of automation: GFW is fully automated, capturing change in forest cover using vegetation index differences across temporal series of Landsat imagery. INPE's PRODES deforestation monitoring service produces annual estimates of clear-cut areas based on Landsat and other satellites, interpreted by analysts.
- Inclusion of small clearings: GFW captures smaller clearings, as little as 0.09 ha. PRODES, in contrast, captures clearings that are only 6.25 ha or larger.
- Differences in causes of deforestation: PRODES computes tree cover loss from farming and mining only. GFW also includes loss due to forest fires, and the opening of logging roads and forest plantations. This can lead to differences, such as PRODES detecting a smaller amount of primary forest loss than GFW in 2016–2017, and a greater amount in 2019, likely because GFW immediately included understorey losses caused by fires, which were then picked up later in 2019 by PRODES when the burned areas were fully cleared.
- Time periods: GFW reports for an annual period January to December, whereas PRODES reports from August of the prior year to July of the reported year. Thus, losses detected by GFW in August would appear in PRODES's reports in the following years (Goldman and Weisse 2018; GFW 2020b; Hethcoat et al. 2020).
- Reporting on deforestation of secondary forests: As mentioned above, GFW captures loss to both primary forest and the clearing of secondary and other forest types. PRODES alerts mask previously deforested areas. This is important because secondary forests make up a considerable proportion of Brazil's total forest cover. For example, Nunes et al. (2020) estimated that, in the Amazon biome, deforestation of secondary forests constituted 36 percent of all tree cover loss between 1987 and 2017.

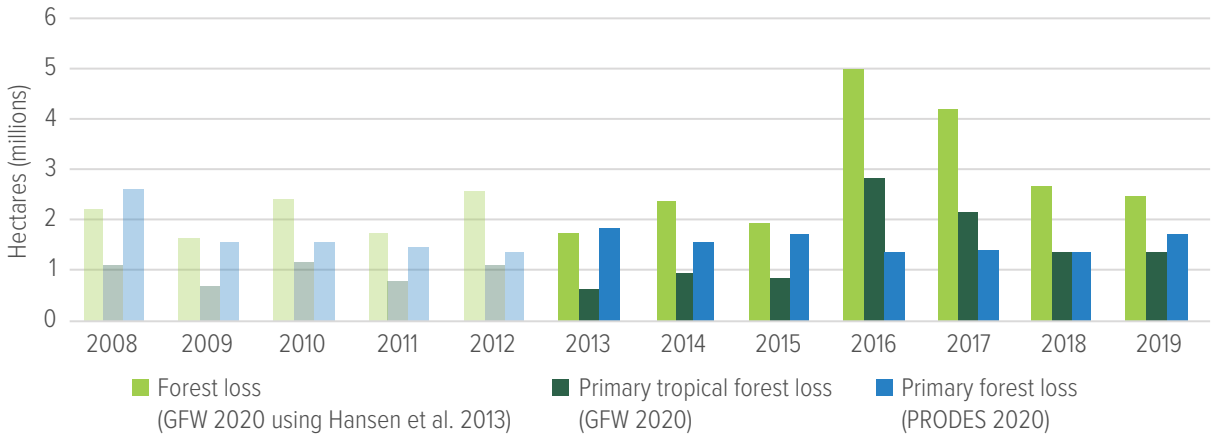
The topline finding in our report uses the GFW forest loss data including both primary and secondary forest that meet our definition of forest having a threshold of at least 50 percent cover.

Deforestation is reportedly moving toward the Central Amazon Basin (Walker et al. 2019; Carrero et al. 2020). In the Cerrado, deforestation is increasing in the region known as Matopiba, including the states of Maranhão, Tocantins, Piauí, and Bahia (Hershaw and Sauer 2017; Rausch et al. 2019).

According to the government data (INPE 2020), Brazil's success in reducing forest loss has now been reversed. Annual deforestation in the Legal Amazon (which includes part of the Cerrado in Mato Grosso, Tocantins, and Maranhão) reportedly reached 1.1 Mha in 2020, 142 percent more than the 2012 historic

low of 0.45 Mha. In 2020, the number of fires in the Amazon exceeded the total recorded in 2019, and as in 2019 (Cardil et al. 2020), nearly all the fires were in areas affected by deforestation (McCoy and Traiano 2021; Agrinews 2021).

Figure 4: Forest loss in Brazil 2013–2019, as reported by GFW and PRODES (Mha)



Source: Forest loss - Global Forest Watch, 2020; Primary tropical forest loss - GFW 2020; Primary Forest Loss - PRODES 2020.

2.2 Drivers of deforestation

Forest Trends findings

Forest Trends evaluated data on the extent and nature of forest loss in Brazil between 2013 and 2019, including research from GFW (2020, using Curtis et al. 2018), MapBiomas (2020b), academic articles, and the existing literature. After reviewing the available data, Forest Trends' best estimate is that:

- 88% of deforestation was driven by commercial agriculture.

Justification

MapBiomas (2020b) concluded that commercial agriculture was the primary driver of deforestation (88 percent of all loss, Table 1): for example, pasture for livestock (mainly cattle) drove 77 percent of all forest loss; soy drove 6 percent directly; "other agriculture" 3 percent; and forest plantations 1 percent (Table 1). This is slightly higher than the GFW (2020) estimate that 73 percent of forest loss was driven by commodities and forestry (which

Table 1: Land-use change from natural forest to agriculture in the Cerrado and Amazon, 2012-2019

To / From	Natural Forest (secondary vegetation + primary forest) to agriculture (ha)	% of all deforestation
Pasture	11,437,101	77%
Soy	885,924	6%
Forest plantation	159,351	1%
Other agriculture	473,584	3%
Total agriculture	**12,955,960**	**88%**
Other Land uses	1,842,514	12%
All land-use change	**14,798,474**	

Source: Mapbiomas Land Cover Transitions Database 5.0 2020

BOX 3

Indirect Land-Use Change Influencing Deforestation

Since 2006, a voluntary moratorium by soy producers on deforestation in Amazonia contributed to a reduction in forest loss (Nepstad et al. 2014). However, soy farming has long driven indirect land-use change, where cattle ranches in areas such as Mato Grosso, Pará, and Rondônia are displaced by soy plantations, causing the ranchers to clear forests for new pastures elsewhere (Lapola et al. 2010; Barona et al. 2010; Arima et al. 2011; Walker and Richards 2013). The ranchers often followed loggers, who have opened access into the Amazon with their logging roads. Sometimes the loggers and ranchers agree to share costs (Perz et al. 2007).

MapBiomas Transitions 5.0 (2020) estimate that between 2012 and 2019, ranchers cleared 11.4 Mha of forest in the Amazon and Cerrado, while only increasing the total area under pasture by 1.9 Mha. That difference is because, during the same period, 7.17 Mha of pasture was converted to cropland (65 percent for soy). Further, soy farmers cleared almost 1 Mha of forest themselves, but were able to expand into at least 4.64 Mha of pastures originally cleared of forests by cattle ranchers.

includes the harvest of plantations), with an additional 26 percent by shifting agriculture, some of which may be commercial.

The MapBiomas (2020b) analysis is based on 30 m by 30 m units, and so it can be assumed that all agriculture identified was large-scale and likely commercial (Souza et al. 2020). Furthermore, commercial agriculture also likely drove additional, albeit indirect, forest loss, as explained in Box 3.

While agriculture is the direct driver of deforestation, the underlying cause is a system that values agricultural land more than land left as forest. Brazil's legislative framework[2] creates a perverse system that gives little value to land that is not in "production." The law grants ownership to people who occupy, then deforest and cultivate "unoccupied" public lands (Brito et al. 2019), thereby incentivizing individuals to move into forested areas and clear them. Unsurprisingly, Brown et al. (2016) found that land occupations and deforestation in the Brazilian Amazon are correlated. On top of that, the demand for agricultural commodities leads to deforestation in regions of weak law enforcement, where public lands can be "grabbed" or purchased at low prices. Thus, programs that grant land title to illegally seized public or indigenous lands are at the heart of the problem of deforestation (Arima et al. 2011; Richards et al. 2014; Brown et al. 2016; Miranda et al. 2019).

Conflict between large landowners and landless squatters is common and often violent as both groups seek formal ownership of this "unproductive" land (Simmons et al. 2007). Landless people can claim squatters' rights on unproductive forest and sometimes mobilize into large groups and move onto the land that they wish to expropriate. The landowners deforest the land to demonstrate that it is "productive" and to increase its value in order to increase the compensation should it be expropriated. Every year, there are more people moving into the Amazon, and more investment in agriculture and ranching, requiring increased infrastructure (Fearnside 2017a). Land speculation and money laundering are additional driving forces of deforestation (Miranda et al. 2019; Reydon et al. 2019).

Since 2012, following the rise of a strong coalition of landed elites (the ruralistas) in the National Congress, there has been a systematic dismantling of Brazil's environmental protections in favor of infrastructure development and agribusiness (Rajão et al. 2020; Fearnside 2016 and 2017a,b; Tollefson 2018; Carrero et al.

[2] Brazil's Land Statute of 1964 reinforced the principle of *direito de posse* or recognition of the right to land if it was undesignated public land that was peacefully occupied and put to productive use.

2020). In 2017, a law granted amnesty for forest cleared illegally between 2005 and 2011. PRODES then recorded an increase in forest loss to 1.7 Mha – an increase of 300,000 ha in 2019.

The ruralistas' influence on legislation has increased substantially since President Bolsonaro took office in January 2019 (Tollefson 2018; Ferrante and Fearnside 2019; Watts 2019; Kaiser 2019). The Plan for the Prevention and Control of Deforestation in the Legal Amazon (PPCDAm), credited for reducing forest loss after 2004, as well as the government's environmental licensing system, were effectively dismantled along with the environmental agencies (West and Fearnside 2021). This signaled impunity for illicit appropriations and encouraged further expansion of holdings, both licit and illicit. Bolsonaro's proposed "land grabbers law," (PL-2633/2020) put forward in 2020, would, if passed, legalize private ownership of deforested land, even in the 277 indigenous territories that have not yet had protection formally confirmed (Fearnside 2020; also see Illegality section, below). This would set up land conflicts that could plague agricultural supply chains for years.

2.3 Estimating illegality for commercial agriculture

After reviewing the literature and conducting expert interviews, Forest Trends concluded that between 2013 and 2019:

- At least 95% of deforestation for commercial agriculture was likely illegal.

Justification

The most common irregularity among operators clearing Brazilian forest is a failure to obtain the necessary permit issued by the Environmental Agency for clearing native vegetation (Box 4). Considering this requirement, as well as those for Permanent Preservation Areas, Legal Reserves (Box 4), and headwater restriction zones, only 0.5 percent of all deforestation in 2019 was "identified as legally compliant" (Rezende de Azevedo et al. 2019). According to the Forest Trends definition of illegality used in this report, contravention of the legislative framework means the agro-conversion was illegal. The Rezende de Azevedo et al. (2019) study was based on authorizations registered in the national system at IBAMA, and since there may be authorizations that were not registered, and these may or may not be legal, Forest Trends adopts a conservative estimate of 95 percent illegality in agro-conversion. The Trase (Vasconcelos 2020) analysis of illegality in Mato Grosso between 2012 and 2017 also identified that 95 percent of deforestation on farms was illegal.

Illegal clearing in indigenous reserves

In addition to the assessment above, numerous studies have reviewed non-compliance with other laws and regulations. For example, illegal land grabbing and deforestation occur across the 110 Mha claimed by indigenous peoples[3] (Box 4). In 2019, 7 percent of deforestation was illegal because it occurred within protected areas and indigenous territories (Rezende de Azevedo et al. 2019). GFW (2020) reports that between 2013 and 2019, 6 percent of forest loss, or 1.3 Mha, was from indigenous and community lands. While Brazil has no legislation that governs free, prior, and informed consent (FPIC), traditional and indigenous communities have the right to access forest resources. Decree 419/11 requires environmental-license applicants to declare if there are indigenous or Quilombola (descendants of Afro-Brazilian slaves) lands in the vicinity of the license area, so that the Brazilian Institute of the Environment and Renewable Natural Resources (IBAMA) may consult with those concerned. The large number and scattered nature of the traditional communities in Brazil leads to a low level of compliance with this legislation (Preferred by Nature 2017).

Cattle ranching is illegal in these reserves and other indigenous territories. Nevertheless, Amnesty International (2019) documented cattle grazing on two reserves and three indigenous territories in Brazil's Amazon. In five sites, the illegal land seizures were accompanied by threats and intimidation, or the locals were directly forced off the reserve. The four sites in Rondônia (Karipuna and Uru-Eu-Wau-Wau indigenous territories, and

[3] Brazil has 51 indigenous reserves either already established or in the process of being established. Organizations such as the New Social Cartography Institute, FUNAI, and The Palmares Foundation have mapped the 110 Mha of traditionally occupied indigenous lands (Preferred by Nature 2017).

BOX 4

Main Requirements of Brazilian Forest Code (BFC) with Respect to Forest Clearance (Law 12.651/2012)

Deforestation permits: The BFC requires that the Environmental Agency issue a deforestation permit (Authorization for Vegetation Suppression) for all areas unless it is a case of national security or accident prevention (art. 8, item 3). This means that virtually all deforestation must have this permit to be considered legal, noting both the location and the area allowed to be cleared, and verifying that they are within the legal limits.

For these criteria, there are two main regulations:

APP (Permanent Preservation Area), which includes buffer zones alongside water bodies, rivers, creeks, springs, steep slopes, hill tops, among others. The Forest Code forbids any deforestation of these buffer zones unless it is for public interest or national utility.

Legal Reserves (LR), which is a minimum proportion of private properties that must be kept under natural vegetation cover. This minimum varies according to the biome: for Amazonia it is 80 percent, Cerrado 35 percent, and 20 percent in other biomes.

When the 2012 Forest Code was introduced, it dramatically reduced the remit of the Brazilian Legal Reserves (LRs). The old Forest Code (1965) required the restoration of native vegetation cleared illegally from both APP and LR areas. However, the Forest Code of 2012 excludes small and medium landholders from the requirement to address the LR deficit, representing 25 percent of the total area of farmland (Sparovek et al. 2012). Thus, the 2012 BFC reduced Brazil's environmental debt by 58 percent, and pardoned 90 percent of landowners (Soares-Filho et al. 2014). A relatively small proportion of private properties are responsible for most of the illegal deforestation: only 2 percent of properties (the large farms) are responsible for 62 percent of the illegal deforestation[4] (Rajão et al. 2020).

Rio Ouro Preto and Rio Jacy-Paraná Reserves) held almost 100,000 cows from more than 700 properties (Amnesty International 2019).

Illegal clearing of public lands

In the Legal Amazon, there are still 50 Mha of public lands that have not been designated to specific land tenure (Azevedo-Ramos et al. 2020); clearing is illegal unless the operator obtains legal title. However, on former public lands now registered to private owners, the legal claims are questionable: Reydon et al. (2019) estimate that more than half (56 percent) of claims may be based on fraudulent documentation, and another 24 percent are claimed by landowners without the actual title (for these, regularization is only possible on a case-by-case analysis based on their size, history and location).

Amnesty for illegal clearing

After the Forest Code of 2012, the next most pivotal legislative change has been Law 13,465 of 2017, which granted amnesty to those who illegally occupied public rural lands between 2005 and 2011. The law also increased the maximum holding from 1,500 to 2,500 ha, a measure aimed to please ruralistas and corporate interests. The law further allowed the sale of smallholder settlements, thus facilitating the concentration of land into medium and large-scale ranches (West and Fearnside 2021). In the Legal Amazon alone, this legitimization of illegal appropriations has resulted in the designation of 19.6 Mha of public lands for privatization, potentially costing the government US$23.8 billion in lost revenue, given that land prices were set as low

[4] Most of Brazil's agricultural properties are free from deforestation. A small number of farms tarnish the sector with illegal deforestation: roughly 20 percent of properties are responsible for 80 percent of potentially illegal deforestation (Rajão et al. 2020).

as 2 percent of market value (Brito et al. 2019).

The impact of both of these laws, however, would be dwarfed if the proposed "land grabbers law," PL-2633/2020, becomes law. This would allow the regularization of illegal land occupations through the granting of land titles (Fearnside 2020; Frente Parlamentar Ambientalista 2020; Brazilian Environmentalist Movement 2020). On December 10, 2019, the Bolsonaro government issued Provisional Measure (MP) 910, called the "MP of Land Regularization," which provided amnesty to those who illegally occupied public lands by legalizing, after mere self-declaration, lands appropriated between 2011 and 2018 (Sauer et al. 2019). While Congress ultimately did not approve MP 910, it became the foundation for PL-2633/2020, which may well be approved, considering the ruralista power-block in the National Congress (Carrero et al. 2020).

Forest Trends defines "illegality" in the context of the conversion of forests that takes place in contravention of the country's legislative framework (laws, regulations, instructions, and any other legal instrument that penalizes non-compliance) at the time that the clearing took place. In our estimates, land that was illegally cleared and later legitimized is counted as illegal.

2.4 Estimating the Percentage of Agro-commodities linked to deforestation that are exported

After reviewing available data, Forest Trends estimates that:

- 25% of commodities embodying deforestation were exported.

Justification

After completing an assessment of production and export data, Forest Trends concluded that Pendrill et al. (2020)'s estimate, that 25 percent of agro-conversion was exported, is sound. Beef and soy account for most of this, but plantation wood, maize, and sugar exports are also contaminated with deforestation (Pendrill et al. 2020).

Soy is the most important export-oriented crop for Brazilian agribusiness: in 2018, 80 percent of Brazil's soy production was exported, valued at more than US$33 billion (up from US$23 billion in 2013). Roughly 41 percent of the EU's soy imports come from Brazil, of which roughly 22 percent is contaminated with a deforestation risk (Rajão et al. 2020). An increasing proportion of Brazil's soy is imported by China: accounting for 70 percent of Brazilian soy exports in 2018, up from 59 percent in 2013, while the EU's proportion has decreased from 23 percent to 13 percent (COMTRADE 2020). These trends reflect China's growing demand for agricultural products, as well as the effects of the tariffs imposed by China on soy from the United States as a result of the US-China trade war during the Trump administration. As the market shifted from the EU towards China, soy producers began demanding the end of the soy moratorium. The US-China trade agreement signed in 2020, which requires China to increase its purchases from the US, may see another shift as China switches back to US sourcing (Rajão et al. 2020; COMTRADE 2020).

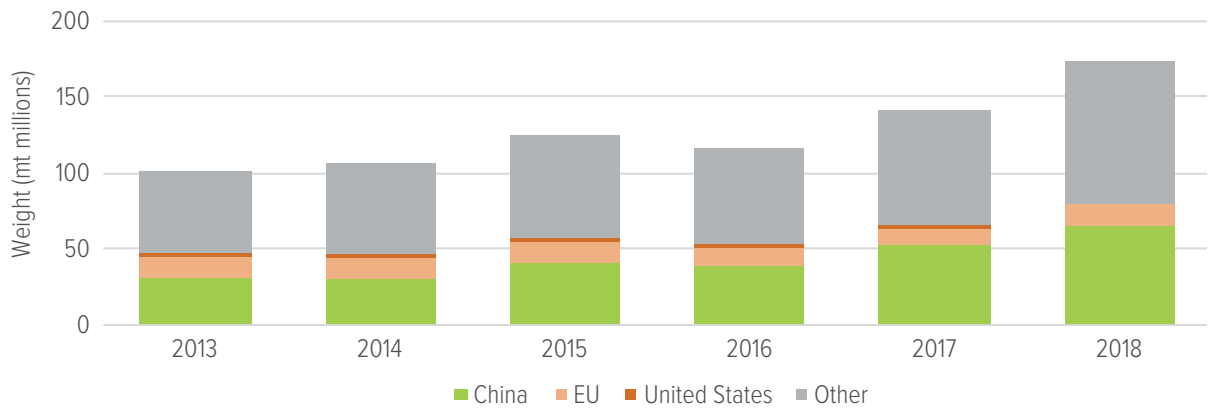
Unlike soy, the majority of cattle products are consumed on the domestic market: only 22 percent of beef is exported and 48 percent of leather (FAOSTAT 2020; Trase 2020a; COMTRADE 2020). The biggest importers of Brazilian beef are China, Hong Kong, Russia, Egypt, and Chile. Brazil was the source of 43 percent of China's beef imports in 2018, up from zero in 2013–2014 (COMTRADE 2020). Brazil's leather goes mostly to China and Italy (44 percent and 23 percent of exports, respectively) (COMTRADE 2020).[5] Live cattle exports are destined for the halal markets of Turkey, Lebanon, Jordan, and Iraq, and are associated with nearly five times more deforestation risk per tonne than for processed beef and offal (Trase 2020b).

Trase (2020a) estimates that in the three years between 2015 and 2017, 6.16 Gt of beef were exported, of which 68 percent came from the Amazon and Cerrado biomes (Trase 2020a). When compared with FAOSTAT data for total production (28.3 Gt), exports represent 22 percent of production, considerably higher than the

[5] COMTRADE's figure for Egypt's import of beef from Brazil in 2013 is replaced with Brazil's reported export of beef to Egypt due to an anomaly in the import data.

11 percent of beef exported according to COMTRADE global import data. The Trase data is preferred in this case as it combines customs, shipping, tax, logistics, and other data.

Figure 5: Imports of Brazilian Soy (Mt), reported by importing trade partners



Source: COMTRADE 2020

3 Commodity Analysis

Beef and soy are selected for the Forest Trends analysis because together they account for 75 percent of embodied deforestation in crops (Pendrill et al. 2020).

3.1 Beef and Leather

Based on its analysis, Forest Trends estimates that:

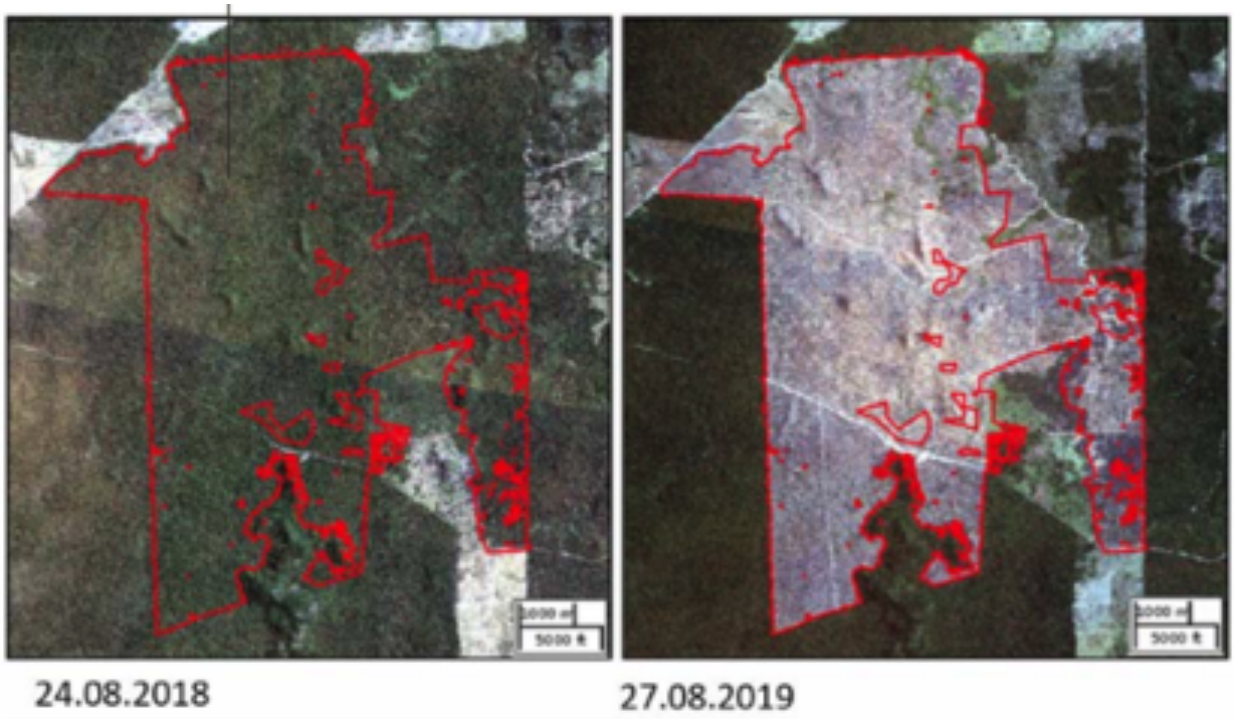
- 36% of pasture is linked to deforestation.

Justification

According to MapBiomas (2020b), in 1990, Brazil had about 136 Mha of pasture. By 2019, pasture had grown to 167 Mha, although 30 Mha of the 1990 pastureland had been converted to other uses (60 percent for crops, like soy). Of the 2019 pastureland, 59.8 Mha had been natural forest in 1990. Therefore, about 36 percent of cattle production is likely contaminated with forest loss that occurred in the last 30 years. (Presumably much of the 100 Mha of pasture that was created prior to 1990, and that remained pasture in 2019, was also on land cleared of forests, but Forest Trends did not include this area in the estimate as this deforestation is older than 30 years.) Forest Trends' 36 percent estimate is likely conservative because it assumes that cattle range uniformly across all pastureland. However, as described in this section, it may be that, in certain states, as much as two-thirds of cattle for export are linked to illegal deforestation.

A moratorium on deforestation for cattle pasture has been in place since 2009 under the beef producers' G4 zero-deforestation agreement. The moratorium was signed after the Federal Public Prosecutor's Office of Pará started to sue ranchers and the four largest meat-packing companies for illegal deforestation (Walker et al. 2013). Although illegal deforestation related to cattle ranching for direct suppliers might have been reduced between 50 to 75 percent by 2013, loopholes in the tracking system and the scattered supply chain in small

Figure 6: The largest polygon deforested in 2019, nearly 4,500 ha in Altamira, Pará



Source: Rezende de Azevedo et al. 2019

properties make it difficult to track indirect deforestation (Godar et al. 2014; Gibbs et al. 2016; Pereira et al. 2016).

The cattle supply chain involves a series of complex trades where calves are moved between multiple properties before they end up slaughtered and sold. Beef exporters rely on buying calves from smallholders who might be using pastures in areas that were recently deforested. Cattle from ranches associated with illegal invasions of public lands may be laundered into the export supply chain by moving them first to deforestation-free ranches. Illegalities are hidden behind fraudulent ("warm") transportation documents, the use of middlemen to deliver cattle to slaughterhouses, and other subterfuges (Rajão et al. 2020).

While it is difficult to track individual cattle along the supply chain, it is clear from their footprint that many pastures are still linked to deforestation. For instance, Figure 6 shows the largest area deforested in 2019, captured by the MapBiomas Alert platform using high-resolution imagery. It shows an area of about 4,500 ha that was cleared illegally in Altamira, Pará.

Using data from Trase, PRODES, the Cadastro Ambiental Rural (Rural Environmental Registry of Brazil or CAR), and Guide to Animal Transport data (GTA), Rajão et al. (2020) tracked cattle entering export supply chains from illegally deforested areas. Their findings indicate that in Pará and Mato Grosso states, the leading beef-exporting states, 60 percent of slaughtered cattle were contaminated with potentially illegal deforestation. Of this amount, 12 percent were directly from suppliers who deforested after 2008, and the remainder from indirect suppliers. They estimate that since 2008, 2.36 Mha of deforestation linked to cattle ranches in these biomes was illegal.

The percentages found by Rajão et al. (2020) are corroborated by Chain Reaction Research: for the world's three largest beef retailers, JBS, Marfrig, and Minerva (all Brazilian), between 2008 and 2019, their research tracked 1,545 direct suppliers that deforested 28,000 ha for pastures. A sample of their 3,164 indirect suppliers deforested an additional 72,600 ha, with 71 to 80 percent coming from the Cerrado and the rest from the Amazon biome (Slob et al. 2020).

3.2 Soy

Based on its analysis, Forest Trends estimates that:

- 49% of soy production is linked to deforestation.

Justification

MapBiomas (2020a) estimates that there were 36.34 Mha of soy planted in Brazil in 2019, of which 23.2 Mha was in Amazonia and the Cerrado. In total, 17.89 Mha, or 49 percent of this was from deforestation (Table 2). According to Forest Trends analysis, virtually all of this is illegal. Rajão et al. (2020) estimate that at least 20 percent of all soy exported from the Amazon and the Cerrado between 2014 and 2017 was potentially linked to illegal deforestation on the basis that deforestation without permits after 2008 (the deadline year for granting amnesty) was likely illegal. They also point out that as their analysis was based on properties registered on the CAR land registry, which covers only 80 percent of the soy planted in the region, the potential illegal deforestation could be higher.

Since 2006, large soy exporters in Amazonia have agreed to a moratorium on deforestation. It appears to have worked: 30 percent of soy expansion reportedly occurred through direct deforestation in the two years preceding the moratorium, but by 2014, only 1 percent of soy expansion was from clearing forests (Gibbs et al. 2015). While the moratorium worked in the Amazon, it may have caused deforestation to leak into the Cerrado, where there is no moratorium. That is, over the same period, up to 30 percent of the soy expansion in the Cerrado replaced native vegetation, with the Matopiba region being the hotspot where 40 percent of the expansion resulted in forest loss (Filho and Costa 2016; Gibbs et al. 2015). Indeed, the Cerrado has experienced most of the pressure for soy expansion. The Cerrado still has more than 20 Mha under native vegetation and another 31.9 Mha of land suitable for soy already cleared (especially in Matopiba) (Nepstad et al. 2019). In light of this, if a soy moratorium does not include the Cerrado, then in the next few decades, it is projected that soy could replace an additional 3.6 Mha of native forests, and a further 2.3 Mha may be deforested by ranching, which would be displaced by soy expansion (Soterroni et al. 2019).

Table 3: Soy expansion into forest in Brazil, pre-1995 to 2019

Time period	Prior to 1995 (source)	1995-2005 (source)	2005-2012 (source)	2012-2019		Total
				Cerrado (source)	Amazon (source)	
Deforestation caused by soy (Mha)	7.6 (11.7 x 65%)	7.2 (Grieg-Gran et al. 2007)	2.2 (Goldman et al., 2020)	0.64 (Mapbiomas v5 Transitions)	0.25 (Mapbiomas v5 Transitions)	17.89

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Illicit Harvest, Complicit Goods

The State of Illegal Deforestation for Agriculture

ANNEX 1 ARGENTINA CASE STUDY 2013-2019

15th in forest loss across the tropics

1% of all forest loss across the tropics

355 Mt of CO_2e Total gross emissions from tree cover loss

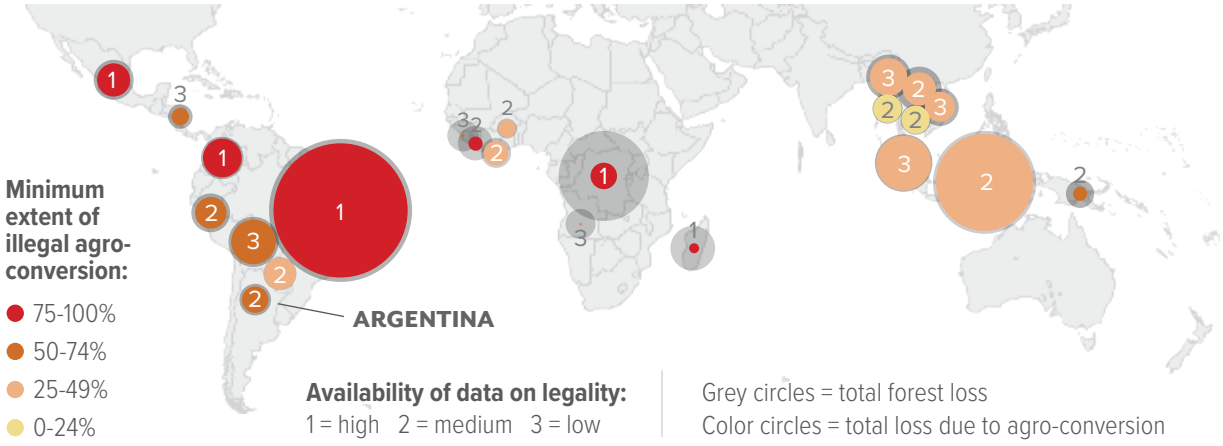
1 Mha total forest loss

of which **71%** due to commercial agriculture

of which at least **65%** likely illegal

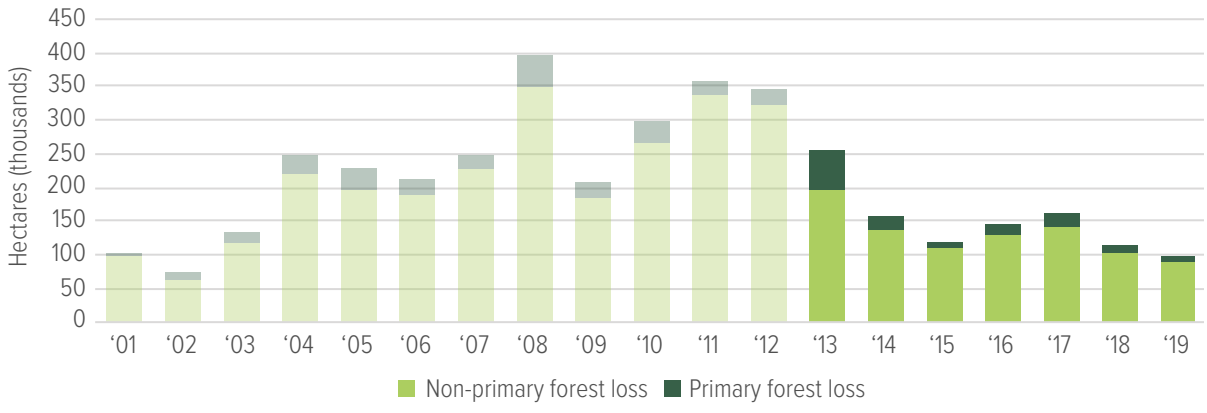
49% likely exported

Figure 1: Relative amount of tropical forest loss driven by commercial agriculture and the extent of illegal clearing.



Source: forest loss – GFW (2020, using Hansen et al. [2013]); agro-conversion – estimates compiled by Forest Trends (2021) from multiple sources, including GFW (2020, using Curtis et al. [2018]); and illegality – estimates compiled by Forest Trends (2021).

Figure 2: Annual forest loss from 2001 to 2019 for Argentina. This report covers the period highlighted (2013-2019).



Source: GFW (2020, using Hansen et al. [2013]).

BOX 1

Forest Trends Findings

- Between 2013 and 2019, commercial agriculture in Argentina was likely responsible for the clearance of more than 700,000 ha of forest.
  - Given that 49% of the agro-conversion was exported, there is a risk that international buyers may be linked to the loss of more than 360,000 ha of tropical forests.
  - At least 65% of agro-conversion is likely illegal.
- Exports in 2019 that were likely from agro-conversion:
  - US$3.2 billion in maize
  - US$1.4 billion in soy
  - US$445 million in beef
  - US$98 million in leather
- These exports carried a medium risk of being grown on illegally cleared land.

1 Introduction

Argentina's Chaco region makes up more than half of the Gran Chaco, a lowland region that stretches across Argentina, Bolivia, Paraguay, and Brazil — home to 40 different groups of indigenous peoples (Schaumberg 2020). Between 2013 and 2019, 66 percent of Argentina's forest loss took place in the provinces of Chaco, Santiago del Estero, Salta, and Formosa, which sit within the Chaco region (GFW 2020, using Hansen et al. 2013).

2 Deforestation Analysis

2.1 Deforestation 2013–2019

Between 2013 and 2019, Argentina lost 5 percent of its 2000 forest cover. Argentina saw its forest loss peak in 2013, at 253,703 ha (GFW 2020 using Hansen et al. 2013). Among the top 20 tropical countries with the highest amount of forest loss, Argentina and Paraguay were the only two that reportedly saw their annual rates of forest loss decrease after 2013 (GFW 2020). The FAO FRA (2020) reports a similar pattern

For the purposes of this study only the following were considered:

- **Forests:** areas with greater than 50% tree cover
- **Forest loss / Deforestation:** complete removal of forest cover
- **Illegal:** deforestation that was, at time that the clearing took place, in contravention of the country's legislative framework governing forest conversion

BOX 2

Soy Expansion Drives Deforestation in South America

A common pattern in Brazil, Argentina, and Paraguay is that forest is first cleared for cattle ranching and shortly afterwards is sold or rented out for more lucrative soy production. Soy rarely replaces forest directly. However, soy expansion is the underlying motivation for deforestation given that it pushes cattle ranching into frontier areas such as the Chaco, driving land-use change. The arrival of a high-value crop such as soy can also drive up local land prices and thereby incentivize the clearing of surrounding forested land (Fraanje and Garnett 2020; Gollnow et al. 2018).

In Argentina, many farmers have come to the Chaco region from the provinces of Santa Fe and Córdoba. They are predominantly successful soy producers who are able to sell their small (200 ha to 300 ha) farms for up to US$20,000 per hectare. They invest in much cheaper land in the Chaco, such as the province of Santiago del Estero, buying at only US$200 to US$300 per hectare. In Santiago del Estero, approximately 75 percent of peasants do not hold formal titles to the land they live and work on, rather they hold their farms under possession status. Many have been dispossessed of their land through a range of tactics including enclosure, legal disputes, violent evictions, intimidation, killing of their livestock, pollution of water and soil, and the illegal of clearance of forests—all without their consent (Goldfarb and van der Haar 2015).

for Argentina, with an annual average of 242,400 ha in the period 2010 to 2015, reduced to 134,800 ha per year for the period 2015 to 2020.

2.2 Drivers of deforestation

Forest Trends findings

Forest Trends' analysis on the extent and nature of forest loss in Argentina between 2013 and 2019 is based on an extensive review of existing literature and data, including research from Global Forest Watch (2020), Pendrill et al. (2020), and REDD+ (SAyDS 2014, FCPF 2019). After reviewing all available data, Forest Trends' best estimate is that:

- At least 71% of deforestation was driven by commercial agriculture.

Justification

According to the GFW driver analysis (GFW 2020, using Curtis et al. 2018), 71 percent of forest loss between 2013 and 2019 was for commercial agriculture. The Pendrill et al. (2020) land balance model uses a different methodology, analyzing the loss of forests (with >25 percent tree cover) and land-use change; and between 2013 and 2017, they estimated that 64 percent of deforestation was embodied in crops. The REDD+ driver analysis also identifies large-scale agriculture as the main driver of deforestation, particularly soybean expansion and growth in biofuels. The agribusiness model, the use of genetically modified crops (such as the Roundup Ready soybeans), the high price of commodities, and the displacement of livestock from the Pampas region are identified as contributing factors (SADyS 2014; FCPF 2019; Gabinete Nacional de Cambio Climático 2017).

Three crops are responsible for 74 percent of embodied deforestation: maize, beef, and soy (GFW 2020, using Pendrill et al. 2020). While most soy expansion took place in the 1990s and 2000s, the area sown with soy reached a peak in 2012 at 2 million hectares (Mha) and has since been declining, to 1.7 Mha in 2017 (the most recent year on record: Minsterio de Agricultura, Gandería y Pesca 2020). Maize cultivation was relatively

steady at 3 Mha in the 1990s and 2000s but saw a rapid increase in area beginning in 2010, up to 9 Mha by 2017 (Minsterio de Agricultura, Gandería y Pesca 2020). The general pattern is that crop expansion replaces pasture, pushing cattle ranching into forested areas (Gasparri et al. 2013; Gabinete Nacional de Cambio Climático 2017).

2.3 Estimating illegality linked to agro-conversion

After reviewing all available data, Forest Trends' most conservative estimate is that:

- At least 65% of deforestation for commercial agriculture was likely illegal.

Justification

Argentina's Forest Law 2007 requires land to be zoned based on its conservation value (high, medium or low). In 2018, this process had been completed for about 54 Mha of forest, approximately 19 percent of the country's land area (Gutman 2018). Regardless, in 2016 and again in 2017, deforestation in red and yellow zones, where clearing is not permitted, was 50 percent of all deforestation. When including forest loss from lands that have not been zoned, which is also in contravention of the Forest Law, the proportion of illegal deforestation increases to c.65 percent (Table 1; Greenpeace Argentina 2018).

The rates of illegal deforestation are even greater in some provinces: in Santiago del Estero between 2009 and 2014, 74 percent of deforestation was illegal, either because it occurred in forbidden areas, or because it surpassed the permitted levels (Camba Sans 2020). Likewise, the province of Salta has been particularly criticized for its abuse of the land zoning system by re-categorizing yellow zones to allow deforestation. In 2014, the National Audit Office suspended all re-categorizations and declared the re-zoning of 144,984 ha in Salta to be illegal. However, the provincial government re-zoned a further 67 farms covering 51,768 ha of forest (Greenpeace Argentina 2018a). This is equivalent to more than double the annual total deforestation in Salta province in 2017 (20,465 ha). The Ministry of Environment and Sustainable Development ruled in early 2018 that the re-zoning of forest land by provinces was illegal, and ordered the cancellation of permits and the restoration of cleared areas (Earthsight 2018; Greenpeace Argentina 2018b).

Argentina's Constitution recognizes indigenous land rights but in practice indigenous communities' rights are ignored (Schaumberg 2020). In 2020, the Inter-American Court of Human Rights (IACHR) made a landmark ruling in favour of Lhaka Honhat, an organization supporting indigenous land rights, finding that the state had violated the rights of the indigenous communities and their rights to community property, and that the state had failed to take effective action to stop activities that were harmful to the communities (Tigre 2020). A few years earlier, Lhaka Honhat had won the right to a single collective title to 400,000 ha in Rivadavia department, Salta province; it was only a fraction of the 1.6 Mha under dispute in Salta province and the 9.3 Mha under dispute nationally (Schaumberg 2020). The IACHR judgment set an important precedent, establishing guidelines for restitution and compensation, and meaning that harm to the environment could potentially be justiciable (Tigre 2020; Cabrera et al. 2020). It remains to be seen how Argentina will provide

Table 1: Deforestation in Argentina by zone

	Red zone	Yellow zone	Green zone	Un-zoned	Total	Red + yellow as % of total deforestation	Red + yellow + unzoned as % of total
2016	3,746	54,535	50,861	27,328	136,473	43%	63%
2017	3,243	83,211	60,736	25,449	172,639	50%	65%

Source: Greenpeace Argentina 2018b

remedy for locals associated with the 9.3 Mha under dispute. More research on illegality and a sector-wide audit of compliance are clearly needed, and in their absence it is not possible to rule out a worst case scenario in which all deforestation for commercial agriculture is illegal.

2.4 Estimating the percentage of agro-commodities linked to deforestation that are exported

After reviewing available data, Forest Trends estimates:

- 49% of commodities embodying deforestation are exported.

Justification

After completing an assessment of production and export data, Forest Trends concluded that the estimate by Pendrill et al. (2020), that 49% of agro-conversion was exported, is sound. Drought in the period 2016 to 2018 led to a 50 percent decline in soy exports, although production in the Chaco remained steady (OEC 2020; Trase 2020). In fact, 20 percent of soy exports go to the EU, China is the second biggest destination, with 6% going to the United Kingdom. Much is sourced from the Chaco, where the deforestation risk is concentrated (COMTRADE 2020; Trase Insights 2020). Soy traders with and without Zero Deforestation Commitments have a similar exposure to deforestation risk (Trase Insights 2020).

Beef and leather, soy, and maize are selected for the Forest Trends analysis because together they account for 66 percent of exported embodied deforestation in crops (Pendrill et al. 2020).

3 Commodity Analysis

3.1 Beef and Leather

Based on its analysis Forest Trends estimates that:

- 14% of cattle pastures are linked to deforestation.

In 2018 there were 7.5 million cattle in the Chaco provinces in pasture cleared from forests. This is 14 percent of the total national herd of 55.2 million (Greenpeace Argentina 2019; USDA GAIN 2017), so it is assumed that at least 14 percent of cattle displace forest. A study of the distribution of cattle in the Chaco, using vaccination data and land cover information, also identified that 14 percent of the cattle stock occurs in woodland-dominated landscapes (Fernandez et al. 2020). Between 2001 and 2015, 1,765,852 ha of forest was replaced by pasture, representing 34 percent of forest loss during the same period (Goldman et al. 2020; GFW 2020). Between 2013 and 2017, beef embodied 201,154 ha of deforestation, 25 percent of all embodied deforestation, of which 12,217 ha was exported (Pendrill et al. 2020).

Argentina increased its herds by about 1 million head a year from 2010 (USDA GAIN 2017). Between 2017 and 2018, Argentine beef exports rose by 62 percent to 24 percent of total production (FAOSTAT 2020; COMTRADE 2020). The main importing countries in 2019 were China (60 percent), Russia (10 percent), Germany (4 percent), Israel (5 percent), Netherlands (2 percent), Brazil (2 percent), Chile (1 percent), and Italy (1 percent) (COMTRADE 2020).

3.2 Soy

Based on its analysis Forest Trends estimates that:

- 9% of soy production is linked to deforestation.

It is estimated that 9 percent of Argentina's soy expansion was onto forested land (Kuepper and Riemersma 2019). In total, 1.8 Mha of forest was replaced by soy between 2001 and 2015 (Goldman et al. 2020), and the

total extent of soy cultivation in Argentina was more than 19.3 Mha in 2015; thus, it is likely that 9 percent of soy replaced forest (FAOSTAT 2020). The deforestation risk is much higher in the Argentinian Chaco: there was likely 1 ha of deforestation risk for every 1,000 mt of soy exported (Trase 2020).

3.3 Maize

Based on its analysis Forest Trends estimates that:

- 52% of maize production is linked to deforestation.

In 2017, 25.6 Mt of maize exports from Argentina were forest risk (Trase 2018), out of a total production of 49 Mt; therefore, 52 percent of production replaced forest (FAOSTAT 2020). Between 2013 and 2017, 234,772 ha of deforestation was embodied in maize, or 29 percent of all embodied deforestation (Pendrill et al. 2020). Argentina is the world's third largest exporter of maize and 17 percent of its cropland is dedicated to maize. Like soy, the cultivation of maize is highly dependent on fertilizers, fuels, machinery, and pesticides (Arrieta et al. 2018).

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Illicit Harvest, Complicit Goods

The State of Illegal Deforestation for Agriculture

ANNEX 1 BOLIVIA CASE STUDY 2013-2019

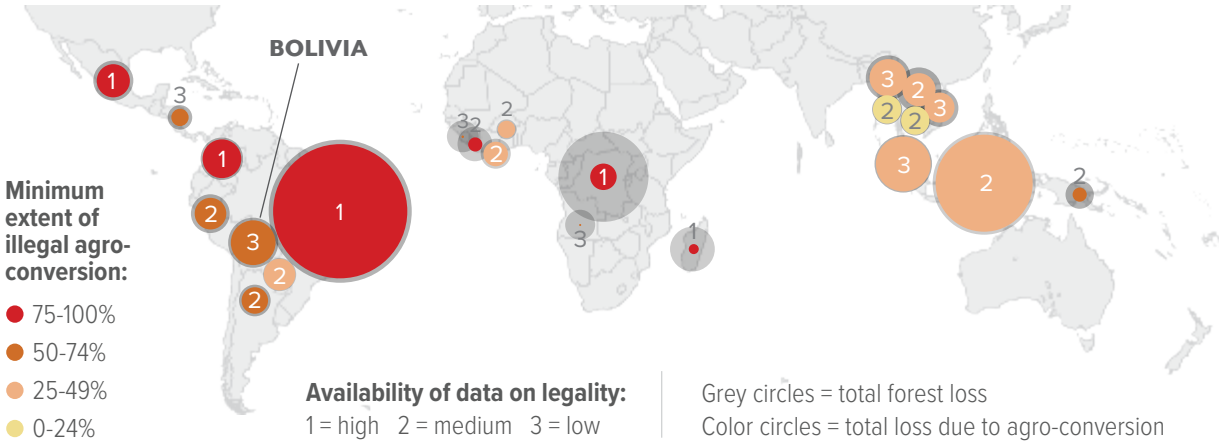
5th in forest loss across the tropics

3% of all forest loss across the tropics

1.1 Gt of CO_2e Total gross emissions from tree cover loss

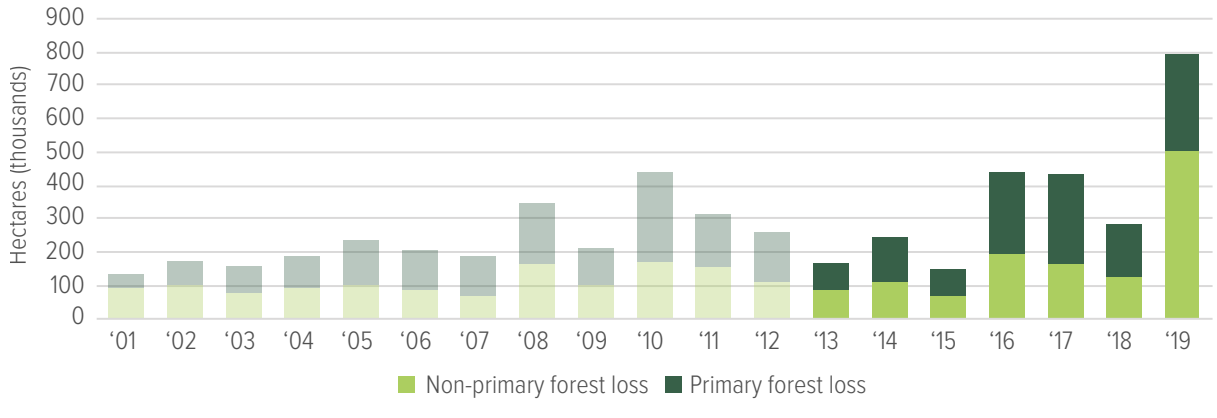
2.5 Mha total forest loss → of which **80%** due to commercial agriculture → of which at least **74%** likely illegal; **7%** likely exported

Figure 1: Relative amount of tropical forest loss driven by commercial agriculture and the extent of illegal clearing.



Source: forest loss – GFW (2020, using Hansen et al. [2013]); agro-conversion – estimates compiled by Forest Trends (2021) from multiple sources, including GFW (2020, using Curtis et al. [2018]); and illegality – estimates compiled by Forest Trends (2021).

Figure 2: Annual forest loss from 2001 to 2019 for Bolivia. This report covers the period highlighted (2013-2019).



Source: GFW (2020, using Hansen et al. [2013]).

BOX 1

Forest Trends Findings

- Between 2013 and 2019, commercial agriculture in Bolivia was likely responsible for the clearance of 2 Mha of forest.
  - Given that 7% of Bolivia's agro-conversion was exported, there is a risk that international buyers may be linked to the loss of 140,000 ha of tropical forests.
  - At least 74% of agro-conversion is likely illegal.
  - US$471 million in soy that was likely from agro-conversion was exported in 2019 alone.
  - These exports carried an unknown risk of being linked to illegal deforestation, but given the high regional average, enhanced due diligence is clearly required.

1 Introduction

Bolivia had more than 50 million hectares (Mha) of forest covering 47 percent of its area in 2020 (FAO FRA 2020). The main biomes are the Amazonian Forests, the Chiquitanian Forests and the Chaco Forests. There is a national network of 22 protected areas covering 16 percent of the country, but these are at increasing risk of commodity-driven deforestation (Romero-Muñoz et al. 2019b). Bolivia's constitution promotes a community-centric and ecologically balanced approach to development, but the Evo Morales administration (2005-2019) introduced laws that prioritized road development, hydrocarbon exploration, and industrialized agriculture at the expense of the country's forest and of those who rely on the forest for their lives and livelihoods (Romero-Muñoz et al. 2019b).

2 Deforestation Analysis

2.1 Deforestation 2013–2019

Bolivia has become a deforestation hotspot in South America. Forest loss in 2019 was an 80 percent increase on the next highest year on record (2016), largely due to fire (Weisse and Goldman 2020). According to the Fundación Amigos de la Naturaleza's fire monitoring service, the dry Chiquitano Forest lost 858,099 ha of forest to fire in 2019, nearly half in the province of Santa Cruz, which is the epicenter

For the purposes of this study only the following were considered:

- **Forests:** areas with greater than 50% tree cover
- **Forest loss / Deforestation:** complete removal of forest cover
- **Illegal:** deforestation that was, at time that the clearing took place, in contravention of the country's legislative framework governing forest conversion

of large-scale agriculture (FAN 2019). In 2020, the permit system for smallholders to burn land in a controlled way was suspended due to COVID-19 restrictions, and fires burned over 1 Mha of land as farmers took advantage of the suspension to deforest land on a large scale (Moloney 2020).

2.2 Drivers of deforestation

Forest Trends findings

Forest Trends' analysis on the extent and nature of forest loss in Bolivia between 2013 and 2019 is based on an extensive review of existing literature and data, including research from Global Forest Watch, Pendrill et al. (2020), and the academic literature. After reviewing the available data Forest Trends' best estimate is that:

- At least 80% of deforestation was driven by commercial agriculture.

Justification

The GFW driver analysis on (GFW 2020, using Curtis et al. 2018) identifies that 80 percent of forest loss was driven by commercial agriculture. FAO FRA (2020) also reports that the cause of forest loss is predominantly land-use change and "disorderly occupation" for agricultural expansion. This reflects a continuation of the pattern identified by Müller et al. (2013) who found that between 1992 and 2004, mechanized agriculture was responsible for 54 percent of forest loss, cattle ranching for 27 percent, and small-scale agriculture for 19 percent.

The province of Santa Cruz accounts for four times as much forest loss as any other province, and in the fires of 2019, nearly 12 percent of the Chiquitano dry forest burned (GFW 2020; Romero-Muñoz et al. 2019a). The fires are a sign of expanding cattle ranching and soybean agriculture: more than 70 percent of the burned area overlaps with agricultural expansion into the forest (Romero-Muñoz et al. 2019a), and there was evidence that the fires were ignited by people (Hinojosa 2019). Further, coca cultivation has caused deforestation in national parks, most notably along the roads that cut through Bolivia's iconic park, the Isiboro-Sécure National Park and Indigenous Territory that strategically straddles the Andes and Amazonia (Fernández-Llamazares et al. 2018).

To the south of the Chiquitano dry forest, in the dry Chaco forest, cattle ranching was the dominant direct driver of deforestation. The Chaco is the preferred area for pasture, because it is only marginally suited for soybean cultivation, is better suited for industrialized ranching, and it costs less to prepare the land for cattle ranching than for crop production. Soybean cultivation in the Argentine Chaco may be an indirect driver of deforestation in the Bolivian (and Paraguayan) Chaco: soybean expansion over former pasture in Argentina generates profits which are invested in pasture expansion in Bolivia and Paraguay (Fehlenberg 2017).

2.3 Estimating illegality linked to Agro-conversion

- The available evidence does not allow Forest Trends to make a rigorous estimate of the percentage of agro-conversion that was illegal, but there is considerable circumstantial evidence to suggest that much of the clearing was illegal.

Bolivia's Constitution recognizes the inalienable collective property rights of Indigenous Peoples, and Bolivia ratified the United Nations Declaration on the Rights of Indigenous Peoples; however, in practice, customary rights to access and use forestlands are either largely ignored or are actively denied (WRI 2014). Neither protection status nor indigenous ownership (of their territories) guarantees the conservation of forest, as demonstrated by the law passed in 2017 downgrading the legal protection of the Isiboro-Sécure National Park and Indigenous Territory, and authorizing the construction of a road through its core (Fernández-

Llamazares 2018).

In 2012, President Morales rejected the REDD+ programme because he opposed the commodification of nature, and he developed an alternative framework that focused on sustainable commodity production, including fines and sanctions for non-compliance and illegal forest conversion (Plurinational State of Bolivia 2012; González 2017). Promises to defend smallholder and indigenous rights, and to curb deforestation were nonetheless broken when he allowed foreign land acquisitions and favoured the interests of the powerful commercial agricultural sector (le Polain de Waroux et al. 2018). The Morales administration legalized deforestation and controlled burns in lowland forests (Supreme Decree 3973), and passed a law allowing biofuel production and associated cropland expansion (Law 1098). One large sugarcane plantation owned by Empresa Azucarera San Buenaventura cleared more than 1,000 hectares of forest in 2016, some of it primary forest, as part of the national plan to expand sugarcane to 350,000 ha (Erickson-Davis 2016; Romero-Muñoz et al. 2019b).

In 2010, Bolivia passed the Law of the Rights of Mother Earth, granting Mother Earth the right to life, biodiversity, clean water and air, equilibrium, restoration, and pollution-free living, and requiring the state and society to protect those rights (WRI 2014; Romero-Muñoz et al. 2019). Nonetheless, a year later, Law 337 facilitated the expansion of agriculture by providing immunity from fines for clearing until the end of 2011. Rather than face steep fines, Law 337 required landowners who illegally deforested prior to 2011 either to reforest or to establish productive agriculture on the land and to pay reduced fines (WRI 2014). The law came into force in 2013. At the time there was an annual rate of forest loss of approximately 200,000 ha per year, and subsequently, this rate doubled in 2016 and 2017, and doubled again in 2019 (GFW 2020, using Hansen et al. 2013).

Soon after Morales resigned in November 2019, the legislative assembly of Beni, a lowland region, approved a law that opened 42 percent of its land to farming and industrial activities. Shortly thereafter, Beni's Indigenous People declared a state of emergency (Rodrigues and Inturias 2020). When Luis Arce won the presidential election in 2020, conservation and environmental groups appealed for action to stop wildfires and deforestation (Moloney 2020).

There are no data on how much agro-conversion in Bolivia is illegal. Bolivia's laws and policies favour soy and pasture expansion, but the legal framework has contradictions, and we could find no public reporting of monitoring of compliance with laws and regulations. Given the issues raised above, however, it is likely that a great deal of clearing is in violation of Bolivia's laws and regulations, and certainly in violation of the rights of Indigenous People. As outlined, indigenous people have frequently called for protection from government-enabled deforestation. In fact, Bolivia implicitly acknowledged the existence of illegal clearing when Law 337 provided immunity for illegal clearing prior to 2011. We do not know whether compliance has improved since then, but we do know that the total amount of deforestation is dramatically higher. Without official investigations of compliance by concessionaires and without formal audits, there is no basis for estimating the percentage of clearing that was conducted illegally. It can only be assumed that in the best case—however, unlikely that is—everything is legal, while the worst case would be that everything is illegal. For the global analysis, Forest Trends assumes Bolivia's actual rate is the same as the regional average. Clearly government audits are required to identify the actual level of illegality of agro-conversion in Bolivia.

2.4 Estimating the percentage of agro-commodities linked to deforestation that are exported

After reviewing the available data Forest Trends estimates:

- 7% of commodities embodying deforestation are exported.

Justification

Beef embodies most deforestation (72 percent) driven by commodities, and all of it is consumed on the domestic market. Of the export commodities associated with deforestation, soy is responsible for more than half of deforestation, followed by quinoa (16 percent), and beef (13 percent) (Pendrill et al. 2020). Two-thirds of Bolivia's national soybean production is exported, as is 37 percent of leather, and none of its beef (FAOSTAT 2020; COMTRADE 2020). Pendrill et al. (2020) estimate that 7 percent of commodities embodying deforestation are exported.

3 Commodity Analysis

Soy is selected for the Forest Trends analysis because it accounts for 53 percent of exported embodied deforestation in crops (Pendrill et al. 2020).

3.1 Soy

Based on its analysis, Forest Trends estimates that:

- 52% of soy production is linked to deforestation.

Between 2005 and 2015, soy displaced 708,423 ha of forest, which represents 52 percent of soy cultivation in 2018 (1.4 Mha) (Goldman et al. 2020; FAOSTAT 2020).

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Illicit Harvest, Complicit Goods

The State of Illegal Deforestation for Agriculture

ANNEX 1 COLOMBIA CASE STUDY 2013-2019

9th in tropical forest loss

2% of all tropical forest loss

1 **Gt of CO_2e** Total gross emissions from tree cover loss

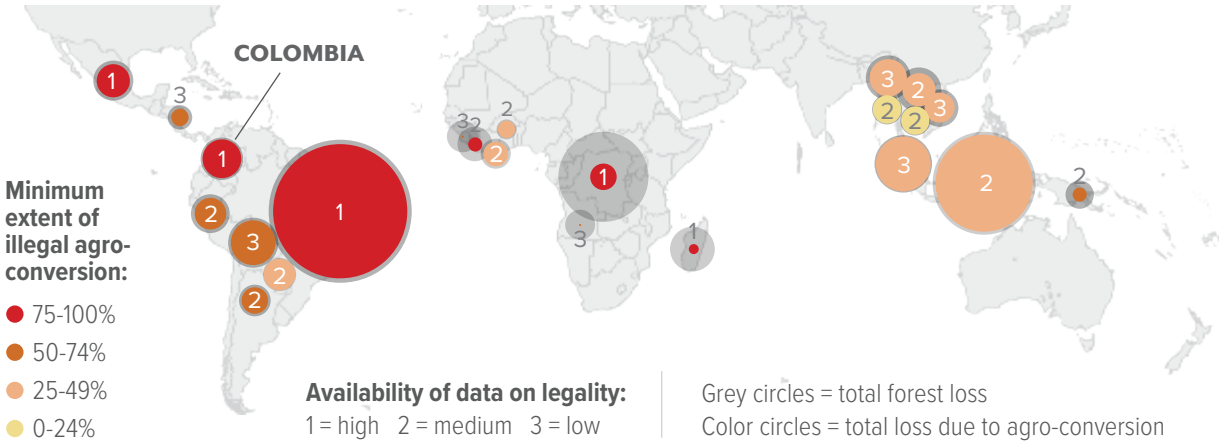
1.8 Mha total loss of tropical forests

of which **84%** due to commercial agriculture

of which at least **89%** likely illegal

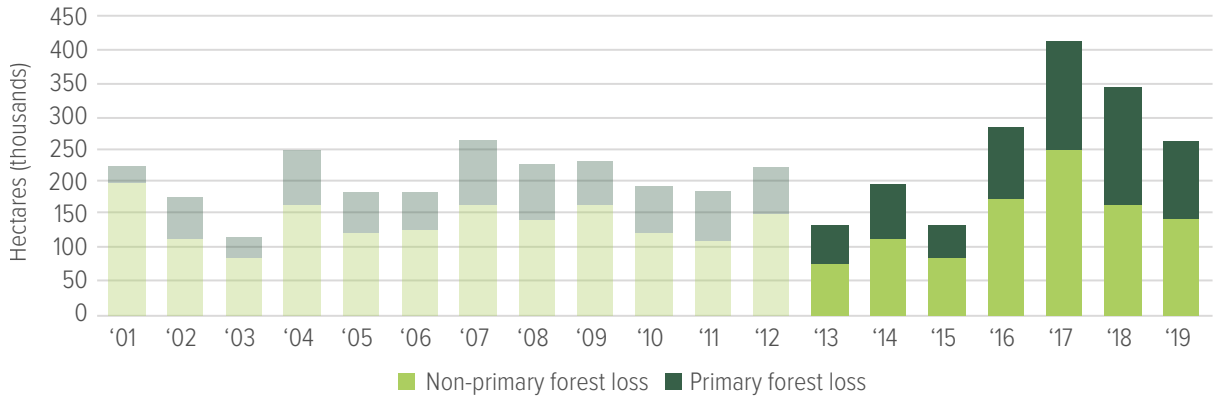
4% likely exported

Figure 1: Relative amount of tropical forest loss driven by commercial agriculture and the extent of illegal clearing.



Source: forest loss – GFW (2020,, using Hansen et al. [2013]); agro-conversion – estimates compiled by Forest Trends (2021) from multiple sources, including GFW (2020 using Curtis et al. [2018]); and illegality – estimates compiled by Forest Trends (2021).

Figure 2: Annual forest loss from 2001 to 2019 for Colombia. This report covers the period highlighted (2013-2019).



Source: GFW (2020, using Hansen et al. [2013]).

BOX 1

Forest Trends Findings

- Between 2013 and 2019, commercial agriculture in Colombia was likely responsible for the clearance of more than 1.5 Mha of forest.
  - Given that 4% of the agro-conversion was exported, there is a risk that international buyers may be linked to the loss of more than 59,000 ha of tropical forests.
  - At least 89% of agro-conversion is likely illegal.
  - Exports carried a high risk of being linked to illegal deforestation.

1 Introduction

More than half (53 percent) of Colombia is covered in forest and nearly 14 percent of the world's biodiversity is found within its borders. The most heavily forested areas are in the Choco-Darien region along Colombia's Pacific coast and in the Amazon region. The temperature, rainfall and climate vary hugely between the coast on the west, the Amazon basin in the east, and the high altitude forests of the Andes. More than 12 million hectares (Mha) (21 percent) of forest are in protected areas, up from 9 Mha in 2000, and 46 percent are in indigenous reserves and 7 percent in Afro-Colombian communal territories (WWF 2015; FAO FRA 2020; Selibas 2020a).

2 Deforestation Analysis

2.1 Deforestation 2013–2019

Between 2013 and 2019, Colombia lost 1.8 Mha of forest, or more than 2 percent of the total forest in 2000. There was a dramatic 201 percent jump in forest loss between 2015 and 2017 when Colombia's peace agreement was finalized, signed and began implementation (GFW 2020, using Hansen et al. 2013). The conflict had in some ways protected the forest, as people were forced to flee from rural to urban areas, and forest regrew on abandoned farms (Salazar et al. 2018). After the peace agreement was signed, large landowners and armed groups moved into areas in the Amazon where guerrilla groups had vacated and the government had no presence (Paz Cordona 2019). In particular, protected areas were badly affected, because in many locations park guards, who were already few in number for huge areas, were displaced

For the purposes of this study only the following were considered:

- **Forests:** areas with greater than 50% tree cover
- **Forest loss / Deforestation:** complete removal of forest cover
- **Illegal:** deforestation that was, at time that the clearing took place, in contravention of the country's legislative framework governing forest conversion

or evacuated after being threatened by armed groups (Selibas 2020b). In 2018, deforestation in the National Natural Parks was 12 percent of the national total, although down to 7 percent by 2019 (Minambiente 2020; Minambiente 2019; Paz Cardona 2019). In the first quarter of 2020, forest loss in the Amazon recorded an 83 percent increase compared to the same period in 2019, disappointing hopes that the downward trend initiated in 2019 would be continued. The increase was apparently tied to new roads opening, illegal agro-conversion and appropriation of forests by "powerful forces" (Botero 2020).

2.2 Drivers of deforestation

Forest Trends findings

Forest Trends' analysis on the extent and nature of forest loss in Colombia between 2013 and 2019 is based on an extensive review of existing literature and data, including research from Global Forest Watch (2020), Pendrill et al. (2020), and Ministry of Environment and Sustainable Development (Minambiente 2017). After reviewing all available data Forest Trends' best estimate is that:

- At least 84% of deforestation was driven by commercial agriculture.

Justification

The 84 percent estimate is based on the Ministry of Environment and Sustainable Development (Minambiente) estimate that 60 to 65 percent of forest loss is due to illegal land grabbing under the guise of cattle ranching, and a further 20 to 22 percent is illegal coca farming, with industrial agriculture also contributing (Minambiente 2017). The mid-point for the sum of these figures is 84 percent. The numbers mirror the National Policy for the Control of Deforestation and Sustainable Management of Forests, which also identifies agriculture as the main driver, including traditional farming, large-scale livestock production, industrial agriculture and coca production (CONPES 2020).

In comparison, the Curtis et al. (2018) driver analysis on Global Forest Watch (GFW) is more conservative, estimating that only 37 percent of tree cover loss is commodity-driven (a further 58 percent is estimated to be driven by shifting agriculture). The GFW estimate is the same as Pendrill et al.'s (2020) calculation that 37 percent of tree cover loss is embodied in crops. However illicit crops and conversion for pasture motivated by land grabbing are not included in these estimates, nor do these methodologies reliably capture small-scale farming (Appendix 1, Forest Trends 2021).

Land grabbing is the underlying driver of deforestation, and cattle ranching on cleared land is often really just a strategy to claim possession of the land (González et al. 2018; Clerici et al. 2020). Land prices have rocketed by as much as 300 percent in some areas, creating a speculative market that rewards such land grabbing (Volckhausen, 2019). The low cattle densities on new pastures are an indication that the real motivation is land grabbing or laundering of illegal assets (González et al. 2018). Rural settlers and small-scale farmers sell deforested land, in some cases opportunistically and in others under pressure from criminal gangs, to larger agricultural producers (Clerici et al. 2020). Most conversion for pasture occurs in the Amazon region (González et al. 2018). In the municipalities around Chiribiquete, the world's largest tropical rainforest national park, more than 300,000 ha have been deforested over the past five years, and more than 650,000 new head of cattle graze there. More than 1,500 km of roads have been built to consolidate the land grab (Botero 2020).

The types of agro-conversion are diverse across Colombia's different regions. An analysis in 2017 identified livestock expansion and land grabbing in the Amazon region; a mixture of small-scale agriculture, pasture and illicit coca production in the North, Central, and South Pacific regions and the Andean Central North region; and a mixture of commercial agriculture including oil palm expansion as well as pasture for livestock in Mapiripán, between the Andes and the Amazon (El Espectador 2018). Areas targeted by the government

for commodity expansion, such as the eastern Orinoquía region, are predicted to see increased deforestation rates in the coming years (Furumo and Lambin 2020).

Palm oil accounted for only 1.5 percent of deforestation between 2011 and 2017, of which 83 percent occurred in the departments of Santander, Bolívar and Norte de Santander (Cabrera et al. 2020). But palm oil cultivation grew by 41 percent between 2005 and 2015, and Colombia established itself as Latin America's leading producer, contributing 2 percent of world palm oil production (COMTRADE 2020; FAOSTAT 2020; Gonzalez et al. 2018). Zero Deforestation Agreements cover four sectors, including palm oil, dairy, meat and cocoa sectors, and are a first step towards greater transparency in supply chains (CONPES 2020; Minambiente 2020).

As Colombia transitions to peace, coca cultivation is associated with more forest loss; up to 27 percent of the area cultivated with coca between 2006 and 2019 was tied to deforestation in peaceful locations, compared to 10 percent in areas of high intensity conflict (Mendoza 2020). Coca is both a direct and indirect driver of deforestation, as plots can be subject to eradication programmes, such as aerial spraying, which degrade forest remnants (Davalos et al. 2011). Financed through illegal markets, coca production increased by 58 percent in the Amazon region from 2015 to 2016, the most recent data available (UNODC 2017; de Wilde 2018).

2.3 Estimating Illegality Linked to Agro-conversion

After reviewing available data Forest Trends' most conservative estimate is that:

- At least 89% of deforestation for commercial agriculture was likely illegal.

Justification

The Forest Trends estimate of agro-conversion is based on the figures for illegal land grabbing under the guise of pasture expansion (responsible for 60 to 65 percent of forest loss); illegal coca production (20 to 22 percent); and an unspecified amount of industrial agriculture (Minambiente 2017). According to Pendrill et al. (2019), wood plantations, coffee and palm oil together account for 5 percent of agro-conversion, and other crops for a further 6 percent. There is no data on illegality in these sectors, so the Forest Trends estimate is that all except 11 percent is illegal, given that land grabbing and coca cultivation are both illegal.

There is a perception among many in Colombia that forest is land without real economic value and until the law was changed in 2018, converting forest into agriculture was a way of claiming land title. Now, forest must be de-zoned out of the forest reserve zone before land title is granted. However, the three departments with the highest rates of deforestation (Santander, Norte de Santander and Choco) have granted title to more than 2 Mha of land that is still in the Forest Reserve Zone, of which more than 40,000 ha have already been deforested (CONPES 2020).

Additional cases of illegality have been documented, such as when the Revolutionary Armed Forces of Colombia (FARC) dissident groups extort landowners to pay a fine or a tax per hectare that is deforested. Sometimes criminal groups operate in alliance with FARC dissidents, and mobilize families to move to remote forest areas, and pressure local authorities to issue land titles (Kjelstad and Puerta 2019). Global Witness (2020) ranked Colombia in 2019 as the most dangerous place in the world to be an environmental defender, with a shocking 64 activists killed that year.

The Constitution of Colombia recognizes the collective title of Indigenous People to their land, and almost 30 percent of the country is designated as reserves that are inalienable and autonomously governed; in total over half of forestland is collectively owned by Indigenous Peoples and Afro-Colombian communities (Minambiente 2017). Despite this, 13 percent of deforestation between 2000 and 2018 was in indigenous

reserves and 7 percent was in collective community forest (CONPES 2020). According to national and international law, Indigenous Peoples have the right to Free, Prior, and Informed Consent (FPIC) with regard to decisions concerning their lands, but this right has been routinely abused (Litvinoff and Griffiths 2014). In some regions, brutal methods have been employed by agribusiness companies and land grabbers to force people to sell or to move off the land. These methods include poisoning community water sources, the slaughter of livestock and horses, kidnappings, death threats, sexual violence, and 'the disappearances' of community leaders (Litvinoff and Griffiths 2014).

2.4 Estimating the percentage of commodities linked to deforestation that are exported

After reviewing the available data Forest Trends estimates:

- 4% of commodities embodying deforestation are exported.

The majority of Colombia's agro-conversion is consumed on the domestic market: beef, wood products from plantations, rice, and even palm oil; only 6 percent of palm oil was exported between 2013 and 2018 (COMTRADE 2020; FAOSTAT 2020). Coffee and cocoa are grown for export but they are responsible for 5 percent and 2 percent of embodied deforestation respectively, of which 82 percent and 66 percent are exported (Pendrill et al. 2020). Colombia's 154,000 ha of coca cultivation in 2019 would have produced 1,137 mt of cocaine for export (Colombia Reports 2019).

Most cattle ranching takes place in the natural regions of the Amazon and Orinoquía. The government strategy for deforestation (CONPES 2020) reports that 50 percent of new land in the Amazon (converted between 2005 and 2012) was for cattle. Of the national herd, 59 percent of cattle is used for beef, 35 percent is for beef and dairy, and 6 percent is for dairy (de Wilde et al. 2018). All of the beef is consumed domestically, and only 8 percent of dairy is exported (COMTRADE 2020; de Wilde et al. 2018)

Given this, while perhaps conservative, Forest Trends uses the Pendrill et al. (2020) estimate that 4 percent of illegal deforestation for commercial agriculture was linked to exports.

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Illicit Harvest, Complicit Goods

The State of Illegal Deforestation for Agriculture

ANNEX 1 HONDURAS CASE STUDY 2013-2019

29th in tropical forest loss

1% of all tropical forest loss

285 Mt of CO_2e Total gross emissions from tree cover loss

0.6 Mha total forest loss

of which

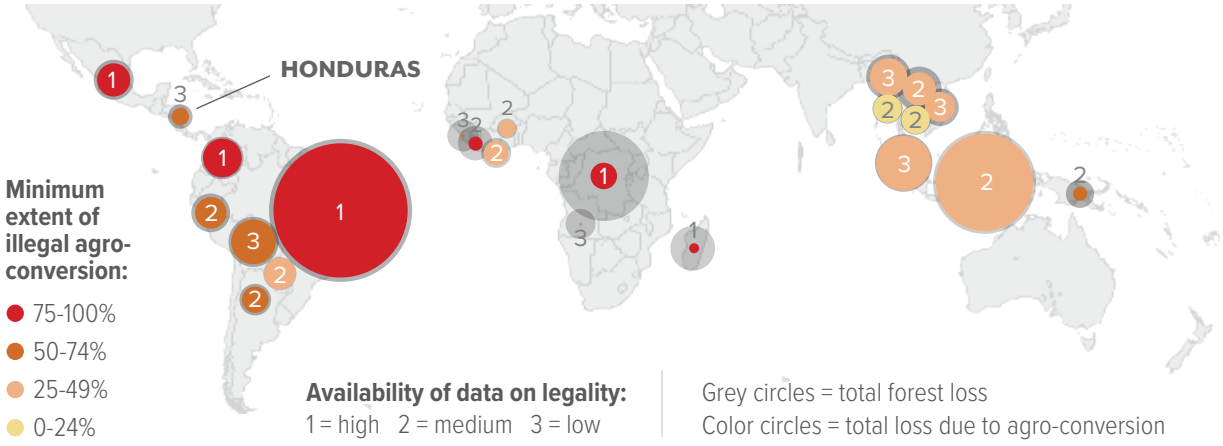
51% due to commercial agriculture

of which at least

74% likely illegal

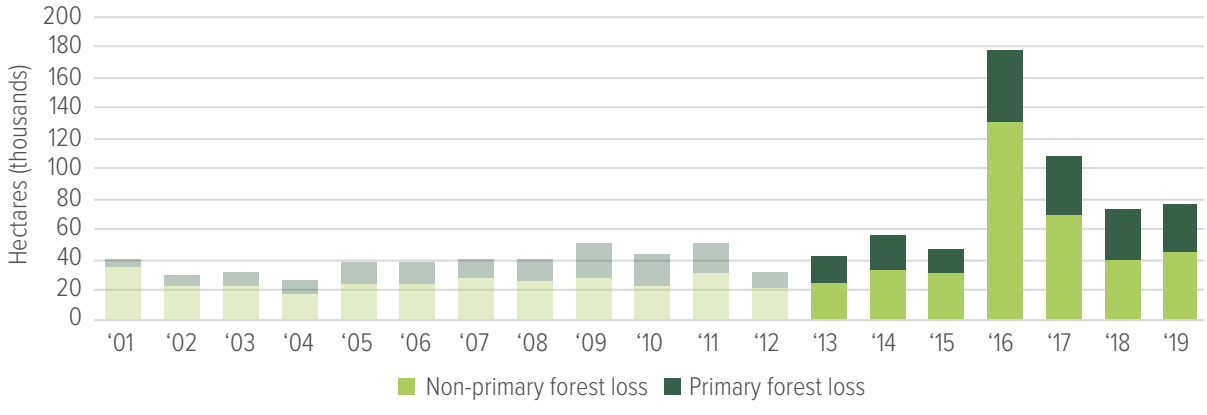
55% likely exported

Figure 1: Relative amount of tropical forest loss driven by commercial agriculture and the extent of illegal clearing.



Source: forest loss – GFW (2020, using Hansen et al. [2013]); agro-conversion – estimates compiled by Forest Trends (2021) from multiple sources, including GFW (2020, using Curtis et al. [2018]); and illegality – estimates compiled by Forest Trends (2021).

Figure 2: Annual forest loss from 2001 to 2019 for Honduras. This report covers the period highlighted (2013-2019).



Source: GFW (2020, using Hansen et al. [2013]).

BOX 1

Forest Trends Findings

- US$299 million in coffee that was likely from agro-conversion was exported in 2019.
- Given the lack of data, it is difficult to determine the extent of risk that exported commodities are grown on illegally cleared land. Given this, heightened due diligence is required by buyers.

1 Introduction

Honduras has 6.3 million hectares (Mha) of forest, covering 57 percent of its land area (FAO FRA 2020). Moist tropical forest makes up roughly half of the area, coniferous forest covers 36 percent, and mangrove forest just 1 percent. Honduras' Indigenous Population comprises more than 700,000 people from nine indigenous groups. An analysis by the International Union for the Conservation of Nature estimated that 46.5 percent of the land that indigenous groups traditionally occupied has been titled in their favour, but this excludes forest areas (Forests of the World n.d.).

2 Commodity Analysis

2.1 Deforestation 2013–2019

Honduras lost more than half a million hectares of forest between 2013 and 2019, representing 9 percent of its forest cover in 2000 (GFW 2020 using Hansen et al. 2013). This is more forest loss than occurred in the 11 years from 2001 to 2011. Forest loss is concentrated in the Caribbean lowlands of the Mesoamerican Biological Corridor, a globally important region of exceptional biological diversity (McSweeney et al. 2014).

2.2 Drivers of deforestation

Forest Trends' analysis on the extent and nature of forest loss in Honduras between 2013 and 2019 is based on a review of existing literature and data, including GFW (2020 using Curtis et al. 2018), Pendrill et al. (2020), and REDD+ (FCPF and UNREDD 2013; de Lamo 2017). After reviewing all available data, Forest Trends' best estimate is that:

- At least 51% of deforestation is driven by commercial agriculture

For the purposes of this study only the following were considered:

- **Forests:** areas with greater than 50% tree cover
- **Forest loss / Deforestation:** complete removal of forest cover
- **Illegal:** deforestation that was, at time that the clearing took place, in contravention of the country's legislative framework governing forest conversion

Justification

According to GFW (2020), commodities reportedly drove only 19 percent of forest loss between 2013 and 2019, and shifting agriculture drove 77 percent. However, the methodology used by Curtis et al. (2018) often does not satisfactorily differentiate small-scale commercial agriculture from subsistence farming (Appendix 1, Forest Trends 2021). Moreover, coffee is a major crop in Honduras, and shade coffee—i.e. the cultivation of coffee under dense canopy and tall trees—is often categorized by satellites as forest, and so agro-conversion for shade coffee is likely under-reported (Bailey and King 2019).

The Pendrill et al. (2020) analysis calculates that 163,917 ha of deforestation were embodied in crops, representing 36 percent of forest loss between 2013 and 2017, with almost all of that accounted for by coffee (73 percent), palm oil (21 percent), and bananas (2 percent). The REDD+ driver analysis also identifies industrial agriculture as a driver of deforestation in the lowlands and valleys, in particular the expansion of pasture for livestock, because of its short-term profitability (FCPF and UNREDD 2013).

In Gracias A Dios, Colon, Yoro, and Olancho in eastern Honduras, there has been large-scale deforestation to make way for cattle ranching and palm oil. This is termed "anomalous narco-deforestation" as it serves multiple objectives: agro-conversion clears land for territorial control of drug trafficking routes, and it creates outlets for money laundering, and provides alternative income streams to local trafficking groups (McSweeney et al. 2014; Davis 2020). It is estimated that cocaine trafficking could account for between 15 and 30 percent of annual national forest loss over the past decade, and 30 to 60 percent of loss within nationally and internationally designated protected areas (Sesnie et al. 2017). Logging and mining are also key extractives.

In order to estimate forest loss to commercial agriculture, Forest Trends uses the Pendrill et al. (2020) figure (36 percent) for cash crops/plantations plus the lower estimate for forest loss driven by cocaine trafficking (15 percent) to arrive at the conservative estimate of 51 percent.

2.3 Estimating how much coffee is linked to deforestation

Coffee is selected for the Forest Trends analysis because it is the number one crop linked to deforestation in Honduras, accounting for nearly half (48 percent) of embodied deforestation (Pendrill et al. 2020).

Based on its analysis, Forest Trends estimates that:

- At least 29% of coffee production is from conversion.

Justification

While growing only 4 percent of the world's coffee production (FAOSTAT 2020), Honduras is responsible for 32 percent of the world's embodied deforestation in coffee (Pendrill et al. 2020). This is because at least 29 percent of the area under coffee cultivation is in areas that were formerly forested. Honduras grows Arabica coffee, in mountainous areas under shade by smallholder farmers (Bunn et al. 2018).

Coffee is a major driver of deforestation, and in some regions, coffee covers up to 50 percent of agricultural land (Bunn et al. 2018). The north of Comayagua in particular has been a hotspot for forest loss driven by coffee expansion by peasant farmers and by coffee growers' groups, with no intervention from the law enforcement agencies (FCPF and UNREDD 2013; Vallejo Larios 2011). A field verification of USAID's MODIS satellite observations identifying deforestation on 706 ha in western Honduras in 2017–2018 found that 62 percent was caused by agriculture, consisting mainly of coffee, as well as some bananas, corn, and beans (Paz 2019). An analysis of Ocotepeque department in the northwestern region bordering Guatemala, which produces 10 percent of Honduras' coffee, estimated that 56 percent of deforested land was converted to coffee (Carbon Fund 2018).

In order to estimate the total area of coffee production linked to deforestation, we used the Pendrill et al. (2020) calculation that 126,886 ha of deforestation is embodied in coffee, which is 29 percent of the total area under coffee cultivation (432,499 ha) (FAOSTAT 2020).

2.4 Estimating illegality linked to agro-conversion for coffee

- The available evidence does not allow Forest Trends to make a rigorous estimate of the percentage of agro-conversion for coffee that was illegal, but there is considerable circumstantial evidence to suggest that much of the clearing was illegal.

Justification

The Forest Law of 2007 (Decreto No 98-2007) prohibits deforestation and introduces a penalty of imprisonment for six to nine years for agriculture and other activities that "violate the vocation of the forest" (Article 178). However, legally recognized agroforestry groups are permitted to operate, and forest recovery activities include agroforestry (Articles 94, 123). Coffee agroforestry systems account for more than half of coffee cultivation (242,909 ha of agroforestry for coffee production, according to RECOVER 2019), and 95 percent of producers are smallholders with less than 7 ha (Bunn 2018). There is therefore a blurred line between what is legal and illegal concerning deforestation for coffee. The REDD+ driver analysis notes that laws are not applied, and calls for the authorities to be more zealous in forest monitoring in order to prevent deforestation for coffee (Vallejo Larios 2011). The Forest Administration is reportedly undermined by political appointees and the demotivation of technical officers. The EU has commented on the lack of legal clarity in forest regulations, and confusion between responsibilities of different organizations (Vallejo Larios 2011).

Deforestation for coffee is clearly illegal if it is in a protected area, above 800 meters in elevation, or within 50 meters of a river (Carbon Fund 2018). According to GFW 2020 (using Hansen et al. 2013) the forest loss in protected areas was 42 percent of the total forest loss between 2013 and 2019 (245,001 ha out of 579,945 ha). Deforestation for coffee into the heart of the Pico Pijol National Park, in Yoro department, has been documented (King 2019).

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Illicit Harvest, Complicit Goods

The State of Illegal Deforestation for Agriculture

ANNEX 1 MEXICO CASE STUDY 2013-2019

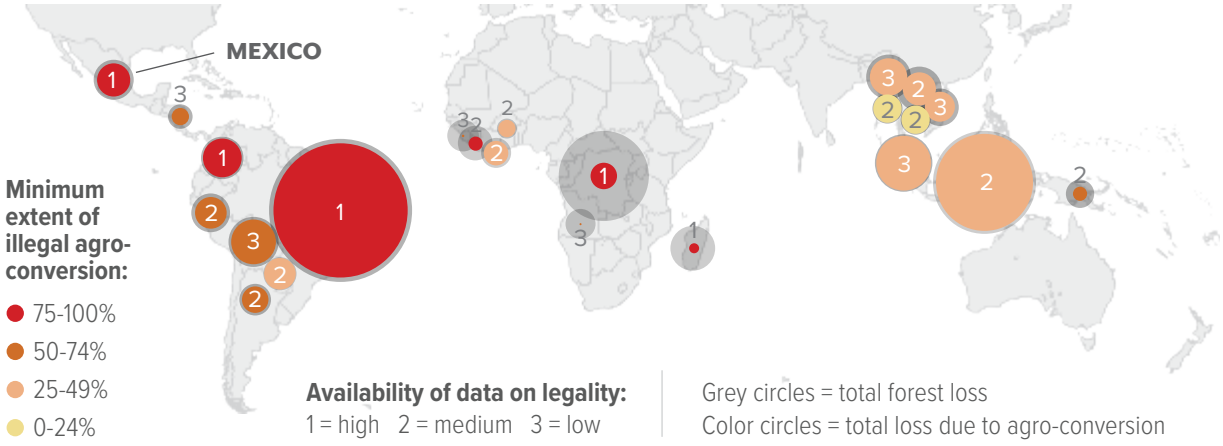
10th in tropical forest loss

2% of all tropical forest loss

731 Mt of CO_2e Total gross emissions from tree cover loss

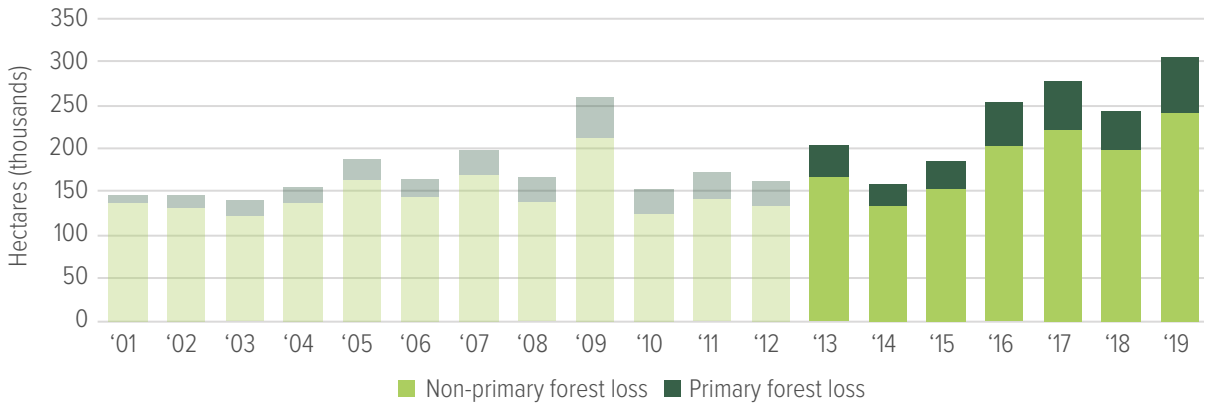
1.6 Mha total forest loss → of which **68%** due to commercial agriculture → of which at least **97%** likely illegal, **10%** likely exported

Figure 1: Relative amount of tropical forest loss driven by commercial agriculture and the extent of illegal clearing.



Source: forest loss – GFW (2020, using Hansen et al. [2013]); agro-conversion – estimates compiled by Forest Trends (2021) from multiple sources, including GFW (2020, using Curtis et al. [2018]); and illegality – estimates compiled by Forest Trends (2021).

Figure 2: Annual forest loss from 2001 to 2019 for Mexico. This report covers the period highlighted (2013-2019).



Source: GFW (2020, using Hansen et al. [2013]).

BOX 1

Forest Trends Findings

- Between 2013 and 2019, commercial agriculture in Mexico was likely responsible for the clearance of at least 1.1 Mha of forest.
  - Given that 10% of Mexico's agro-conversion commodities were exported, it is likely that international buyers were linked to at least 110,000 ha of deforestation
  - At least 97% of agro-conversion is likely illegal
- US$570 million in beef from agro-conversion was exported in 2019 alone.
- US$219 million in leather from agro-conversion was exported in 2019 alone.
  - There is a high risk that these exports were produced on illegally cleared land

1 Introduction

Mexico has tropical forests along its coasts, dry and temperate forests inland, and, to the north, desert and shrubland (WWF n.d.). Mexico represents the northern extent of the Mesoamerican Biodiversity Hotspot (CEPF n.d.). In 1990, Mexico had 71 million hectares (Mha) of forest, which was reduced to 66 Mha by 2020, or 34 percent of its territory (FAO FRA 2020). There are some positive initiatives, however. A study comparing tree cover loss in protected areas and Payment for Ecosystem Services (PES) projects found that both resulted in an estimated 20 to 25 percent reduction in the predicted loss of forest cover. In addition, the PES led to a 10 to 12 percent increase in the locality poverty alleviation index (Sims and Alix-Garcia 2017).

2 Deforestation Analysis

2.1 Deforestation 2013–2019

According to GFW (2020 using Hansen et al. 2013), between 2013 and 2019, Mexico lost 1.6 Mha of forest, with 2019 having the highest ever amount of annual forest loss. The National Forestry Commission of Mexico (CONAFOR) reported that the annual rate of deforestation between 2011 and 2015 was 30 percent higher than the annual rate between 2007 and 2010 (CONAFOR 2020). FAO (FRA 2020) likewise reports an increase of the annual average rate of net forest loss, at 128,000 ha a year in the period 2015 to 2020, up from 122,000 a year in the period 2010 to 2015. Mexico's multiple ecoregions show different patterns

For the purposes of this study only the following were considered:

- **Forests:** areas with greater than 50% tree cover
- **Forest loss / Deforestation:** complete removal of forest cover
- **Illegal:** deforestation that was, at time that the clearing took place, in contravention of the country's legislative framework governing forest conversion

BOX 2

Mexican avocados and deforestation

Since 2010, deforestation for avocados has been rapidly expanding across Mexico (Karst 2019). In the three states that grow the majority of avocados, deforestation has increased by 162 percent in Michoacán, 511 percent in Mexico, and 1,001 percent in Jalisco in response to increasing foreign demand (Dominguez Caballero and Barrera Flores 2019). This rapid expansion of orchards has become a significant driver of deforestation in Mexico. Michoacán alone loses between 6,000 and 8,000 ha per year to avocado production, constituting between 10 and 13 percent of annual forest loss in Mexico (Dominguez Caballero and Barrera Flores 2019).

Such drastic changes to the landscape have caused serious environmental impacts: avocado orchards in Jalisco have eroded the soil, caused deadly flooding events, and diminished the water supply (Mandragon and Lopez-Portillo 2020). Most orchards are planted on former pine and fir forests, reducing carbon sequestration capacity as much as fourfold (Stevenson 2016). Further, Michoacán is famous for its Monarch Butterfly Biosphere Reserve, which hosts millions of monarch butterflies each winter, and has faced encroachment by avocado expansion. Aside from its impacts on local resources and biodiversity, intensive avocado production has also exposed local communities to health risks. Chemical runoff from pesticide and fertilizer use is infiltrating water supplies and polluting the air (Stevenson 2016).

Despite the social and ecological drawbacks, the economic prospect of avocado expansion continues to drive the trend. Forest landowners in Michoacán receive around US$33/ha for conserving ecosystem services, whereas they earn US$68/ha on average to grow avocados (Dominguez Caballero and Barrera Flores 2019).

Gira, a rural technology NGO, claims that many hectares of avocado orchards are procured unlawfully (Stevenson 2016). Government inspections of land-use change in 2017 revealed that as much as 96 percent of orchards are illegal (Dominguez Caballero and Barrera Flores 2019). Organized crime groups have entered the scene in recent years, often land grabbing for illegal logging and avocado cultivation, and using violence against local environmental activists.

In the past two decades, US demand for avocados has increased by 440 percent (Dominguez Caballero and Barrera Flores 2019). US domestic production is limited by drought stress in California, thus a large share of production is imported from central and southern Mexico (Tucker 2016; Dominguez Caballero and Barrera Flores 2019).

in forest cover. For example, there was an increase in woody vegetation in the Balsas dry forest (more than 1 Mha between 2000 and 2014), the Trans-Mexican volcanic belt and the Tamaulipan Mezquital, where pasture and agriculture have decreased (Bonilla-Moheno and Aide 2020). Meanwhile, the Yucatan Peninsula, in the southeast, is a hotspot for deforestation, accounting for 43 percent of forest loss between 2013 and 2017 (GFW 2020, using Hansen et al. 2013).

2.2 Drivers of deforestation

Forest Trends findings

Forest Trends' analysis on the extent and nature of forest loss in Mexico between 2013 and 2019 is based on an extensive review of existing literature and data, including research from Global Forest Watch (2020),

Pendrill et al. (2020) and REDD+ (Trench et al. 2018; Ellis et al. 2015). After reviewing all available data Forest Trends' best estimate is that:

- At least 68% of deforestation was driven by commercial agriculture.

Justification

GFW (2020) estimated that commodities drove 21 percent of forest loss between 2013 and 2019, and that shifting cultivation drove 70 percent (Curtis et al. 2018). Given the important role of small-scale agriculture, some of what is identified as shifting agriculture is likely to be commercial. (Note that the GFW drivers data often underestimated the role of commercial agriculture in driving forest loss (Appendix 1, Forest Trends 2021).

CONAFOR analyzed forest transitions and agriculture accounts for a total of 97 percent of forest loss, higher even than GFW's 91 percent: between 2013 and 2018, 70 percent of forest loss was for pasture and 27 percent was for crops (CONAFOR 2020). Not all of this loss was from commercial agriculture, however, some was likely subsistence agriculture. The CONAFOR data include all forests in Mexico, not just tropical forests.

In contrast, the REDD+ driver analysis of deforestation in the Yucatan Peninsula in the southeast is focused on tropical forests. This analysis estimates that 14 percent of deforestation is caused by subsistence agriculture, while 68 percent is caused by larger scale or commercial agriculture, mostly (48 percent) livestock (Ellis et al. 2015). In practice, large livestock farms are interspersed with smaller rain-fed or irrigated fields for crops and fruit (Ellis et al. 2017; 2020). This makes it difficult for satellite observations to distinguish between subsistence and small-scale commercial agriculture.

Pendrill et al. (2020) estimate that 81 percent of forest loss across all of Mexico between 2013 and 2017 was embodied in crops; and given that roughly a quarter of maize and beans is for subsistence, this suggests that 77 percent of forest loss was for commercial agriculture (Agroproductores n.d.).

To be conservative, however, Forest Trends uses the lower REDD+ estimate that at least 68 percent (Ellis et al. 2015) of tropical forest loss was driven by commercial agriculture.

The REDD+ Readiness Plan identified the underlying causes of deforestation as extensive agricultural incentives, rural marginalization, weak community and *ejido* (common land) governance, lack of resources available for forest vigilance, and areas without forest management plans (Goldstein et al. n.d.). Investment in forests is low compared to that in agriculture. Farming subsidies such as PROGAN (The Sustainable Livestock Production, Livestock Management and Bee Keeping Initiative), MasAgro (Sustainable Modernization of Traditional Agriculture), and the Programa de Adquisición de Activos Productivos pay farmers for increased production but do not penalize deforestation or forest degradation (Goldstein et al. n.d.).

2.3 Estimating illegality linked to agro-conversion

After reviewing all available data Forest Trends' most conservative estimate is that:

- At least 97% of deforestation for commercial agriculture was likely illegal.

Justification

Some 70 to 80 percent of forest in Mexico is owned communally (Strochlic 2019). Community-owned forest is either *ejido*, land granted to peasant communities, or *comunidades*, land historically belonging to indigenous communities. Use rights to the commons are managed by a general assembly of *ejiditarios*. Article 59 of the Agrarian Law prohibits the sale of *ejido* land that is forest, but this is rarely enforced (Government of Mexico 1992; Torres-Mazuera et al. 2021). Torres-Mazuera et al. (2021) report that in Yucatan Peninsula, 355,304 ha of common *ejido* land were sold and appropriated by various actors of the *ejido*, government, and business

sectors, a probable first step towards illegal deforestation.

In addition, agro-conversion is illegal where authorization has not been obtained for land-use change from the Ministry of the Environment and Natural Resources, but this law is also rarely implemented (Gómez Durán 2020). In practice, *ejido* forest is often sold to new owners who clear it for agriculture without obtaining a permit. Between 2005 and 2015, only 37,713 ha of land-use change from forestry to agriculture were authorized (Beraud Macías et al. 2018). In contrast, according to GFW (2020), more than 1.4 Mha was deforested for commercial agriculture during this period: this implies that 37,713 ha (3 percent) of agro-conversion was legal at most.

Greenpeace Mexico investigated pig farms in Yucatan state and identified 10,997 ha of deforestation within farm boundaries, many of which overlapped with protected and conservation areas (La Vanguardia 2020); and out of 14 pig farms in Campeche state, 10 were operating illegally, without the required environmental impact assessments (Sánchez 2020).

More than a dozen Mennonite colonies farm more than 25,000 hectares in Campeche where they produce 90 percent of Mexico's soybeans. The Mayan beekeepers had found their forest bees were dying because of aerial spraying of glyphosate, the herbicide sprayed on transgenic soy. They sued the government, and in 2012, the Supreme Court banned genetically modified soy. Despite this success in the courts, transgenic soy and glyphosate are reportedly still in use (ProgresoHoy 2018; Strochlic 2019).

Based on the available evidence, Forest Trends concludes that 97 percent of agro-conversion is illegal because it was not an authorized land-use change.

2.4 Estimating the percentage of agro-commodities linked to deforestation that are exported

After reviewing available data Forest Trends estimates:

- 10% of commodities embodying deforestation are exported.

Justification

Beef accounts for most deforestation: 45 percent of all exported embodied deforestation is in beef. Maize accounts for a further 16 percent of embodied deforestation, and wheat, soybeans, and seed cotton each account for 4 percent (Pendrill et al. 2020). Pork carries deforestation risk, because of the rapid expansion in pig farms in the Yucatan Peninsula and associated deforestation. Pork is exported from Progreso, the port in Yucatan, to South Korea and Japan (ProgresoHoy 2018). Forest Trends uses the Pendrill et al. (2020) estimate that 10 percent of agricultural conversion is exported.

3 Commodity Analysis

Beef is selected for the Forest Trends analysis because it accounts for 45 percent of exported embodied deforestation in crops (Pendrill et al. 2020).

3.1 Beef

Based on its analysis, Forest Trends estimates that:

- 38% of cattle pastures are linked to deforestation.
- At least 97% of agro-conversion is illegal.

Justification

In 2014, according to FAO (2020), 2.6 Mha of land was classified as cultivated pasture, and of this 985,237

ha or 38 percent had been converted from forest between 2001 and 2014, according to a study by Bonilla-Moheno and Aide (2020). This figure is likely an underestimate because of the continued conversion of forest to pasture from 2015 onwards. On a national scale, the area for pasturelands has declined by nearly 1.5 Mha, but pasture is the main driver of deforestation in the tropical moist forests and Yucatan dry forests ecoregions. The dry forests have seen a decrease in pasture and recovery of woody vegetation, while the moist forests have been converted to pasture (Bonilla-Moheno and Aide 2020). Overall cattle numbers have remained roughly static between 2014 (17.7 million head) and 2020 (16.9 million head), as reported by USDA (2015; 2020). The moist forest ecoregions where deforestation occurred saw an increase in grazing-produced cattle, while the dry forest regions (where pasture reduced) saw a switch to grain-fed cattle (Bonilla-Moheno and Aide 2020).

A hotspot for cattle-driven deforestation is in the tropical forests of Chiapas state on the border with Guatemala, where there is a flourishing illegal cross-border trade in cattle. Officials at the Mexican Ministry of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA) estimate that 1 million cattle a year are imported into Mexico across unofficial border points. The National Commission of Natural Protected Areas identified cattle ranching as the main driver of forest loss in Chiapas (Soberanes 2018). The cattle encroach into protected areas, starting at the edges and working inwards. The eight protected areas in the Lacandon Jungle lost 33,062 ha of tree cover (10 percent of all loss) between 2013 and 2019, likely for cattle (GFW 2020).

The export of bovine meat was worth more than US$1.5 billion to Mexico in 2019, almost all of it destined for the United States (COMTRADE 2020).

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Illicit Harvest, Complicit Goods

The State of Illegal Deforestation for Agriculture

ANNEX 1 PARAGUAY CASE STUDY 2013-2019

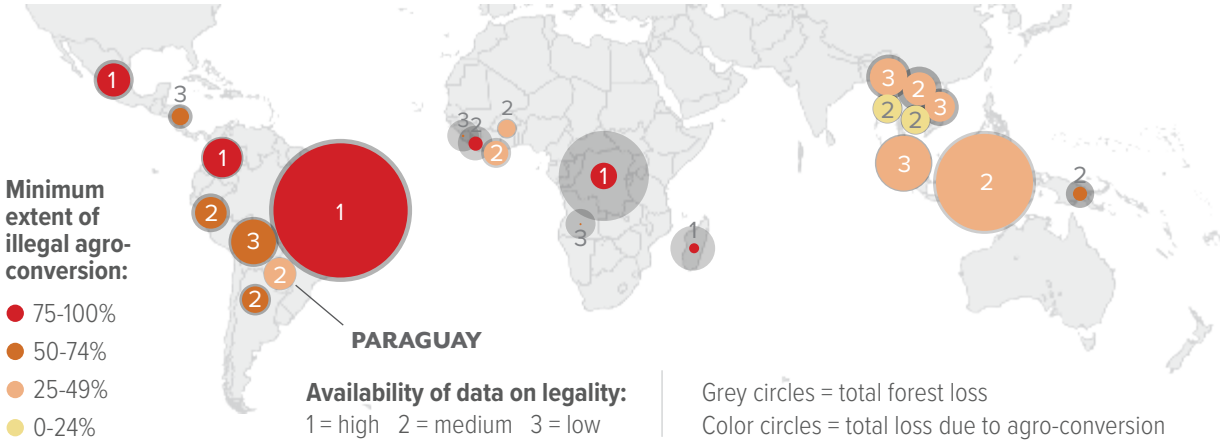
14th in tropical forest loss

1% of all tropical forest loss

354 Mt of CO_2e Total gross emissions from tree cover loss

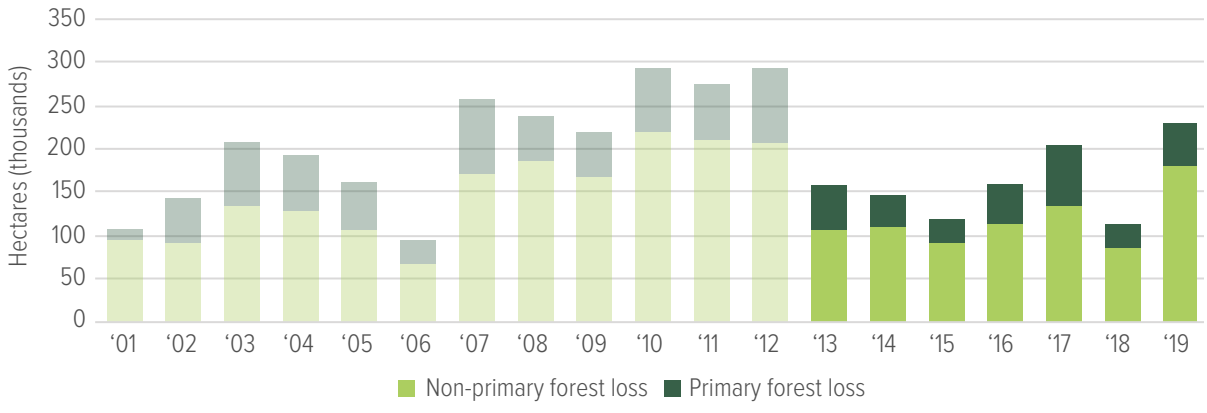
1.1 Mha total forest loss — of which **89%** due to commercial agriculture — of which at least **49%** likely illegal, **69%** likely exported

Figure 1: Relative amount of tropical forest loss driven by commercial agriculture and the extent of illegal clearing.



Source: forest loss – GFW (2020, using Hansen et al. [2013]); agro-conversion – estimates compiled by Forest Trends (2021) from multiple sources, including GFW (2020, using Curtis et al. [2018]); and illegality – estimates compiled by Forest Trends (2021).

Figure 2: Annual forest loss from 2001 to 2019 for Paraguay. This report covers the period highlighted (2013-2019).



Source: GFW (2020, using Hansen et al. [2013]).

BOX 1

Forest Trends Findings

- Between 2013 and 2019, commercial agriculture in Paraguay was likely responsible for the clearance of more than 1 Mha of forest.
  - Given that 69% of the commodities were exported, it is likely that exports were linked to at least 680,000 ha of deforestation.
- Exports in 2019 that were likely from agro-conversion:
- US$1.4 billion in soy.
  - All soy from agro-conversion was grown on illegally cleared land.
- US$486 million in beef.
- US$30 million in leather.
  - It is difficult to determine the level of risk that exported commodities were grown on illegally cleared land. Given this, heightened due diligence is required by buyers.

1 Introduction

Paraguay had 16 million hectares (Mha) of forest in 2020, covering 41 percent of its area (FAO FRA 2020). To the west of the Paraguay River is the Gran Chaco, which is a vast plain extending over 17 Mha in Paraguay (as well as into northern Argentina and southeastern Bolivia) with a mixture of savannahs, swamps, forests, and scrublands. It is the second largest forested landscape in South America, after the Amazon. It supports a high diversity of animals and plants, but it has one of the highest rates of deforestation in the world (Steiner et al. 2020; NASA Earth Observatory 2016). The Atlantic Forest, to the east, has only 7 percent of its original forest, and is considered by some to be Latin America's most important biome for biodiversity (World Bank 2017).

For the purposes of this study only the following were considered:

- **Forests:** areas with greater than 50% tree cover
- **Forest loss / Deforestation:** complete removal of forest cover
- **Illegal:** deforestation that was, at time that the clearing took place, in contravention of the country's legislative framework governing forest conversion

2 Deforestation Analysis

2.1 Deforestation 2013-2019

Between 2013 and 2019, Paraguay lost 8 percent of its 2000 forest cover (Hansen et al. 2013 on GFW). After a peak in 2010–2012, the annual rate of loss dropped but remained alarmingly high, with 2019 the highest between 2013 and 2019. The Gran Chaco accounts for 67 percent of deforestation.

2.2 Drivers of deforestation

Forest Trends' analysis on the extent and nature of forest loss in Paraguay between 2013 and 2019 is based on an extensive review of existing literature and data, including research from Global Forest Watch, Pendrill et al. (2020), and REDD+ (2014; 2019). After reviewing all available data, Forest Trends' best estimate is that:

- 89% of deforestation was driven by commercial agriculture

Justification

According to GFW (2020, using Curtis et al. 2018), 89 percent of forest loss between 2013 and 2019 was commodity-driven. The REDD+ driver analysis reports that the main driver in the east is expansion of soy and in the west, pasture for livestock (ENBCS 2019; FCPF 2014). The Pendrill et al. (2020) data on embodied deforestation in crops indicates that only 39 percent of forest loss was driven by agriculture but given the high accuracy of the Curtis et al. driver analysis for Latin America (94 percent), we use this estimate in this report.

In the Gran Chaco, more than 99 percent of forest loss between 2014 and 2018 was driven by the expansion of pasture (Trase 2020). Charcoal production is also a driver of deforestation, as the hardwood trees felled during clear-cutting are turned into charcoal and sold by Paraguay's largest exporter of charcoal, Bricapar, to retailers such as Lidl, Aldi, and Carrefour in Europe and the United States (Earthsight 2017).

The Atlantic Forest in the east suffered massive losses, about 7 Mha, for agriculture before the Zero Deforestation Law of 2004. The law reduced the rate by more than 90 percent from 2002 (110,000 ha of forest loss per year) to 2009 (8,000 ha of forest loss per year). Forest conversion continues, but at a slower rate (3 percent loss between 2015–2016 and 2016–2017) (da Ponte et al. 2017). Illegal marijuana cultivation is an emerging threat to the forest. Since 2015, the National Anti-Drug Secretariat (Secretaría Nacional Antidrogas) has destroyed 834 hectares of marijuana crops in protected areas and seized large amounts of the drug, but since 2004, not one person has been charged for illegal deforestation (Benítez 2020a; 2020b).

Throughout Paraguay, land is a source of inequality and conflict. According to a 2008 census, just 1.6 percent of the population controlled 80 percent of all agricultural land. Between 2013 and 2015, Paraguayan scholars recorded 39 land occupations, 4,105 *campesino* (peasant farmers) and Indigenous People forcibly removed from land, and 61 public conflicts over land rights between *campesinos*, Indigenous Peoples and the state (Earthsight 2017; Correia 2019).

2.3 Estimating illegality linked to agro-conversion

After reviewing all available data, Forest Trends' most conservative estimate is that:

- 49% is a low-end estimate of illegal deforestation for commercial agriculture.

Justification

At least 33 percent of deforestation is illegal because it occurred in the eastern Atlantic Forest where there

BOX 2

Uncontacted indigenous peoples threatened by deforestation for cattle ranches

The Ayoreo Indigenous Peoples of Paraguay claim 11 Mha as their historic territory. An area extending for 550,000 ha has been recognized as the Natural and Cultural Patrimony of the Ayoreo Totobiegosode, or PNCAT by its Spanish acronym (Patrimonio Natural y Cultural Ayoreo Totobiegosode (Earthsight 2020)). The President of the Union of Ayoreo Natives of Paraguay (Unión de Nativos Ayoreo de Paraguay – UNAP), Mateo Sobode Chiquenoi, described their territory:

> Our territory, Eami, is a living being that shelters us and which is illuminated when we are present. We express ourselves through our territory, and our history is etched in every stream, in every waterhole, on the trees, in the forest clearings and on the salt flats. Our territory, Eami, also expresses itself through our history, because the Ayoreo people and our territory are a single being. *(UNAP 2010)*

UNAP works for the protection of the uncontacted Ayoreo groups whose forest is at risk of exploitation by commercial farmers. The Totobiegosode community of the Ayoreo indigenous group has submitted a claim for title to 550,000 ha of their territory; but although the adjudication process is still under way, the Secretariat of the Environment issued environmental permits for livestock, forestry, and oil exploration in the claimed territories without consulting the communities, in violation of Act No. 43/89 (UNSR 2015). Title has been granted to smaller, non-contiguous areas, but the government acknowledges its inability to carry out the necessary expropriations across the remaining claim.

A Brazilian firm, Yaguareté Porá Ltd was given a 78,549 ha plot in the heart of the Ayoreo territory, near where an uncontacted group of the Totobiegosode live. These are the last Indigenous People living in voluntary isolation anywhere in the Americas outside the Amazon. Despite this, Yaguareté bulldozed 2,000 ha of forest in 2015 (Earthsight 2020). The UN Special Rapporteur received evidence that the company was still operating in the disputed territories even though their environmental permits had been repeatedly revoked by the courts (UNSR 2015). In 2016, the Inter-American Court of Human Rights ordered deforestation in the PNCAT to cease. In 2018, Paraguay's National Forestry Institute (INFONA) issued resolutions suspending all land-use change plans granted to properties within PNCAT, but that same year 2,100 ha were bulldozed, and in 2019, 520 ha were lost in just six weeks (Earthsight 2020).

Yaguareté is not the only company operating inside the PNCAT; there are also ranches owned by Caucasian and Chortitze. Cattle from the ranches are sold to FrigoAthena, a meatpacker and subsidiary of Minerva, and the hides are made into leather which is exported to Europe. An investigation traced the leather from the cattle ranches in the PNCAT all the way to factories in Italy and Germany where it is used for luxury car interiors (Earthsight 2020).

is a Zero Deforestation Law. In the Gran Chaco, which is accountable for 67 percent of deforestation, 24 percent of that may have been illegal in 2017 because of non-compliance with land-use change authorization requirements (INFONA 2018); so 33% + (24%x67%) = 49%. In addition, the Inter-American Court of Human Rights ruled that land belonging to Indigenous Peoples must be returned, otherwise the land use is illegal (Litvinoff and Griffiths 2014). This could mean that deforestation on lands claimed by indigenous peoples is illegal.

In Paraguay, soy production is concentrated in the east, in the Atlantic Forest biome where "most if not all" of the deforestation is illegal (Trase 2020). The 2004 Zero Deforestation Law prohibits the conversion of forestland for agricultural uses in the Atlantic Forest. The law reduced deforestation in eastern Paraguay, but

increased it in the Chaco Region in western Paraguay (Forest Trends 2020). Large-scale farmers, often Brazilians, grow soy, while medium- and small-scale farmers are Paraguayans ranging cattle (Da Ponte et al. 2017). As with land ownership, cattle ownership in Paraguay is highly unequal, with 10 percent of ranchers owning 82 percent of the country's cattle (Global Forest Coalition 2019).

The Gran Chaco in the west is the ancestral territory of many Indigenous Peoples, most notably the Ayoreo whose territory spans more than half of the Paraguayan Gran Chaco, as well as parts of neighbouring countries (Earthsight 2020). The Ayoreo territory covers 11 Mha, of that 191,000 ha is under legal title (UNAP 2010). The Constitution recognizes the right to communal land ownership, and Paraguay has ratified the International Labour Organization (ILO) Indigenous and Tribal Peoples Convention (No. 169), and the jurisdiction of the Inter-American Court of Human Rights is recognized, but, despite this, Indigenous Peoples' rights are neither respected nor protected (UNSR 2015). Three judgments of the Inter-American Court of Human Rights in 2005, 2006, and 2010 in relation to Enlhet communities in the Chaco reaffirmed the legal obligation of the Paraguayan state to return lands to Indigenous Peoples that had been taken from them by third parties without their prior agreement (Litvinoff and Griffiths 2014). However, these obligations are routinely flouted. The United Nations Special Rapporteur on the Rights of Indigenous Peoples (UNSR) expressed concern about violations of the land rights of Indigenous Peoples by public institutions, in particular by the government's Secretariat for Environment issuing environmental permits that do not conform to Paraguayan law or international standards relating to the rights of Indigenous Peoples (UNSR 2015). The Inter-American Commission of Human Rights passed a resolution in February 2016 urging the Paraguayan government to take precautionary measures to protect Ayoreo communities in voluntary isolation and to avoid deforestation in their customary lands (Earthsight 2017a). Instead, in 2017, President Horacio Manuel Cartes passed a decree weakening forest protections in the Chaco, before allegedly using it to authorize clearances on his own ranch (Earthsight 2017b). The International Union for the Conservation of Nature (IUCN) estimates that 7 Mha of forest are vulnerable to legal deforestation according to Paraguay's laws (IDH and IUCN NL 2019).

2.4 Estimating the percentage of agro-commodities linked to deforestation that are exported

After reviewing available data, Forest Trends estimates:

- 69% of commodities embodying deforestation are exported.

Justification

3 Commodity Analysis

Paraguay exported 69 percent of its embodied deforestation between 2013 and 2017 (Pendrill et al. 2020). Soy is Paraguay's major forest-risk commodity, representing 76 percent of exported embodied deforestation. Maize is the second biggest export forest-risk commodity, imported by Brazil (49 percent in 2018), Uruguay, Chile, South Korea, and Saudi Arabia (OEC 2020). Maize embodied 54,795 ha of deforestation between 2013 and 2017, or 9 percent of all embodied deforestation (Pendrill et al. 2020).

Soy, beef, and leather are selected for the Forest Trends analysis because together they account for 83 percent of exported embodied deforestation in crops (Pendrill et al. 2020).

3.1 Soy

Based on its analysis, Forest Trends estimates that:

- 57% of soy is from agro-conversion.

- All soy from agro-conversion is illegal

A study by the Joint Research Centre of the European Union (JRC) for the period 2008 to 2017 suggests that 57 percent of soy expansion was onto previously forested lands in Paraguay (IDH and IUCN NL 2019). Between 2013 and 2017, soy embodied 419,542 ha of deforestation, 66 percent of all embodied deforestation (Pendrill et al. 2020). Due to violations of the Zero Deforestation Law, it is likely that almost all of the soy deforestation in the reference period is illegal, as it is nearly all in the east (Trase 2020).

Paraguay sold 9.5 million tons of soy in 2018, and soy accounts for 50 percent of exports. Annual production increased by 20 percent during the reference period, and soy production in the Chaco is likely to increase following government approval of drought-resistant soy varieties in November 2019 (FAOSTAT; Trase 2020). Already the land area used to cultivate soy in the dry Chaco has gone from zero hectares in 2011 to 5,315 ha in 2018 (Trase 2020). Paraguay's big soy exporters are Cargill, ADM, Bunge, Cofco, and Louis Drefuys.

3.2 Beef / Leather

Based on its analysis, Forest Trends estimates that:

- 45% of cattle pastures are linked to deforestation.
- At least 24% of agro-conversion in the Gran Chaco is likely illegal.

Analysis shows that 45 percent of the cattle herd is located in the Gran Chaco where pasture expansion drives 99 percent of deforestation (Trase 2020), and it is likely that all pasture has displaced forest. Between 2013 and 2017, beef embodied 54,999 ha of deforestation, 9 percent of all embodied deforestation (Pendrill et al. 2020). Nearly a quarter (24 percent) of deforestation in the Chaco forest may have been illegal in 2017 (the rate of illegality is higher in the east where the Zero Deforestation Law applies) (INFONA 2018). In addition, the Inter-American Court of Human Rights ruling that land belonging to Indigenous Peoples must be returned, implies that the deforestation on lands claimed by indigenous peoples was illegal.

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Illicit Harvest, Complicit Goods

The State of Illegal Deforestation for Agriculture

ANNEX 1 PERU CASE STUDY 2013-2019

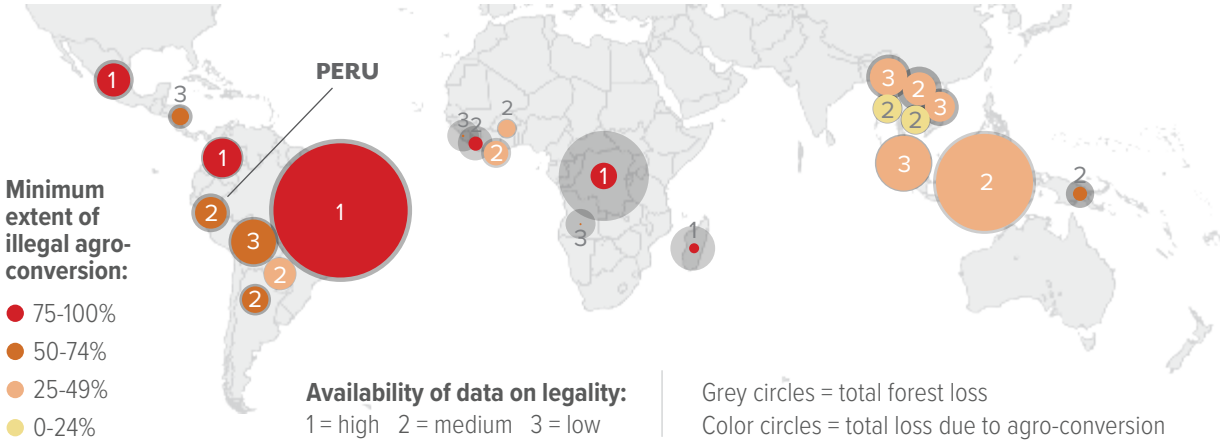
11th in forest loss across the tropics

2% of all tropical forest loss

988 Mt of CO_2e Total gross emissions from tree cover loss

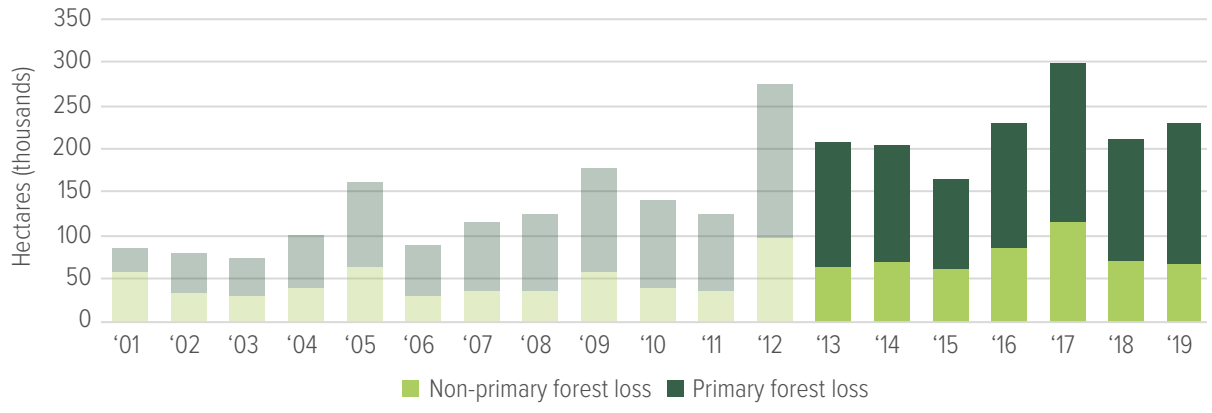
1.5 Mha total forest loss → of which **66%** due to commercial agriculture → of which at least **51%** likely illegal; **11%** exported

Figure 1: Relative amount of tropical forest loss driven by commercial agriculture and the extent of illegal clearing.



Source: forest loss – GFW (2020, using Hansen et al. [2013]); agro-conversion – estimates compiled by Forest Trends (2021) from multiple sources, including GFW (2020, using Curtis et al. [2018]); and illegality – estimates compiled by Forest Trends (2021).

Figure 2: Annual forest loss from 2001 to 2019 for Peru. This report covers the period highlighted (2013-2019).



Source: GFW (2020, using Hansen et al. [2013]).

BOX 1

Forest Trends Findings

- Between 2013 and 2019, commercial agriculture in Peru was likely responsible for the clearance of more than 1 Mha of forest.
  - Given that 11% of the agro-conversion was exported, there is a risk that international buyers may be linked to the loss of 110,000 ha of tropical forests.
  - At least 51% of agro-conversion is likely illegal.
- Exports in 2019 that were likely from agro-conversion:
  - US$24 million in palm oil.
  - There is a medium risk that these exports were grown on illegally cleared land.

1 Introduction

Peru contains the second largest area of forest in Latin America, covering more than half of the country: 72 million hectares (Mha), of which 68 Mha is rainforest in the Amazon (FAO FRA 2020; Estrategia Nacional sobre Bosques y Cambio Climatico 2016). Peru also has high-altitude forest in the Andes mountains (220,000 ha) and seasonally dry coastal forest (3.6 Mha). Within the Peruvian Amazon, 11.5 Mha are the territory of native communities and a further 18.3 Mha are protected areas. However, about 22 percent of the Peruvian Amazon has no legal status and is, therefore, at increased risk of deforestation (Estrategia Nacional sobre Bosques y Cambio Climatico 2016).

2 Deforestation Analysis

2.1 Deforestation 2013–2019

Peru saw more tree cover loss in 2016–2017 than ever before, according to GFW (2020, using Hansen et al. 2013). Since then deforestation has been decreasing, but levels remain historically high. In 2019, a government crackdown succeeded in halting deforestation for gold mines in La Pampa in the southern Peruvian Amazon, but deforestation for commercial agriculture continued apace: a new Mennonite colony caused deforestation in the Loreto region; cattle ranching caused losses in the Ucayali and Huánuco regions; and in the south there was continued agricultural expansion into the forest (Finer and Mamani

For the purposes of this study only the following were considered:

- **Forests:** areas with greater than 50% tree cover
- **Forest loss / Deforestation:** complete removal of forest cover
- **Illegal:** deforestation that was, at time that the clearing took place, in contravention of the country's legislative framework governing forest conversion

2020).

2.2 Drivers of deforestation

Forest Trends evaluated data on the extent and nature of forest cover loss in Peru between 2013 and 2019, in particular data from Global Forest Watch (2020), Pendrill et al. (2020) and REDD+ (Estrategia Nacional sobre Bosques y Cambio Climatico 2016). After reviewing the available data, Forest Trends concludes:

- 66% of forest loss was driven by commercial agriculture.

Justification

The top drivers of deforestation in Peru are agriculture (52 percent); the expansion of grazing for cattle (40 percent); and illegal gold mining (Augusto et al. 2020; The Peru National Strategy on Forests and Climate Change 2016). GFW (using Curtis et al. 2018) identifies 74 percent of forest loss as driven by shifting agriculture—which probably includes a significant amount of small-scale commercial agriculture—and 24 percent driven by commodities, a category which also includes mining. For a long time small-scale farmers and migrants were blamed for deforestation, but an analysis of the size of clearings showed that only 28 percent of clearings were smaller than a hectare in 2019 (Geobosques 2020; Ravikumar et al. 2016).

There is no doubt that farming is rapidly encroaching into the Amazon. The 2012 National Agricultural Census recorded 468,000 farmers in the Amazon, an increase of 47 percent on 1994, in total accounting for 21 percent of the country's farmers (Zegarra Méndez and Gayoso 2015). According to the census, 2.2 Mha of forestland in the Amazon is used for agriculture, of which 36 percent is permanent crops (such as coffee and cocao), and 16 percent is pasture (Zegarra Méndez and Gayoso 2015). Small-scale farming often combines subsistence and cash crops, and a reasonable assumption is that 50 percent of small-scale agriculture is commercial in some form (Gonzales 2020). Farmers advance into the forest when their soil fertility declines, and state incentives encourage expansion into cash crops such as coffee, cocoa, and oil palm, resulting in further deforestation (Gonzales 2020). The Forest Trends estimate is that 66 percent of deforestation is driven by commercial agriculture, on the basis that half of all deforestation caused by agriculture (half of 52 percent) and all the large-scale cattle ranching (26 percent) is commercial (Estrategia Nacional sobre Bosques y Cambio Climatico 2016).

Palm oil accounted for only about 2 percent of Peru's tree cover loss between 2001 and 2015, but it is expanding, and the scale and speed of forest clearance for large palm oil projects is dramatic (Dammert 2019; Goldman et al. 2020). Moreover, large-scale deforestation for palm oil is often either illegal or improperly authorized by the government (Dammert 2019). Large-scale deforestation has also been observed in three Mennonite colonies in the Loreto and Ucayali regions, causing the deforestation of 3,440 ha since 2017 (MAAP 2019).

Nearly 95 percent of all deforestation in the Amazon occurs within 5.5 km of a road (EIA 2018).The opening of logging roads facilitates the movement of people into the forest for agriculture (Peru National Strategy on Forests and Climate Change 2016). Degradation from logging also increases the risk of fires: in 2020, fires occurred in 1,885 ha of recently deforested land and in 2,700 ha of forest. All the fires were probably illegal, according to Peruvian fire management regulations (MAAP 2020a)..

2.3 Estimating illegality linked to agro-conversion

After reviewing the literature and expert input, Forest Trends concluded that between 2013 and 2019:

- At least 51% of deforestation for commercial agriculture was illegal.

Justification

As noted above, the agricultural area in the Amazon is 2.2 Mha, and of this nearly 1 Mha is farmed by about

123,000 smallholder families without land titles, who grow coffee as well as maize, bananas, and cocoa. About half of their land consists of remnant forest patches (World Agroforestry 2018; Robiglio et al. 2018). The deforestation incurred by these farmers is unlikely to be legal: Peru's Forest and Wildlife Law No. 27308,37 states that intact forest resources "cannot be used for agriculture and cattle grazing or other activities that affect vegetation cover, sustainable use and the conservation of forest resources" (EIA 2017). Based on census data, 1.1 Mha of the agricultural area is under permanent crops or pasture (Zegarra Méndez and Gayoso 2015) —that is, 1.1 Mha is likely commercial agriculture, of which smallholder agriculture accounts for 48 percent. In a positive development, a new agroforestry concession mechanism, introduced as a subsidiary to Law 29763, could bring this land under sustainable management and give families the legal right to occupation. This would promote the conservation of the remaining forest and the restoration of deforested areas with agroforestry (World Agroforestry 2018; Robiglio et al. 2018).

Most large-scale conversions are also likely illegal. The Mennonite clearances noted above are under investigation by the environmental prosecutor's office (known as FEMA) for clearance without approval and unauthorized land-use change (Finer et al. 2020b). The cocoa concession owned and operated by United Cacao (later Tamshi S.A.C.) near the town of Tamshiyacu in the northern Peruvian Amazon deforested 2,380 ha of mostly primary forest since 2013, and was fined about US$35 million for carrying out activities without having an approved environmental management plan (Finer and Novoa 2016).

Land trafficking is a major area of illegality related to commercial agriculture and deforestation. This involves fraudulent or corrupt titling of land to individuals or associations who sell it on to agricultural businesses (Dammert 2019). The Melka Group infamously used this to acquire its palm oil concessions in Ucayali region. Officials in the Ucayali government's agriculture department (DRAU, or Regional Sectoral Agriculture Directorate) issued false proof of ownership certificates, disowning the rightful owners in favour of individuals connected to the plantation companies. Land was also acquired from the state and from farmers' associations in shady deals that were investigated by the First Prosecutor's Office. The plantation companies Plantaciones de Ucayali and Plantations de Pucallpa were liquidated after the public prosecutor's enquiries and bought by another company in the Melka Group. They continue to operate under the name Ocho Sur (Herrera 2018; Torrico 2020; Dammert 2019; Aramis and Luna Amancio 2019; Proetica 2017). A total of 12,200 ha of deforestation was reported by 2015, of which 9,400 ha was primary forest (Finer and Novoa 2015; Finer et al. 2016). Palm oil from these plantations entered the supply chain of Alicorp, one of Peru's biggest businesses and part of the Romero Group, through the Olpesa and Olamsa oil extraction plants in San Martin and Ucayali (Herrera 2018). Unfortunately legal loopholes protect public sector workers from prosecution for corruption and make it hard to achieve successful prosecutions (Castro 2021).

The deforestation by Plantations de Pucallpa also affected local Indigenous Peoples. The Santa Clara Uchunya indigenous community of the Shipibo Konibo ethnic group in the Ucayali region initiated judicial proceedings against the clearing of ancestral lands. The Santa Clara Uchunya have rights to about 8,000 ha of land, but only hold formal land title to 218 ha (Notess and Veit 2018). In 2015, the Ministry of Agriculture ruled that the deforestation had been illegal, but by then more than 5,000 hectares of forest had been destroyed (Forest Peoples Programme 2017; Oxfam 2017). In 2019, the Shipibo Konibo filed a complaint with the Roundtable on Sustainable Palm Oil (RSPO) that a member, Alicorp, was doing business with Ocho Sur (Chain Reaction Research 2019). In 2020, the Norway sovereign wealth fund, Norges Bank Investment Management, withdrew its US$12.3 million investment from Alicorp citing its intention "to avoid investing in companies that…are responsible for violations of ethical principles" (Crothers 2020).

Romero Group is the biggest exporter of palm oil in Peru and its companies own plantations as well as refineries. In a rare success story, legal action against Romero Group succeeded in halting four new oil palm projects in Loreto region before any deforestation occurred. The former director of Management of Agricultural Environmental Affairs of the Ministry of Agriculture was found guilty of illegally approving the environmental certificates for four palm oil projects which together would have caused 23,000 ha of primary forest loss.

Following the ruling, Romero Group adopted a No Deforestation, No Peat, No Exploitation (NDPE) policy (Steinweg et al. 2017; EIA 2017; Finer et al. 2017; Bracamonte and Castro 2020).

The legal framework protecting forests is fraught with contradictions and loopholes. If forest is classified as suitable for agriculture, even primary forest can be at risk of deforestation. Legal reforms in 2014 weakened environmental laws and regulations so the government may now curb or extinguish Indigenous Peoples' territorial rights in order to prioritize development projects (Valqui et al. 2014). A forestry law passed in 2011 claims to grant Indigenous People the right to Free, Prior, and Informed Consent (FPIC) (Che Piu and Menton 2014), but it does not require their actual consent (Cultural Survival 2017).

Altogether, the documented cases of illegal deforestation for commercial agriculture, as well as the probable illegal deforestation by farmers lacking formal land tenure, support an overall estimate of at least 51 percent of agro-conversion being illegal. More research on illegality is clearly needed, but in its absence, given the widespread evidence of illegality, it is not possible to rule out a worst-case scenario in which all deforestation for commercial agriculture is illegal.

2.4 Estimating the percentage of agro-commodities linked to deforestation that are exported

After reviewing available data Forest Trends estimates:

- 11% of commodities embodying deforestation are exported.

Justification

According to data from the 2012 Census, in the Peruvian Amazon, the cultivated area of 1,490,498 ha was dominated by seven crops (Table 1). Of these, livestock, coffee, cocoa, oil palm, the majority of the plantain and some of the cassava are commercial agriculture.

Half the deforestation embodied in agricultural commodities in Peru is in beef, which is for the domestic market (Pendrill et al. 2020). The export of palm oil grew by 490 percent between 2013 and 2018, mainly destined for Colombia, Chile, and Ecuador (COMTRADE 2020; FAOSTAT 2020). According to Pendrill et al., 11 percent of embodied deforestation in crops is exported (2020).

Table 1: Crops driving agricultural expansion in Peru, 2012

	Coffee	Pasture	Cocoa	Plantain	Maize	Rice	Cassava	Oil Palm
% of total cultivated area	25%	25.2%	8.7%	8.2%	7.8%	5.5%	4.8%	1.8%
Commercial?	commercial	commercial	commercial	76% is sold	For livestock feed	A transitional crop	36% is sold	commercial
% exported	77%	Beef 0% Leather 9%	69%		1%		0%	5%

Source: Peru National Strategy on Forests and Climate Change 2016; COMTRADE 2020; FAOSTAT 2020

3 Commodity Analysis

3.1 Palm Oil

- 44% of palm oil is contaminated with deforestation.

Justification

A meta-analysis of palm oil studies found that 44 percent of palm oil expansion in the Peruvian Amazon was on cleared forest. The large-scale plantations had a bigger deforestation footprint than smallholder plantings, of which 30 percent was on former forest (Meijaard et al. 2020). Private sector partnerships, promoted by the National Plan for the Sustainable Development of Palm Oil 2016–2025, have also been proven to have a negative impact: community–company partnership farms show more deforestation (between 34 and 62 percent more) than neighbouring farms that did not grow oil palm (Bennett et al. 2018). In total, about 80,000 ha of oil palm has been planted (Dammert 2019). The regions of Ucayali and San Martin have the most oil palm, 38 percent and 39 percent respectively, with the remainder in Loreto (18 percent) and Huánuco (5 percent) (Proética 2017). Peru reports that it has the capacity to dedicate 1.5 Mha or more to oil palm, indicating the continuing risk of forest conversion for oil palm (EIA 2017; Estrategia Nacional sobre Bosques y Cambio Climatico 2016).

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ANNEX 2:

Africa

Illicit Harvest, Complicit Goods

The State of Illegal Deforestation for Agriculture

ANNEX 2 DEMOCRATIC REPUBLIC OF CONGO CASE STUDY 2013-2019

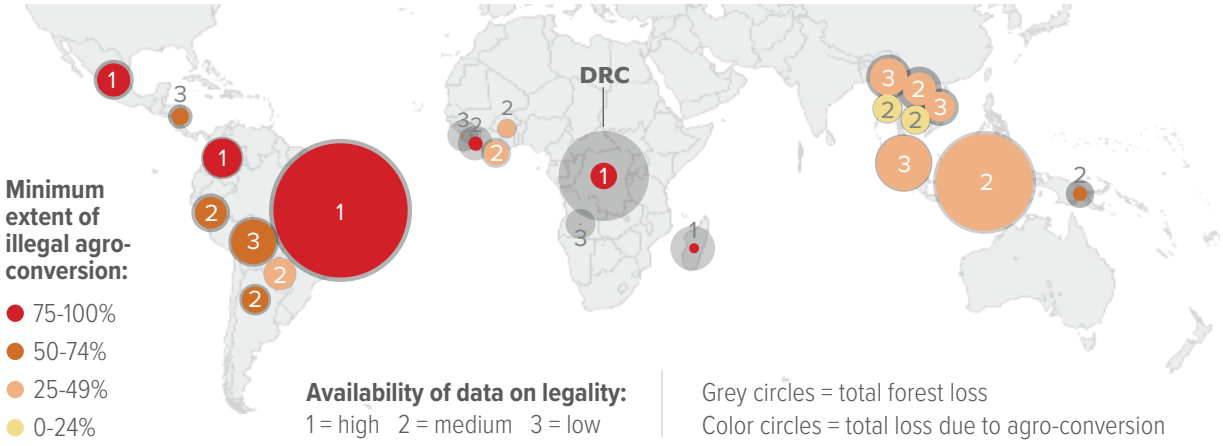
3rd in forest loss in the tropics

11% of all forest loss in the tropics

3.4 Gt of CO_2e Total gross emissions from tree cover loss

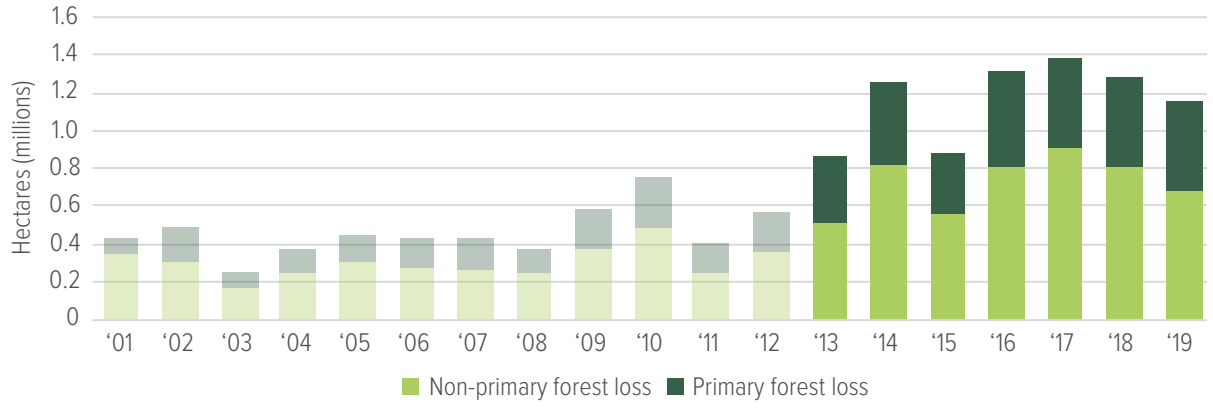
8.1 Mha total >50% loss of tropical forests — of which **9%** due to commercial agriculture — of which at least **99%** likely illegal, **1%** exported

Figure 1: Relative amount of tropical forest loss driven by commercial agriculture and the extent of illegal clearing.



Source: forest loss – GFW (2020, using Hansen et al. [2013]); agro-conversion – estimates compiled by Forest Trends (2021) from multiple sources, including GFW (2020, using Curtis et al. [2018]); and illegality – estimates compiled by Forest Trends (2021).

Figure 2: Annual forest loss from 2001 to 2019 for Democratic Republic of Congo. This report covers the period highlighted (2013-2019).



Source: GFW (2020, using Hansen et al. [2013]).

BOX 1

Forest Trends Findings

- Between 2013 and 2019, commercial agriculture in DRC was likely responsible for the clearance of more than 700,000 ha of forest.
  - Given that 1% of the agro-conversion was exported, there is a risk that international buyers may be linked to the loss of more than 7,000 ha of tropical forests.
  - At least 99% of agro-conversion is likely illegal.
- US$280,000 in rubber that was likely produced from agro-conversion was exported in 2019.
- There is a high risk that these exports were grown on illegally cleared land.

1 Introduction

In 2019, the Democratic Republic of Congo (DRC) was home to 59 percent of the remaining tropical rainforest in the Congo Basin.[1] Forest covers over 126 million hectares (Mha) and more than half of the country's area (FAO FRA 2020). It is estimated that 40 million people depend on the forest for their subsistence, of whom 600,000 to 700,000 are Indigenous Peoples (FPP 2021). The forest is also home to the mountain gorilla, bonobo, chimpanzee, elephant, okapi, white rhino, forest elephant, and pangolin.

Since 2017, DRC's annual forest loss has overtaken Indonesia's and it became second only to Brazil in forest loss (GFW 2020). The Cuvette Centrale is a swampy shallow depression running alongside the River Congo that holds the world's largest store of peatland carbon. These peatlands extend for over 145,500 square kilometers (km^2), covering a large expanse of DRC and part of northern Republic of Congo. They store 30 gigatons (Gt) of carbon, which is similar to the above ground carbon stocks of all the forests of the entire Congo Basin. The stored carbon is relatively undisturbed, because this region is difficult to access, but over the long-term, it remains vulnerable to land use change and reduced precipitation due to climate change (Dargie et al. 2017).

For the purposes of this study only the following were considered:

- **Forests:** areas with greater than 50% tree cover
- **Forest loss / Deforestation:** complete removal of forest cover
- **Illegal:** deforestation that was, at time that the clearing took place, in contravention of the country's legislative framework governing forest conversion

[1] 59% of primary forest and 59% of >50% tree cover

2 Deforestation Analysis

2.1 Deforestation 2013-2019

Between 2001 and 2019, DRC lost 13.7 Mha of forest, of which 8.1 Mha were lost between 2013 and 2019. The rate of annual forest loss was 167 percent higher in 2019 than it was in 2001 (GFW 2020, using Hansen et al. 2013). According to the Food and Agriculture Organization (FAO), the forest area in DRC has been reduced from 144 Mha in 2000 to 126 Mha in 2020, a loss of 18 Mha (FAO FRA 2020).

2.2 Drivers of deforestation

Forest Trends evaluated several different sets of data on the extent and nature of forest loss in DRC between 2013 and 2019, including research from Global Forest Watch (GFW) (2020, using Curtis et al. 2018), Pendrill et al. 2020, and academic literature. Forest Trends concludes that there is insufficient data to arrive at a precise and accurate estimate regarding the drivers of deforestation. However the best estimate is that:

- Between 9% and 22%, at least, is driven by commercial agriculture.

Justification

Small-scale agriculture is reportedly the main driver of deforestation (CIFOR 2015). Global Forest Watch (2020, using Curtis et al. 2018), attributes 99 percent of forest cover loss to shifting agriculture. However, as outlined in the methodology (Appendix 1, Forest Trends 2021), GFW likely overestimates the role of subsistence agriculture, especially in Africa.

Democratic Republic of Congo has a population of over 70 million, most of whom have few livelihood options, so there is a high dependence on smallholder farming for subsistence agriculture and market exchange in nearby towns and cities. Furthermore, people move into remote forest because of conflict and insecurity, which increases unplanned clearance of primary forest. Forest loss is increasing along major roads and in areas of previously intact forest (Turubanova et al. 2018; Molinario et al. 2020). Urbanization is also a driver, as only 16 percent of Congolese households have access to electricity and there is huge demand for charcoal. According to Alain Engunda from the World Resources Institute in Kinshasa, “If people don’t have electricity, they cut trees.” (Schneider 2020)

Pendrill et al. (2020) compared land cover change with forest (>25 percent tree cover) loss data between 2013 and 2017 and calculated that 22 percent of deforestation was connected to crop cultivation, mostly cassava (7 percent), rice (5 percent), maize (4 percent), and plantain (3 percent). These crops are not exported, but it is not known how much was grown for subsistence versus small-scale commercial agriculture. It is likely that some were grown as cash crops sold on the local market, and thus, by Forest Trends’ definition, the farming should be considered commercial agriculture (albeit small-scale).

According to Mousseau (2019), “it is a misconception that the Congolese are mostly subsistence farmers because most of them actually produce both for their own consumption and for the market…However, they face many constraints to produce and commercialize their crops such as poor transport and storage infrastructures, high cost of transport, and lack of negotiating power with intermediaries.” The challenges are further demonstrated by the shocking statistic that a third of the population is experiencing crisis levels of acute food insecurity (FAO 2020). A projection of deforestation up to 2030 predicts that more than 60 percent of forest loss will be driven by the expansion of manioc, with oil palm, peanuts, maize, and rice also playing an increasing role (Umunay & McGlyn 2017).

Starting in 2013, the government had planned to grant very large concessions in the form of “agro-industrial parks” under the country’s US$6 billion, seven-year National Agricultural Investment Plan. The first agro-

industrial park (80,000 ha) at Bukanga Lonzo in Bandundu province was inaugurated in 2014, at an estimated cost to the government of about US$83 million (Kirpalu et al. 2014). In total, 22 agro-industrial parks were planned to cover 1.5 Mha, but the Bukanga Lonzo site was closed after only a few years. A leaked audit by Ernst and Young suggested that the parks were a source of fraud and corruption (Mousseau 2019). Another project under the World Bank, worth US$110 million, proposed to expand agriculture, despite recognizing that "deforestation and land clearing activities may be expected" (World Bank 2013). A second World Bank project, worth US$75 million, was meant to "support commercial agriculture in the rain forest area," including activities to improve cultivation techniques in forests, "introduce perennial crops in forests," and enhance the value chain of coffee, cocoa, palm, and rubber (World Bank 2017).

The presence of plantations and commercial agriculture is both an indirect and direct cause of tree loss because plantation workers rely on shifting cultivation and non-timber forest products (NTFP) for food, energy, and building materials. A study by Molinario et al. (2020) found that 9 percent of intact forest loss was within five kilometers (km) of logging, mines, or plantations, and 12 percent of tree cover loss within secondary forest was within five km of commercial land uses, even though the direct loss to commercial agriculture was only a fraction of this percentage (Molinario et al. 2020). Therefore, largescale commercial agriculture may in fact be directly and indirectly responsible for at least 9 to 12 percent of deforestation.

It is likely that GFW (2020) also underestimates the role of logging in driving deforestation directly or indirectly. According to FAO (FAOSTAT 2020), annual production of logs was 4.6 million m^3 every year between 2013 and 2019, but the actual annual figures may be higher, as identical figures every year cast doubt on the reliability of this reporting. Forest Trends research indicates that illegal logging is likely the biggest threat to primary forests. More investigations are needed to better understand the links between illegal logging (both small and large scale) and agriculture (both commercial and subsistence) as drivers of deforestation.

2.3 Estimating illegality linked to agro-conversion

After reviewing all available data Forest Trends' best estimate is that:

- 99% of deforestation for commercial agriculture was illegal.

Justification

Where compliance has been investigated related to commercial agriculture, as in the case of the government's attempt to create the first agro-industrial park (described above) there is clear evidence of fraud and corruption.

For example, the palm oil concessions of Lokutu, Yaligima, and Boteka in Oriental and Equateur Provinces, run by Feronia Inc., are accused of illegalities. The plantations were started by the Lever brothers under King Leopold's brutal colonial rule (the Lever brothers' plantation business grew to become Unilever). Local community leaders claim that the land was originally taken illegally, and that more recently, Feronia's agreement in 2012 to take over the former Unilever concessions did not comply with the legal requirement for community consultation (RIAO-RDC & GRAIN 2015; Feronia 2018). Feronia admits that, back then, "the concept of Free, Prior and Informed Consent (FPIC) did not exist."

As of 2018, oil palm has been planted on 24,183 ha (out of 103,613 ha in three concessions) according to MapHub using GLAD alerts (Feronia 2018; Bottrill et al. 2014). When it obtained the concessions in 2012, Feronia received over USD$100 million in investment from the UK, German, Belgian, and Dutch development banks and was 38 percent owned by CDC Group, the UK development bank, until it went bankrupt in 2020 (at a loss to the UK taxpayer of USD$76 million) (HRW 2020; CDC Group 2021; Kennedy & Grylls 2021). The Feronia plantations have been beset by accusations of human rights and environmental abuses, including worker exposure to toxic pesticides and dumping untreated industrial waste in a nearby river (HRW 2019). Furthermore, there were accusations of fraud and corruption: since August 2008, payments of nearly $3 million were made to Barnabe Kikaya bin Karubi, who served on Feronia's board of directors until 2014, and

was the DRC's Ambassador to the UK 2009 to 2014, and prior to that, President Joseph Kabila's Private Secretary and Minister of Information (RIAO-RDC & GRAIN 2015).

In Congolese law, the soil and subsoil belong to the state and concessions are the preferred mechanism for granting access to forest resources. This puts Indigenous Peoples at a great disadvantage. There is limited recognition of customary land rights in law, and in practice, Indigenous People lack land tenure security and live with the constant threat of land grabs or expropriation. In 2020, the National Assembly passed a law "On the Promotion and Protection of Indigenous Peoples," which gives Indigenous Peoples the right to their land. However, it may be a case of one step forward and one step back — the National Land Management Policy (PNAT in French) under development in 2021 favours economic growth over environmental or social concerns, and is criticised for its weak civil society participation and the omission of customary tenure security (FPP 2021).

Between 2013 and 2019, 10 percent of DRC's tree cover loss occurred in logging concessions and rates of illegality were high (Engunda Ikala et al. 2018; Global Witness 2018). Logging is on an industrial scale: concessions cover 10.7 Mha of forest, or roughly 7 percent of DRC's forests (Global Witness 2018; Engunda Ikala et al. 2018). Chatham House estimates that 99 percent of timber produced in DRC is illegal (Hoare 2015). For example, Norsudtimber is the biggest logging company with 4 Mha of concessions, of which 90 percent are alleged to be operating illegally (Global Witness 2018). Despite a moratorium on new forest concessions in force since 2002, in January 2020, the Minister of Environment and Sustainable Development granted nine logging concessions to Chinese companies and declined to publish the contracts. Civil society organisations accused the government of breaking the law and filed an action for annulment of these deals with the Council of State (FPP 2021).

Even when logging is selective, it is not sustainable because the massive logs are removed via skidder trails and logging roads that open up the forest to an influx of farmers (Witte 1995; Lescuyer 2014). Because almost all logging is illegal, and because this activity opens up the forest for conversion to agriculture, it follows that the forest conversion itself is also illegal.

2.4 Estimating the percentage of agro-commodities exported from illegally deforested lands

After reviewing available data Forest Trends estimates:

- 1% of commodities embodying deforestation are exported.

Justification

Forest Trends used data from Pendrill et al. (2020) to produce this estimate. Most crops grown on former forest, such as cassava, rice, maize, and plantain are sold in local markets for domestic consumption and to provide minimal income to small scale farmers (Mousseau 2019). While cocoa and rubber are grown for export markets, their deforestation footprint between 2013 and 2017 is relatively small, 11,763 ha and 3,456 ha, respectively (Pendrill et al. 2020).

3 Commodity Analysis

Rubber was selected for analysis because it is one of the DRC's top two exported agricultural commodities linked to deforestation.

3.1 Rubber

Based on its analysis Forest Trends estimates that:

- At least 15% of rubber production is linked to deforestation.

Justification

Rubber cultivation covered 64,168 ha in 2018 of which 9,624 ha replaced forest between 2001 and 2015 (Goldman et al. 2020; FOASTAT 2020). Rubber exports in 2019 had a value of $1.9 million and went mostly to Malaysia (59 percent). Other importers of note were Romania, Turkey, Italy, and Spain (COMTRADE 2020).

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Illicit Harvest, Complicit Goods

The State of Illegal Deforestation for Agriculture

ANNEX 2 ANGOLA CASE STUDY 2013-2019

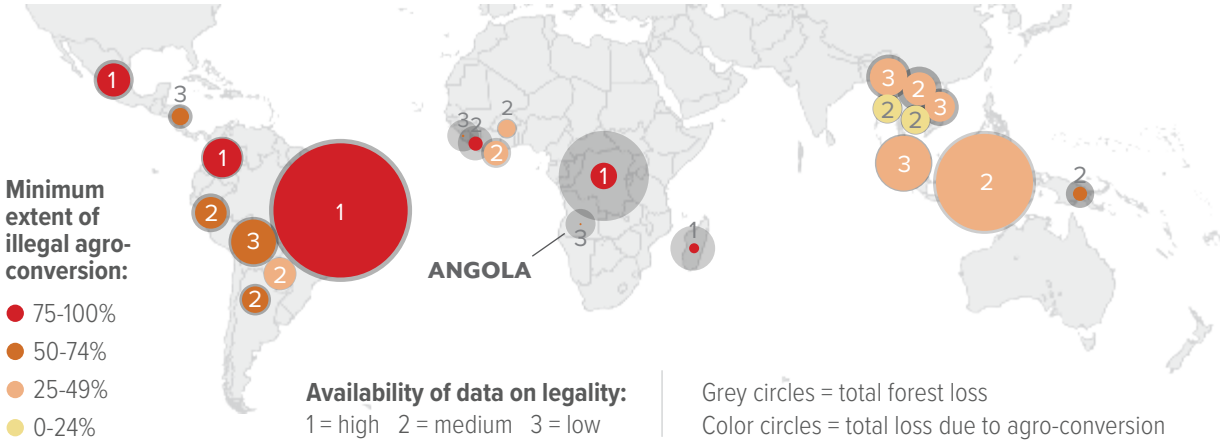
19th in forest loss across the tropics

1% of all forest loss across the tropics

376 Mt of CO_2e Total gross emissions from tree cover loss

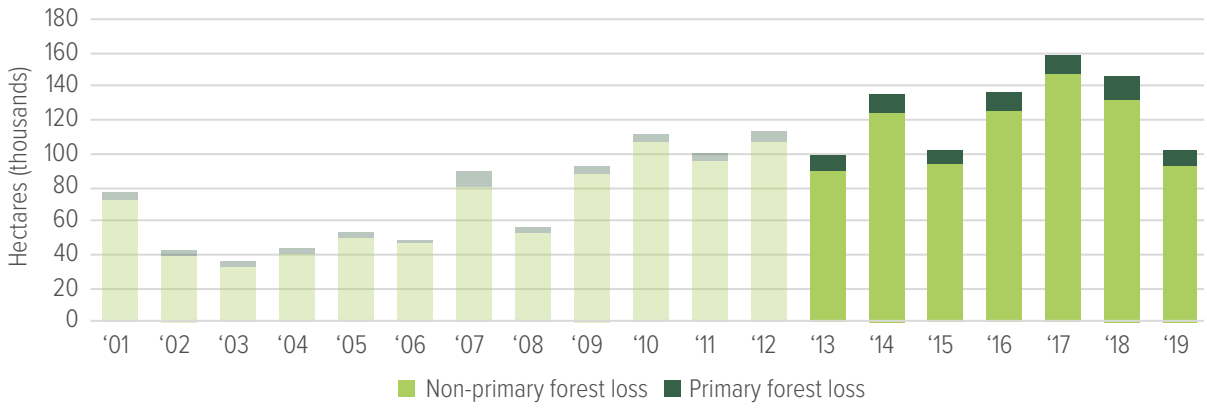
0.9 Mha total forest loss → of which **2%** due to commercial agriculture → of which at least **71%** likely illegal; **0%** likely exported

Figure 1: Relative amount of tropical forest loss driven by commercial agriculture and the extent of illegal clearing.



Source: forest loss – GFW (2020, using Hansen et al. [2013]); agro-conversion – estimates compiled by Forest Trends (2021) from multiple sources, including GFW (2020, using Curtis et al. [2018]); and illegality – estimates compiled by Forest Trends (2021).

Figure 2: Annual forest loss from 2001 to 2019 for Angola. This report covers the period highlighted (2013-2019).



Source: GFW (2020, using Hansen et al. [2013]).

BOX 1

Forest Trends Findings

- Between 2013 and 2019, commercial agriculture in Angola was likely responsible for the clearance of more than 18,000 ha of forest
  - There is no record of agro-commodities that were exported
  - The proportion of agro-conversion that is illegal is not known

Clearly more research is warranted in understanding the drivers of deforestation in Angola, especially as it is among the top 20 countries with tropical forest loss. In fact, according to FAO, between 2015 and 2019, Angola had the fourth largest decrease in forest cover in the world.

1 Introduction

Angola had 67 million hectares (Mha) of forest in 2019, covering 54 percent of the country (FAO FRA 2020). In the north, tropical rainforest accounts for about 2 percent of Angola's forest, and forms part of the Congo Basin. The majority of Angola's forest is open dry forest and savannah or Miombo woodlands, accounting for about 80 percent of total forest (Landlinks 2010). These are complex landscapes, made up of a mosaic of intact and disturbed woodlands, mixed with fields, wetlands, and homesteads (Chiteculo et al. 2018b). In the south, there are about 31,000 ha of mangrove forest (FAO FRA 2020).

2 Deforestation Analysis

2.1 Deforestation 2013–2019

Angola lost 882,670 ha between 2013 and 2019 (GFW 2020, using Hansen et al. 2013), that is, 3 percent of its forest extent in 2000. During this time, the annual rate of deforestation increased: 2017 was the worst year on record when 159,499 ha of forest was reportedly lost, a 61 percent increase on forest loss since 2013 (Hansen et al. 2013 on GFW). FAO FRA (2020) records a dramatically higher rate of loss: since 2000, the net loss of forest is reported to be 555,060 ha a year. The explanation for this difference is unclear. Forest Trends (2021), Appendix 1 discusses some of the methodological differences between FAO and GFW, but it is likely that the FAO Angola data are based on estimates, rather than analyses of satellite imagery like GFW. FAO data indicate a consistent 0.8 percent decrease in forest cover each year between 2015 and 2020, whereas GFW documents annual variation in losses.

For the purposes of this study only the following were considered:

- **Forests:** areas with greater than 50% tree cover
- **Forest loss / Deforestation:** complete removal of forest cover
- **Illegal:** deforestation that was, at time that the clearing took place, in contravention of the country's legislative framework governing forest conversion

2.2 Drivers of deforestation

Forest Trends' analysis on the extent and nature of forest loss in Angola between 2013 and 2019 is based on a review of existing literature and data, including research from Global Forest Watch (2020), Pendrill et al. (2020), and academic articles. After reviewing the available data Forest Trends' best estimate is that:

- At least 2% of deforestation was driven by commercial agriculture

Justification

Expansion of agriculture is the primary driver of deforestation in Angola (Schneibel et al. 2017). Other drivers include domestic demand for wood and charcoal, and international demand for tropical timber (Gomes 2019). Charcoal and firewood are the main source of energy for 80 percent of the population, and most is produced illegally without the required license from the Institute for Forest Development (Chiteculo et al. 2018b). The Curtis et al. (2018) driver analysis on GFW identifies that 2 percent of forest loss was driven by commodities, and 96 percent by shifting agriculture. It is possible that some of what is identified as shifting agriculture by GFW is small-scale commercial agriculture (see Forest Trends 2021, Text Box 1 for an explanation of the GFW model's low accuracy for distinguishing between commodities and shifting agriculture, especially in Africa).

Shifting agriculture in Angola is largely for subsistence, but many farming families sell part of their production to local traders to gain a small cash income (Tvedten et al. 2018). For example, farmers in the central highlands often combine subsistence farming with cash crops, producing maize and pulses for subsistence, and vegetables and timber for the local market (Delgado-Matas and Pukkala 2013).

According to Pendrill et al. (2020), 23 percent of forest loss is embodied in crops. This analysis defines forest as tree cover greater than 25 percent, so it includes the more open canopy of the Miombo woodland where pastoralists herd their cattle (the Curtis et al. (2018) driver analysis on GFW used >50 percent tree cover loss). According to Pendrill et al. (2020), cattle are responsible for more than one-third (35 percent) of embodied deforestation, even though the pastoralists are recognized as having a positive role in supporting biodiversity and regulating wildfires (Ruvuga et al. 2019). Cattle are used for subsistence and more: they are a source of prestige and a repository of value; their milk and meat is eaten, and they are traded for grain and other goods (Schneider 2019). Other crops embodying deforestation are cassava (20 percent of embodied deforestation) and maize (19 percent) (Pendrill et al. 2020). Maize cultivation has increased by more than 1 Mha between 2013 and 2018, driven by domestic demand (FAOSTAT 2020; COMTRADE 2020).

Being unable to differentiate between subsistence and small-scale farming of cash crops, we are conservative, and only include the 2 percent of deforestation that GFW links to commercial agriculture.

2.3 Estimating illegality linked to agro-conversion

A lack of data also means that Forest Trends is unable to make an estimate of the amount of illegality associated with deforestation for commercial agriculture in Angola. For the purpose of the overall Forest Trends (2021) report, we, therefore, use the average for other countries in Africa.

In Angola, all land and natural forests are state property, and the state recognizes customary rights of land and forest for subsistence use. The new Law on Forests and Wild Fauna passed in 2016 prohibits deforestation on classified land, and requires prior authorization for deforestation for agriculture, but allows deforestation for subsistence agriculture (Ministério da Agricultura 2016). No concession contracts have been issued since the law came into effect (only annual licenses for logging are being issued until the Forestry Development Institution has capacity to manage long-term logging concessions).

2.4 Estimating the percentage of agro-commodities linked to deforestation that are exported

After reviewing available data Forest Trends estimates that:

- 0% of commodities linked to deforestation are exported.

Justification

According to Pendrill et al. (2020), only 212 ha of embodied deforestation were exported, out of 393,963 ha of forest loss. Angola's agricultural productivity has not recovered since the civil war, and the country is a net importer of key commodities such as maize (República de Angola Consulado Geral No Porto n.d.).

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Illicit Harvest, Complicit Goods

The State of Illegal Deforestation for Agriculture

ANNEX 2 CÔTE D'IVOIRE CASE STUDY 2013-2019

17th in tropical forest loss

1% of all tropical forest loss

514 Mt of CO_2e Total gross emissions from aboveground biomass loss

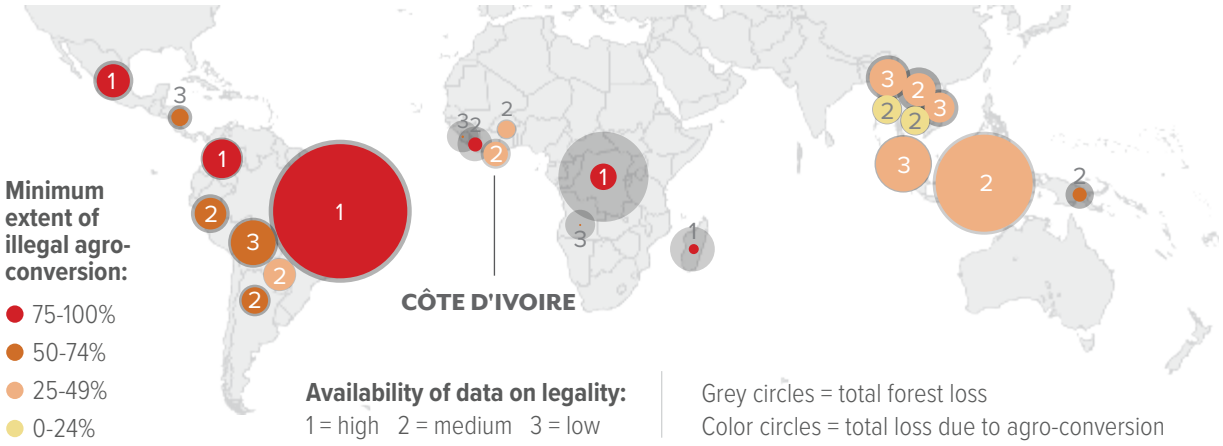
0.9 Mha total loss of tropical forests

of which **62%** due to commercial agriculture

of which at least **26%** likely illegal

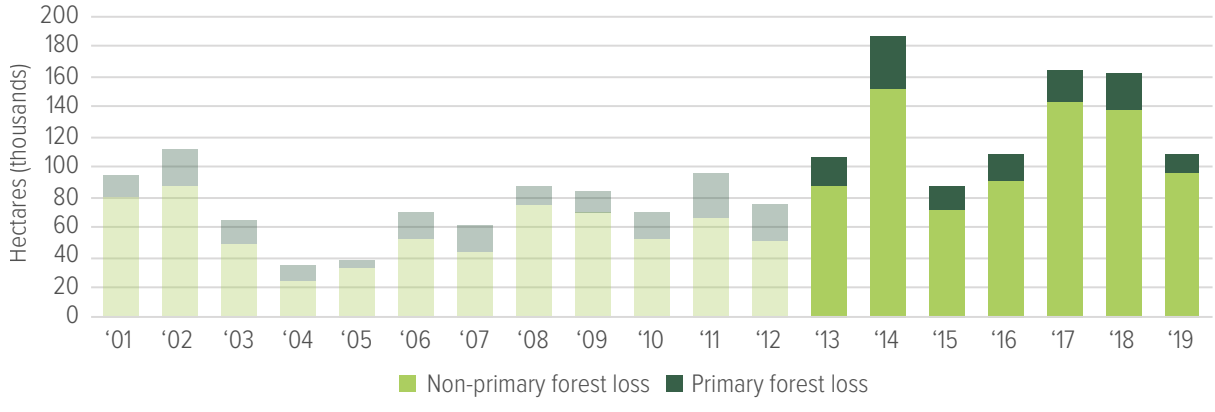
64% likely exported

Figure 1: Relative amount of tropical forest loss driven by commercial agriculture and the extent of illegal clearing.



Source: forest loss – GFW (2020, using Hansen et al. [2013]); agro-conversion – estimates compiled by Forest Trends (2021) from multiple sources, including GFW (2020, using Curtis et al. [2018]); and illegality – estimates compiled by Forest Trends (2021).

Figure 2: Annual forest loss from 2001 to 2019 for Côte d'Ivoire. This report covers the period highlighted (2013-2019).



Source: GFW (2020, using Hansen et al. [2013]).

BOX 1

Forest Trends Findings

- Between 2013 and 2019, commercial agriculture in Côte d'Ivoire was likely responsible for the illegal clearance of approximately 600,000 ha of forest.
- Given that 64% of Côte d'Ivoire's agro-conversion was exported, there is a risk that international buyers may be linked to the loss of at least 360,000 ha tropical forests, if not more.
- At least 26% of agro-conversion is likely illegal.
- Exports in 2019 that were likely from agro-conversion:
  - US$2.2 billion in cocoa. There is a high risk that these exports were grown on illegally cleared land.
  - US$9.6 million in coffee. It is difficult to determine the risk that these exports were grown on illegally cleared land. Given this, heightened due dilligence is required by buyers.

1 Introduction

From 7.8 million hectares (Mha) of forest in 1990, Côte d'Ivoire now has less than 2.8 Mha, or only 9 percent of its territory (FAO FRA 2020). Côte d'Ivoire has one of the most extensive areas of the Upper Guinean Forest in West Africa. This forest is a global biodiversity hotspot and has an exceptional variety of habitats with 2,800 species of vascular plants (REDD+ 2017). The ecoregion consists of undulating hills, high plateaux, and occasional mountains, which are home to endemic plant species, such as the orchid *Rhipidoglossum paucifolium* that grows only on Mount Nimba, on the border between Liberia, Guinea and Côte d'Ivoire. Lowland tropical forest grows between the mountains and the coast, while on the northern slopes the montane forest transitions into a fragmented mosaic of deciduous trees, savannah and farms, where once there was dense forest (WWF n.d.; CILSS 2016). The Permanent Forest Area includes production forests (*forêts classées*) and protected areas; and additional forest fragments remain in rural areas, unprotected by forest law (325 fragments identified in 2015) (MINEF 2018). The *forêts classées* still have large areas of intact forest but are under intense pressure from the farming communities living there (REDD+ 2017). One report estimates that more than 1 million people live in the *forêts classées* (Fountain and Huetz-Adams 2018).

For the purposes of this study only the following were considered:

- **Forests:** areas with greater than 50% tree cover
- **Forest loss / Deforestation:** complete removal of forest cover
- **Illegal:** deforestation that was, at time that the clearing took place, in contravention of the country's legislative framework governing forest conversion

2 Deforestation Analysis

2.1 Deforestation 2013–2019

The forest cover loss between 2013 and 2019 was nearly 1 Mha, on average a loss of more than 130,000 ha per year, with the highest-ever loss reported in 2014 (GFW 2020, using Hansen et al. 2013).

2.2 Drivers of deforestation

Forest Trends findings

Forest Trends evaluated data on the extent and nature of forest cover loss in Côte d'Ivoire between 2013 and 2019, in particular data from GFW (2020 using Curtis et al. 2018), Pendrill et al. (2020) and Côte d'Ivoire's REDD+ strategy. After reviewing the available data Forest Trends estimates that:

- 62% of forest loss was driven by commercial agriculture.

Justification

The Curtis et al. (2018) driver analysis reports that only 2 percent of tree cover loss was driven by commodities, while 97 percent was shifting agriculture (GFW 2020). However, Curtis et al. and GFW report that, especially in the context of Africa, they likely underestimate the role of commercial agriculture in driving tree cover loss, reflecting their low level of accuracy for differentiating between subsistence and commercial agriculture conducted by smallholders (Appendix 1, Forest Trends 2021). Therefore, we have evaluated the literature to obtain a more accurate estimate.

The Government of Côte d'Ivoire identifies agriculture as the driver of 62 percent of deforestation, citing 'cash crops' such as cocoa, cashews, rubber, coffee, palm oil, fruit, and cotton, most of which are grown for export (REDD+ 2017). A separate driver analysis (BNEDT 2016) conducted with regional workshops and key stakeholder interviews also identified that 62 percent of deforestation was driven by agriculture, and, excluding rice, vegetables and other crops, almost all of it was driven by commercial agriculture (or 52 percent of total deforestation). There is significant variation by region, ranging from 22 percent in the east to 71 percent in the southeast (BNEDT 2016). The Pendrill et al. (2020) estimate is lower, calculating that 24 percent of forest loss (defined as >25% cover) between 2013 and 2017 was embodied in crops (of which cocoa was 26 percent and coffee 14 percent); but Pendrill et al.'s method assumes that crops expand first into pasture, which is not so true in West Africa as it is in Latin America. In Côte d'Ivoire, a combination of land availability, soil and climate suitability means that coffee and cocoa are grown in former forest areas, and the rate of deforestation for crops is higher than Pendrill et al.'s estimate.

Given the above, and because agro-conversion in Côte d'Ivoire is mostly by smallholders, often creating a canopy that may not be detected as forest loss by satellite observations, Forest Trends considers the REDD+ (2017) driver analysis to be most accurate. This is conservative compared to WWF's claim that cocoa may be responsible for 70 percent of Côte d'Ivoire's illegal deforestation (WWF 2017). According to FAO, cocoa expanded its coverage by 1.3 Mha between 2013 and 2018, growing on a total of 4 Mha in 2018 (FAOSTAT 2020). This expansion is assumed to be mostly into forest, given that palm oil and rubber also expanded their coverage, (by 69,459 ha and 109,459 ha respectively), and the area dedicated to coffee only reduced by a marginal 92,095 ha (FAOSTAT 2020).

2.3 Estimating illegality linked to Agro-conversion

After reviewing all available data Forest Trends most conservative estimate is that:

- At least 26% of deforestation for commercial agriculture was illegal.

Justification

GFW's analysis of satellite observations indicates that 258,834 ha, or 28 percent, of tree cover loss occurred in protected areas during the reference period; according to Bitty et al. (2015) study, 93 percent of the forest loss in protected areas is for illegal cocoa production, while 7 percent is for subsistence crops (GFW 2020). Therefore Forest Trends estimates that 26 percent of agro-conversion is illegal.

Bitty et al. (2015) studied 23 protected areas (selected because they were known to have contained primates in past surveys) and found that they had been "completely or nearly transformed into cocoa plantations." The study surveyed a total area of 439,250 ha (23 protected areas) and found that 323,900 ha, or 74 percent, had been transformed into cocoa plantations with only 26 percent remaining as forest. Seven parks or reserves had been totally transformed into farms while the others had been partially converted. The study established that illegal cocoa farming was the major cause of deforestation within Côte d'Ivoire's protected areas, and that primate populations had suffered as a result: more than half (13 protected areas) had no remaining primate populations (Bitty et al. 2015).

Agro-conversion in the *forêts classées* and rural domain forest is also likely to be illegal as the state holds management control over all forest lands unless land ownership has been granted to an individual (Preferred by Nature 2017). If illegal agro-conversion in *forêts classées* were to be included in the Forest Trends estimate, the percentage of illegality would be significantly higher, but there is insufficient evidence to justify doing this. More research into illegality of agro-conversion is needed. Based on the data currently available, it is safe to say that at least 26 percent of agro-conversion is illegal, and probably much more.

2.4 Estimating the percentage of agro-commodities linked to deforestation that are exported

After reviewing the available data Forest Trends estimates:

- 64% of crops embodying deforestation were exported.

Forest Trends' estimate is based on BNEDT's (2016) analysis of which crops drive deforestation, combined with production and trade data which shows what proportion of these crops was exported (Table 1). The remainder (36 percent) was for staple crops such as yam and rice that are likely grown for the domestic market, as is most palm oil (see Table 1: sum of AxB) (BNEDT 2016; EU REDD Facility 2020; FAOSTAT 2020).

Table 1: Production and export of key agro-conversion crops (FAOSTAT 2020; COMTRADE 2020; BNEDT 2016)

2013–2018	Cocoa	Coffee	Palm Oil	Rubber
production (mt)	10,494,782	570,696	14,767,215	2,395,194
% of production exported (A)	100%	73%	8%	100%
% of agro-conversion attributable (B)	38%	3%	11%	23%
% of commodities from agro-conversion exported (AxB)	38%	2%	1%	23%

3 Commodity Analysis

3.1 Cocoa

- 40% of cocoa production is from illegal deforestation

Justification

Côte d'Ivoire is the world's leading producer of cocoa. Between 2013 and 2018, Côte d'Ivoire reported production of nearly 10.5 million mt of cocoa, 36 percent of the world's supply (FAOSTAT 2020). Cocoa beans are Côte d'Ivoire's top export, worth US$5.35 billion in 2018 and destined primarily for the EU (60 percent; the top three importers are the Netherlands, Germany, and Belgium), and the United States (18 percent; Observatory of Economic Complexity; Table 2). Cocoa farmers have already noticed the effects of rapid forest loss, with decreases in rainfall and soil quality negatively impacting their productivity (Fern 2018). This is exacerbated by climate change.

The expansion of cocoa in Côte d'Ivoire has been largely in forest reserves and other protected areas where farmers encroach and clear the forest for full-sun cultivation. The director of the government's Forest Reserve protection agency estimated that 40 percent of Ivorian cocoa comes from protected areas, and is therefore contaminated with illegal deforestation (Higonnet et al. 2017; AFD n.d.; Yeung 2019).

In November 2017, 37 major chocolate and cocoa companies launched the Cocoa & Forests Initiative commitment to zero deforestation (World Cocoa Foundation 2018). However, illegal conversion continued and the call has grown louder for governments to prohibit deforestation in supply chains (Fern 2018). A study of the southwest region of Côte d'Ivoire identified 13,748 ha of deforestation in the year after the launch of the initiative. This was almost the same amount recorded in the previous year (14,827 ha). Cavaly Mont Sante National Park showed the largest increase in illegal deforestation during this period, while Taï National Park was held up as a model of successful protection (Higonnet et al. 2018).

In 2019, the government introduced a new forestry code and reclassified 2 Mha of protected forest as 'agro-forest'. This legalization of farming in forest reserves allows cocoa production to continue while trees are planted in an attempt to reforest areas that have lost three-quarters of their tree cover (Monnier and Mieu 2017). Critics of the law say that it will lead to a loss in property rights for indigenous communities and create a monopoly for foreign companies (AfricaBiz 2019).

Table 2: Imports of cocoa from Côte d'Ivoire by the EU, United Kingdom and United States as a proportion of global imports (COMTRADE 2020)

	World imports (mt)	EU imports (mt) (%)	UK imports (mt)	US imports (mt)
2013-2018	10,745,781	6,467,353 (60%)	342,800 (3%)	1,892,545 (18%)

3.1 Coffee

- At least 13% of coffee production is linked to deforestation.

Justification

Very few data are available on the proportion of coffee production coming from agro-conversion of forests. The Forest Trends estimate is based on Goldman et al. (2020)'s estimate of how much forest was replaced by coffee between 2001 and 2015 (79,043 ha), as a proportion of the extent of coffee in 2018 (597,664 ha

according to FAOSTAT 2020), indicating that 13 percent of coffee is grown on former forest.

After Honduras, Côte d'Ivoire ranks second in the amount of deforestation embodied in coffee production. That is, Côte d'Ivoire is responsible for 20 percent of the world's forest-risk coffee (Pendrill et al. 2020) despite producing only 1 percent of the world's coffee (570,696 mt of coffee between 2013 and 2018; FAOSTAT 2020). The EU imported 25 percent of Côte d'Ivoire's coffee in the reference period (104,446 mt), with other top importers being Algeria, the United Kingdom, and Korea (COMTRADE 2020).

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Illicit Harvest, Complicit Goods

The State of Illegal Deforestation for Agriculture

ANNEX 2 GHANA CASE STUDY 2013-2019

33rd in tropical forest loss

1% of all tropical forest loss

253 Mt of CO_2e Total gross emissions from tree cover loss

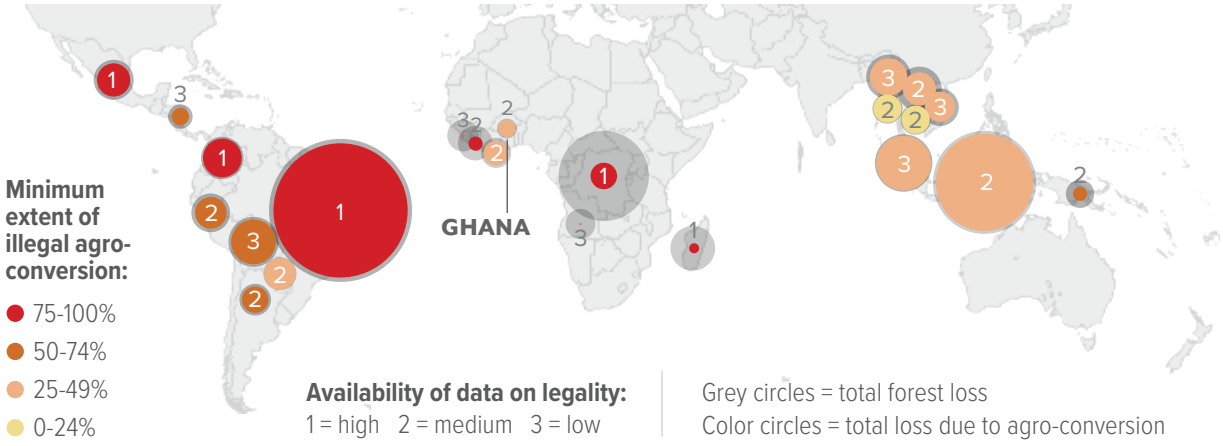
0.4 Mha total >50% loss of tropical forests

of which **77%** due to commercial agriculture

of which at least **45%** likely illegal

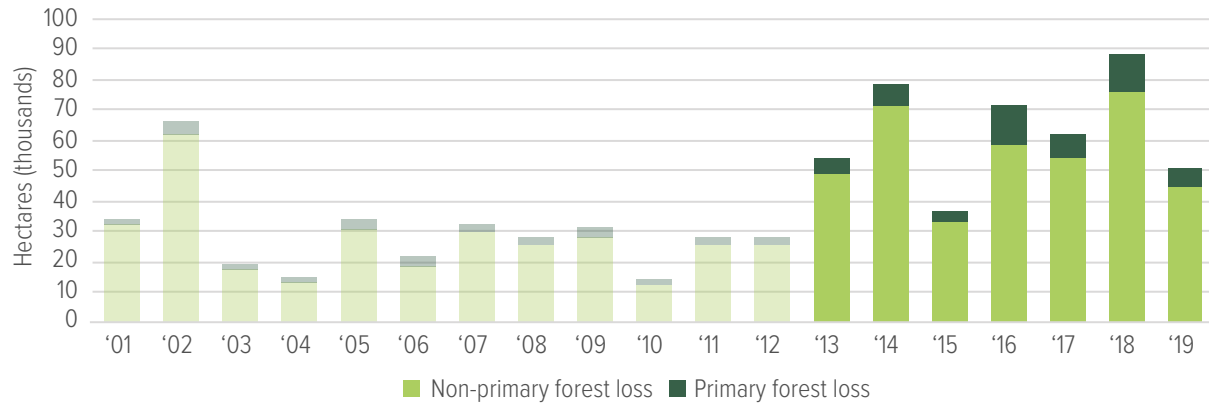
14% likely exported

Figure 1: Relative amount of tropical forest loss driven by commercial agriculture and the extent of illegal clearing.



Source: forest loss – GFW (2020, using Hansen et al. [2013]); agro-conversion – estimates compiled by Forest Trends (2021) from multiple sources, including GFW (2020, using Curtis et al. [2018]); and illegality – estimates compiled by Forest Trends (2021).

Figure 2: Annual forest loss from 2001 to 2019 for Ghana. This report covers the period highlighted (2013-2019).



Source: GFW (2020, using Hansen et al. [2013]).

BOX 1

Forest Trends Findings

- Between 2013 and 2019, commercial agriculture in Ghana was likely responsible for the clearance of more than 340,000 ha of forest.
- US$312 million in cocoa that was likely from agro-conversion was exported in 2019.
- These exports carried a medium risk of being grown on illegally cleared land.

1 Introduction

Ghana's forests are concentrated in the southwest of the country, with wet and moist evergreen forest on the coastal border with Côte d'Ivoire, semi-deciduous forest to the east, and savannah to the north. In 1990, Ghana had 9.9 million hectares (Mha) of forest, which was reduced to 7.9 Mha by 2020, or 35 percent of its territory (FAO FRA 2020). Ghana's Upper Guinean Forest is a world biodiversity hotspot, but is 85 percent degraded by illegal logging and expansion of agriculture (Acheampong et al. 2019). Ghana's remaining closed canopy forest[1] is mainly found in the gazetted forest reserves and national parks (REDD+ 2016).

2 Commodity Analysis

2.1 Deforestation 2013–2019

Ghana lost 442,522 ha of forest between 2013 and 2019, with the highest ever loss reported in 2018 when 88,521 ha were lost, or 2 percent of Ghana's 2000 forest cover (GFW 2020 using Hansen et al. 2013). The government reported a higher annual rate of forest loss in 2016, at 135,000 ha per annum (REDD+ 2016), but the government defines forests as >15 percent canopy cover, whereas we use GFW data with a >50 percent canopy cover threshold.

2.2 Drivers of deforestation

Forest Trends findings

Forest Trends' analysis on the extent and nature of forest loss in Ghana between 2013 and 2019 is based on a review of existing literature and data, including GFW (2020 using Curtis et al. 2018), Pendrill et al., and

[1] The REDD+ report defines forests as tree cover greater than 60 percent.

For the purposes of this study only the following were considered:

- **Forests:** areas with greater than 50% tree cover
- **Forest loss / Deforestation:** complete removal of forest cover
- **Illegal:** deforestation that was, at time that the clearing took place, in contravention of the country's legislative framework governing forest conversion

REDD+ (2016; 2017). After reviewing all available data, Forest Trends' best estimate is that:

- At least 77% of deforestation is driven by commercial agriculture.

Justification

All sources indicated that the expansion of agriculture is the main driver of deforestation in Ghana, but it is a challenge to identify how much is commercial and how much is for subsistence. GFW (2020) identifies only 5 percent of tree cover loss as being driven by commodities, but as explained in the main report (Appendix 1, Forest Trends 2021), their methodology (Curtis et al. 2018) often confuses commercial and shifting agriculture. This is particularly relevant in Ghana where 95 percent of farms are smaller than 10 ha (GFW 2020; REDD+ 2016; Curtis et al. 2018; FAO n.d.).

Agriculture in the forest zone includes market-oriented tree crops such as cocoa, oil palm, coffee, and rubber, as well as mixed food crops such as maize, plantain, cocoyam, and cassava (FAO n.d.). The REDD+ analysis of forest loss emissions says that 77 percent of clearance of closed forest between 2013 and 2015 was for agriculture (211,517 ha of >60 percent cover). Cocoa accounted for 34 percent of forest loss, other tree crops for a further 7 percent, and 36 percent was for crops (see Table 1; National REDD+ Secretariat and Forestry Commission 2017). The crops are likely to have been a mixture of cash crops and subsistence crops. Maize cultivation expanded by 160,904 ha between 2013 and 2018 (FAOSTAT 2020). Maize is a widely consumed staple crop in Ghana, and was grown mostly for consumption until a government program promoting smallholder market engagement led to a 40 percent increase in average maize output between the periods 2013–2016 and 2017–2019. Much of the increase in production is therefore likely due to growing maize as a cash crop (MOFA-IFPRI 2020). Cassava, which increased by almost as much (157,805 ha), is a regular source of income for most rural families, and generates 22 percent of agricultural gross domestic product (FAOSTAT 2020, MOFA n.d.).

Given that the population of rural farmers did not increase dramatically in 2013, it is assumed that the 77 percent jump in deforestation was due to an increase in farming for commercial purposes (Table 1), as opposed to for subsistence. This assumes subsistence agriculture was in areas that were too small to be detected, or where the mix of crops appeared to look like forests (see below).

A study in the Ashanti region of south central Ghana analyzed deforestation in 58 forest reserves from 1986 to 2015. By 2015, nearly half of the forest reserves were degraded, and agriculture had caused 78 percent of the forest loss. Visits to 10 forest reserves revealed that the tree crops often formed a dense canopy that the authors call "deforestation in disguise" because of the tendency for satellite observations to identify it as forest rather than agro-conversion. When the tree canopy closes over the food crops, the farmers move on and clear new forest for crops, into which they interplant tree crops after a few years, creating a cycle of clearance, commodity tree planting, intercropping, and deforestation (Acheampong et al. 2019).

Table 1: . Agricultural conversion of closed forest in Ghana 2013–2015 (ha)

Cropland	Oil Palm	Citrus	Rubber	Cocoa	Sum of ag-driven loss	Total loss of closed forest
76,686	9,231	1,539	4,616	71,446	163,518	211,517
36%	4%	1%	2%	34%	77%	

Source: National REDD+ Secretariat and Forestry Commission 2017

2.3 Estimating how much cocoa is linked to deforestation

Cocoa was selected for the Forest Trends analysis because it is one of Ghana's top two exported agricultural commodities contaminated with deforestation. Based on its analysis, Forest Trends estimates that:

- 13% of cocoa production is linked to deforestation.

Justification

Goldman et al. (2020) calculate that cocoa has displaced 233,599 ha of forest since 2001, or 13 percent of cocoa's total extent (1.8 Mha) in 2018 (FAOSTAT 2020). Low productivity, poverty, and non-enforcement of forest laws are underlying causes for the continued encroachment by farmers into forest.

Cocoa is planted in cleared closed canopy forest, and one-third (34 percent) of forest loss between 2013 and 2015 was due to cocoa, according to Goldman et al. (2020) and GFW (2020) forest loss data. The cocoa trees the farmers rely on are adversely affected by the loss of the forest they replace. The ecosystem services of rainfall and soil fertility begin to fail, and reduce the productivity of the existing cocoa trees, which is exacerbated by climate change (REDD+ 2015). Corporate disinterest in the environmental effects of the cocoa supply chain has been blamed for continued forest conversion for cocoa (Fountain and Friedel 2018).

Ghana's cocoa production between 2013 and 2018, 5.3 Mt, represents 18 percent of global production (FAOSTAT 2020). All cocoa is exported, worth US$1.8 billion in 2018, Ghana's third largest export after gold and crude petroleum. The Netherlands is the top importer, followed by Malaysia, France, and Germany (OEC 2020). The United Kingdom is the sixth largest importer of cocoa beans in Europe, and Ghana is a main direct supplier to the United Kingdom (Chatham House 2020).

In 2017, the leading cocoa and chocolate companies pledged to end deforestation within cocoa supply chains. But 2018 showed a rise in primary forest loss, particularly in protected areas (Weisse and Goldman 2019). There may be grounds for hope, as tree cover loss in 2019 was lower than it was in 2018: REDD+ programs and pledges by both countries and major companies to end deforestation may have played a part. Other more destructive alternatives are also a factor, as low cocoa prices in 2018 led some farmers to lease out their land for illegal mining activities (Ebbah 2020).

2.4 Estimating illegality of agro-conversion for cocoa

Based on its analysis Forest Trends estimates that:

- At least 45% of agro-conversion for cocoa is likely illegal.

Justification

GFW (2020 using Hansen et al. 2013) reports the loss of 84,319 ha of forest in protected areas between 2013 and 2019. It is likely that all forest loss in protected areas is for cocoa because: a) cocoa is cultivated in forest areas (Hoare et al. 2017); b) reports since the early 2000s have warned that the last forests outside protected areas are disappearing, pushing the deforestation risk into protected areas (UNDP n.d.); c) farmers have a preference for growing cocoa on recently deforested land (Maclean 2018). If all loss from protected areas is assumed to be for cocoa, then 45 percent of the increase in coverage of cocoa (187,940 ha) since 2013, would be illegal.

Occupancy and agriculture are not permitted in Ghana's forest reserves, although there are settlements that were already within the reserves at the time of gazetting (Agyarko n.d.). Weak enforcement of forest protection laws has allowed a gradual expansion of these grandfathered settlements into the remaining forest reserve, and there are government programs that allow farming on degraded forest land in exchange for nurturing young trees into maturity (the Modified Taungya System) (Acheampong et al. 2019; 2018), but deforestation

for crops within protected forest estates is illegal. Given that very little intact forest remains outside the protected forest estates, Forest Trends' estimate is likely conservative: forest loss in protected areas is assumed to be for cocoa expansion, and is therefore illegal, but even cocoa expansion outside protected areas is likely illegal if it is encroaching onto forest.

There are other illegalities around land ownership and land use, namely human rights abuses, child labor, trafficking, and use of hazardous pesticides. There are documented cases of the illegal use of salvage permits; these were designed to facilitate the sale of logs cut for farming and other projects, but are being used for the transport of and trade in illegally felled rosewood. Salvage permits do not authorize logging, only the collection of felled wood, but logging is carried out under them. Logging under the permits has been recorded in forest and game reserves such as Mole National Park, Gbele Game Reserve, and Wechiau Community Hippo Sanctuary (Dumenu 2019; EIA 2019).

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Illicit Harvest, Complicit Goods

The State of Illegal Deforestation for Agriculture

ANNEX 2 LIBERIA CASE STUDY 2013-2019

13th in tropical forest loss

2% of all tropical forest loss

655 Mt of CO_2e Total gross emissions from tree cover loss

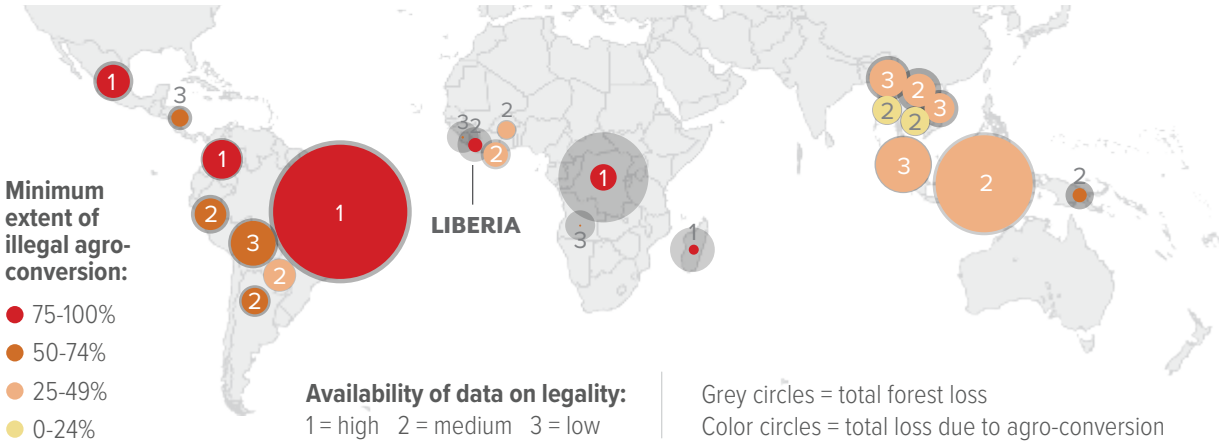
1.2 Mha total forest loss

of which **14%** due to commercial agriculture

of which at least **85%** likely illegal

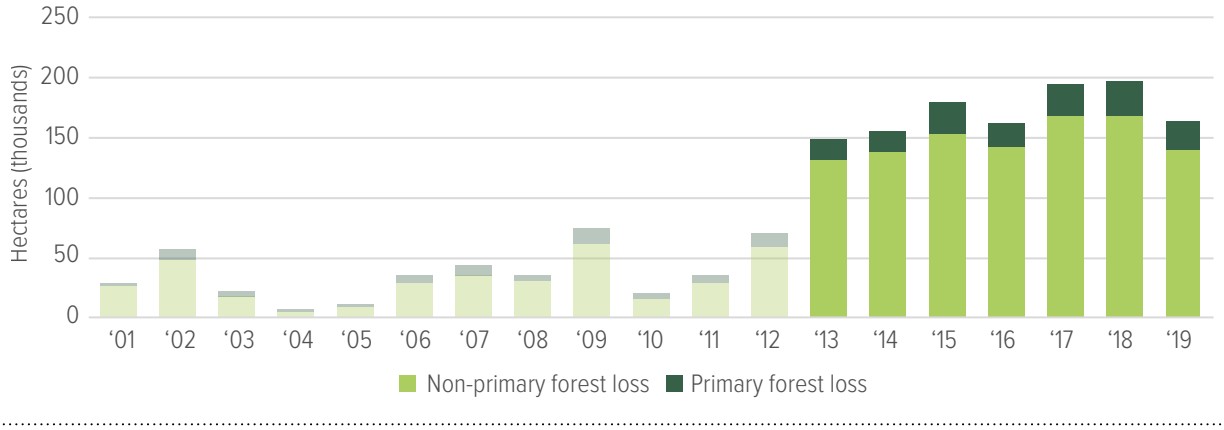
53% likely exported

Figure 1: Relative amount of tropical forest loss driven by commercial agriculture and the extent of illegal clearing.



Source: forest loss – GFW (2020, using Hansen et al. [2013]); agro-conversion – estimates compiled by Forest Trends (2021) from multiple sources, including GFW (2020, using Curtis et al. [2018]); and illegality – estimates compiled by Forest Trends (2021).

Figure 2: Annual forest loss from 2001 to 2019 for Liberia. This report covers the period highlighted (2013-2019).



Source: GFW (2020, using Hansen et al. [2013]).

BOX 1

Forest Trends Findings

- Between 2013 and 2019, commercial agriculture in Liberia was likely responsible for the clearance of at least 200,000 ha of forest.
  - Given that 53% of Liberia's agro-conversion commodities were exported, it is likely that international buyers were linked to the loss of more than 100,000 ha of deforestation.
  - At least 85% of agro-conversion is likely illegal.
  - Therefore, these exports carried a high risk of being grown on illegally cleared land.

1 Introduction

Liberia contains half of the remaining Upper Guinean tropical rainforest, one of the world's biodiversity hotspots (CILSS 2016). Long home to the world's largest rubber plantations (operated by Firestone/Bridgestone), the country has tried to stimulate economic development since the end of the Liberian civil war in 2003 through the allocation of large-scale logging and plantation concessions.

2 Deforestation Analysis

2.1 Deforestation 2013–2019

Since the end of the civil war, forest loss has reportedly accelerated to more than 170,000 hectares per year. Between 2013 and 2019, almost 1.2 million hectares (Mha) have been lost, or more than 13 percent of the total forest that Liberia had in 2000 (GFW 2020, using Hansen et al. 2013).

2.2 Drivers of deforestation

Forest Trends findings

Forest Trends' analysis on the extent and nature of forest loss in Liberia between 2013 and 2019 is based on a review of existing literature and data, including research from the Government of Liberia (GoL), Global Forest Watch (2020, using Curtis et al. 2013), Pendrill et al. (2020) and Liberia's REDD+ strategy. After reviewing

For the purposes of this study only the following were considered:

- **Forests:** areas with greater than 50% tree cover
- **Forest loss / Deforestation:** complete removal of forest cover
- **Illegal:** deforestation that was, at time that the clearing took place, in contravention of the country's legislative framework governing forest conversion

the available data, Forest Trends' best estimate is that:

- At least 14% of deforestation was driven by commercial agriculture.

Justification

GFW (2020, using Curtis et al. 2018) report that subsistence agriculture was the major driver of forest loss, and that commercial agriculture was responsible for only 4 percent of the forest loss between 2013 and 2019. But, as discussed in the main report (Appendix 1, Forest Trends 2021), GFW acknowledges that their analysis is likely to underestimate the importance of commercial agriculture as a driver of forest loss, especially in the African context. Certainly, a 2.5-fold increase in forest loss after 2012 raises questions regarding the cause of such a large, sudden increase.[1] Such a large leap seems unlikely to be due solely to subsistence consumption. Rather, it suggests that GFW may be underestimating the amount of forest loss for commercial agriculture, even if it is only cash crops for domestic consumption.

The Government of Liberia (GoL 2016) REDD+ strategy states that the "conversion for palm oil plantations and Timber Sales Contracts could amount to approximately 500,000 ha of deforestation"—a similar area to that which was deforested between 2000 and 2014. The government believed that over the next 5 to 15 years, the immediate drivers of deforestation were likely to be palm oil and logging, while unplanned activities such as pit sawing (that is, informal processing of timber using chainsaws), charcoal, and shifting agriculture are threats that are likely to grow larger.

Analysis of individual agriculture concessions in the GFW database suggests that the GoL is correct and that 4 percent is indeed an underestimate. The more granular concession analysis suggests that commercial agriculture and logging concessions were responsible for at least four times more forest loss: that is, instead of 4 percent, at least 11 percent (or >166,679 ha) of forest was lost in clearing for oil palm plantations (130,675 ha from three concessions: 45 percent from Sime Darby; 27 percent from Equatorial Oil Palm; and, 26 percent from Golden Veroleum). An additional 3 percent[2] (36,000 ha) was lost from government-allocated logging concessions (known in Liberia as Forest Management Contracts or FMCs and Timber Sales Contracts or TSCs). A Bickel and Cerutti (2017) study noted that the "epicenters of severe deforestation emanate from the large concession."

Pendrill et al. (2020) report that between 2013 and 2017, 21,137 ha of forest was lost due to cocoa expansion, and 9,583 ha due to rubber, accounting for a further 3 percent of forest loss during that period. While the actual amount of deforestation driven by commercial agriculture is unknown, in the best case, it is 14 percent, but it is likely that commercial agriculture is responsible for much more.

2.3 Estimating illegality linked to agro-conversion

After reviewing all available data, Forest Trends' most conservative estimate is that:

- 85% of deforestation for commercial agriculture was likely illegal.

Justification

[1] As discussed in Forest Trends (2021) Appendix 1, GFW changed their methodology in 2013 (Potapov et al. 2015). However, they were able to revise data and use consistent analyses for satellite images obtained since 2011.

[2] This 3% estimate is likely conservative as it does not include any forest loss associated with Community Forest Management Areas (CFMAs), now at least 20% of the area under forest contracts. Nor does the revised estimate include informal—and likely unsustainable—logging (known as pit sawing) that supplies the domestic market with timber, despite the fact that the same Bickel and Cerutti (2017) study estimated that pit sawyers log around 100,000 to 130,000 ha per year (or almost three-quarters of the area now deforested each year). The study noted the fact that pit sawyers favor logging along "roads made by logging concessions and other extractive industries may contribute to the observed spread of deforestation and forest degradation around concessions." The GoL (2016) reckons that pit sawing occupies an area of forest that is as large as the area of official commercial logging in government-allocated concessions (FMCs and TSCs). Charcoal production further consumes an area of equivalent size.

Liberia has a grim history with respect to forest management and illegal deforestation. The Liberia Truth and Reconciliation Commission of Liberia (2009) documented how, during the civil war, illegal timber exports financed weapons purchases; loggers evaded more than 85 percent of taxes; and security forces of the logging companies acted as private militias. Not a single logging company that operated between 1980 and 2003 could demonstrate that they held a valid license; so the first Executive Order of the President Ellen Johnson Sirleaf was to declare all claims to logging licenses to be null and void (Blundell et al. 2019).

The NGO Global Witness (2018) found that these patterns are continuing: all of Liberia's large logging contracts are alleged to be illegal, with evidence that logging companies are illegally owned or controlled by politicians and government officials, despite a ban on Liberian politicians owning companies with logging contracts. Forest Trends (2020) recently reviewed the distribution of benefits that operators are legally obliged to share with communities, and found that only 13 percent of the funds that should have been allocated to communities have been paid into the National Benefits Sharing Trust Fund. Further, logging companies are increasingly "exploiting legal loopholes" through CFMAs, which are the least-regulated category of Liberia's logging concessions (Global Witness 2018). This is similar to 2011–2012, when the government illegally allocated c.40 percent of Liberia's forests to logging companies through Private Use Permits (PUPs). Ultimately a presidential investigation concluded that the PUPs were rife with corruption and illegality. The government revoked all PUPs (Jallah et al. 2012) and, in 2015, the Court of Appeal upheld the conviction of the leadership of the Forestry Development Authority—the agency that manages Liberia's forests—on economic sabotage and obstruction of government function, causing the loss of US$6 million to the government (Daily Observer 2015). A similar scandal broke in 2010 related to the corrupt allocation of rights to the carbon stored in 400,000 ha of Liberia's tropical rainforest (Carus 2010). The contract was cancelled after another presidential investigation; London police arrested the head of the UK-based company, Carbon Harvesting Corporation, which was allegedly behind the scheme (Global Witness 2011). In both cases, were it not for the role of NGO advocacy, it is unlikely that the scandals would have come to light.

The UN Panel of Experts (2013) monitoring Liberia for the Security Council explicitly identified large-scale oil palm as posing "significant challenges to peace and security in rural areas," potentially contributing to renewed civil conflict. Despite the sector operating in what Global Witness (2015) noted was a "legal vacuum," Blundell et al. (2019) reviewed the sector and found that the palm oil concessions may be considered illegal land grabs because they did not obtain informed consent, and used bribes, threats and intimidation.

While there has been no formal legal review of the commercial agriculture sector in Liberia, it is likely that non-compliance is widespread. Given the corruption, lack of enforcement, and the legal vacuum noted by Global Witness (2015), and the paltry 13 percent compliance that Forest Trends (2020) found for community benefits-sharing, compliance is most likely less than 15 percent. In a worst-case scenario, all agro-conversion would be illegal.

2.4 Estimating the percentage of agro-commodities linked to deforestation that are exported

After reviewing the available data, Forest Trends estimates:

- 53% of commodities embodying deforestation are exported.

Justification

Forest Trends uses the Pendrill et al. (2020) estimate that 53 percent of agricultural conversion is exported. Cocoa, rice, and rubber are the top commodities embodying deforestation, and both cocoa and rubber are almost all (93 percent) exported (Pendrill et al. 2020). The Government of Liberia (2014) recognizes that the commercial oil palm plantations are "almost entirely export focused," although to date little palm oil has actually been exported. In 2018, Liberia exported 14,010 mt of palm oil, 33 percent of production, and in 2019, exports increased to 32,138 mt (FAOSTAT 2020). Presumably, exports from Liberia's oil palm plantations are

yet to appear in the Pendrill (2020) data.

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Illicit Harvest, Complicit Goods

The State of Illegal Deforestation for Agriculture

ANNEX 2 MADAGASCAR CASE STUDY 2013-2019

6th in forest loss across the tropics

3% of all forest loss across the tropics

1.1 Gt of CO_2e Total gross emissions from tree cover loss

2 Mha total forest loss

of which

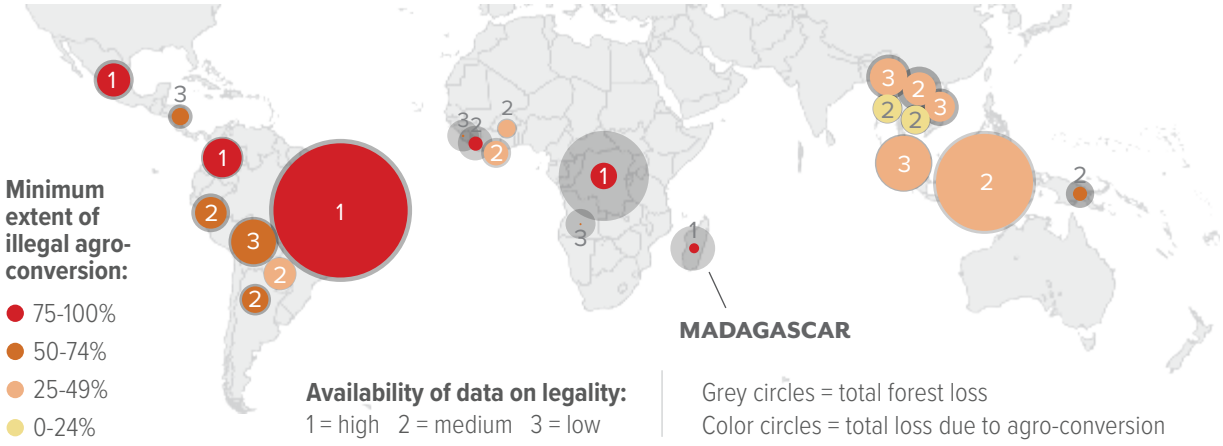
3% due to commercial agriculture

of which at least

100% likely illegal

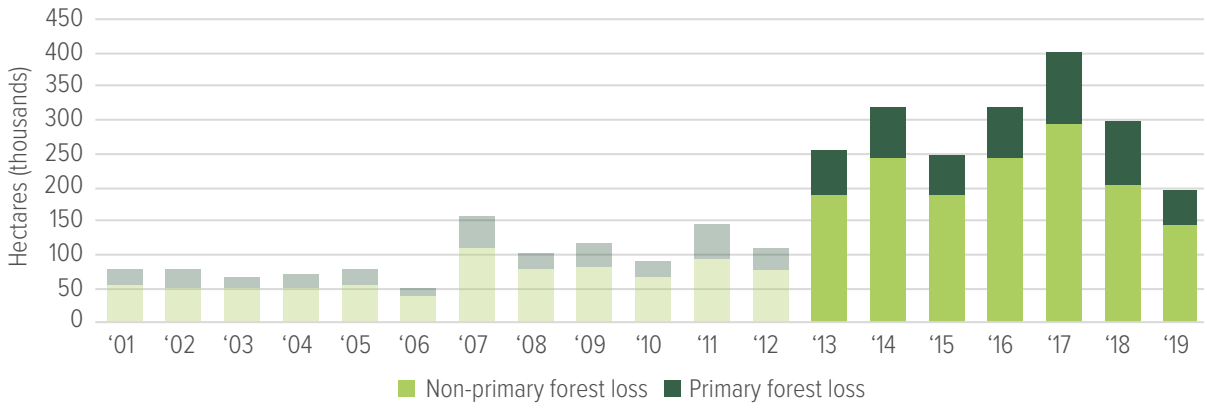
1% likely exported

Figure 1: Relative amount of tropical forest loss driven by commercial agriculture and the extent of illegal clearing.



Source: forest loss – GFW (2020, using Hansen et al. [2013]); agro-conversion – estimates compiled by Forest Trends (2021) from multiple sources, including GFW (2020, using Curtis et al. [2018]); and illegality – estimates compiled by Forest Trends (2021).

Figure 2: Annual forest loss from 2001 to 2019 for Madagascar. This report covers the period highlighted (2013-2019).



Source: GFW (2020, using Hansen et al. [2013]).

BOX 1

Forest Trends Findings

- Between 2013 and 2019, commercial agriculture in Madagascar was likely responsible for the clearance of more than 60,000 ha of forest.
  - Given that 1% of the agro-conversion was exported, there is a risk that international buyers may be linked to the loss of 600 ha of tropical forests.
  - 100% of agro-conversion is illegal.

1 Introduction

There are more unique species of plants and animals living in Madagascar than on the entire African continent, and more than 80 percent of its species can be found nowhere else on Earth (USAID 2020). Madagascar has 4.4 million hectares (Mha) (50 percent) of moist forests, 2.6 Mha (29 percent) of dry forests, 1.7 Mha of spiny forests (19 percent), and 177,000 ha (2 percent) of mangroves. According to FAO FRA (2020), there was 22.4 Mha of forest cover in 2020, covering 21 percent of the land area.

2 Deforestation Analysis

2.1 Deforestation 2013–2019

Nearly half of Madagascar's forests have been destroyed in the last 60 years. Between 2013 and 2019, Madagascar lost more than 2 Mha of forest (GFW 2020 using Hansen et al. 2013), and the annual rate of deforestation is 236 percent higher than it was between 2000 and 2012. The remaining forest is highly fragmented with 46 percent of the forest less than 100 m from the forest edge (Vieilledent et al. 2018).

Actual forest loss may be even greater than currently thought, as a study of satellite observations reported that 48 percent of 30 m x 30 m satellite images failed to identify small-scale forest loss. Madagascar's mix of dense-cover tree crops and smaller forest fragments makes detection of small-scale losses challenging, particularly agriculture that involves the cultivation of clove trees, coffee bushes, fruit trees, and vanilla lianas which produce a canopy that can be confused with forest cover (Vieilledent et al. 2018).

For the purposes of this study only the following were considered:

- **Forests:** areas with greater than 50% tree cover
- **Forest loss / Deforestation:** complete removal of forest cover
- **Illegal:** deforestation that was, at time that the clearing took place, in contravention of the country's legislative framework governing forest conversion

2.2 Drivers of deforestation

Forest Trends' analysis on the extent and nature of forest loss in Madagascar between 2013 and 2019 is based on an extensive review of existing literature and data, including research from Global Forest Watch (2020, using Curtis et al. 2018), Pendrill et al. (2020), and REDD+ (2017). After reviewing all available data, Forest Trends' best estimate is that:

- At least 3% of Madagascar's deforestation was driven by commercial agriculture.

Justification

According to the REDD+ driver analysis (2017), Madagascar's forest loss is mostly driven by shifting cultivation (mainly subsistence rice production), livestock farming, mining, and fuelwood collection. The Curtis et al. (2018) driver analysis on GFW likewise reports that most forest loss (97 percent) was driven by shifting agriculture, and 2 percent was commodity-driven. In the east, rainforests are cleared for subsistence agriculture (Zaehringer et al. 2016; Vieilledent et al. 2018). The western dry forests are experiencing greater pressure from commercial agriculture. Drought in the south and southwest has meant that seasonal migration up the west coast has turned into permanent migration with a corresponding increase in deforestation. The migrants clear forest for subsistence agriculture, and also for cash crops and pasture: the local elites use the migrants as a labor pool for commercial agriculture. They are employed to extract valuable timber, then to clear the forest, often by burning, and to plant corn and peanuts. Wages are invested in zebu cattle, and further forest is cleared for pasture (Vielledent et al. 2020; Whyner 2021).

Clearing the forest is seen as a way of assuring food security for future generations as descendants have the right to use the plot for further cultivation (Urech 2011). The 2005 Land Law effectively acknowledged customary tenure for individuals and recognized individuals with claims to land by right of occupation or use as the owners. Another law, known as GELOSE (Gestion Locale Sécurisée), authorized the transfer of some forest management authority to local community management groups called Vondron'Olona Ifotony (VOI) (Urech 2011). A study found that the conditions of VOI-managed forests improved after locals gained management authority, while forests not under VOI control experienced illegal timber harvesting and conversion to cropland (McLain et al. 2019).

2.3 Estimating illegality linked to agro-conversion

After reviewing all available data, Forest Trends estimates that:

- 100% of deforestation for commercial agriculture was likely illegal.

Justification

Forest clearance for agriculture has been illegal since 1987, according to Decree 87-143 of 1987 (Vielledent et al. 2020; Zinner et al. 2014). Prosecutions for forest clearance are rare, particularly of the large landowners who pay small farmers to clear the forest. Authorities are reportedly involved in the trade in cash crops, and politicians own some of the businesses involved (Vielledent et al. 2020).

Nearly half a million ha (437,347 ha) of forest loss was in protected areas (GFW 2020 using Hansen et al. 2013). The organizations managing protected areas have no legal enforcement powers. An analysis of NASA satellite data on active fires found an 81 percent increase in fire incidents inside protected areas between March 1 and May 17, 2020 compared to the same period in 2019, possibly because of reductions in forest patrols due to COVID-19. The west of the country, with its unique dry forests, was worst affected (Vyawahare 2020b).

Some cases of illegal agro-conversion are documented. In the buffer zone of the Ankarafantsika National

Park, a forest agent (no longer in position) hired laborers to cut down forest and sow peanuts (McLain et al. 2019). In another case, the Bongolava Protected Area (also close to the Ankarafantsika National Park) was created in 2006 because its dry deciduous forest mixed with grassy savannah and shallow lakes is one of the most endangered ecosystems in Madagascar. It was left in a management vacuum when funding was withdrawn after Madagascar's 2009 coup. In 2012, high corn prices attracted local farmers whose rice paddies had been destroyed in a recent cyclone to burn down trees and plant corn. These farmers were followed by bigger landowners and public servants who took advantage of the lack of enforcement and hired migrant day laborers to clear large areas of forest (Gerety 2018).

2.4 Estimating the percentage of agro-commodities linked to deforestation that are exported

After reviewing all available data, Forest Trends' most conservative estimate is that:

- 1% of commodities embodying deforestation are exported.

Justification

Cattle (zebu) numbers have declined and a World Bank program to promote their beef for export was put on hold when export was banned in 2019 (Vyawahare 2020a). Maize and peanuts are the main cash crops grown on former forest in western Madagascar and peanut cultivation expanded by 50 percent from 52,000 ha in 2010 to 78,426 ha in 2017 (Vielledent et al. 2020). Peanut exports were worth US$7.65 million in 2018, mostly exported to Vietnam (OEC 2020). Maize is grown for the domestic market, for food and for livestock feed, with farmers in western Madagascar reporting that maize from forest conversion was bought by the Star company to brew the national THB beer (Vielledent et al. 2020).

Timber and charcoal are by-products of agro-conversion. An embargo was placed on trade in the precious timber, and since 2013, *Dalbergia spp.* (rosewood and palisander) and *Diospyros spp.* (ebony) from Madagascar have been in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), but the trade allegedly continues illegally (Sharife and Maintikely 2018). Forest Trends uses the Pendrill et al. (2020) estimate that 1 percent of agricultural conversion is exported, most of which is in beef and wood products.

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Illicit Harvest, Complicit Goods

The State of Illegal Deforestation for Agriculture

ANNEX 2 SIERRA LEONE CASE STUDY 2013-2019

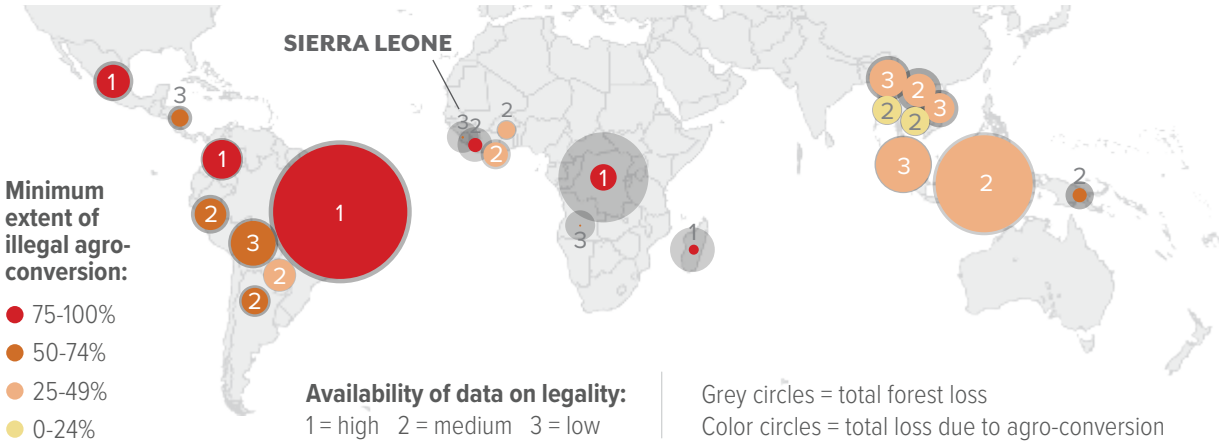
16th in forest loss across the tropics

1% of all forest loss across the tropics

485 Mt of CO_2e Total gross emissions from tree cover loss

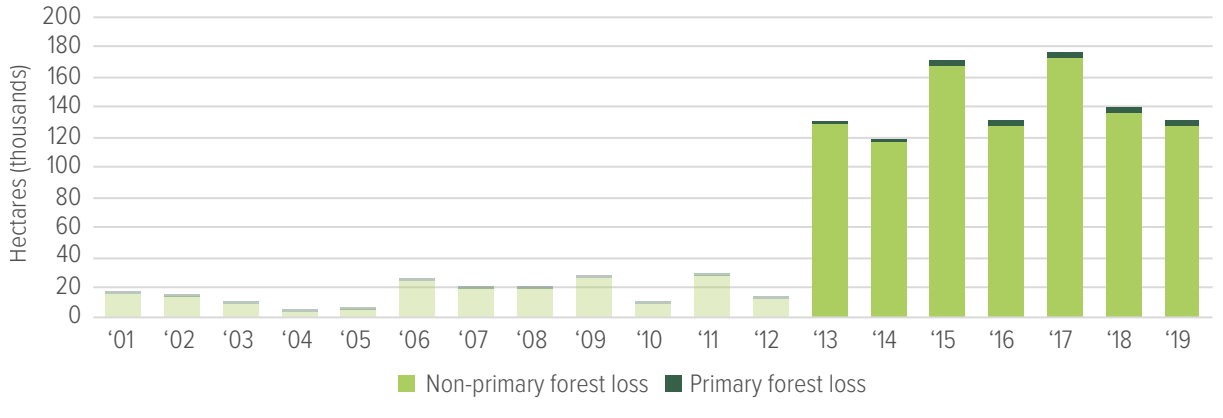
1 Mha total forest loss → of which **4%** due to commercial agriculture → of which at least **71%** likely illegal, **2%** likely exported

Figure 1: Relative amount of tropical forest loss driven by commercial agriculture and the extent of illegal clearing.



Source: forest loss – GFW (2020, using Hansen et al. [2013]); agro-conversion – estimates compiled by Forest Trends (2021) from multiple sources, including GFW (2020, using Curtis et al. [2018]); and illegality – estimates compiled by Forest Trends (2021).

Figure 2: Annual forest loss from 2001 to 2019 for Sierra Leone. This report covers the period highlighted (2013-2019).



Source: GFW (2020, using Hansen et al. [2013]).

BOX 1

Forest Trends Findings

- Between 2013 and 2019, commercial agriculture in Sierra Leone was likely responsible for the clearance of at least 40,000 ha of forest.
  - Given that 2% of Sierra Leone's agro-conversion commodities were exported, it is likely that international buyers were linked to at least 1,000 ha of deforestation.
  - Forest Trends is unable to estimate the risk of illegality associated with forest clearing.
    - Yet there are credible allegations of illegality linked to the 18,000-plus ha Socfin palm oil concession, apparently confirmed by a Government of Sierra Leone (2019) Technical Committee.
- However, our confidence in all these estimates is undermined by a lack of evidence. Clearly more research is warranted to understand the drivers of deforestation in a country that represents the 16th highest amount of tropical forest loss since 2013; that sits in one of the world's few biodiversity hotspots; and that fought a civil war linked to "agrarian tensions."

1 Introduction

Sierra Leone is found in the West African biodiversity hotspot of the Upper Guinean tropical rainforest. Sierra Leone's civil war, which ended in 2002, has been described as "an eruption of long-term, entrenched agrarian tensions" (Peters and Richards 2011). During the war, up to half of the population was displaced, and deforestation was restricted to the areas around settlements with large numbers of internally displaced people (IDPs) (FAO FRA 2020). Consequently, pressure on the forest was low across most of Sierra Leone, particularly in areas of high-intensity conflict (Wadsworth and Lebbie 2019; Burgess et al. 2015).

By 2012, however, the United Nations Development Programme (UNDP) had recognized that deforestation was the most prominent risk factor in terms of disaster management, as forest loss was "rapidly accelerating in Sierra Leone and if it continues unchecked, could carry grave consequences, such as floods, which cause physical damages on private and public infrastructures as well as loss of lives" (Tarawalli 2012).

For the purposes of this study only the following were considered:

- **Forests:** areas with greater than 50% tree cover
- **Forest loss / Deforestation:** complete removal of forest cover
- **Illegal:** deforestation that was, at time that the clearing took place, in contravention of the country's legislative framework governing forest conversion

2 Deforestation Analysis

2.1 Deforestation 2013–2019

Sierra Leone has seen a drastic increase in deforestation: according to GFW (2020, using Hansen et al. 2013), forest loss increased more than 10 times, to an average annual loss of more than 140,000 ha per year. Between 2013 and 2019, nearly 1 million ha (Mha) of forest was reportedly lost.

2.2 Drivers of deforestation

Forest Trends findings

Forest Trends' analysis on the extent and nature of forest loss in Sierra Leone between 2013 and 2019, is based on a review of existing literature and data, including Global Forest Watch, Pendrill et al., and REDD+. Forest Trends concludes that there are insufficient data to arrive at a precise and accurate estimate regarding the drivers of deforestation. The existing evidence allows an estimate that:

- At least 4% of deforestation is driven by commercial agriculture, although it is likely to be greater than this.

Justification

Mattai (2017) identified the following drivers of deforestation, without determining their relative contribution: urbanization, mining and quarrying, slash-and-burn farming, firewood and charcoal production, and timber production. The Curtis et al. (2018) driver analysis on GFW (2020) estimates that 96 percent of the forest loss between 2013 and 2019 was driven by subsistence agriculture, and less than 4 percent by commodities. But, as discussed in the main report (Appendix 1, Forest Trends 2021), GFW acknowledges that their analysis is likely to underestimate the importance of commercial agriculture as a driver of deforestation, especially in the African context. As slash-and-burn is used in both commercial and subsistence farming (GoSL 2017), it is difficult to distinguish shifting agriculture from commercial agriculture using satellite observations. Further, Wadsworth and Lebbie (2019) note that the "presence of mixed plantations of coffee, cocoa, cola nut, and fruit trees…are spectrally and structurally very similar to natural forests", which creates analytical challenges to using satellite imagery to determine drivers of deforestation.

Another reason to suspect the GFW attribution of forest loss is that subsistence agriculture does not seem like a reasonable explanation for an almost 10-fold jump in forest loss after 2012. Such a large leap seems unlikely if the loss was all driven by subsistence consumption. Rather, it suggests that GFW may be underestimating the amount of deforestation for commercial agriculture, even if it is only cash crops for domestic consumption.[1]

A final reason to suspect that the GFW rate underestimates the importance of commercial agriculture as a driver of deforestation in Sierra Leone is the significant area of land that the government has offered to concessions. The Oakland Institute (2011) reported that between 2007 and 2011, the government of Ernest Bai Koroma leased (or was negotiating) close to 500,000 ha of farmland, double that "if all land deals involving foreign carbon credit schemes and 'pre-identified' land availabilities are taken into account." In particular, SLIEPA, Sierra Leone's investment promotion agency, had emphasized land for sugarcane and palm oil, mainly for biofuel. The leases reviewed by the Oakland Institute (2011) include:

[1] As discussed in Forest Trends (2021) Text Box 1, GFW changed their methodology in 2013 (Potapov et al. 2015). However, they were able to revise data and use consistent analyses for satellite images obtained since 2011.

- Sugarcane:
  - Addax Bioenergy (Switzerland): 20,000 ha for biofuel exports to Europe
  - Complant (China): 1,200 ha to 2,000 ha
- Palm oil:
  - Quifel Agribusiness (SL) Ltd (subsidiary of Quifel Natural Resources, Portugal): >120,000 ha
  - Siva Group Biopalm Energy (India): 80,000 ha
  - Sierra Leone Agriculture (subsidiary CAPARO Renewable Agricultural Developments, UK): 43,000 ha
  - Sepahan Afrique (Iran): 10,117 ha (palm oil and rice)
  - SocFin (Belgium/Luxembourg): 6,475 ha (palm oil and rubber)
  - Malaysian Government, Islamic Development Bank: 2,500 ha
- Rice:
  - Vedico Mange Bureh Farm Ltd (Germany/Vietnam): up to 50,000 ha
- Biofuel:
  - Whitestone Charles Anderson (UK): 115,000 ha

By 2020, it was not clear how many of these leases were operational. International NGOs appear focused on only one: the 50-year lease for oil palm entered in 2011 by Société Financière des Caoutchoucs (Socfin). The original lease allocated ~6,500 ha. However, two amendments increased the area claimed by Socfin to 18,481 ha, of which 12,342 ha were planted in 2019 (Schneider 2020).

Given the large number of leases negotiated by the former government of Sierra Leone, and the high rate of deforestation, more research is needed to understand the importance of various drivers of deforestation. The GFW (2020, using Hansen et al. 2013) forest loss data show a doubling of annual forest loss around 2012, and then a further increase; it could be possible that some of the increase is due to farmers introducing cash crops into production.

Pendrill et al. (2020) identify cassava, rice, and maize as the main crops embodying deforestation, but these reportedly account for only 5 percent of deforestation.

In summary, it is likely that the GFW (2020, using Curtis et al. 2018) estimate of the importance of commercial agriculture as driving 4 percent of forest loss is an underestimate, but it is not clear by how much. Lacking any additional information, Forest Trends used the GFW estimate of 4 percent, recognizing that it is likely to be the best-case scenario, and that commercial agriculture may in fact be driving much more forest loss.

2.3 Estimating illegality linked to agro-conversion

Given the paltry amount of data available, Forest Trends is unable to make an estimate of the risk of illegality associated with deforestation for commercial agriculture in Sierra Leone.

A legal analysis by Welthungerhilfe (2012) found illegality associated with the Socfin palm oil lease, concluding that “there are strong indications that due to legal inconsistencies the signed lease agreements are in effect voidable,” and that there is “an urgent need for a review and amendments of both the lease and the sub-lease agreement so as to ease the tension and to prevent the tension generating into a conflict that would likely escalate.” A leaked Government of Sierra Leone (2019) Technical Committee report also found irregularities with Socfin’s Sahn Malen operations, including: a concession area that is almost 1,000 ha larger

than the lease agreement; non-compliance with the Provinces Land Act and environmental protection requirements; a lack of an illiteracy-protection clause; a lack of consent by landowners; and corruption by the local authorities.

Perhaps not surprising given this list of violations, the plantation has seen local unrest. Community members have been arrested, including in 2019, when two men were allegedly killed by government security forces inside the Socfin concession area, and people were beaten and houses damaged when police and military raids were carried out in the surrounding villages (Oakland Institute 2019).

The Oakland Institute (2019) summarized the issues with commercial agriculture in Sierra Leone, noting:

1. The lack of transparency and disclosure of land deals, to the extent that local communities cannot make informed decisions.
2. The weak legal framework and lack of inter-agency coordination within the government, which leads to weak oversight, and a lack of enforcement and safeguards.
3. Confusion surrounding the "availability" of land for investment due to a lack of land inventories.
4. Land being cultivated for biofuels as opposed to food production for local markets.
5. Negotiations that take advantage of local vulnerabilities and lack grievance mechanisms.

They conclude: "Given this range of problems, the conditions surrounding agricultural investments in Sierra Leone are ripe for exploitation and conflict."

However, the Socfin plantation represents only about 1 percent of all deforestation. It may be that its practices are widespread, but without any evidence to support this, Forest Trends does not make any assumptions. Therefore, we are unable to make an estimate of the risk of illegality connected to deforestation for commercial agriculture in Sierra Leone. For the purposes of the Forest Trends (2021) global analyses, we use the regional average for Africa in lieu of data specifically for Sierra Leone.

2.4 Estimating the percentage of agro-commodities linked to deforestation that are exported

After reviewing the available data Forest Trends estimates:

- 2% of commodities embodying deforestation are exported.

Justification

Forest Trends uses the Pendrill et al. (2020) estimate that 2 percent of commodities linked to agricultural conversion are exported. While Sierra Leone once exported rice, spices, palm products, cocoa beans, and coffee, it is now a net importer of food (Oakland Institute 2011). According to Pendrill et al. (2020), of Sierra Leone's two main export commodities, cocoa now embodies only 1 percent of deforestation, and coffee 0 percent. Cassava and rice embody most deforestation (56 percent and 18 percent respectively) but they are likely for domestic consumption.

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ANNEX 3:
Asia-Pacific

Illicit Harvest, Complicit Goods

The State of Illegal Deforestation for Agriculture

ANNEX 3 INDONESIA CASE STUDY 2013-2019

2nd in forest loss across the tropics

14% of all forest loss across the tropics

6.8 Gt of CO_2e Total gross emissions from tree cover loss

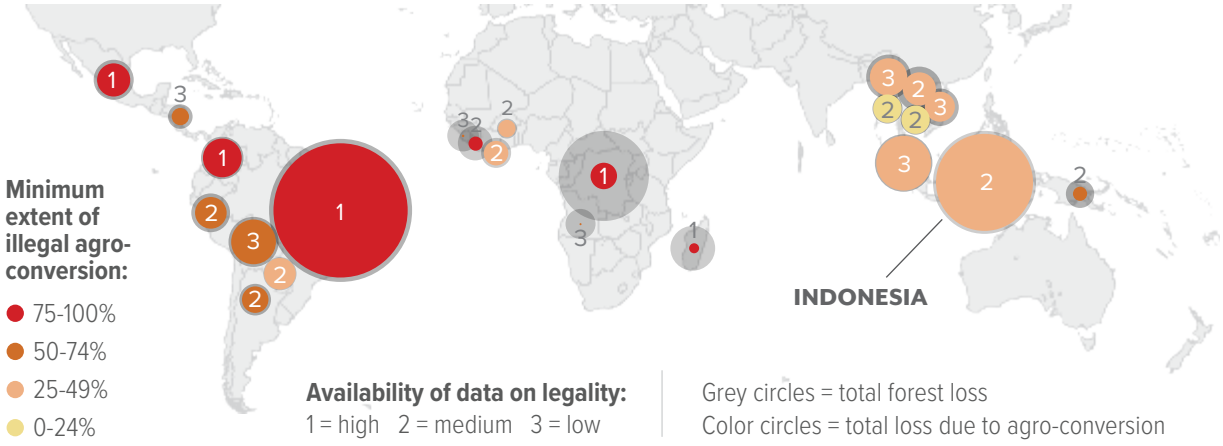
10.6 Mha total loss forest loss

of which **89%** due to commercial agriculture

of which at least **47%** likely illegal

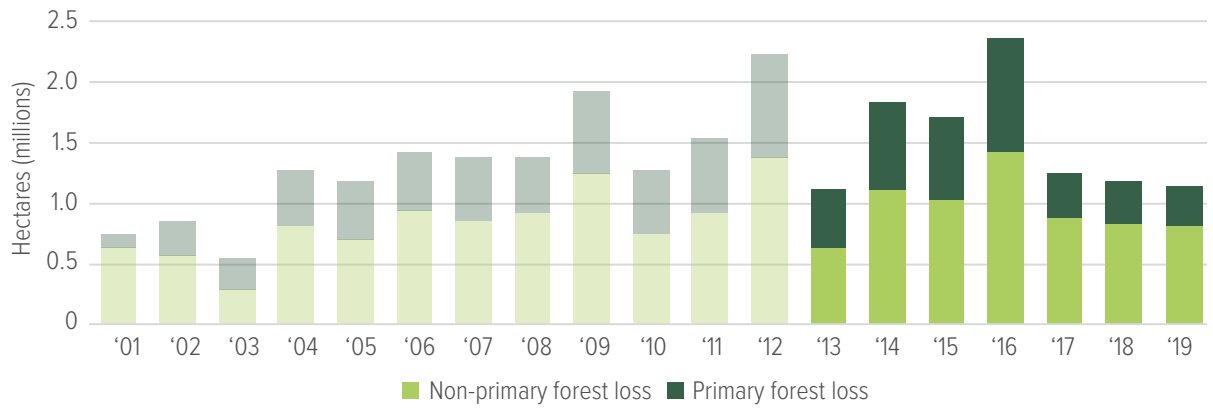
47% exported

Figure 1: Relative amount of tropical forest loss driven by commercial agriculture and the extent of illegal clearing.



Source: forest loss – GFW (2020 using Hansen et al. [2013]); agro-conversion – estimates compiled by Forest Trends (2021) from multiple sources, including GFW (2020 using Curtis et al. [2018]); and illegality – estimates compiled by Forest Trends (2021).

Figure 2: Annual forest loss from 2001 to 2019 for Indonesia. This report covers the period highlighted (2013-2019).



Source: GFW (2020 using Hansen et al. [2013]).

BOX 1

Forest Trends Findings

- Between 2013 and 2019, commercial agriculture in Indonesia was likely responsible for the clearance of 9.4 Mha of forest.
  - Given that 47% of the production was exported, there is a risk that international buyers may be linked to at least 4.4 Mha of deforestation.
  - At least 47% of agro-conversion was likely illegal.
  - Therefore, exports carried a high risk of a link to illegal deforestation.
- Exports in 2019 that were likely from agro-conversion:
  - US$6.2 billion in palm oil with an 81% risk of illegality
  - US$3.5 billion in pulp and $4.8 billion in paper with a 68% risk of illegality
  - US$1.1 billion in rubber with a high risk of illegality

1 Introduction

Indonesia has the world's third largest expanse of tropical forest and contains 9 percent of all forests across the tropics (GFW 2020). Located between Asia and Australia and between the Pacific and Indian Oceans, Indonesia has extremely high levels of biodiversity and endemism (Government of Indonesia 2020). It is also considered one of the world's 36 biodiversity hotspots.[1] As of 2016, however, only 20 percent of Indonesia's 151 million hectares (Mha) of forest was still intact and undegraded (GFW 2020). According to FAO, Indonesia has had the third largest loss of forests globally (0.78 percent per year) over the last five years (FRA 2020). Global Forest Watch estimates that since 2001, Indonesia's loss of 26.3 Mha of tropical forests – a 17 percent decrease in tree cover – generated emissions of more than 18 Gigatonnes (Gt) of carbon dioxide-equivalent (CO_2e) (GFW 2020).

According to the Government of Indonesia (2020), below-ground carbon sources, such as peatlands (a critical carbon sink[2]), are a major contributor to these emissions, mainly through decomposition (when drained, for example) and fires. Indonesia has the most extensive peatlands in the world covering 24.67

[1] There are 36 widely acknowledged biodiversity hotspots around the world. These threatened areas comprise 2.4% of the Earth's land yet contain half of all plant and animal species. (See Glossary; Conservation International 2020).

[2] In Indonesia, below-ground carbon sinks (including the soil) store twice the amount of carbon as the above ground vegetation (41.5 Gt vs. 21.6 Gt; GFW 2020).

For the purposes of this study only the following were considered:

- **Forests:** areas with greater than 50% tree cover
- **Forest loss / Deforestation:** complete removal of forest cover
- **Illegal:** deforestation that was, at time that the clearing took place, in contravention of the country's legislative framework governing forest conversion

Mha (Government of Indonesia 2020), 4.3 Mha of which in Papua, Sumatra, and Borneo have now been converted to plantations, resulting in massive carbon emissions (Dargie et al. 2019). When clearing is associated with forest fires, the peat can continue to burn for years, even below-ground. Between January 2012 and December 2020, almost three million fire alerts were reported to GFW (2020), peaking during severe El Niño droughts that exacerbated the intensity of the peat burns.

Because of the massive emissions related to forest clearing, Indonesia ranks among the world's top four emitters of greenhouse gases (Wright 2019). In 2015, the Government of Indonesia (2020) estimated that 66 percent of emissions nationwide were from forestry — mainly from a combination of forest fires, deforestation, clearing peatlands, and logging. Much of the forest loss was to make way for large-scale, commercial agriculture, particularly oil palm and pulp plantations (Climate Watch 2020).

In 2009, Indonesia committed to reduce emissions by 26 percent from business as usual by 2020.[3] However, comparing the five years before the 2009 commitment to the most recent five years, Indonesia's land-use change emissions have not decreased (GFW 2020), while emissions from burning fossil fuels were a third higher (Ritchie & Roser 2017). Indonesia has now committed to reduce emissions by 29 percent of 2010 levels (60 percent of which still come from the forestry sector), mainly by reducing deforestation, forest degradation, and emissions from peatlands. Reductions are now "slated to take place over the period of 2020 to 2030" (Government of Indonesia 2020).

Indeed, over the past three years emissions have fallen, even as exports of processed timber products have increased (Government of Indonesia 2020). Recently, the United Nations Green Climate Fund paid Indonesia US$103.8 million – the Fund's largest pay out yet – for Indonesia's efforts to curb carbon CO_2e emissions by preventing deforestation and forest degradation. It is estimated that these efforts prevented forest loss between 2014 and 2016 that would have otherwise resulted in 20.3 Mt CO_2e of emissions (Jong 2020c; UNDP 2020). The Government of Norway[4] (2020) similarly made a payment of US$56 million to Indonesia for preventing the emission of 11.23 MtCO_2e through reducing its rate of deforestation from 2016 to 2017.

This chapter evaluates patterns of deforestation in Indonesia over the past seven years – both successes and failures, but particularly the impact of illegal clearing for export-driven commercial agriculture on deforestation.

2 Deforestation Analysis

2.1 Deforestation 2013-2019

Between 2013 and 2019, GFW (2020, using Hansen et al. 2013) estimates that 10.6 Mha of forest cover was lost across Indonesia (or 14 percent of all forest loss across the tropics). Seven percent of Indonesia's forest cover from 2000 has been lost. In this section, Forest Trends evaluates some of the patterns associated with this forest loss.

According to GFW (2020), forest loss peaked in 2016, when nearly 2.4 Mha were lost – 39 percent from primary forests – mainly due to fires started after a severe 2015 El Niño drought, as well as political-economic dynamics unleashed by an unprecedented number of local (district-level) elections (Purnomo et al. 2019). Smoke from these forest fires likely caused the premature death of at least 100,000 people (Weisse & Goldman 2017). During the months-long crisis, the fires released more than 1.6 GtCO_2e, or more than all the emissions from the US at the time (Harris et al. 2015). The World Bank estimated that the fires cost

[3] Or by 41% with international support.

[4] This payment is based on the 2010 Letter of Intent between the governments of Indonesia and Norway, in which Norway pledged up to US$1 billion in exchange for Indonesia slowing its emissions from deforestation (which accounts for the bulk of its CO_2 emissions).

Indonesia more than US$16 billion in direct damage to assets and losses from affected economic activities. Fires that broke out again in 2019 cost Indonesia at least another US$5 billion (World Bank 2016; World Bank 2020). Because about 44 percent of the areas burned in 2019 were on peatlands, carbon emissions from the 2019 fires were estimated to have almost double the emissions of the fires in the Brazilian Amazon that year (European Commission 2019; Reuters 2019).

According to reports, deforestation declined substantially between 2016 and 2019, justifying the compensation from the Green Climate Fund and Government of Norway. Indeed, the 2010 Letter of Intent (LoI) between the governments of Indonesia and Norway is credited with helping drive this decline, in part because it created political momentum, especially after the 2015 fires. Credit also goes to the creation of the Peat Restoration Agency (Badan Restorasi Gambut or BRG in Indonesian) and a 2016 moratorium on the clearing of certain peatlands and areas of primary forest.[5] In December 2020, Indonesia extended the tenure of the BRG for another four years, expanding its remit to include mangroves (it is now the Peat and Mangrove Restoration Agency (BRGM; Government of Indonesia 2020)). Weisse & Goldman (2020) further credit the reduction in deforestation to increased law enforcement and the now-permanent moratorium on clearing selected primary forests and selected peatlands for resource exploitation. Oil palm concessions granted Location Permits prior to 2012 are notable exemptions.[6]

2.2 Drivers of deforestation

Forest Trends evaluated the extent and nature of forest cover loss due to commercial agriculture using data from Global Forest Watch (2020), Pendrill et al. (2020), Goldman et al. (2020), and Austin et al. (2019), Forest Trends found:

- 89% of forest loss from 2013 to 2019 was driven by commercial agriculture.

Justification

Global Forest Watch (2020, using Curtis et al. 2018) estimates that 91 percent of all forest loss was driven by commodities, which is defined by GFW as including mining, not just agricultural commodities (Appendix 1, Forest Trends 2021). Given that between 2001 and 2016, mining was responsible for only 2 percent of deforestation (Austin et al. 2019), Forest Trends estimates that 89 percent of deforestation was likely driven by commercial agriculture. (Note: GFW (2020) estimated that forestry was responsible for a further 5 percent of forest cover loss.)

The GFW analyses are broadly corroborated by the academic literature on drivers of deforestation in Indonesia. Austin et al. (2019) found that a third of deforestation resulted in the conversion of forests to grassland, of which one third was later converted to other land cover categories. Such forest clearing leading to grasslands rather than development is not uncommon. Carlson et al. (2012), for example, found that in Kalimantan – one of the centers of oil palm development – 79 percent of the area allocated for oil palm up to 2010 had not been planted successfully, despite the forests being cleared.

While some clearings may have eventually been planted after significant time delays, it is widely reported that permits for clearing the forests were often obtained with no intention of ever investing in planting operations. The Government of Indonesia (2020) reports that 27 percent of pulp plantations (HTIs) have no

[5] The moratorium, in place since 2011, bans new permits for the commercial exploitation of primary and peat forests. This was meant to limit the expansion of oil palm, pulpwood, and logging concessions (Busch et al. 2019).

[6] This, however, does not mean that all Location Permits (Izin Lokasi) granted prior to 2012 are legal. They are only the first in a series of necessary permits before a concessionaire may clear natural forests (e.g., Environment Permits (Izin Lingkungan), Planation Business Permits (Izin Usaha Perkebunan or IUP), and Rights to Cultivate Land (Hak Guna Usaha or HGU)). It is uncommon for HGU permits to be granted to oil palm plantations inside the Forest Estate (the 120 Mha area over which the Ministry of Environment and Forestry holds sole jurisdiction) unless they had their areas released or swapped out from the Forest Estate. Only when all necessary permits have been secured should concessionaires be given a Timber Utilization Permit (Izin Pemanfaatan Kayu or IPK) by provincial forestry offices to clear fell the natural forests standing within their concessions (Brown, D. 2021).

management activity because of "social conflicts [with local communities], weak financial performance, and the gap between HTI and downstream industries." In the past, the failure to plant was also driven by persistent corruption, which facilitates what would otherwise be illegal land clearance, simply to get access to timber that operators would not be permitted to harvest otherwise.[7] This fraud allowed operators to profit from the forest clearance and then claim tax credits for reforestation and/or plantation-development, even in cases where planting never occurred (KPK 2013; Gaveau et al. 2017).[8]

A recent concern is that the Government of Indonesia (2020) has targeted 9 Mha of land for its agricultural reform program (TORA), of which 4.1 Mha is to be "de-designated" from the Forest Estate. A further 770,000 ha of forest may be lost under another agriculture program, the Food Estate project, to be managed by Prabowo Subianto (Reuters 2020). There is concern that the Food Estate project will drive "massive deforestation," (Loasana 2020) in part because of the history of precursors. For example, the Suharto-era 1.4 Mha Peatland Project (PLG; the so-called Mega Rice Project initiated in 1995) in Central Kalimantan failed to increase food security, instead using reforestation funds to convert forests into plantations like oil palm. The Merauke Integrated Food and Energy Estate (MIFEE) in Papua also failed to increase food security and is instead now described as a "textbook land grab" for export-oriented commercial agriculture (Jong 2020e), including 594,000 ha for pulpwood and 266,000 ha for oil palm.

2.3 Estimating illegality of commercial agriculture

After reviewing all available data, Forest Trends estimates that:

- At least 47% of deforestation for commercial agriculture was likely illegal.

This is a necessarily conservative estimate because there is little data on compliance for most crops. It is possible that the level of illegality (>80 percent) across oil palm plantations is widespread across the commercial agriculture sector.

Justification

Oil Palm Plantations and Legal Compliance

In 2019, Indonesia's Supreme Audit Agency (BPK) concluded that 81 percent of oil palm concessions violated one or more laws or mandatory management standards, including "operating illegally in protected, production or other forest areas; operating outside concession boundaries; operating without relevant permits; and failing to develop smallholdings for local people as required" (Greenpeace 2019).

Among the contributors to this widespread non-compliance is the fact that more than two-thirds of the 16.8 Mha of oil palm plantations are not certified under the Indonesian Sustainable Palm Oil (ISPO) standard, as is required by Indonesian law (Jong 2020d). To be certified by ISPO, which operates under the jurisdiction of the Coordinating Ministry for Economic Affairs, producers must be in compliance with all legislation relevant to environmental sustainability. Ministry of Agriculture regulations[9] state that after a company is given three warnings (with at least four months between warnings), failure to secure ISPO certification will result in the plantation's business permits (IUPs) being revoked.[10]

Further underlining the widespread lack of compliance, the Indonesia's Anti-Corruption Commission (KPK) found that 20 percent of oil palm plantations are illegally located inside the Forest Estate, including 300,000 ha in Protection and Conservation Forest and 3.1 Mha in Production Forest. Of the latter plantations, almost half (1.5 Mha) have apparently never applied to the Ministry of Environment and Forests (MoEF) for retroactive

[7] Oil palm production has been incentivized through income tax breaks, accelerated amortization and depreciation, and a government guarantee against operational losses. Foreign investment in particular is encouraged by allowing up to 95 percent foreign ownership, whereas only 45 percent is allowed in most other sectors (Blundell et al. 2018).

[8] Similar patterns of a lack of planting are apparently common in pulp plantations. For example, the plantation company PT MHB (whose director, Probosutedjo, was a stepbrother of former President Suharto), allegedly charged reforestation funds for planting 79,452 ha of pulp plantations in Kalimantan, while only 20,000 ha had actually been planted (Pirard & Cossalter 2006).

Figure 3: Indonesia's Peatland Hydrological Units (KHG)

Source: Astuti 2020, based on Ministerial Decree No 129/2017

permission to release their concessions from (or to swap them with areas outside) the Forest Estate, and thus, are illegal. As for the remaining companies that reportedly have applied for excisions or swaps, almost no decisions have been issued after more than four years, so most of these applications may have been constructively refused by the MoEF, meaning they are still illegal (Brown 2021).

Illegal plantations on deep peat: oil palm and timber

A moratorium on the clearing of certain peatland was enacted in 2016 through Government Regulation No. 57/2016. The moratorium covers 30 percent of the 24.7 Mha of "peat hydrological units" (Kesatuan Hidrologis Gambut, KHG) across Indonesia (Figure 3). This is meant to protect peatlands inside conservation and protection forests, but also a critical and otherwise endangered subset of peat forests within production forests and non-forest public lands with "deep peat" soils exceeding three meters in depth. According to the Government of Indonesia (2021), 212 oil palm plantations hold rights to land covering an area of around 1.25 Mha of KHG, of which 600,000 ha of deep peat must be protected, and 99 pulp plantations hold rights to 2.2 Mha of KHG, of which 1.3 Mha deep peat must be protected. In total, 1.9 Mha of plantations on deep peat are impermissible.

For the entire 2.2 Mha of KHG where (HTIs are located, the MoEF requires Peat Ecosystem Restoration Plans (Rencana Pemulihan Ekosistem Gambut, RPEG) to be submitted. But as of 2019, the Government of Indonesia (2020) reports that "fewer than one quarter of those that had submitted" RPEGs had "actually improved their performance."

Both of Indonesia's major pulp and paper companies, APP and APRIL, have attracted considerable controversy for their clearing of peat forests for plantations (Anti Forest Mafia Coalition 2019a; 2019b). In 2018, Greenpeace (2018a) severed its five-year Memorandum of Understanding with APP's owners, Sinar Mas, because its APP failed to reveal the ownership structure of their suppliers (as required by law). Greenpeace also alleges that

[9] No. 7/2009 on guidelines for evaluating plantation companies and No. 11/2015 on the ISPO.

[10] BPK 2019: 31

a Sinar Mas-owned HTI had cleared thousands of hectares of forest and peatland since 2013.

Illegal burning inside concessions

While extreme forest fire seasons are linked to El Niño drought, Purnomo et al. (2019) note that "fires were not ignited because of dry climatic conditions. Fires in Indonesia were mostly intentional and man-made and were amplified by the biophysical and atmospheric conditions." Plantation operators clear forests and then burn the slash to make the land commercially cultivable, even though clearing with fire is illegal. Oil palm and pulp concessions in particular are linked to outbreaks of fire, and they were, for example, the biggest contributors to haze in Riau in 2015 (Purmono et al. 2019). According to Greenpeace (2019), between August and October 2019, the MoEF suspended activity in more than 60 concessions that had been burned to prevent evidence being destroyed pending investigation.

Between 2015 and 2019, Greenpeace (2020) estimates that across Indonesia, 4.4 Mha were burned. In just five months mid-2015, over 2.6 Mha of forest were destroyed by fire during a severe El Niño drought (CIFOR 2015). Among pulp plantations, Greenpeace (2019b) reported that between 2015 and 2018, PT Bumi Andalas Permai (linked to Sinar Mas/APP) had the largest area burned (81,800 ha) – an area larger than Singapore. The three largest pulp groups had burned more than 400,000 ha. An additional 185,600 ha reportedly was burned in pulp concessions in 2019, two-thirds of which was reported from just ten pulp concessionaires (Greenpeace 2020).

Between 2015 and 2020, the Government of Indonesia (2020) reported the MoEF issued 1,456 administrative sanctions, more than one-third for forest and land fires, and 524 "forest encroachment operations," although only 116 cases were submitted for trial. Despite this, no concessions have lost their license since 2015, and none have been suspended. In contrast, 431 written warnings have been issued (73 percent in 2019). Three concessions were revoked in 2015, but none were plantations that overlap with the largest areas burned (Greenpeace 2020).

Failure to recognize customary rights

Customary land and resource rights are articulated in the Indonesian Constitution,[11] as well as international human rights law (Colchester 2019). In addition, Indonesia's forestry law recognizes the rights of local communities, including the right:

- To be consulted and participate in decisions related to the resources on which they depend;
- To be compensated for loss of access to such resources;
- To have their villages and locally important sites removed from operational areas; and,
- To receive benefit-sharing and development assistance from companies who profit from forestry operations on community-claimed land.

In 2015, the MoEF issued a regulation on Forest Rights, which was replaced by a new Ministerial Regulation in 2019 on Adat [Customary] Forests and Rights Forest, to "bring the nation's forest regulation in line with a high-profile decision by Indonesia's Constitutional Court in 2013 concerning Adat forests [i.e., not allowing customary forests to be in the Forest Estate];" indeed, 34 percent of Indonesia's 74,954 villages are located in or on the fringes of forest areas (Government of Indonesia 2020). By 2020, however, only 66 Adat forests covering 44,629 ha have been recognized (Government of Indonesia 2020).

Customary rights have been routinely violated with impunity in the forestry sector (Harwell & Cortesi 2015).

[11] "Constitutional Court Ruling No. 35/2012 found that the Ministry of Forestry's categorization of indigenous lands as "state forest" (and therefore eligible to be licensed to forestry companies) is discriminatory and unconstitutional. Likewise, ruling No. 45/2011 found the issuing of forestry concessions without investigating the existence of pre-existing claims to be discriminatory to Indigenous communities and damaging to their livelihoods." (Harwell & Cortesi 2015)

For example, an investigation by the Forest Stewardship Council found "clear and convincing evidence" that the oil palm company Korindo had violated the rights of indigenous peoples by first failing to properly consult them about plans to convert community lands into oil palm plantations, and then by unfairly compensating the affected communities (Jong 2019a). Such widespread disregard for legal customary rights fuels ongoing conflicts between companies and communities – disputes that often turn violent (IPAC 2013, 2016).

As mentioned above, 27 percent of pulp plantations are not actively managed, a main cause of which is conflict with local communities (Government of Indonesia 2020). These results match the Indonesian Chamber of Commerce and the Indonesia Business Council for Sustainable Development's Conflict Resolution Unit (Barriero 2017) that found that the costs of conflict "are significant, misunderstood, and potentially pose a serious obstacle to productivity for companies, communities, and the government, and therefore, Indonesia as a whole." In two-thirds of the reported conflicts, the driver was land disputes between plantations and local communities, and in more than half of all cases, conflicts thought to be resolved had re-emerged or escalated.

Corruption & tax evasion

Patronage networks in the plantation sector, and patronage politics in Indonesia more broadly, have made it easy for companies to bypass regulations and obtain licences for peatlands (Varkkey 2013). The series "Indonesia for Sale" documented how district chiefs "systematically exploited their control over land amid a near-complete lack of oversight, to make millions of dollars by selling permits to major plantation firms" (The Gecko Project 2019). For example, Akil Mochtar, the chief justice of Indonesia's Constitutional Court in 2013, was paid a bribe to throw an election for incumbent officials from Kalimantan. The money for the bribe came directly from a deal for plantation permits involving a Malaysian company.

Politicians in forest districts appear to often rely on funding from loggers and plantation developers to fund their campaigns, setting up a conflict of interest as these politicians are responsible for land-use decisions and local law enforcement. An analysis by Burgess et al. (2012) found a "political logging cycle," whereby illegal logging in Protected Areas jumped by 42 percent in the year leading up to local elections. Illegal logging then fell dramatically in the election year and did not resume in Protected Areas thereafter. However, in the post-election years, increased deforestation due to concession clearing outside of Protected Areas increased by 40 to 57 percent, as politicians seemed to repay their election debts by granting forest concessions. The same study examined "district splitting," which occurred as part of the decentralization movement after the fall of former President Suharto. For each new district added, the provincial deforestation rate increased by 7.8 percent. In Kalimantan, "local elections were found to be an obstacle [not a solution]" in tackling forest fires as "incumbents issue [concession] permits to improve their chances of continuing in the second term. Meanwhile, the challengers make [campaign] promises to allocate land." (Purnomo et al. 2019)

Environmental Investigation Agency (2014) found that in 2014 in Central Kalimantan province, where oil palm has now expanded to cover more than 1.7 Mha, local sawmills reported a 150 percent spike in timber sourced from logging concessions. But it is unlikely that such a dramatic increase could have come from the legal logging concessions because it would have meant that they exceeded their annual allowable cut by 150 percent. Researchers concluded that timber sourced from land clearing for plantations was likely being mischaracterized as originating from legal forestry and/or laundered from other sources (EIA 2014).

Summary

The Indonesian Supreme Audit Agency concluded that at least 81 percent of oil palm concessionaires were operating illegally. Another estimate suggests that oil palm was responsible for half of the forest loss driven by agro-commodities between 2013 and 2017 (Pendrill et al. 2020). Estimating the rate of illegality across the other half of forest loss is difficult as these commodities have not been subject to a similar audit. However, as outlined above, many pulp plantations have been linked to fires and tax evasion, among other violations

of law and regulation. At least 1.3 Mha are on protected deep peat, 27 percent are not actively managed, and almost 0.6 Mha were burned between 2015 and 2019. Assuming, at the very least, that the 0.6 Mha of forest lost to fires were illegal, then between oil palm and pulp plantations alone, at least 47 percent of that deforestation was likely illegal.

There is clearly a need for increased monitoring given: 1) the vast area cleared for commercial agriculture, 2) the fact that that area is likely increasing and so much has been on peat land, and 3) the widespread illegality associated with the oil palm sector — the only commodity for which a formal review has been completed. The Government must do more to monitor and report on compliance of the legality of agro-conversion, especially because Indonesia is responsible for almost 15 percent of all tropical forest loss since 2013. Further, given the high risk of agricultural products being contaminated by a link to illegal deforestation, traders must practice enhanced due diligence when purchasing commodities from Indonesia.

2.4 Estimating the percentage of agro-commodities linked to deforestation that are exported

After reviewing available data, Forest Trends estimates that:

- 47% of commodities embodying deforestation are exported.

After completing its own assessment, Forest Trends concluded that Pendrill et al. (2020)'s estimate that 47 percent of agro-conversion is exported is sound. Palm oil accounts for 83 percent of all exported crops linked to deforestation, and 88 percent of Indonesia's palm oil production was exported between 2013 and 2017 (Pendrill et al. 2020; FAOSTAT 2020; COMTRADE 2020). Wood products from plantations account for a further 5 percent of exported embodied deforestation, and rubber accounts for 6 percent (Pendrill et al. 2020).

Palm oil, pulp, and rubber were selected for Forest Trends' analysis because together they are three major export crops that account for more than 65 percent of Indonesia's embodied deforestation in crops (Pendrill et al. 2020).

3.1 Oil Palm

3 Commodity Analysis

Based on its analysis, Forest Trends estimates that:

- 38% of palm oil production was linked to deforestation.
- At least 81% of agro-conversion for palm oil is likely illegal.

Justification

Palm oil meets more than 40 percent of global demand for vegetable oil (Meijaard et al. 2020) and between 2013 and 2018, 54 percent of global imports of crude palm oil came from Indonesia. In 2019, Indonesia's 32 million tonnes (Mt) of palm oil exports were worth over US$16 billion (COMTRADE 2020).

While Carlson et al. (2013) estimated that 69 percent of oil palm planted from 1990 to 2010 in Kalimantan replaced forest, a meta-review of five studies of palm oil expansion estimated that, on average, 38 percent of oil palm plantations replaced forest (Meijaard et al. 2020).

3.2 Tree plantations (mainly for pulp)

Based on its analysis, Forest Trends estimates that:

- 100% of tree plantations are linked to deforestation.

- At least 68% of agro-conversion for plantations was likely illegal.

Justification

The vast majority of Indonesia's 2 Mha of pulp plantations planted since the early 1990s "occurred through clearing degraded primary forests, much of which was located on peatlands. As a result, the industry was a leading driver of deforestation through the early-2010s" (TRASE 2021a). Of the pulp plantations, about 1 Mha are on peatlands that have experienced recurring fires (TRASE 2021b), which suggests that over time, "these plantations will steadily become less productive or even unviable" (TRASE 2021a; TRASE 2021b).

Between 2015 and 2019, wood consumption by the pulp processing sector increased by about one-third, mostly due to the opening of the OKI mill in South Sumatra in 2016, which expanded the sector's domestic processing capacity by 38 percent (TRASE 2021a). However, the same study found that since 2013, there has been an 85 percent reduction in the amount of annual deforestation driven by the sector, presumably as pulp plantations began meeting Indonesia's supply needs.

According to FAO FRA (2020), Indonesia has 2 Mha, of pulp plantations, and thus, it is likely that all HTI plantations are linked to deforestation. Prior to 2013, Forest Trends (2014) estimated that at least 80 percent of this conversion had been illegal. Since then, Forest Trends has been unable to obtain a rigorous estimate on the rate of illegality related to clearing for pulp plantations. But, given that clearing since 2013 accounts for only about 15 percent of all forest clearing for pulp, it is likely that at least 68 percent of forest conversion for pulp was illegal.

Indonesia produced 87 Mt of pulp between 2013 and 2018, and 120 Mt of paper (FAOSTAT 2020). Exports of pulp were negligible, while 53 percent of paper was exported worth US$1.3 billion between 2013 and 2019 (COMTRADE 2020).

3.3 Rubber

Forest Trends estimates that:

- At least 26% of rubber was linked to deforestation.

Justification

Rubber cultivation covered 3,671,302 ha in 2018, of which 965,163 ha replaced forest between 2001 and 2015 (Goldman et al. 2020; FAOSTAT 2020).

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Illicit Harvest, Complicit Goods

The State of Illegal Deforestation for Agriculture

ANNEX 3 CAMBODIA CASE STUDY 2013-2019

18th in tropical forest loss

1% of all tropical forest loss

567 Mt of CO_2e Total gross emissions from forest loss

0.9 Mha total loss of tropical forests

of which

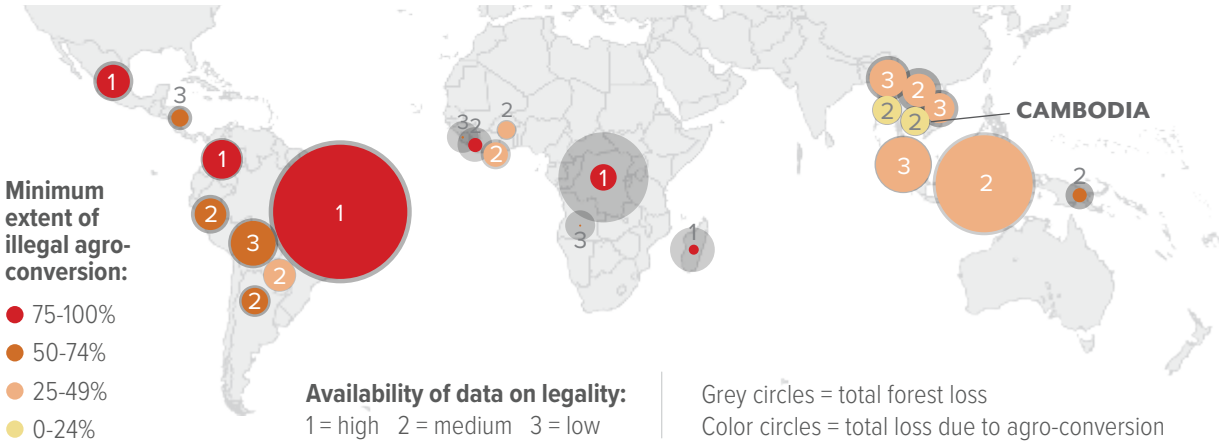
89% due to commercial agriculture

of which at least

16% likely illegal

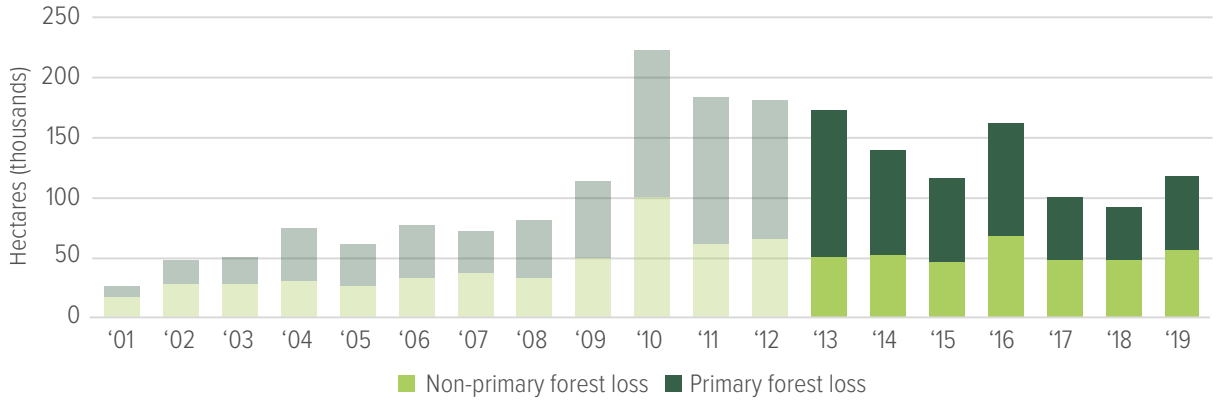
16% likely exported

Figure 1: Relative amount of tropical forest loss driven by commercial agriculture and the extent of illegal clearing.



Source: forest loss – GFW (2020, using Hansen et al. [2013]); agro-conversion – estimates compiled by Forest Trends (2021) from multiple sources, including GFW (2020, using Curtis et al. [2018]); and illegality – estimates compiled by Forest Trends (2021).

Figure 2: Annual forest loss from 2001 to 2019 for Cambodia. This report covers the period highlighted (2013-2019).



Source: GFW (2020, using Hansen et al. [2013]).

BOX 1

Forest Trends Findings

- Between 2013 and 2019, commercial agriculture in Cambodia was likely responsible for the clearance of more than 800,000 ha of forest.
  - Given that 16% of Cambodia's agricultural commodities were exported, it is likely that international buyers may be linked to at least 120,000 ha of deforestation.
  - At least 16% of agro-conversion is likely illegal.
- US$204 million in rubber that was likely from agro-conversion was exported in 2019 alone.
  - It is difficult to determine the risk that exported commodities were grown on illegally cleared land. Given this, heightened due diligence is required by buyers.

1 Introduction

Cambodia's forest once covered 73 percent of the country's total land area, but since 1965 it has been reduced to only 46 percent (FAO FRA 2020; The Royal Government of Cambodia 2017). The Central Indochina Dry Forests ecoregion stretches across the arid plains of northern, eastern, and south-central Cambodia, and into Laos and Thailand, although Cambodia's only remaining dry forests are in the country's northeast. This ecoregion is characterized by deciduous trees, sometimes forming a closed canopy and sometimes a partially open canopy that allows grasses in the understorey. It is home to the critically endangered kouprey (a forest ox now feared extinct) and Eld's deer, and the endangered tiger, Asian elephant, gaur, banteng, wild water buffalo, serow, pileated gibbon, leaf monkeys, and others (WWF n.d.). Cambodia's floodplain forest around Tonle Sap and the Mekong River plays an important role in absorbing and storing water when the Mekong floods, but it is drying out as a result of droughts and upstream hydropower stations, and the area suffered extensive fires in 2016 (Lovgren 2020).

2 Deforestation Analysis

2.1 Deforestation 2013–2019

The rate of forest loss in the past seven years was more than double what it was in the first seven years of this century (GFW 2020, using Hansen et al. 2013). An analysis of deforestation from 1993 to 2017

For the purposes of this study only the following were considered:

- **Forests:** areas with greater than 50% tree cover
- **Forest loss / Deforestation:** complete removal of forest cover
- **Illegal:** deforestation that was, at time that the clearing took place, in contravention of the country's legislative framework governing forest conversion

revealed that deforestation was worse in the plains than in the uplands (Lohani et al. 2020), but in 2019, the upland region of Rôtânôkiri had the highest rate of deforestation (GFW 2020).

Cambodia has promoted industrial agriculture but often this has come at the cost of the forests, and it has not delivered the promised socio-economic benefits (Open Development Cambodia 2016). By 2014, the Royal Government of Cambodia had granted a total forest area of approximately 2.02 million hectares (Mha) for agribusiness development (later reduced to 1.2 Mha) (Ingalls et al. 2018a). In addition, 2.45 Mha of forested area were allocated as social land concessions to poor households, military families, and for establishing new villages. In 2014, the government de-gazetted a further 1.2 Mha of forest to issue land titles to landless communities (The Royal Government of Cambodia 2017)..

2.2 Drivers of deforestation

Forest Trends findings

Forest Trends analysis on the extent and nature of forest loss in Cambodia between 2013 and 2019, is based on an extensive review of existing literature and data, including research from Global Forest Watch, Pendrill et al. (2020) and REDD+ (2015). After reviewing all available data Forest Trends' best estimate is that:

- 89% of deforestation was driven by commercial agriculture.

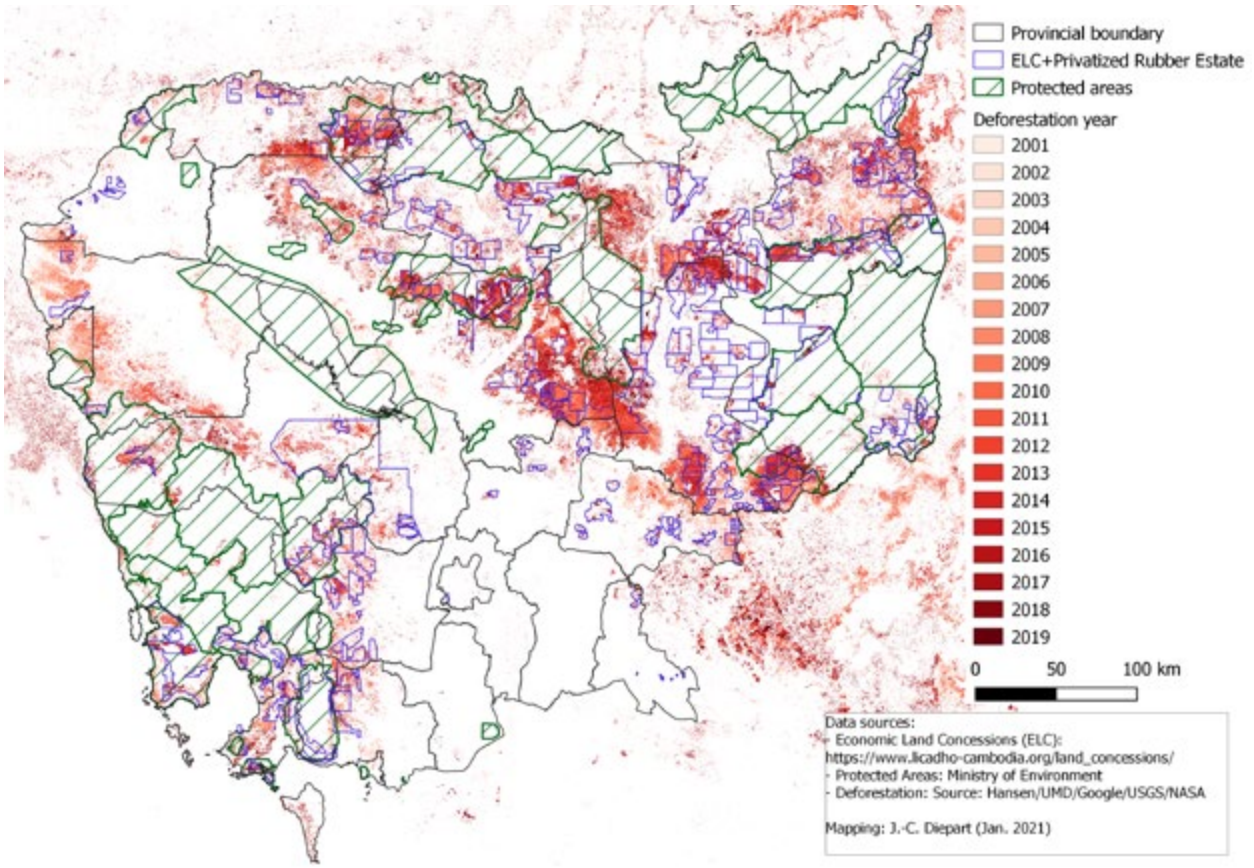
Justification

Forest Trends' estimate is based on the Curtis et al. (2018) driver analysis on GFW, which estimates that 89 percent of forest loss was driven by commodities. The REDD+ driver analysis also identifies the primary driver as agro-industrial economic land concessions, local and large-scale agricultural expansion, and migration to forested frontier regions, as well as logging of luxury timber (Cambodia REDD+ Programme 2015). The following paragraphs examine large-scale agro-conversion in Economic Land Concessions (ELCs), and then small-scale agriculture.

Of all the deforestation from 2001 to 2019, 30.9 percent was in ELCs (Diepart 2021). These ELCs were issued from 2001 to 2012, and quickly became notorious for causing displacement of local peoples from their land, often generating conflict. About 25 percent of ELCs overlap with protected areas (Johanssen et al. 2020). The official aim of the ELCs was to stimulate agro-industrial activities on "under-utilized land," but in reality the ELCs were often placed in areas of high conservation value, which have the most valuable timber reserves in the country, and they enabled clear-cut logging of high-value timber (Milne 2015). A study identified that ELCs are 57 percent more likely to be placed in areas with high carbon values than in already-degraded land (Beauchamp et al. 2018). Thus, they were described as "mechanisms for the ruling elite to enable land grabbing and clear-cutting and selling of high value timber under the pretext of an agricultural intensification strategy" (Beauchamp et al. 2018).

The Royal Government of Cambodia issued Order 01 (2012–2013) to try to address some of the problems associated with ELCs. Order 01 introduced a moratorium on the granting of new ELCs, a titling campaign (see below), and a full review of existing ELCs in an effort to discover which companies were in violation of the contract they had signed. The government revoked poorly performing ELCs for later redistribution, and the total land under ELCs was reduced from 2 Mha to 1.2 Mha (Johanssen et al. 2020; Ingalls et al. 2018). While there was hope that cancelled ELCs would be returned to smallholders, cancelled ELCs in protected areas remain under the Ministry of Environment jurisdiction for conservation, while cancelled ELCs under the Ministry of Agriculture, Forestry and Fisheries' jurisdiction are under instruction to be reforested (Ingalls et al. 2018a).

Figure 3: Map of deforestation, ELCs and protected areas in Cambodia



Smallholder agriculture drives deforestation around the ELCs and in the frontier territory close to the borders with Vietnam and Thailand. Forest is replaced with cassava that is grown for export to Vietnam and Thailand, but also in order to stake a claim to land (Mahanty and Milne 2016; Kong et al. 2019). The land titling campaign (Order 01 in 2012–2013) was a populist effort to issue private land titles to farmers who had been dispossessed by ELCs or whose land in the forest frontier had never been formally recognized or mapped. Families had to demonstrate 'active use' of the land, so they cut down the forest and planted cassava, and often then sold it on to speculators and elites. Cassava consolidated the land claims, but the real driver was the opportunity to obtain titles on former forestlands. The military and well-connected individuals became increasingly involved (Mahanty and Milne 2016). In total, 641,623 titles were issued under Order 01, covering more than 1 Mha of which 30 percent came from uncategorized forest areas, while 25 percent came from ELCs (Ingalls et al. 2018a).

2.3 Estimating illegality linked to agro-conversion

After reviewing all available data Forest Trends' most conservative estimate is that:

- At least 16% of deforestation for commercial agriculture was likely illegal.

Justification

Forest Trends could find no published estimate of the proportion of deforestation for commercial agriculture that is legal as opposed to illegal. Outside of the ELCs, there are documented cases of illegal land grabs and corruption related to obtaining land titles for deforested land, particularly along the borders with Vietnam

BOX 2

Violence at Memot Rubber Plantation

In the run-up to the 2018 elections, protesters at Memot Rubber Plantation had their houses burned by security forces for being inside the concession boundaries. The concession is linked to Prime Minister Hun Sen's niece, Kim Sokleap, Chair of the Board of Directors of Memot Rubber Plantation Co., Ltd. When farmers demonstrated against the violence, eight farmers were arrested. The security forces opened fire and shot three local people (Loughlin and Milne 2020).

and Thailand. Any forest clearance that occurred between 2001 and 2012 was not allowed according to the 2001 Land Law, unless in forest areas that were de-gazetted as part of the peace-building process (some areas in the northwest and in the north). After Order 01 and the land titling campaign (and the start of the period covered by this report), once a smallholder's land claim was recognized by the state, then legal ownership was granted and deforestation was no longer illegal.

Since Order 01, however, most deforestation has been in ELCs. As mentioned above, the law requires ELCs to be on state-owned private land, but 25 percent are in Cambodia's protected areas where development is prohibited (Johanssen et al. 2020). Satellite observations of forest loss within protected areas are able to identify deforestation which is illegal under the Protected Areas Law. GFW reports that 42 percent of forest loss between 2013 and 2019 was in protected areas (GFW 2020).

Of the ELCs outside protected areas, companies have the right to clear the timber before putting the land under cultivation, but irregularities and non-compliance with regulations raises concerns about high levels of illegality. Companies are required to conduct environmental impact assessments but only three assessments are listed on Open Development Cambodia (2018). Moreover, ELCs are required to generate state revenue and increase agricultural production, but most have not seen any cultivation after being clear cut: of the deforestation in ELCs between 2001 and 2015, only 26 percent had been planted by 2015—the most recent data available (Grogan et al. 2019). Secondary requirements are to create social benefits, improve living standards, and protect the environment, but there are widespread complaints of unfair evictions, coercion, human rights abuses, and environmental degradation (Diepart et al. 2019). Furthermore, there are documented cases of illegal clearance in the forest surrounding the ELC concessions, and high-value timber being trafficked under the concession's logging permit (Milne 2015).

There are also illegalities related to the granting of concessions and accusations of corruption and bribery during this process. There is a limit on the size of the area of land holdings, but 15 companies were granted concessions that exceed the maximum area; and according to LICADHO's land concession dataset, these represent 51 percent of the total 1.2 Mha allocated to ELCs (LICADHO n.d.; Radio Free Asia 2020; Global Witness 2013).

The law prohibits ELCs from overlapping with natural forest but three concessions in the forests of Mondulkiri in eastern Cambodia demonstrate how flawed the law is in practice. The three concessions (Binh Phuc Kratie-rubber 1, Binh Phuc Kratie-rubber 2, and Eastern Rubber concessions, all affiliated with Vietnam Rubber Group) were reduced to 15 percent of their original size after a survey exposed that 85 percent of the area was evergreen or semi-evergreen forest. However, lobbying by the Vietnamese embassy reinstated each to 5,000 ha. The concession boundaries were redrawn to include the richest evergreen forest, and Milne (2015) notes that the reshaped concessions facilitate illegal clearing beyond the concession boundaries. Since then—between 2014 and 2016—the entirety of the original concession area was cleared (45,993 ha), as well

as parts of the wildlife sanctuary not included in the concession, and timber was exported to Vietnam (Ingalls et al. 2018b).

No study has been conducted of illegalities in ELCs, but we know that 51 percent exceeded the maximum size limit, and given that ELCs represent 30.9 percent of deforestation, we use 16 percent (51% x 30.9%) as the lower bound for the estimate of illegality of all agro-conversion. In the absence of further research, it is not possible to rule out a worst-case scenario in which all deforestation for commercial agriculture is illegal.

2.4 Estimating the percentage of agro-commodities linked to deforestation that are exported

After reviewing available data Forest Trends estimates:

- 16% of commodities embodying deforestation are exported.

Justification

After completing its own assessment, Forest Trends concluded that the estimate by Pendrill et al (2020), that 47% of ag conversion is exported, is sound. While rice embodies most deforestation (36 percent), it is predominantly consumed on the domestic market, although 7 percent of production was exported in 2018, largely to the EU and China (Pendrill et al. 2020; USDA 2019). Cassava accounts for 30 percent of embodied deforestation and 21 percent is exported, almost all to Thailand. Soybeans and beef are each responsible for 10 percent of agro-conversion, and 25 percent of soy is exported, while all beef is consumed domestically (Pendrill et al. 2020; COMTRADE 2020; FAOSTAT 2020). Even though the majority of ELCs are licensed for rubber, rubber only contributes to 3 percent of embodied deforestation in crops, all of which is exported.

3 Commodity Analysis

Rubber is selected for the Forest Trends analysis because it is one of the top five exported agricultural commodities contaminated with deforestation (the others are cassava, rice, sugar, and soybeans).

3.1 Rubber

Based on its analysis, Forest Trends estimates that:

- 100% of rubber production is linked to deforestation.

Goldman et al. (2020) calculate that 329,003 ha of rubber replaced forest between 2001 and 2015, representing 81 percent of Cambodia's 410,000 ha of rubber (Khmer Times 2020). Another study, by Grogan et al. (2019), reports that 508,600 ± 78,200 ha of forest was cleared and replaced by rubber between 2001 and 2015—even more than the government reports as the total area planted with rubber. The Forest Trends estimate is that 100 percent of rubber is from agro-conversion. There is also indirect deforestation as displaced villagers clear land; as migrant laborers employed by the concessionaires start farming; and as smallholders attempt to halt further expansion of commercial agriculture by establishing land-ownership claims (Magliocca 2019).

More than one-third of Cambodia's rubber concessions (150,000 ha) are held by the Vietnam Rubber Group, which expanded its operations to Cambodia and Laos in 2005–2006, accelerating as land became scarce in Vietnam from 2011 (Global Witness 2013). One study estimates that 31 percent of all forest-to-rubber conversions took place in protected areas between 2001 and 2015, causing 158,500 ± 46,900 ha of forest loss (Grogan 2019). Forest Trends takes this figure for the base-estimate of the proportion of rubber that is from illegal agro-conversion, recognizing that other types of illegalities abound, and that our estimate is likely highly conservative. COMTRADE global import data for rubber from Cambodia records more than four times

the amount that Cambodia reports it produced during the same period (FAOSTAT 2020), indicating vast under-reporting of trade by industry in Cambodia. This may be an indication of widespread tax evasion and other high levels of corruption.

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Illicit Harvest, Complicit Goods

The State of Illegal Deforestation for Agriculture

ANNEX 3 LAOS CASE STUDY 2013-2019

7th in forest loss across the tropics

3% of all forest loss across the tropics

1 Gt of CO_2e Total gross emissions from tree cover loss

2 Mha total loss of tropical forests

of which

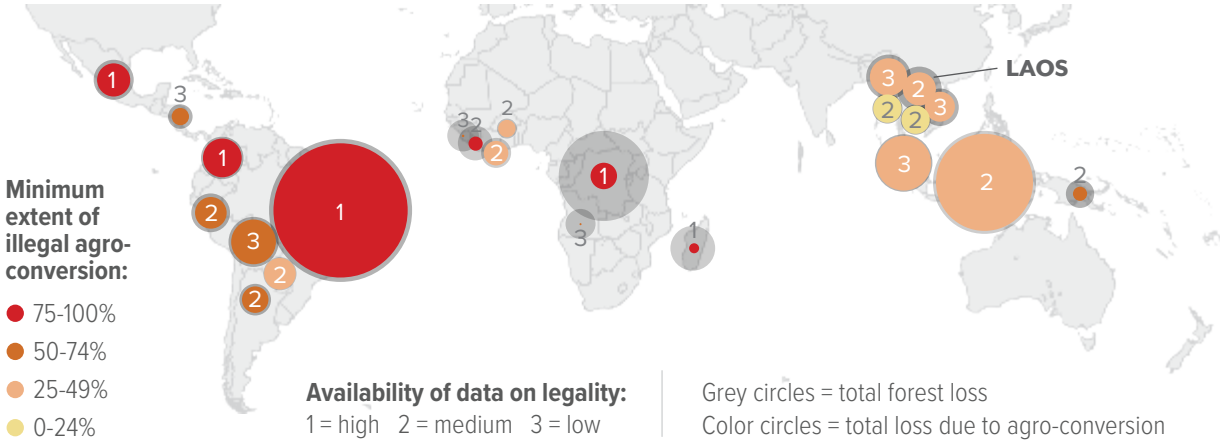
56% due to commercial agriculture

of which at least

49% likely illegal

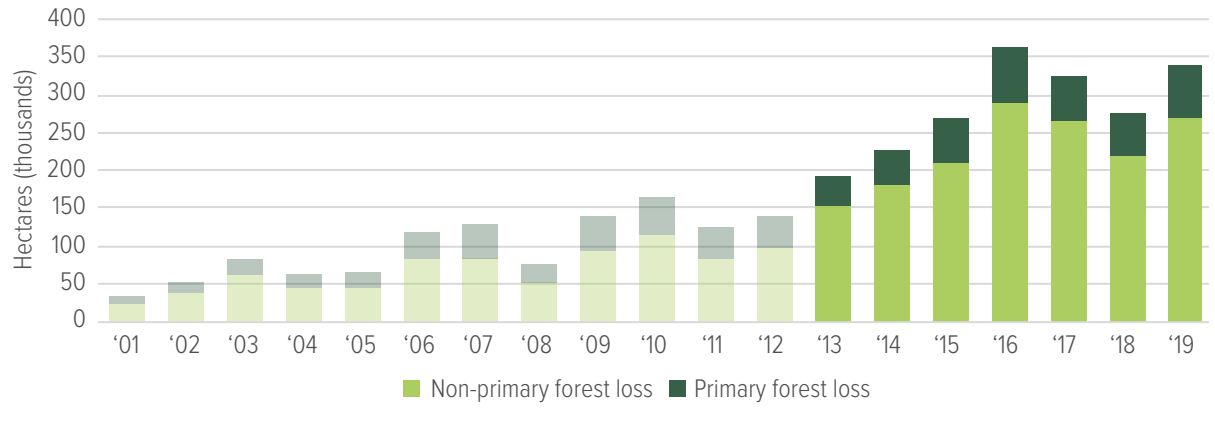
20% likely exported

Figure 1: Relative amount of tropical forest loss driven by commercial agriculture and the extent of illegal clearing.



Source: forest loss – GFW (2020, using Hansen et al. [2013]); agro-conversion – estimates compiled by Forest Trends (2021) from multiple sources, including GFW (2020, using Curtis et al. [2018]); and illegality – estimates compiled by Forest Trends (2021).

Figure 2: Annual forest loss from 2001 to 2019 for Laos. This report covers the period highlighted (2013-2019).



Source: GFW (2020, using Hansen et al. [2013]).

BOX 1

Forest Trends Findings

- Between 2013 and 2019, commercial agriculture in Laos was likely responsible for the clearance of more than 1.1 Mha of forest.
  - Given that 20% of the agro-conversion was exported, there is a risk that international buyers may be linked to the loss of more than 220,000 ha of tropical forests.
  - At least 49% of agro-conversion is likely illegal.
- Exports in 2019 that were likely from agro-conversion:
  - US$65 million in rubber.
  - It is difficult to determine the risk that exported commodities were grown on illegally cleared land. Given this, heightened due diligence is required by buyers.

1 Introduction

Lao PDR (Laos) is in the humid tropics, a mountainous country with three types of forest: upper mixed deciduous forest, upper dry evergreen forest, and dry dipterocarp forest. Laos has lost more than 3 million hectares (Mha) of forest this century, 18 percent of its 2000 forest extent. Laos' rate of forest loss has overtaken that of Cambodia, formerly reported to have the fastest deforestation in the Mekong (GFW 2020 using Hansen et al. 2013). Approximately 80 percent of the Lao population live in rural areas and are both food-insecure and heavily dependent on forest resources (Phimmavong et al. 2019).

The Government of Lao PDR defines forest cover as area >0.5 ha with >20 percent canopy cover. According to this, Laos had 41.4 percent of forest cover in 2010. The government has two policies aiming to: (i) restore forest cover to 70 percent of the country; and (ii) allocate 70 percent of the land as State Forestland. Land zoned as forestland does not necessarily have forest cover; in fact only 48 percent of forestland has forest cover and nearly 3,000 villages are located inside the area zoned as forestland. For villagers living on forestland, land tenure laws and decisions are complex and confusing, leaving them in a state of tenure insecurity, which discourages long-term investments in natural forest management or reforestation (MRLG 2019). Three categories of forestland give different levels of protection or user rights: Conservation; Production; or Protection forest, but the zoned areas are not clear, with no good maps and few coordinates for land zoned in the different categories (MRLG 2019). The Lao 2020 Forest Strategy aims to increase forest cover through local farmers establishing tree plantations and through foreign direct investment in large-scale plantations (Phimmavong et al. 2019).

For the purposes of this study only the following were considered:

- **Forests:** areas with greater than 50% tree cover
- **Forest loss / Deforestation:** complete removal of forest cover
- **Illegal:** deforestation that was, at time that the clearing took place, in contravention of the country's legislative framework governing forest conversion

2 Deforestation Analysis

2.1 Deforestation 2013–2019

Almost 2 Mha of forest (>50 percent tree cover) were cleared between 2013 and 2019, representing 11 percent of Laos' forest cover in 2000 (GFW 2020 using Hansen et al. 2013). Annual forest loss exceeded previous records, peaking in 2016 with 365,000 ha of loss, of which more than 76,000 ha was primary forest.

2.2 Drivers of deforestation

Forest Trends findings

Forest Trends' analysis on the extent and nature of forest loss in Laos between 2013 and 2019 is based on an extensive review of existing literature and data, including research from Global Forest Watch (2020 using Curtis et al. 2018), Pendrill et al. (2020) and REDD+ (FCPF 2018). After reviewing all available data Forest Trends' best estimate is that:

- 56% of deforestation was driven by commercial agriculture.

Justification

The driver analysis on GFW (2020 using Curtis et al. 2018) reports that 56 percent of the forest loss between 2013 and 2019 was driven by commodities (mostly commercial agriculture), and this is backed up by other studies. For example, spatial drivers analysis of deforestation in six northern provinces found that permanent agriculture, particularly cash crops, was the main driver: 39 percent of forest was lost between 2005 and 2015 to permanent agriculture and tree crops, with a further 23 percent lost to shifting cultivation, some of which was for cash crops (FCPF 2018).

Agro-conversion in Laos is by both smallholders and agro-industry. Cassava and coffee, for example, are grown both on family farms and on concessions: the total area under cassava production is 71,010 ha, of which land deals constitute 65 percent; and coffee is grown on 82,980 ha, of which land deals make up 13 percent. In northern Laos a large portion of agriculture and tree plantation investment is done through contract farming arrangements, which are not categorized as concessions (Schönweger et al. 2012). The latest report on land leases and concessions says that the total area granted is 1,008,884 ha, of which 24 percent is for agriculture and 35 percent is for tree plantations. Most land deals are concessions (92 percent) rather than leases, and the average size of agricultural deals was 619 ha (Hett et al. 2020). While an earlier analysis of the land cover dataset revealed that 37 percent of the area under investment was on land classed as forest (Schönweger et al. 2012), Hett et al. (2020) calculate that 20 percent of the total area developed as tree plantations was in areas categorized as forest, and 10 percent of the area developed for agriculture was in forest.

The allocation of land under concessions or leases is central to the Lao PDR Government's (2016) strategy of industrialization and modernization. Due to concerns about the negative social and environmental impact of concessions, a selective moratorium (Prime Minister Order 13) was signed in 2012 preventing new concessions for rubber, eucalyptus, and some minerals (Ingalls et al. 2018), but a loophole allowed concessions with official written approval by the government to proceed. In the seven months following the announcement, a total of 208,805 ha of land were contracted out, 54 percent of which were for rubber production, some of which was reported in the Dong Hua Sao National Biodiversity Conservation Area (Forest Trends 2014b). A second inventory in 2014 of two provinces showed the number of concessions had nearly doubled (Hett et al. 2015).

Wood plantations, primarily eucalyptus, are reported to cover more than 100,000 ha, primarily in central and southern Laos (Hett et al. 2020). The Lao 2020 Forest Strategy aims to increase forest cover by encouraging foreign direct investment in tree plantations, as well as encouraging farmers to plant commercial tree species, in order to meet the target of 700,000 ha of new plantations (rubber and wood) by 2030 (Phimmavong et al. 2019). According to the Forestry Law (2007), industrial tree plantations can be developed only on degraded or barren land, but in reality, they are often established on previously forested land, and the government recognizes that they are a major driver of deforestation (Lestrelin et al. 2013). Despite the dominance of the concession model in Laos, smallholder teak plantations are also common in the north, and there are occasional examples of alternative models such as land-sharing plantation concessions (e.g., farmers are allowed to grow food crops between the trees) and contract tree-growing. Van der Meer Simo et al. (2020) identified that tree plantations contributed most to household livelihoods when companies engaged in participatory land-use planning, where households had most opportunities for paid labour, and where households were allowed to do intercropping.

2.3 Estimating illegality linked to agro-conversion

After reviewing all available data Forest Trends' most conservative estimate is that:

- At least 49% of agro-conversion was illegal.

Justification

It is hard to judge the illegality of agro-conversion by smallholders. The Forest Law (2007) allows villagers to use degraded forestland but does not specify for what purpose (MRLG 2019). State Forestland was gazetted during the 1990s and 2000s, and it is not clear to what extent the unforested land (52 percent of all forestland) has been deforested for small-scale agriculture after gazetting, or whether the zoning was done regardless of the fact that it was already in production. An additional 1.9 Mha of forest cover exists outside of designated State Forestland, and here the legality of any deforestation for commercial agriculture is even harder to track; and the lack of legal protection implies that the risk of illegal deforestation is high.

The Forest Trends estimate that at least 49 percent of agro-conversion is illegal is based on a rate of 98 percent of illegality for agriculture and tree plantation concessions and leases, and an assumption that these represent roughly half of all agricultural conversion. This is based on the Smith et al. (2017) analysis that 47 percent of rubber is cultivated in concessions; and 65 percent of cassava and 13 percent of coffee is in concessions (Hett et al. (2020) estimate of crop coverage in concessions as a proportion of national crop coverage from FAO 2020). This is a conservative estimate because it does not include potentially illegal conversion by farmers on land outside concessions and leases.

The illegality rate of 98 percent in concessions and leases is based on review by Hett et al. (2020) of legal compliance in which only 1 percent of agriculture projects were able to demonstrate compliance with

Table 1: Land deal compliance with key legal requirements

	Concession licence	Economic and Technical Feasibility Study	Environmental Assessments and Monitoring Plans*	Environmental Compliance Certificate	Project Development Agreements	Concession Agreement
Agriculture	24%	12%	1%	2%	21%	40%
Tree plantations	32%	25%	2%	4%	35%	57%

*Initial Environmental Examination or Environmental and Social Impact Assessment and associated Monitoring Plans

Source: Hett et al. 2020

environmental assessment requirements, and 2 percent of tree plantation projects. Furthermore, the majority of tree plantation projects that had carried out impact assessments did so only after the land was cleared, which is in direct conflict with both legal provisions and the purpose of the impact assessment.

Other types of illegalities abound. Bribery, corruption and nepotism are widespread in the granting of concession licences (Preferred by Nature 2017). Officials have been found to have allocated areas exceeding the limit of their mandate, and activities have begun before authorization is granted, or sometimes even before authorization is requested (Schönweger et al. 2012). Workers are not given contracts or safe working conditions, and compensation to villagers for lost or alienated land is inadequate (Forest Trends 2014a). An investigation into the rubber concessions owned by the Vietnam Rubber Group and Hoang Anh Gia Lai (HAGL) (covering almost 19,000 ha and 26,549 ha, respectively) identified illegalities in the allocation of land on primary forest, a lack of consultation and consent, the use of threats and the burning down of three houses, and a lack of adequate compensation for concessions on private land, fields, and forest (Global Witness 2013).

2.4 Estimating the percentage of agro-commodities linked to deforestation that are exported

After reviewing available data Forest Trends estimates:

- 20% of commodities embodying deforestation are exported.

Justification

Historically, rubber has been a key driver of deforestation, but in recent years it has been overtaken by rice, wood plantations, cassava, sugar, maize, and coffee. Rice, which represents 25 percent of Laos' embodied deforestation in crops, is primarily for domestic consumption, as Laos is a net importer of rice (Mullis and Prasertsri 2020). Rice is primarily produced in lowland areas, but the 11 percent of production that is from the highlands can be assumed to be at high risk of contamination with deforestation (Mullis and Prasertsri 2020).

Plantation wood products represent 16 percent of embodied deforestation but poor data on wood production, consumption, and exports make it hard to estimate the proportion of conversion that is linked to exports (Pendrill et al. 2020). In 2012, plantation timber exports were dominated by teak, mostly in the form of squared logs, destined for China, Thailand, and Vietnam, with India as an emerging market (Smith et al. 2017). Since then domestic mills have been established for the processing of eucalyptus and acacia, for construction poles, and sticks for fences and screens. Vietnam is the main export market for logs, but plantation wood was temporarily affected by a log and sawnwood export ban introduced in 2016, until it was eased to allow the export of unprocessed plantation timber (Forest Trends 2017).

Maize is an important forest-risk crop, cultivated for livestock feed, and exported to Thailand, Vietnam, and China (FCPF 2018). Coffee and sugar embodied 5 percent and 4 percent of deforestation respectively, of which 18 percent and 72 percent were exported respectively (Pendrill et al. 2020). Overall, Pendrill et al. (2020) estimate that 20 percent of deforestation embodied in crops was exported.

3 Commodity Analysis

Rubber is selected for the Forest Trends analysis because historic deforestation is embodied in rubber, and rubber is the most significant agricultural or plantation export, accounting for 3% of Laos' exports in 2018 (OEC 2020).

3.1 Rubber

Based on its analysis Forest Trends estimates that:

- 17% of rubber production is linked to deforestation.

Rubber (*Hevea brasiliensis*) poses the most risk to forests when grown in concessions: 47 percent of rubber production is from concessions in central and southern Laos (ACIAR 2020) and 37 percent of concessions are on forest (Schönweger et al. 2012). Smallholder rubber in northern Laos primarily replaced paddy rice (Liu et al. 2016). Therefore, an estimate of the proportion of rubber from forest conversion is 47% x 37% = 17% of the total area planted in rubber. Laos produces 1 percent of the world's rubber, reportedly producing 130,000 Mt in 2018 (Griffiths 2020). The main foreign investors are China and Vietnam, in contract farming and concessions, respectively. A 2012 moratorium on rubber concessions remains in place while a review of the sector is ongoing.

Despite causing deforestation, contradictions in Laos' forest policies allow rubber to contribute 45 percent of progress towards Laos' forest cover target (ACIAR 2020). Almost all of the natural rubber latex produced in Laos is exported to Vietnam and China which together account for 99 percent of global imports of natural rubber from Laos between 2013 and 2018 (ACIAR 2020; COMTRADE 2020).

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Illicit Harvest, Complicit Goods

The State of Illegal Deforestation for Agriculture

ANNEX 3 MALAYSIA CASE STUDY 2013-2019

4th in forest loss across the tropics

4% of all forest loss across the tropics

1.8 Gt of CO_2e Total gross emissions from tree cover loss

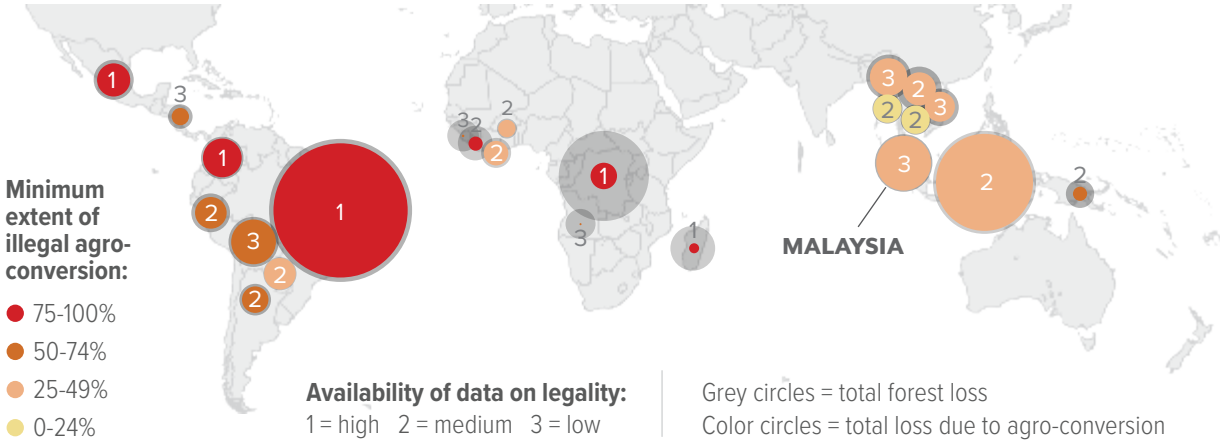
3.3 Mha total forest loss

of which **91%** due to commercial agriculture

of which at least **37%** likely illegal

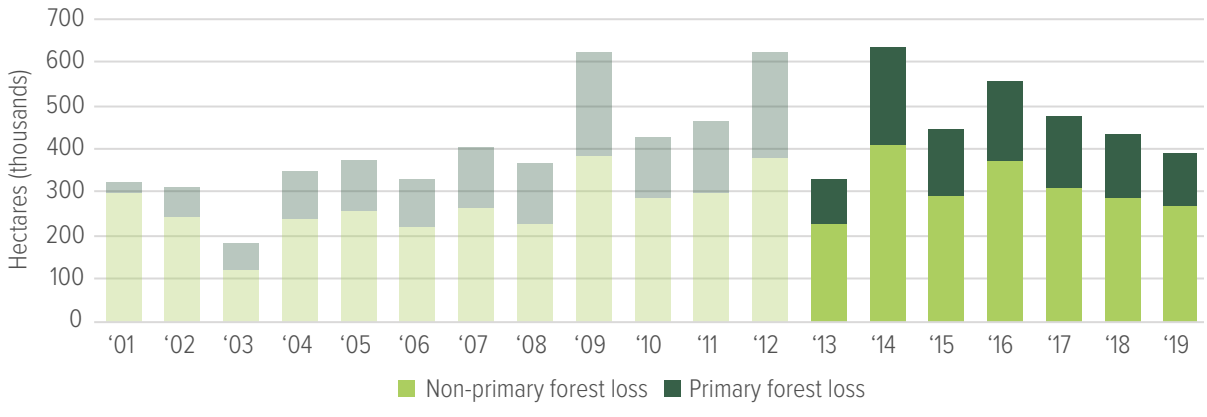
59% likely exported

Figure 1: Relative amount of tropical forest loss driven by commercial agriculture and the extent of illegal clearing.



Source: forest loss – GFW (2020, using Hansen et al. [2013]); agro-conversion – estimates compiled by Forest Trends (2021) from multiple sources, including GFW (2020, using Curtis et al. [2018]); and illegality – estimates compiled by Forest Trends (2021).

Figure 2: Annual forest loss from 2001 to 2019 for Malaysia. This report covers the period highlighted (2013-2019).



Source: GFW (2020, using Hansen et al. [2013]).

BOX 1

Forest Trends Findings

- Between 2013 and 2019, commercial agriculture in Malaysia was likely responsible for the clearance of more than 3 Mha of forest.
  - Given that at least 59% of the agro-conversion was exported, there is a risk that international buyers may be linked to the loss of more than 1.8 Mha tropical forests.
  - Due to a lack of sector-wide assessments of legal compliance, we are unable to estimate the amount of illegality linked to agro-conversion. However, the existing evidence suggests that the sector may be plagued by illegal operations and corruption.
- Exports in 2019 that were likely from agro-conversion:
  - US$6.5 billion in palm oil
  - US$9.9 million in pulp
  - US$726 million in rubber
  - It is difficult to determine the extent of risk that exported commodities were grown on illegally cleared land. Given the evidence of widespread non-compliance, enhanced due diligence is clearly required.

1 Introduction

Malaysia has a variety of forests across its mainland (peninsular) and on the island of Borneo (Sarawak and Sabah), including lowland, hill, and upper hill dipterocarp forest, oak-laurel forest, montane ericaceous forest, peat swamp forest, and mangrove forests. The Dipterocarpaceae family of trees—the namesake of the dipterocarp forest—form a threatened habitat, particularly in lowland areas up to 300 meters above sea level, where large areas have been logged, developed for agriculture and urban expansion (WWF n.d.). The dipterocarps dominate the forests of Southeast Asia, especially on the island of Borneo, and they dominate the tropical timber market. In the 1980s and 1990s, Borneo alone produced as much timber as all of South America and Africa combined (Curran et al. 2004).

Since 2000, Malaysia has lost 28 percent of its forest, more than half from Borneo—that is, the states of Sarawak and Sabah were responsible for 34 percent and 21 percent of Malaysia's total loss, respectively (GFW 2020 using Hansen et al. 2013). This chapter evaluates the evidence regarding patterns of deforestation in Malaysia, in particular the role of demand for agricultural commodities in driving the illegal clearing of its forests.

For the purposes of this study only the following were considered:

- **Forests:** areas with greater than 50% tree cover
- **Forest loss / Deforestation:** complete removal of forest cover
- **Illegal:** deforestation that was, at time that the clearing took place, in contravention of the country's legislative framework governing forest conversion

2 Deforestation Analysis

2.1 Deforestation 2013–2019

According to GFW (2020 using Hansen et al. 2013), between 2013 and 2019, Malaysia lost 3.3 million hectares (Mha) of forest cover, more than one-third (34 percent) from primary humid forest. Annual forest loss peaked between 2009 and 2014 at more than 620,000 ha, but has reportedly been progressively decreasing since then, to less than 400,000 ha across all Malaysia. However, there is concern that forest loss appeared to be accelerating in Peninsular Malaysia in 2019, with much of the deforestation in permanent forest reserves, which are supposed to be under official protection (Humphrey 2019). There is also concern that in Malaysian Borneo, while the country is locked down under COVID-19 restrictions, further logging is being approved, such as the Gerenai concession given "to Samling [a logging company] to extract timber from an area of forest with a footprint ten times the size of San Francisco", although it allegedly lacks the free, prior and informed consent of indigenous communities as required by the Malaysia Timber Certification Scheme (McAlpine 2020). The indigenous Kenyah Jamok barricaded their lands against bulldozers in 2018 when Samling reportedly illegally entered their forest reserve.

2.2 Drivers of deforestation

Forest Trends' analysis on the extent and nature of forest loss in Malaysia between 2013 and 2019 is based on an extensive review of existing literature and data, including datasets and research from Global Forest Watch (2020 using Curtis et al. 2018), Pendrill et al. (2020), and the academic literature. After reviewing all available data, Forest Trends concludes that:

- 91% of Malaysia's deforestation is driven by commercial agriculture.

Justification

GFW (2020) measured that 91 percent of forest loss between 2013 and 2019 was driven by commodities. Li et al. (2020) report that 68 percent of forest loss between 2000 and 2017 was for palm oil, with faster expansion in Borneo than in Peninsular Malaysia (Cheng et al. 2019). That is, the area in oil palm plantations across Peninsular Malaysia increased by 2 Mha (62 percent) between 2000 and 2018, and across Malaysian Borneo by 3 Mha (109 percent) (Li et al. 2020). In Borneo, "plantation expansion and associated forest conversion appear to have declined somewhat since a peak in 2012 and net forest loss has slowed, but not ceased, since 2016" (Gaveau et al. 2019).

In addition to oil palm, the other major driver of forest loss was industrial pulp plantations. Malaysia's wood fiber concessions cover more than 7 Mha, almost all (93 percent) in Sarawak, and the rest in Sabah (GFW 2020). Gaveau et al. (2016) estimate that 87 percent of the plantations replaced forests, and that by 2015, 346,103 ha of forest had been lost.

According to Pendrill et al. (2020), rubber accounts for 11 percent of embodied deforestation in crops, and rice for a further 5 percent. Goldman et al. (2020) report that rubber replaced more than 700,000 ha of forest between 2001 and 2015, in particular 152,558 ha between 2013 and 2015.

Private oil palm plantations make up 62 percent of the area planted, while the rest are either state agency joint ventures or owned by smallholders (who may be independent or supported by a company or state agency, which guarantees purchase of the produce) (Preferred by Nature 2017).

A study (Gatti and Velichevskaya 2020) of sustainable-certified (Roundtable on Sustainable Palm Oil – RSPO) palm oil concessions in Borneo found that most were located in areas that were forest less than 30 years ago. Three-quarters (131 out of 173) of the RSPO concessions were located in an area that was forested

orangutan habitat in 1989. Of the 140,000 ha of concessions that were forested in 1984, only 3,300 ha of fragmented forests remained by 2020.

2.3 Estimating illegality linked to agro-conversion

After evaluating the literature and expert interviews, the available evidence does not allow Forest Trends to make a rigorous estimate of the percentage of agro-conversion that was illegal, but there is considerable circumstantial evidence to suggest that much of the clearing was illegal.

Justification

While permanent reserve forests make up about 85.5 percent (4 Mha) of forests in Peninsular Malaysia, and protected areas another 10.3 percent (Law 2021), these forests may be stripped of their status when the state government publishes the excision in the official gazette. Despite the simplicity in removing protection, there is evidence that excisions, and subsequent deforestation, are still not in compliance with the law. For example, Law (2021) reports that in Peninsular Malaysia the Johor State Forestry Department audit team examined two recent excisions of 17,532 ha and found that the government "had failed to present specific evidence to explain the excision and showed no progress to correct the violation. As a result, the auditing body suspended Johor's forest management certification" (Law, 2021). Unfortunately, the various state governments that have the authority to excise forests have not conducted a similar audit of all forest clearing (or at least these audits have not been published). Therefore, it is not clear how representative the Johor audit results are of all deforestation events across Malaysia.

Likewise, there are a number of reported violations of Indigenous Peoples' rights, but it is not clear how widespread these violations are, in part because the law itself is ambiguous. The Constitution of the Malaysian Federation recognizes customary rights, and despite being a signatory to the UN Declaration on the Rights of Indigenous Peoples (UNDRIP), Malaysia has yet to codify its obligations to protect and respect native customary rights (NCRs) to lands, and the right to free, prior and informed consent (FPIC). Malaysia's plural legal system, in which multiple bodies of law in the individual states operate in parallel, makes the codification of rights more complicated. State governments in Peninsular Malaysia have been reluctant to register reserves of the indigenous Orang Asli, and in fact, have been quick to revoke the status of previously registered indigenous lands (Litvinoff and Griffiths 2014). For example, Reuters (2019) reported that the Malaysian government was suing the state of Kelantan after it gave logging licenses to companies that were establishing plantations on Indigenous People's customary land. Indigenous Peoples fare better in the Bornean State of Sabah and to a degree in Sarawak, where indigenous groups are in the majority, and customary land rights are recognized in law. However, few NCR areas are demarcated (Colchester 2011).

As in Peninsular Malaysia, in Sarawak, regulations have been amended to make it easier for companies to obtain NCR lands. Communities claiming NCR have to prove continuous occupation since 1958, and the government has disputed court rulings that NCR lands include reserved forest and communal land (Colchester 2011). One study found that claims to customary ownership are being pursued in about a quarter of plantations in Sarawak (Cramb and McCarthy 2016).

Moreover, plantations on smallholder and NCR lands have been fraught with allegations of corruption and other illegality. The Federal Land Development Authority (Felda), the government agency with a mandate to resettle rural poor communities and establish oil palm and rubber cultivation, is currently the largest smallholder organization in Malaysia, and has 330,000 ha of commercial plantations (Earthworm 2019). When its private-sector arm, Felda Global Ventures, was listed on the Malaysian stock exchange in 2012 it was one of the world's largest palm oil firms. Its share price lost 75 percent of its value when the Malaysian Anti-Corruption Commission announced an investigation into an asset transfer of US$70 million to another company without the knowledge of the board (Earthsight 2018). This is an indicator of widespread illegality, but a full audit of

the palm oil sector is required.

One positive development is that Malaysia announced in 2019 that it would cap all development of oil palm at 6 Mha, that is, only 0.15 Mha more than existed at that time (Raghu 2019). This would make any further development unambiguously illegal. However, the cap has still not been codified into law, and has been increased to 6.5 Mha, but now the policy includes a ban on the conversion of permanent forest reserves and peatlands for oil palm cultivation (Malay Mail 2020b). The policy should also increase transparency in the supply chain, including making concession maps publicly accessible, but there is no mention of a compliance review of the sector.

Investigations by the Bruno Manser Fund (2012) have also revealed high-level abuse of NCR. Abdul Taib Mahmud, the Chief Minister of Sarawak from 1981 to 2014 and the current Governor of Sarawak, reportedly encouraged NCR landowners to surrender their lands to the state so they could be managed under joint ventures with private oil palm plantation companies, with the state land agency as trustee for the landowner. Land was classified as State Land Forest, and Sarawak's land bank (the area earmarked for conversion to plantation agriculture) was estimated to be 3.9 Mha, in contrast to Sabah with 0.6 Mha and Peninsular Malaysia with only 0.2 Mha (Yong et al. 2014). As Chief Minister Taib was the gatekeeper of land and timber licenses, he allegedly amassed a personal fortune of US$15 billion, making him Malaysia's richest man (Bruno Manser Fund 2012). Bribes and backroom deals were allegedly common, and indigenous communities in Sarawak filed more than 100 cases in the courts, suing the government and companies for encroachment onto their ancestral lands (Global Witness 2014).

In one of his deals, Taib awarded two concessions near the UNESCO-protected Gunung Mulu National Park to a firm, Radiant Lagoon, where his son had been a director and returned as director four months later. The local Penan and Berawan/Tering communities claim this land under NCR and deny that they provided FPIC. In these concessions, clear-cutting began in 2018 and by April, 16 percent of the 4,400 hectares had been cleared in violation of UNDRIP (Bruno Manser Fund 2019).

The Malaysian Human Rights Commission conducted a national inquiry into indigenous land rights, and found that the state had not effectively implemented laws and policies in favor of indigenous communities (Subramaniam and Nicholas 2018). The inquiry recorded complaints, summarized in Table 1, related to slow processing of land applications, fraud in use of power of attorney, and a lack of an appeals process and

Table 1: Summary of cases related to plantations presented to the Malaysian Human Rights Commission's national inquiry into indigenous land rights

State	No. of cases	Type of case
Sarawak	172 cases (most related to multiple issues)	Allegations that commercial plantations had encroached on village(s) without FPIC, including nine complaints regarding the issuance of provisional lease (PL) on lands with NCR claims. The inquiry found that FPIC had indeed been denied, and work had commenced even before Environmental Impact Assessments (EIAs) had been prepared.
Sabah	51 (an additional 332 cases were presented but they did not relate to plantations)	Allegations that commercial plantations had encroached on land claimed as NCR without the community's knowledge and/or FPIC.
Peninsular Malaysia	50 (an additional 250 cases related to indigenous land rights but not to plantations)	Apart from loss of land, many witnesses complained that the opening of plantations had resulted in destruction of graveyards and crops, as well as the pollution of rivers and loss of livelihoods and traditional ways of life. The Department of Environment also confirmed that the EIAs were incomplete. Compensation was usually not paid because the Orang Asli's right to the land was not recognized.

Source: SUHAKAM Inquiry Report 2013

complaints mechanism.

A case similar to those in Table 1 is the Sujan Forest Reserve. In 2009, a 490,000-ha pulp and paper concession was allocated to the Sarawak Forest Department without the FPIC of the Iban (Sea Dayak) Indigenous People who were living there (Environmental Justice Atlas 2019). The communities have a map showing their customary land boundary and a memorandum from the Bintulu Lands and Surveys Department recognizing their NCR, but in 2009 they were accused of occupying state land in breach of the Sarawak Land Code. A plantation license was granted to Grand Perfect Sdn. Bhd., a consortium of three timber companies, for a plantable area of 150,000 ha of acacia. From 2013 to 2019, 58,987 ha were cleared (GFW 2020). This represents 14 percent of the total 420,146 ha of industrial timber plantations planted in Sarawak in 2019 (PERKASA 2019).

In summary, while there is plenty of circumstantial evidence of illegality associated with forest clearing, we are unable to estimate compliance across the commercial agriculture sector. Malaysia must conduct a sector-wide evaluation of compliance. (An example of such an audit is the Sabah Forestry Department's evaluation of their Forest Management Unit (FMU) licenses allocated to more than 1.8 Mha since 1997. Of the 37 FMUs, only 66 percent are able to meet the minimum standards ("though there is still room for improvement"), and four FMUs had to be terminated (Borneo Post 2020).)

For the purposes of the global analyses in this report, we assume that in the best case—however, unlikely—0 percent of deforestation was illegal, and of course, the worst case is that all is illegal. Given the widespread disregard of NCRs, as well as the widespread allegations of corruption across Malaysia during this period, it may be that if the government did audit all concessions, they would in fact find that all new clearing for plantations was either illegally allocated, operated illegally (without social or environmental impact assessments, for example), and/or evaded taxes, among other violations. For the estimate based on the best available evidence, we assume that Malaysia has the same rate of illegality as the rest of Asia for which we were able to obtain data.

The original Forest Trends (2014) report concluded that "[n]o suitable quantitative data exist on which to base estimates, though plentiful qualitative data demonstrate that problem is widespread, especially in Sarawak (Forest Trends 2013), which was the location of 57% of oil palm planting in 2000 to 2012 (Malaysian Palm Oil Board 2013)." Given that commodities drive almost all deforestation across Malaysia, and that the country represents a substantial proportion (4 percent) of all tropical forest loss, it is clear that Malaysia must conduct a comprehensive review in order to evaluate the actual rate of illegality across the sector.

2.4 Estimating the Percentage of Agro-commodities from Illegal Deforested Lands that are Exported

After reviewing available data Forest Trends estimates:

- 59% of commodities embodying deforestation are exported.

Justification

Palm oil is the commodity responsible for most forest loss: 68 percent of forest loss, according to Li et al. (2020), and 89 percent of production was exported between 2013 and 2018 (FAOSTAT 2020; COMTRADE 2020). Pulp drives 4 percent of total forest loss (Gaveau et al. 2016; GFW 2020), and 11 percent of pulp was exported. Virtually all rubber is exported: 4.6 Mt between 2013 and 2018 (FAOSTAT 2020; COMTRADE 2020). According to OEC (2020), in 2019 palm oil accounted for 3.4 percent of all exports, rubber for 1.6 percent, and paper for 0.6 percent. Forest Trends uses the Pendrill et al. (2020) estimate that 59 percent of agricultural conversion is exported.

3 Commodity Analysis

Palm oil, pulp and rubber are selected for the Forest Trends analysis because together they account for 81 percent of embodied deforestation.

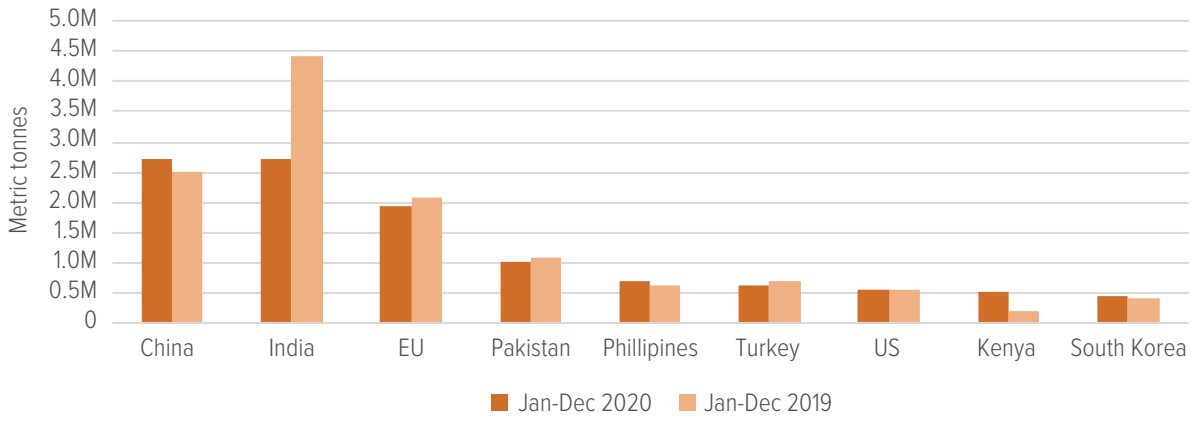
3.1 Palm Oil

After reviewing available data Forest Trends estimates:

- At least 68% of palm oil production is linked to deforestation.

Meijaard et al. (2020) conducted a review of four studies and concluded that 68 percent of oil palm expansion was into forest (this is a weighted median taking into account the studies' different time periods). Malaysia and Indonesia together account for 85 percent of global production of palm oil (Earthsight 2020). Malaysian exports in the first six months of 2019 and 2020 show a reduction of 12 percent, led by significant changes in the purchasing of Malaysian palm oil by India and the European Union (EU) (see Figure 3). India restricted imports of palm oil from Malaysia after Prime Minister Tun Dr Mahathir Mohamad criticized India's actions in Kashmir and a new citizenship law (Malay Mail 2020a). The European Parliament decided in 2018 to put a cap on palm oil biofuels in transport and to phase them out by 2030 (European Parliament 2020). Nearly half of the EU's palm oil imports were used for biodiesel in 2014 and 2015 (Copenhagen Economics 2018). The decision provoked a virulent response from corporate and political leaders in Malaysia who accused the Europeans of being "hypocrites" responsible for "economic colonization" (Earthsight 2018).

Figure 3: Malaysian exports of palm oil in the first six months of 2019 and 2020



Source: Malaysian Palm Oil Council 2020

3.2 Pulp

Based on its analysis Forest Trends estimates that:

- At least 14% of pulp plantations displaced forest.

Goldman et al. (2020) report that wood fiber plantations replaced 91,704 ha of forest between 2001 and 2015. This means that at least 14 percent of plantations displaced forest, given that there were 655,870 ha of plantation forest (distinct from rubber) in 2016, according to FAOFRA (2020).

Pulp production between 2013 and 2019 was reportedly 1.8 Mt (FAOSTAT 2020). Despite this, Malaysia is a net importer of pulp, even though it is a net exporter of paper (by 1.2 Mt; COMTRADE 2013–18). Most of the 23.6 Mt of paper produced was for the domestic market. Much of this paper production is derived from pre- and post-consumer waste paper, blended with a small proportion of imported pulp (Hewitt 2020).

3.3 Rubber

Based on its analysis Forest Trends estimates that:

- At least 66% of rubber production is linked to deforestation.

Justification

Rubber cultivation covered 1,103,880 ha in 2018 of which 729,753 ha replaced forest between 2001 and 2015 (Goldman et al. 2020; FAOSTAT 2020). The United States is the biggest importer of Malaysian rubber (35 percent of all rubber exports), followed by Japan, Germany, and the United Kingdom (6 percent, 5 percent, and 4 percent respectively) (OEC 2020).

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Illicit Harvest, Complicit Goods

The State of Illegal Deforestation for Agriculture

ANNEX 3 MYANMAR CASE STUDY 2013-2019

8th in tropical forest loss

3% of all tropical forest loss

1.075 Gt of CO_2e Total gross emissions from tree cover loss

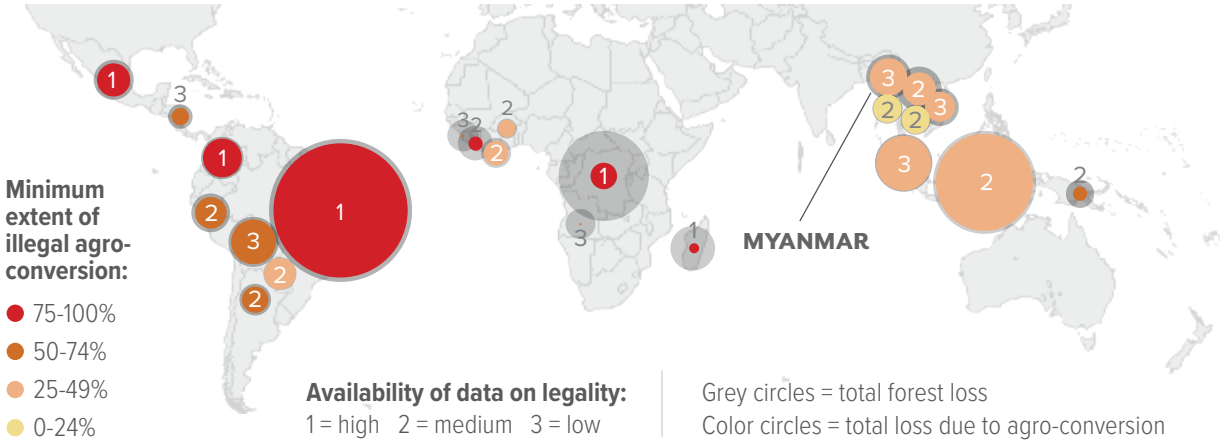
2 Mha total >50% loss of tropical forests

of which **68%** due to commercial agriculture

of which at least **37%** likely illegal

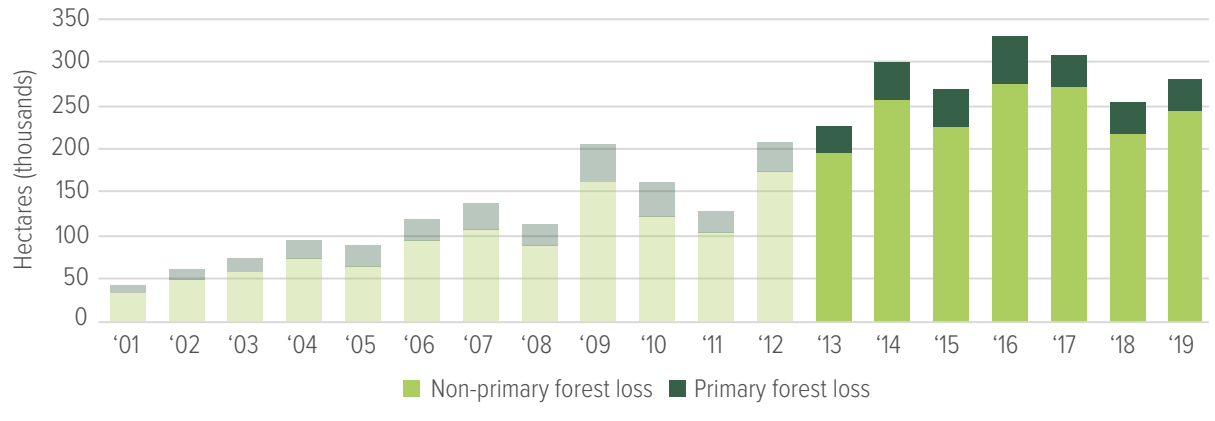
10% exported

Figure 1: Relative amount of tropical forest loss driven by commercial agriculture and the extent of illegal clearing.



Source: forest loss – GFW (2020, using Hansen et al. [2013]); agro-conversion – estimates compiled by Forest Trends (2021) from multiple sources, including GFW (2020, using Curtis et al. [2018]); and illegality – estimates compiled by Forest Trends (2021).

Figure 2: Annual forest loss from 2001 to 2019 for Myanmar. This report covers the period highlighted (2013-2019).



Source: GFW (2020, using Hansen et al. [2013]).

BOX 1

Forest Trends Findings

- Commercial agriculture in Myanmar was likely responsible for the clearance of 1.4 million hectares (Mha) of forest.
- The proportion that was illegal is not known.
- Given that 10% of the agro-conversion was exported, there is a risk that international buyers may be linked to the loss of 140,000 ha of tropical forests.

1 Introduction

According to the FAO (2020), Myanmar had 29.9 million hectares (Mha) of forest cover in 2015 (defined as >40 percent tree cover), but this dropped to 28.5 Mha in 2020, representing 43 percent of the land area, compared to 61 percent in 1975. Of this, 41 percent is in Myanmar's Permanent Forest Estate, managed under the National Forest Policy for timber production (World Bank 2019). Myanmar's remaining large forests are mostly located in the far north and south of the country, out of the Permanent Forest Estate on what is called Virgin, Fallow and Vacant Land; which is under customary land management although customary tenure is poorly recognized (World Bank 2019). In the north the forest stretches across Northern Sagaing and Kachin, and links up with forest in India; in the south, the Tanintharyi forests extend into Thailand (Bhagwat et al. 2017).

2 Deforestation Analysis

2.1 Deforestation 2013–2019

Almost 2 Mha of forest (>50 percent tree cover) were cleared between 2013 and 2019, representing 5 percent of Myanmar's forest cover in 2000 (GFW 2020 using Hansen et al. 2013). Annual forest loss was higher in this reference period compared to the period covered by the last Forest Trends (2014) report (2000–2012): that is, the annual deforestation rate had increased by 145 percent. (The FAO records a lower annual loss of 289,000 ha a year, possibly because it is based on government estimates, and uses a different definition of forest (>40 percent cover).)

For the purposes of this study only the following were considered:

- **Forests:** areas with greater than 50% tree cover
- **Forest loss / Deforestation:** complete removal of forest cover
- **Illegal:** deforestation that was, at time that the clearing took place, in contravention of the country's legislative framework governing forest conversion

2.2 Drivers of deforestation

Forest Trends evaluated several different sets of data on the extent and nature of forest loss in Myanmar, including research from Global Forest Watch, Pendrill et al. (2020) and REDD+ (Enters 2017). After reviewing all available data, Forest Trends' best estimate is that:

- 68% of Myanmar's deforestation is driven by commercial agriculture.

Justification

According to the REDD+ driver analysis, commodities are responsible for between 65 and 68 percent of deforestation, predominantly rice, beans, and pulses, while shifting cultivation is responsible for between 30 and 35 percent (Enters 2017). This is backed up by a study by Bhagwat et al. (2016) that combined remote sensing and ground-truthing, which found that 26 percent of intact forest loss was for new plantations (535,838 ha out of 2,067,988 ha) and 48 percent was for agriculture, mining, and infrastructure (987,841 ha), of which about 3 percent was for infrastructure and 2 percent for mining (World Bank 2019). In other words, approximately 870,000 ha of the forest loss was likely for agriculture, which, when added to the 535,838 ha for plantations, represents 68 percent. Bhagwat et al. use an 80 percent threshold for intact forest, because the evergreen, mixed deciduous-evergreen, mangrove, and bamboo forests of Myanmar have very dense canopies. They identify that Shan and Sagaing, where the forest was already fragmented and under pressure from surrounding agriculture, lost the most intact forest.

This general picture of the importance of commercial agriculture as a driver is backed up by a study using a longer timeframe of 1988 to 2017; it found that about 74 percent of the lost forest area was replaced by agricultural land (Yang et al. 2019). The Curtis et al. (2018) driver analysis on GFW identifies less deforestation driven by commodities (39 percent), probably because clearance that is motivated by conversion timber under the guise of commercial agriculture is not included in their analysis but is included in this analysis.

The Tanintharyi Region has 2.5 Mha of largely intact lowland forests, and 1.9 Mha have been allocated by the Government of Myanmar to oil palm plantation companies. All of Myanmar's oil palm concessions are in Tanintharyi Region, and most are in high conservation value forests. This expansion is described as a top-down, military-led operation being implemented by companies more interested in land speculation and logging than in plantations (Forest Trends 2015). According to Pendrill et al. (2020), there is no palm oil production that embodies deforestation, implying that conversion timber and land grabbing is the motivation for much of the deforestation.

Shan, Kayin, Kachin, and Mon have the greatest increase in plantation area (Bhagwat et al. 2017). In Kachin, forced resettlements of people by the Myanmar army to remove support for the Kachin Independence Party (KIA) armed group is linked to land grabs and logging, and business groups with connections on both sides of the Myanmar–China border see lucrative opportunities in cassava and sugarcane as biofuels (Treue et al. 2016; Forest Trends 2015). Mon, Tanintharyi, and Kayin account for 68 percent of the total 652,000 ha under rubber, although with the decline in prices many rubber plantations are inactive and the wood is sold for woodchips and firewood (World Bank 2019). The hotspot for rubber is in Kachin, funded by Chinese investment for export to China (Forest Trends 2015). In the Rakhine State and Ayeyarwady Region, mangrove forest has been decreasing at an alarming rate of 14,619 ha per year, or 2 percent per year, predominantly for conversion into rice paddy fields (World Bank 2019).

Forest land is de-gazetted to be used for agriculture, industry, or military purposes, and the procedures for de-gazetting forest reserves are not transparent. Government lists 2.1 Mha allocated in agricultural concessions, and Forest Trends (2015) estimates that an additional 200,000 ha are allocated out of government oversight or in areas outside of central government's control. Out of the area officially granted for large-scale agriculture in 2013, less than a quarter was planted, indicating the land may have been acquired to provide a legal

shortcut to logging or land grabs (Forest Trends 2015). Indeed, the total deforestation embodied in crops for the period 2013 to 2017 is 423,000 ha, a fraction of the total land-use change detected through remote sensing (Pendrill et al. 2020; Bhagwat et al. 2016). This supports the theory that agricultural licences are used primarily for conversion timber, often without any intention of developing an agricultural concession.

Local-level snapshots give an indication of the role of conversion timber in deforestation and show that there was a rush to extract and export timber before a log export ban was introduced in 2014. Decades of systematic overharvesting meant the Permanent Forest Estate was logged out, and conversion timber from agricultural concessions in unclassified forest provided a new source for timber. Two townships in Kachin give an insight into conversion timber. In Bamaw and Shweku townships, nearly 10,000 trees were felled in 2013–2014 for conversion of land to agriculture, an increase of more than three times the number felled the previous year. The volume of wood increased by a factor of eight, implying bigger and more valuable trees were being felled, indicating that good forests are being destroyed (Springate-Baginski 2016).

Before the log export ban, Myanmar was the world's largest producer and exporter of teak (Kollert and Walotek 2015). The EU Timber Regulation had instructed operators not to place teak from Myanmar on the EU market, but despite this, there is an illegal trade in teak from Myanmar to Europe through Croatia (EIA 2020). Teak is not the only species under threat. EIA research estimated that rosewoods such as tamalan (*Dalbergia oliveri/bariensis*) and padauk (*Pterocarpus macrocarpus*) could be logged to commercial extinction by 2017 (EIA 2015). Myanmar's illegal wood flow also includes fuelwood and charcoal (Kissinger 2017). Myanmar produced nearly 2 million Mt of charcoal during the reference period, of which half was exported, all of it by road and therefore illegally (COMTRADE 2020; FAOSTAT 2020).

2.3 Estimating illegality linked to agro-conversion

- The available evidence does not allow Forest Trends to make a rigorous estimate of the percentage of agro-conversion that was illegal, but there is considerable circumstantial evidence to suggest that much of the clearing was illegal.

Justification

While government agencies and authorities issue permits, in the past they have often used legal loopholes and exemptions to bypass all the legal requirements (Forest Trends 2015). Despite this, many concessions have operated illegally: for example, some concessions are bigger than the maximum permitted size, and, as discussed above, very few start cultivation within the legally required timeframe (15 percent must be cultivated within the first year, 30 percent in the second and so on, according to Bylaw Article 45) (Forest Trends 2015).

Large-scale land acquisitions often provoke conflicts because local access and land use are denied and communities' statutory and customary land rights are ignored (Forest Trends 2015). The Vacant, Fallow and Virgin Land Management Law of 2012 allows large-scale agricultural investment on land or woodland, but the land that is categorized as vacant or fallow is often under swidden cultivation by farmers and community groups (Boutry and Mya Darli Thant 2020). A 2018 amendment requires farmers to register the use of land categorized as vacant or fallow, but few applications are successful. By making it obligatory but practically impossible to register land, local tenure is further undermined and communities are in a weaker position if they wish to contest a concession (Boutry and Mya Darli Thant 2020).

Sagaing Region has many reported cases of illegality relating to bribes and kickbacks, such as the sugar cane plantation near Katha town, awarded to Great Wall[1], where valuable tree species were quickly logged

[1] Myanmar-based Great Wall Food Stuff Industry Company Limited and Asian agri-business Wilmar International Limited formed a joint venture in 2014, called Great Wall - Wilmar Holdings Limited, to produce and sell sugar.

BOX 2

Illegalities in an oil palm plantation in Tanintharyi Region

The Myanmar Stark Prestige Plantation (MSPP) concession is in Myeik District, which is an area jointly administered by the Myanmar government and the Karen National Union after more than six decades of civil war. Four indigenous Karen villages are inside the concession and their agricultural and community land was declared vacant. MSPP acquired a Myanmar Investment Commission permit but did not get permission from the Central Committee for the Management of Vacant, Fallow and Virgin Lands to use the relevant land. By 2016, nearly 2,500 ha had been cleared on a concession covering more than 15,000 ha. MSPP destroyed and burned the community's cashew and betel crops with no warning and no offer of compensation, which is illegal under Myanmar Law. MSPP is a joint venture between Malaysia-based Prestige Platform (a subsidiary of Samling Group), which owns a 95 percent stake, and Myanmar-based Stark Industries, which owns a 5 percent stake (Tarkapaw et al. 2016).

out (Springate-Baginski et al. 2016). Kachin is also identified as an area where contracts are likely to involve illegalities, because the Union military policy to resettle people to remove support for the KIA creates opportunities for land grabs, and subsequent concessions are riddled with corruption (Springate-Baginski et al. 2016). Box 2 discusses another example from the Tanintharyi Region.

2.4 Estimating the percent of agro-commodities from illegal deforested lands that are exported

After reviewing all available data Forest Trends estimates:

- 10% of commodities embodying deforestation are exported.

Justification

The commodities causing deforestation since 2000 are rice, maize, pulses, and beans (Enters 2017). Rice accounted for 87.6 percent of mangrove deforestation between 2000 and 2012 (Richards and Friess 2016). Six percent of rice is exported while most is consumed on the domestic market (COMTRADE 2020; FAOSTAT 2020). Maize is increasingly in demand from neighboring countries, and as the area under cultivation expands, it drives deforestation; 24 percent of production is exported. Beans and pulses are grown as a second crop after maize and rice, and are calculated to have caused 122,304 ha of deforestation between 2013 and 2017, of which 14 percent was exported (Pendrill et al. 2020; COMTRADE 2020). Overall, Pendrill et al. (2020) estimate that 10 percent of embodied deforestation in crops is exported.

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Illicit Harvest, Complicit Goods

The State of Illegal Deforestation for Agriculture

ANNEX 3 PAPUA NEW GUINEA CASE STUDY 2013-2019

22rd in forest loss across the tropics

1% of all forest loss across the tropics

612 Mt of CO_2e Total gross emissions from tree cover loss

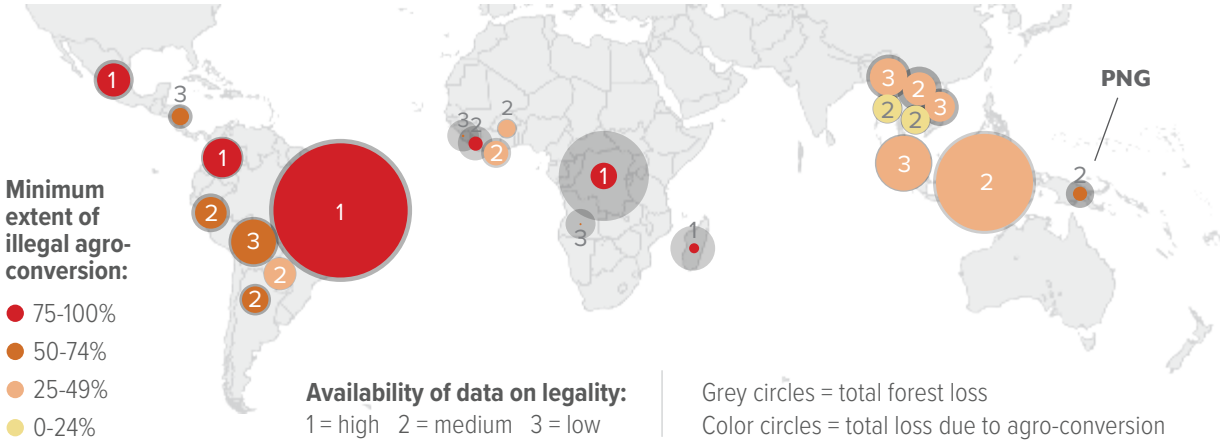
20.4 Mha total loss of tropical forests

of which **30%** due to commercial agriculture

of which at least **63%** likely illegal

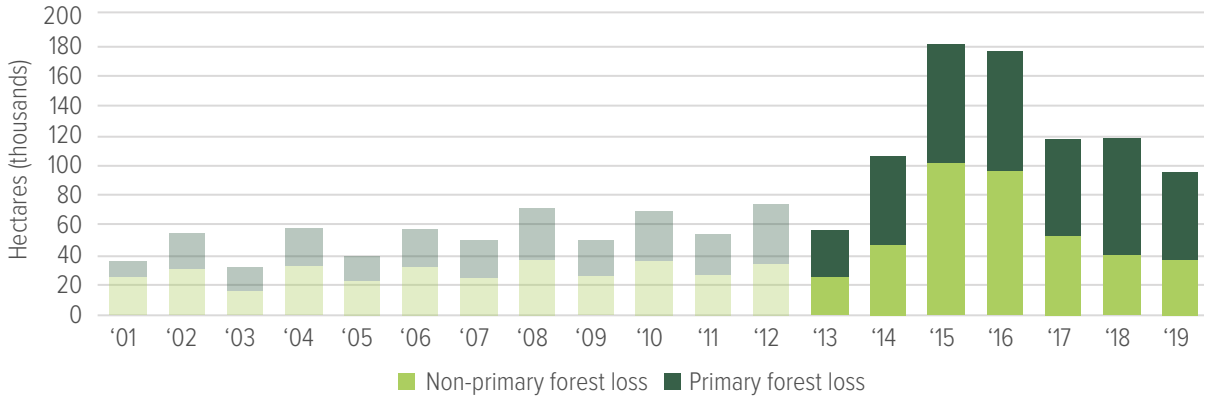
99% likely exported

Figure 1: Relative amount of tropical forest loss driven by commercial agriculture and the extent of illegal clearing.



Source: forest loss – GFW (2020, using Hansen et al. [2013]); agro-conversion – estimates compiled by Forest Trends (2021) from multiple sources, including GFW (2020, using Curtis et al. [2018]); and illegality – estimates compiled by Forest Trends (2021).

Figure 2: Annual forest loss from 2001 to 2019 for Papau New Guinea. This report covers the period highlighted (2013-2019).



Source: GFW (2020, using Hansen et al. [2013]).

BOX 1

Forest Trends Findings

- Between 2013 and 2019, commercial agriculture in Papua New Guinea was likely responsible for the clearance of more than 240,000 ha of forest.
  - Given that 100% of the commodities linked to deforestation was exported, there is a risk that international buyers may be linked to the loss of more than 240,000 ha tropical forests.
  - At least 63% of agro-conversion is likely illegal.
  - There is a high risk that exports were produced on illegally cleared land.

1 Introduction

Papua New Guinea (PNG) had more than 40 million hectares (Mha) of forest in 2019, covering 79 percent of the country's surface (GFW 2020, using Hansen et al. 2013; FAO FRA 2020). As of 2016, 30 percent of the tree cover was intact forest (GFW 2020). PNG has 1,571 known species of amphibians, birds, mammals, and reptiles, of which 26 percent are endemic and 7 percent are threatened (Mongabay 2006). Less than 4 percent of the forest is in protected areas, and almost all forest land is owned by the people who have traditionally lived on it and used it for thousands of years (FAO FRA 2020; Hall 2018). The constitution grants PNG's citizens a form of collective and inalienable title, meaning that it is owned communally and cannot be sold. Despite this remarkable constitutional right, large areas of forest are exposed to large-scale industrial exploitation. PNG's Commission of Inquiry into land leases identified corruption at all levels of government as a major problem, linked to weak public institutions and governance. It said: "Corruption and conflicts of interest were of particular concern in extractive industries, particularly the logging sector, and in government procurement" (Hall 2018). Free, Prior, and Informed Consent (FPIC) is legally required but foreign companies abuse the law and illegally grab land through a combination of trickery, corruption, intimidation, and force (Hall 2018).

2 Deforestation Analysis

2.1 Deforestation 2013–2019

Deforestation in PNG increased dramatically during the period 2013 to 2019, when 2 percent of the 2000 tree cover was lost. The average annual rate of loss was 130 percent times the annual rate during the previous 13 years, from 2000 to 2013.

For the purposes of this study only the following were considered:

- **Forests:** areas with greater than 50% tree cover
- **Forest loss / Deforestation:** complete removal of forest cover
- **Illegal:** deforestation that was, at time that the clearing took place, in contravention of the country's legislative framework governing forest conversion

2.2 Drivers of deforestation

Forest Trends' analysis on the extent and nature of forest loss in PNG between 2013 and 2019 is based on an extensive review of existing literature and data, including research from Global Forest Watch (2020 using Curtis et al. 2018), Pendrill et al (2020), academic and government articles. After reviewing the available data, Forest Trends' best estimate is that:

- At least 30% of deforestation was driven by commercial agriculture.

Justification

In PNG, permits for agricultural conversion are used as a fraudulent way of obtaining access to conversion timber. GFW (2020) does not identify commercial agriculture as a driver for any deforestation, but this is because the crops for which the permits were granted were never planted. The Curtis et al. (2018) driver analysis on GFW reports that shifting agriculture was responsible for 88 percent of tree cover loss while commodities were 0 percent; Appendix 1 of Forest Trends (2021), explains the error in mistaking commercial agriculture as shifting agriculture. Therefore, Forest Trends has evaluated the literature on land-use change in PNG to get a more accurate estimate. The Forest Trends estimate that 30 percent of deforestation is caused by commercial agriculture is based on detailed analysis of licences granted for agriculture and timber exports (Filer 2020). It is backed up by the government, which also estimates that 30 percent of deforestation is driven by commercial agriculture, with 63 percent caused by shifting agriculture (Government of PNG 2017).

Permits granted for agriculture allow clear cutting of forest for planting but in many cases the crops are never planted, and the agriculture permits provide a front for clear-cut logging (i.e., the fraud allows loggers access to timber that they would otherwise not be able to harvest). The proportion of logs exported under agriculture permits is an indicator of the proportion of deforestation driven by commercial agriculture: from 2013 to 2019, 30 percent of all logs exported (by volume) reportedly came from agriculture-related licences.

New Forest Clearing Authority (FCA) licences were issued in this period for 601,740 ha of forest to be logged for agriculture. (Timber Authority (TA) licences also allow logging for agriculture, specifically selective logging for the domestic market on 50 ha or less. However, information is not available on the extent of TAs authorized during the reference period.) Timber from FCAs is exported under an Export Permit and the volume of logs exported from these concessions is an accurate reflection of the volume harvested, except in the case of the Inland Lassul Baining/Toriu Headwaters concession, where some of the logs have been processed onshore. Between 2013 and 2019, 7,508,743 m^3 of logs were exported from FCA and TA projects, or approximately 30 percent of all total log exports (25,508,270 m^3) (Filer 2020).

Agricultural conversion in the reference period took place on concessions whose permits were issued as far back as 2007. Palm oil is the leading commodity for which permits were issued, with 43 percent of FCAs allocated (0.7 Mha out of 1.7 Mha) (Filer 2020). Global trade and national production data indicate that 23 percent of PNG's palm oil is exported, representing 5 percent of PNG exports by value in 2018, with increasing annual demand domestically (NationMaster 2020; FAOSTAT 2020; COMTRADE 2020; OEC 2020). The TAs issued in West Sepik Province are for smallholder oil palm schemes, as are roughly half of those in Oro, East Sepik, East New Britain and West New Britain provinces (Filer 2020).

Some FCAs are issued for rubber, though in the case of FCA 18-01 on Manus Island, it is unlikely to ever export any rubber (Global Witness 2020). PNG's rubber production is minimal, under 10,000 mt a year, and almost all for export (FAOSTAT 2020; COMTRADE 2020). About 50 percent of logs exported under TAs in New Ireland Province are related to the development of smallholder rubber projects (Filer 2020).

2.3 Estimating illegality linked to agro-conversion

After reviewing available data Forest Trends most conservative estimate is that:

- At least 63% of deforestation for commercial agriculture was illegal.

Justification

As mentioned above, the citizens of PNG own the land and their collective title cannot be sold but it can be leased. Forest conversion is a two-step process: 1) under the Land Act, the state acquires the land and leases it to an agreed entity; and 2) under the Forestry Act, harvesting rights are granted. Both steps require FPIC, and conversion is illegal if consent is not given, if an Environment Permit is not issued, and unless the relevant Provincial Forest Management Committee has approved it (Filer 2020b; NEPCon 2017).

Large-scale leasing of communal forest took place from 2003 under Special Agricultural Business Leases (SABLs), causing alarm that all 5.5 Mha would be clear-cut for agriculture. A Commission of Inquiry investigated and found most of the SABLs allocated to be unlawful, and in 2014, the government repealed the mechanism and promised to revoke all those found to be illegal. However, logging of the allocated SABLs continued. Despite government statements to the media that the SABLs were revoked, the PNG Forest Authority continued to issue FCAs, allowing clear felling of forests in SABL areas. Lengthy court battles were required to get the SABL licences revoked, such as the court ruling on the illegality of the SABL associated with FCA 11-01 in the Turubu area of East Sepik province. In this case, a three-year court battle led to a ruling that the 1.1 Mha SABL violated the landowners' rights under the Constitution and Land Act. However, by the time the Supreme Court upheld this ruling after an appeal, timber worth US$65 million had been cut and exported (Global Witness 2017). Even then the government quickly issued a new FCA for the same area (Table 1).

Global Witness investigated four SABLs and spoke to villagers who claimed that they had not given their consent for the clearance of the forest, and who wanted their land back. Communities complained of pollution in the Min River on the island of New Hanover and of the Incorporated Landowner Groups that did not represent the residents in East Sepik Province (Global Witness 2017). In each case, new FCAs had been issued for these contested leases. Analysis conducted by the author for this report indicates that log exports from these four SABLs represent 11 percent of national production during the reference period (FAOSTAT) (Table 1).

Since 2015, FCAs have been issued to forests without an accompanying SABL. Global Witness (2018 and 2020)

Table 1: Log exports from SABL forests cleared under new FCAs

Province	Forest area	Gross area (ha)	Licence type	Licence number	2013–2019 Log exports m^3
E.N. Britain	Sigite Mukus	42,400	FCA	15-07	1,170,865
West Sepik	Bewani	139,909	FCA	10-03	625,020
New Ireland	Central New Hanover	56,592	FCA	16-02	600,300
East Sepik	Wewak Turubu	121,000	FCA	11-01	774,016
TOTAL					**3,170,201**
% of national timber production (25,508,270 m^3 between 2013 and 2019)					11%

Source: Global Witness 2017; Filer 2020. Log export analysis is based on reports from SGS, the Swiss inspection company which verifies that PNG logs have been exported in the quantity, quality, value, and from the area approved by government.

BOX 2

Permits for commercial agriculture provide a front for logging

The FCA Makolkol "topped the log export volume shipped in 2019," according to the SGS Log Export Monitoring Report for 2019. The FCA exported more timber than any other project of any licence type. It was investigated and illegalities appear to have been involved.

In 2017, Global Witness travelled to East New Britain Province to confirm satellite imagery that showed there was extensive logging rather than clearance in the Makolkol FCA. The Malaysian-owned company Kerawara Ltd exported timber worth more than PGK16 million (~US$5 million) from Makolkol in 2017. The absence of large-scale agricultural clearance happening in those titles strongly suggests that these permits were obtained fraudulently merely to obtain valuable timber, rather than to prepare for agriculture concessions.

investigated new FCAs and found evidence of illegalities. For example, eight FCAs were issued in 2016–2017 and none had public records available to show how the companies involved secured the rights to clear this land, and whether landowner consent was secured (Global Witness 2018). Table 2 shows exports from new FCAs as a proportion of total timber production for PNG (Filer 2020; SGS 2019; FAOSTAT 2020). The log exports from these FCAs, which appear to have been issued illegally, represent 2 percent of national production.

TA permits were also issued for agriculture and infrastructure. These permits do not allow exports, so all log exports from TAs are illegal. The illegal FCA and TA exports amount to 63 percent of all exports under these agriculture-related licences. This is a conservative estimate. The rate of illegality in FCAs is likely to be higher. Commissioner Mirou, who led the Commission of Inquiry into SABLs in 2013, stated: "Many FCAs were issued in questionable circumstances. Many of these FCAs issued were not supported by authentic, verified and approved agriculture development plans. Even if these FCAs were supported by properly approved agriculture development plans, during the operations in many instances it had been noted that the operators or developers departed or digressed from the approved agriculture plans." He went on to say that many of the FCAs exceeded the 500 ha limit on clear felling for agriculture, and logging "generally continued into areas not immediately within the 500 hectares phases but over the whole areas of SABLs" (NEPCon 2017).

Table 2: Log exports from four new FCAs evaluated for evidence of illegalities

Province	Forest area name	Gross area (ha)	Licence type	Licence number	2013–2019 Log exports m^3
Northern (Oro)	Wanigela	42,607	FCA	05-04	8,741
Manus	Pohowa	40,400	FCA	18-01	22,489
E.N. Britain	Dengnenge	23,656	FCA	15-09	47,485
E.N. Britain	Makolkol	28,500	FCA	15-10	429,776
TOTAL					**509,491**
% of national timber production (25,508,270 m^3 between 2013 and 2019)					2%

Source: Global Witness 2018, 2020; Filer 2020.

2.4 Estimating the percentage of agro-commodities linked to deforestation that are exported

After reviewing all available data Forest Trends estimates that:

- 99% of commodities linked to deforestation are exported.

The Forest Trends analysis is that commercial agriculture is a cover for timber extraction and export, and because 99 percent of timber is exported, our estimate is that 99 percent of commodities from agro-conversion are exported. SGS reports 4,040,234 m^3 of log exports in 2018, which is 99 percent of production (SGS 2018; FAOSTAT 2020). PNG is China's single largest supplier of tropical logs: it shipped more than 3.5 million m3 of logs there in 2018 (COMTRADE 2020). The United States and EU, in turn, are China's largest markets for its plywood and wood furniture exports (Global Witness 2018).

In terms of the crops grown on former forest, cocoa and coffee each represent 5 percent of deforestation embodied in crops (Pendrill et al. 2020). These are primarily for the export market, 97 percent and 87 percent respectively (COMTRADE 2020; FAOSTAT 2020). Most palm oil is export-oriented, although domestic consumption of palm oil has been increasing at a rate of 12.5 percent a year since 2014 (NationMaster 2020). According to Pendrill et al., 48 percent of embodied deforestation is in beef, none of which is for export. Overall Pendrill et al. estimate that 10 percent of >25 percent tree cover loss between 2013 and 2017 is embodied in crops, of which 28 percent is exported.

Timber

Forest Trends estimates that 29% of log exports are from illegal agro-conversion. Timber produced under FCAs and TAs granted for agriculture is likely illegal conversion timber, where the agricultural licences provide a front for logging rather than preparation for agriculture concessions. As a proportion, logs harvested under these licences are 29 percent of total timber production between 2013 and 2019, and based on the illegality analysis above, 63 to 100 percent of agro-conversion is illegal.

Table 3: Proportion of log exports under agricultural licences (FCA + TA) that are likely illegal

Type of agro-conversion	Log exports from projects with evidence of illegalities 2013–2019 (m^3)	Total log exports (m^3) from all FCAs and TAs issued for agriculture 2013–2019	% of log exports from FCA and TA licences 2013–2019
SABL forests cleared under new FCAs	3,170,201	6,618,401	58%
New FCAs with evidence of illegalities	509,491		2%
TA*	890,342	890,342	3%
% of agro-conversion that is illegal			63%

*Out of 89 TAs, 17 are for palm oil; 45 are at least 50 percent dedicated to palm oil; 13 are at least 50 percent related to smallholder rubber. Others are related to roads or unknown. (Filer 2020)

Table 4: Proportion of timber produced under agricultural licences

Type of licence	Timber exports 2013–2019 (m3)	Total timber exports 2013–2019 (m3)	% of timber from agro-conversion	% timber from illegal agro-conversion
FCA	6,618,401	25,508,270	26%	15%–26%
TA	890,342		3%	3%

Source: Professor Colin Filer (2020) for timber exports from FCAs and TAs, SGS (2020) for total timber exports.

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Illicit Harvest, Complicit Goods

The State of Illegal Deforestation for Agriculture

ANNEX 3 THAILAND CASE STUDY 2013-2019

20th in forest loss across the tropics

1% of all forest loss across the tropics

507 Mt of CO_2e Total gross emissions from tree cover loss

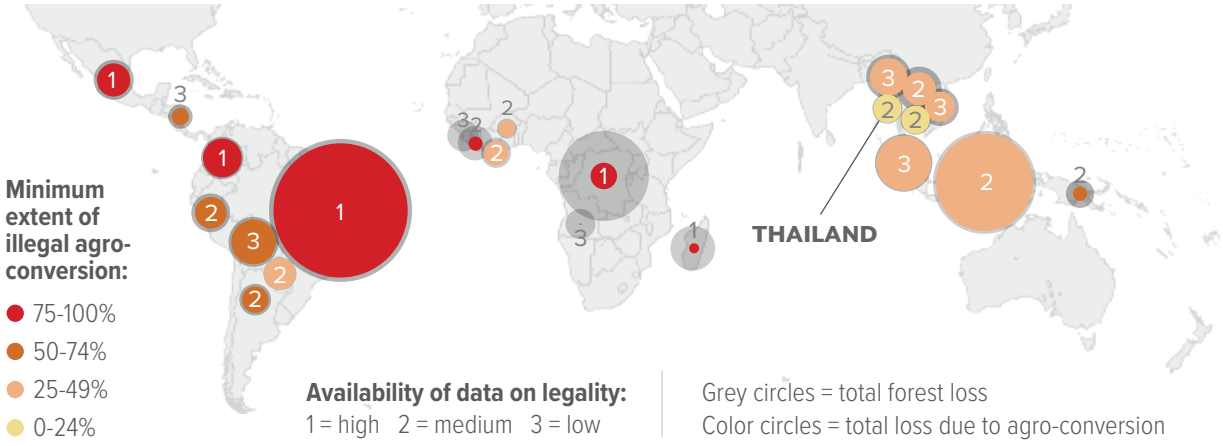
0.9 Mha total loss of tropical forests

of which **86%** due to commercial agriculture

of which at least **9%** likely illegal

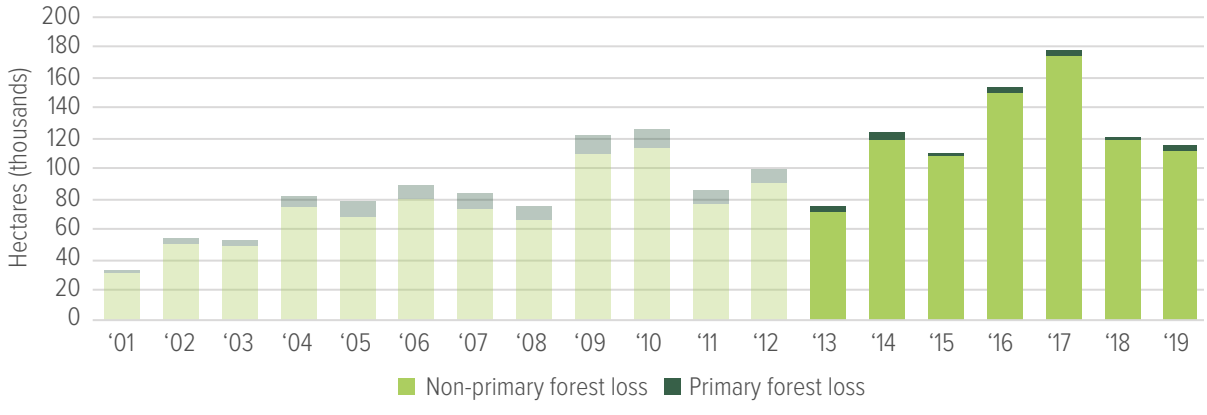
50% exported

Figure 1: Relative amount of tropical forest loss driven by commercial agriculture and the extent of illegal clearing.



Source: forest loss – GFW (2020, using Hansen et al. [2013]); agro-conversion – estimates compiled by Forest Trends (2021) from multiple sources, including GFW (2020, using Curtis et al. [2018]); and illegality – estimates compiled by Forest Trends (2021).

Figure 2: Annual forest loss from 2001 to 2019 for Thailand. This report covers the period highlighted (2013-2019).



Source: GFW (2020, using Hansen et al. [2013]).

BOX 1

Forest Trends Findings

- Between 2013 and 2019, commercial agriculture in Thailand was likely responsible for the clearance of more than 760,000 ha of forest.
  - Given that 50% of the agro-conversion was exported, there is a risk that international buyers may be linked to the loss of more than 380,000 ha of tropical forests.
  - At least 9% of agro-conversion is likely illegal.
  - It is likely that exports are contaminated with links to illegal deforestation, but it is difficult to determine the level of risk that exported commodities were grown on illegally cleared land. Given this, heightened due diligence is required by buyers.

1 Introduction

Thailand has diverse forests, ranging from upper montane forest, coniferous forest, and dry deciduous forests in the north to lowland rainforests, sphagnum bog, peat swamp, and tropical mangrove forests in the south (Wangpakapattanawong et al. 2016). The Royal Forest Department estimates that forest covered 16.3 million hectares (Mha) in 2017, with an additional 3.5 Mha of rubber plantations, altogether covering 32 percent of the land area (RFD 2018). This was an increase on 1998, the year with the smallest amount of forest cover, in which only 25 percent of the country was covered in forest. After the 2014 coup, the National Council for Peace and Order set a target of increasing forest cover to 40 percent, and is promoting reforestation through various measures (Sola et al. 2020).

2 Deforestation Analysis

2.1 Deforestation 2013–2019

Thailand lost 879,926 ha of tree cover during the period 2013 to 2019, that is, 5 percent of forest cover in 2000. The rate of loss is accelerating: this figure over seven years is almost the same as the loss of forest that incurred over all 11 years from 2001 to 2011 (GFW 2020, using Hansen et al. 2013).

For the purposes of this study only the following were considered:

- **Forests:** areas with greater than 50% tree cover
- **Forest loss / Deforestation:** complete removal of forest cover
- **Illegal:** deforestation that was, at time that the clearing took place, in contravention of the country's legislative framework governing forest conversion

2.2 Drivers of deforestation

Forest Trends' analysis on the extent and nature of forest loss in Thailand between 2013 and 2019 is based on a review of existing literature and data, including Global Forest Watch, Pendrill et al., and REDD+ (FCPF 2020; Sola et al. 2020). After reviewing all available data, Forest Trends' best estimate is that:

- At least 86% of deforestation is driven by commercial agriculture.

Justification

Global Forest Watch (2020, using Curtis et al. 2018) estimates that 28 percent of forest loss was driven by commodities. However, as discussed in Appendix 1, Forest Trends (2021), GFW analyses may be conservative. Pendrill et al. (2020) similarly calculated that 27 percent of forest loss was embodied in crops (200,137 ha embodied in crops, out of 730,369 ha of loss between 2013 and 2017). Rubber was the main crop linked to deforestation, accounting for 85,506 ha of forest loss between 2013 and 2017 (Pendrill et al. 2020). Rubber plantations covered 3.5 Mha in 2020, a reduction from 3.7 Mha in 2015, as some rubber was converted to oil palm (FAO FRA 2020).

In its REDD+ driver analysis, the Government of Thailand instead identifies agriculture as the main driver of deforestation, with crops responsible for 79 percent of deforestation; plantations responsible for 7 percent; and shrimp farming accountable for additional forest loss. (Note: The government defines forests as >10 percent tree cover, whereas in the GFW estimate referred to above, Forest Trends uses a >50 percent tree cover definition for forests. However, the GFW estimate of the role of commodities is 27 percent—almost the same when using the same definition as the Government of Thailand.)

The difference between GFW, Pendrill et al., and the Government of Thailand may be due to methodology. Pendrill et al. and GFW use the same analytical methods for all forests worldwide (Appendix 1, Forest Trends 2021), whereas the methodology in the REDD+ (2020) analysis was based on forest change maps in Thailand for the period 2006 to 2016 and a survey on drivers. GFW identifies forestry as responsible for two-thirds (63 percent) of forest loss, indicating that the difference may be due to classification of tree crops. The government identified annual crops, but also rubber, oil palm, and fruit trees as the main drivers (FCPF 2020). The latter may have been subsumed in GFW's forestry category instead. Regardless, we accept the government's estimate of 86 percent of deforestation driven by cash crops and plantations. Both the government and GFW allocate a small role for subsistence agriculture, estimating that it drives 9 percent or 1 percent of forest loss, respectively.

Thailand is the world's third largest producer of palm oil, after Indonesia and Malaysia. Oil palm is mostly grown in the south, some of it on drained peatlands; 70 percent is produced by small-scale farmers (Stokes 2017). In 2015, Thailand had 700,000 ha of plantations, and the government's *Oil Palm and Palm Oil Industries Development Strategy 2015 – 2026* plans a further expansion of oil palm plantations by around 50 percent over the next nine years (Stokes 2017). The REDD+ (2020) analysis recognizes that government policies promoting cash crops have resulted in an expansion in agriculture, which has had a negative impact on forests. As well as palm oil, sugarcane, and cassava have been promoted as sources of energy (Phumee et al. 2018).

A reforestation effort has replaced areas of former forest with monoculture timber and wood fiber plantations. Further, households could get permits to establish tree plantations of up to 5.6 ha in national reserve forest. Privately owned plantations now extend over 1.3 Mha and mostly consist of teak, pine, eucalyptus, and acacia (FCPF 2020).

2.3 Estimating illegality linked to agro-conversion

After reviewing all available data Forest Trends estimate that:

- At least 9% of deforestation for commercial agriculture was likely illegal.

In 2015, Thailand passed legislation allowing the conversion of forests for agriculture, mining, and other uses, provided that the forest was no longer fit as wildlife habitat. Finding such forests was not difficult, as large areas had been degraded by forestry until the introduction of a nationwide logging ban in 1989 (Sola et al. 2020). (At the time of the ban there were 300 active logging concessions, down from a peak in 1979 when nearly half the country was leased out in 516 concessions (Lohmann 1993)).

While agro-conversion in heavily degraded forests is legal, agro-conversion is prohibited in protected areas that cover about 20 percent of the country's land area and 60 percent of Thailand's forests. In fact, 9 percent of all forest loss was in protected areas. Agricultural encroachment into these protected forests is rooted in a history of dispossession and subsequent tensions or land conflict. In the Phu Kao – Phu Phan Kham National Park, the agricultural area increased by 66 percent, from 1,092.2 ha in 2013 to 1,809.6 ha in 2015, of which 13 percent was in forest. The agricultural land was mostly dedicated to cash crops, predominantly (81 percent) cassava (Phromma et al. 2019). In Phu Wiang National Park, from 2008 to 2014 a total of 1,657 ha of forestland, roughly 5 percent of the national park, were converted to sugarcane (77 percent) and cassava (23 percent) (Kawasaki et al. 2015). In one year, from 2014 to 2015, RFD recorded 3,607 offences related to illegal encroachment on 23,500 ha of land in the National Forest Reserves (Preferred by Nature 2017).

Forest Trends has found no reporting on the legal status of forest clearing outside of protected areas, and we make no assumption about the illegality of these operations. Given that our evaluation of legality is necessarily incomplete, we are likely to be highly conservative in our estimate that less than 10 percent of clearing between 2013 and 2019 for commercial agriculture was likely illegal. We note that in the rest of Asia for which we have data, the average rate of illegality linked to conversion for commercial agriculture was 37% percent of all forest loss.

2.4 Estimating the percentage of agro-commodities linked to deforestation that are exported

After reviewing all available data Forest Trends estimates:

- 50% of commodities embodying deforestation are exported.

Justification

Forest Trends uses the Pendrill et al. (2020) estimate that about 50 percent of agricultural conversion is exported. Rubber is Thailand's biggest forest-risk commodity that is exported, representing 62 percent of embodied deforestation in exported crops (Pendrill et al. 2020). Rubberwood accounted for more than 86 percent of Thailand's sawnwood exports between 2012 and 2016 (Forest Trends 2019). Almost all palm oil production (91 percent) is sold on the domestic market for use as biodiesel (45 percent), cooking oil (33 percent), or in other industries (Petchseechoung 2016).

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Illicit Harvest, Complicit Goods

The State of Illegal Deforestation for Agriculture

ANNEX 3 VIETNAM CASE STUDY 2013-2019

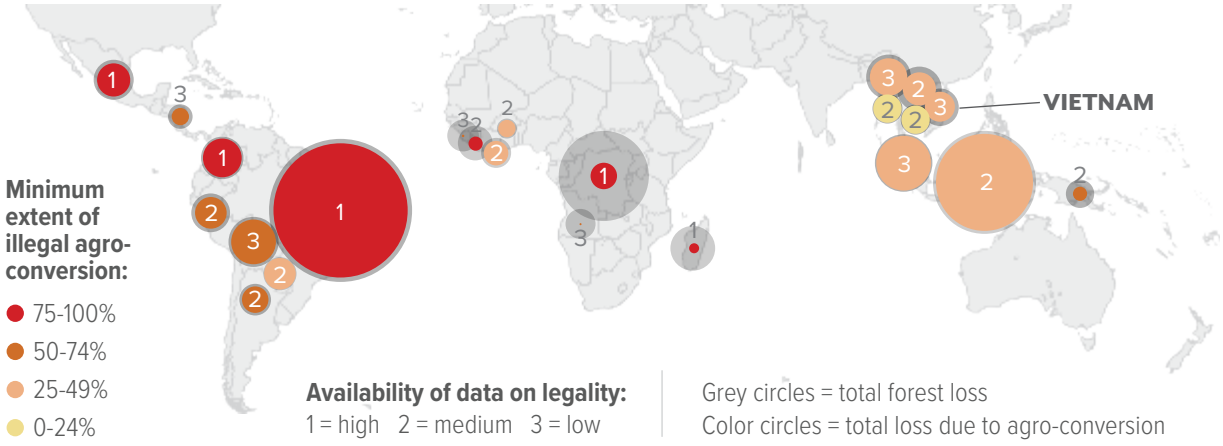
12th in tropical forest loss

2% of all tropical forest loss

1 Gt of CO_2e Total gross emissions from tree cover loss

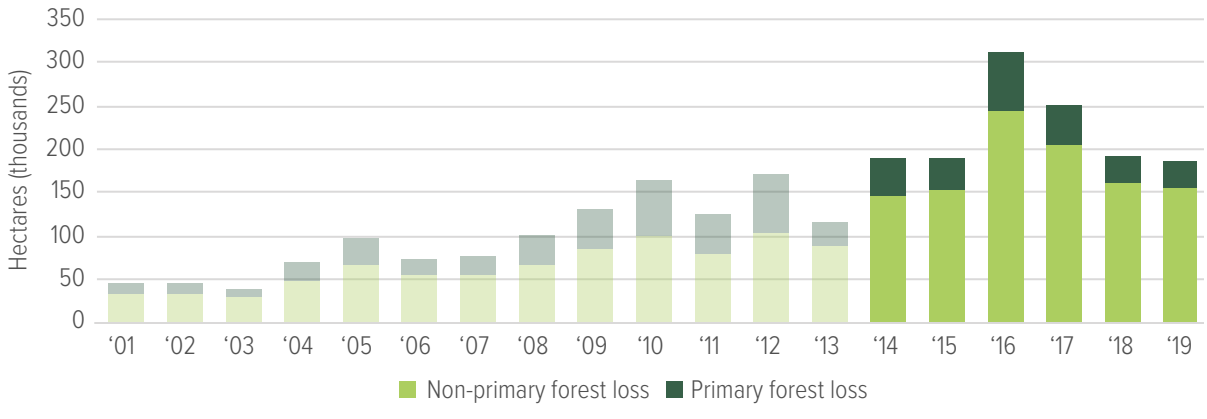
1.4 Mha total forest loss → of which **63%** due to commercial agriculture → of which at least **37%** likely illegal; **32%** likely exported

Figure 1: Relative amount of tropical forest loss driven by commercial agriculture and the extent of illegal clearing.



Source: forest loss – GFW (2020, using Hansen et al. [2013]); agro-conversion – estimates compiled by Forest Trends (2021) from multiple sources, including GFW (2020, using Curtis et al. [2018]); and illegality – estimates compiled by Forest Trends (2021).

Figure 2: Annual forest loss from 2001 to 2019 for Mexico. This report covers the period highlighted (2013-2019).



Source: GFW (2020, using Hansen et al. [2013]).

BOX 1

Forest Trends Findings

- Between 2013 and 2019, commercial agriculture in Vietnam was likely responsible for the clearance of more than 900,000 ha of forest.
  - Given that 32% of Vietnam's agro-conversion was exported, there is a risk that international buyers may be linked to the loss of more than 280,000 ha tropical forests.
  - At least 37% of agro-conversion is likely illegal. Given the weak monitoring and enforcement, especially of the rights of ethnic minorities and Indigenous People in the highlands, the actual rate may be higher than this regional average.
  - Exports in 2019 that were likely from agro-conversion:
    - US$369 million in coffee
    - US$676 million in rubber
  - It is difficult to determine the risk that exported commodities were grown on illegally cleared land. Given this, heightened due diligence is required by buyers.

1 Introduction

Vietnam's forests have shown a remarkable recovery since the late 1970s, at which time forest cover in Vietnam was down to only 17 percent, from 43 percent in the 1940s. The use of defoliants such as Agent Orange during the Vietnam War affected anything from 14 to 44 percent of forest cover, and large areas of grassland have not reverted to forest because tree seedlings cannot survive in the nutrient-depleted soil (Tatarski and Johnson 2016; World Land Trust 2019). After the war, logging, slash-and-burn agriculture, and land encroachment further depleted the forest.

When the country transitioned to a market-based economy in the 1980s, forest management moved from exclusive government control to a more multistakeholder approach. Under this policy, 1.4 million households were granted about 3.1 million hectares (Mha) of forest, leading to increased care for the land (Open Development Mekong 2020). In 2020, FAO FRA reported that Vietnam had more than 14.6 Mha of forest, an increase of more than 1 Mha in just a decade, the same as the increase in planted forest, which covers 1.2 Mha more in 2020 than in 2010. Smallholder plantations account for most of the increase in forest cover and the majority of the land granted to families during the decentralization of forest management in the 1980s is now used to grow acacias (Tatarski and Johnson 2016).

For the purposes of this study only the following were considered:

- **Forests:** areas with greater than 50% tree cover
- **Forest loss / Deforestation:** complete removal of forest cover
- **Illegal:** deforestation that was, at time that the clearing took place, in contravention of the country's legislative framework governing forest conversion

2 Deforestation Analysis

2.1 Deforestation 2013–2019

Between 2013 and 2019, more than 1.4 Mha of forest was lost (Hansen et al. 2013 on GFW). Meanwhile the Government of Vietnam reported a net gain in forest cover between 2015 and 2020, largely because plantations increased by nearly 800,000 ha while natural forest declined by more than 100,000 ha (FAO FRA 2020). Primary forest accounts for less than 1 percent of forest area (FAO FRA 2020).

2.2 Drivers of deforestation

Forest Trends findings

Forest Trends evaluated several different sets of data on the extent and nature of forest loss in Vietnam between 2013 and 2019, including research from Global Forest Watch, Pendrill et al. (2020) and REDD+ (2016). After reviewing all available data Forest Trends' best estimate is that:

- 63% of deforestation was driven by commercial agriculture.

Justification

According to the Curtis et al. (2018) driver analysis on GFW (2020), 63 percent of forest loss between 2013 and 2019 was due to commercial agriculture. The REDD+ analysis (MARD 2016) supports this: it says the direct drivers of deforestation are agricultural conversion (rubber plantations, coffee, and pepper perennial crops), unsustainable logging, infrastructure, and forest fires. The Pendrill et al. (2020) analysis identified that the crops with most embodied deforestation between 2013 and 2017 (calculated based on tree cover loss and land-use change) were rubber (19 percent of embodied deforestation), vegetables (19 percent), rice (12 percent), beef (8 percent), pepper (6 percent), and coffee (5 percent) (Pendrill et al. 2020).

The major agricultural drivers vary between the different regions: in the highland plateau areas, coffee expanded rapidly in the 1990s at the cost of forest, while in the coastal regions, mangrove forest was cleared for shrimp farms (Pham et al. 2012). The Central Highlands, in particular, lost 582,657 ha of natural forests between 2005 and 2015, a 32 percent reduction in area. This was directly driven by the expansion of rubber and coffee, and more recently by the expansion of cassava and black pepper (Kissinger 2020). The northwest of Vietnam is another deforestation hotspot, with reports of illegal deforestation to plant cherry orchards in Điện Biên province as well as illegal logging (Viet Nam News 2017).

National programs have promoted organized migration into the Central Highlands and migrants were attracted by the high prices of coffee and opportunities to work on industrial agriculture projects. They also came because, for many, their agricultural land in the lowlands was converted to large industrial projects. Migration

Table 1: . Crop expansion replacing forest in the Central Highlands, 2005–2015

	Rubber	Coffee	Cassava	Pepper
Increase in area 2005–2015 (ha)	172,308 ha	106,000	157,292	52,000
Percentage increase	198%	29%	Not known*	106%

*Small incursions in forest cannot be captured easily in satellite imagery, and patches are detected as they get bigger over time.

Source: Kissinger 2020

in turn displaced the highland minority groups, who often do not have land title certificates (known as the "Red Book" in Vietnam). The displaced moved into forested areas that they had to clear to continue farming (Kissinger 2020; Yang et al. 2016). The population in highland areas doubled between 1991 and 2014, leading to tensions between the national majority ethnic Khin migrants and the ethnic minority groups and Indigenous Peoples of the highlands. While coffee had been the main cause of deforestation in the 1990s, when the price of coffee dropped, farmers with access to capital switched to other crops such as black pepper, avocado, and passion fruit (Kissinger 2020). Cassava has been a recent boom crop, as it grows on nutrient-poor soil, requires low upfront investments, and reaches good prices on the export market (To et al. 2016).

Most plantations are owned by 1.5 million smallholders (Morgan and Woolford 2017). The area of tree plantations increased from 3.6 million ha in 2015 to 4.3 million ha in 2020 (FAO FRA 2020). Wood plantations (often eucalyptus and acacia varieties) were a large driver of deforestation in the 1990s for the wood chip market but more recently policies have preferred native species and long-term plantations for sawnlog production (Kissinger 2020).

Rubber plantations have continued to expand: between 2013 and 2019 there was an increase of more than 140,000 ha (FAOSTAT 2020). In fact, rubber expansion exceeded government targets, and local regulations could not rein in the expansion of rubber into natural forests. Land-use change decisions are made primarily at the provincial level and implemented locally, but there is a time lag between planting and first harvest, which can mean that farmers extend their fields to produce food until the rubber is ready to harvest. In such cases, legal conversion of forest for rubber leads to further illegal clearance for subsistence use. The smallholder farmers are often named as the direct driver of deforestation, but a more important driver is the reclassification of lands as "degraded" that makes the area eligible for conversion to rubber. If the farmers were not pushed off their land by the rubber plantations, they would not have to clear new forests for their subsistence farms (Kissinger 2020).

2.3 Estimating illegality linked to agro-conversion

- The percentage of agro-conversion that is illegal is not known.

Agriculture is not allowed on land classified as forestland, but when land-use classifications are changed to allow conversion of degraded forest, then agriculture may be legal; without these changes, it would be illegal. Clearance for shifting agriculture is illegal, since a ban was introduced in 1998 as part of the government's attempt to decrease deforestation (Yang et al. 2016). Logging in natural forest is banned, and illegal logging is often the first stage of clearing a forest for commercial agriculture. The boundaries between legal and illegal are unclear: if farmers planted cassava on swidden fallow land before the land was classified as forestland by the government, then it is not clear if this is legal or illegal (Kissinger 2020; To et al. 2016; Chatham House 2020). There are no published studies that evaluate agricultural expansion and corresponding classification changes.

In the Central Highlands the expansion of crops for industrial agriculture for export has been allowed even though this has a knock-on effect of displacing indigenous ethnic groups from their land and into the forest, as mentioned above, where their deforestation is classed as illegal. It is important that subsistence farmers, who are often from minority groups, are not blamed for illegal deforestation; they are bearing the brunt of national policies that condone agricultural conversion which is done by majority Khin farmers and migrants as part of state programmes (Kissinger 2021).

The Criminal Code introduced criminal liability for the unlawful repurposing of land and other aspects of forest management, and the penalties for environmental crimes have increased. The Ministry of Agriculture and Rural Development (MARD) manages forest sector policy in Vietnam, with power "deconcentrated" to local government (provincial, district, and commune levels) (Yang et al. 2016). Enforcement and monitoring

is perceived to be weak, with more emphasis on the administrative aspects of forest monitoring, even though the tools to address it are available (Open Development Mekong 2020; Kissinger 2021).

Without rigorous information, we cannot provide a precise, reliable estimate of illegality, so for the purposes of this study, we can only assume that in the best case everything is legal; in the worst case, nothing is. More research needs to be done to identify the level of illegal deforestation in agricultural commodities in Vietnam.

2.4 Estimating the percentage of agro-commodities linked to deforestation that are exported

- 32% of commodities embodying deforestation are exported.

Justification

Rubber, coffee, plantation wood, and pepper are key forest-risk commodities that are grown for the export market. All coffee is exported and 80% of rubber. However, forest is also cleared for rice, vegetables, and cattle, which are for the domestic market. Data on the proportion of deforestation going into exported agricultural commodities are lacking. The most reliable estimate is Pendrill et al.'s calculation, based on land-use change and tree cover loss maps, that 32 percent of embodied deforestation in crops is exported. The Pendrill et al. study amortizes deforestation attributed to a given commodity over five years.

3 Commodity Analysis

Rubber and coffee are selected for the Forest Trends analysis because they are the top two agricultural exports contaminated with deforestation, together accounting for 53% of exported embodied deforestation in crops (Pendrill et al. 2020).

3.1 Coffee

Based on its analysis Forest Trends estimates that:

- 15% of coffee is from agro-conversion.

Vietnam produced 16 percent of the world's coffee in 2018, and is the second largest exporter after Brazil. Germany, the United States, and Italy accounted for 36 percent of total export value (US$891 million), while the United Kingdom accounted for 5 percent (COMTRADE 2020).

The Central Highlands, one of the hotspots for natural forest loss, accounts for nearly 90 percent of the country's coffee cultivation (EU-REDD+ Facility 2018). Here, in 2020 alone, 330,000 ha of forestland was converted to crops, of which 18 percent was for coffee. Applying this percentage to all forest loss in the Central Highlands (a conservative estimate given that conversion for coffee used to be higher), could mean that 102,000 ha of forest was converted to coffee, or 15 percent of Vietnam's total coffee cultivation. In principle, if coffee is grown on land classified as forest then the production of coffee is illegal; however, if coffee was planted before the land was classified as forestland, then it may be legal (Chatham House 2020). Therefore, it is not possible to say how much coffee is from illegal agro-conversion.

There are nearly 690,000 coffee farmers in Vietnam, of whom one-third are from ethnic minorities, and nearly two-thirds grow coffee on small plots of less than a hectare. Coffee plantations on forestland are not eligible for "Red Book" land titles. This limits access to government credit, and means that many farmers incur private loans with high interest rates, which in turn instigates further expansion into the forest to increase production (Chatham House 2020).

3.1 Rubber

Based on its analysis Forest Trends estimates that:

- 63% of rubber production is linked to deforestation.

Vietnam is the fourth largest producer of rubber globally, producing 9,972,264 mt in 2013–2018, after Thailand (43,314,458 mt), Indonesia (41,778,992 mt) and Malaysia (10,914,811 mt) (FAOSTAT 2020). Fully 80 percent of Vietnam's latex rubber is exported, and China is the largest market (COMTRADE 2020).

In the Central Highlands, 79 percent of rubber plantations were established in natural forest. In the northwest, forestland was allocated to households and converted to rubber plantations (To and Nghi 2014). The Government of Vietnam has identified the conversion of forests to plantations of industrial crops, such as rubber, as one of the five drivers of deforestation and degradation in the country.

Rubberwood has become an important raw material for Vietnam's wood products industry. Vietnam is now the world's third largest exporter of rubberwood, worth US$1.7 billion each year, accounting for almost 25 percent of Vietnam's wood products exports (ITTO 2019). Vietnam has nearly 700,000 ha of rubber trees, and as rubber trees reach the end of their productive lives, they are cleared for replanting; about 70 percent of the wood can be used by manufacturers (FAOSTAT 2020; ITTO 2019).

In recent years, Vietnam has focused on addressing the drivers of deforestation and forest degradation by stabilizing the planning of new rubber plantations. The illegality of deforestation for rubber is not known, but it is generally perceived to be low risk because rubber trees are classified as a multipurpose tree, meaning that it could be considered a forest tree and allowed to grow on forestland. Rubber plantations are considered as production forests and contribute to the achievement of Vietnam's aim to increase forest cover to 45 percent by 2030 (Open Development Mekong 2020).

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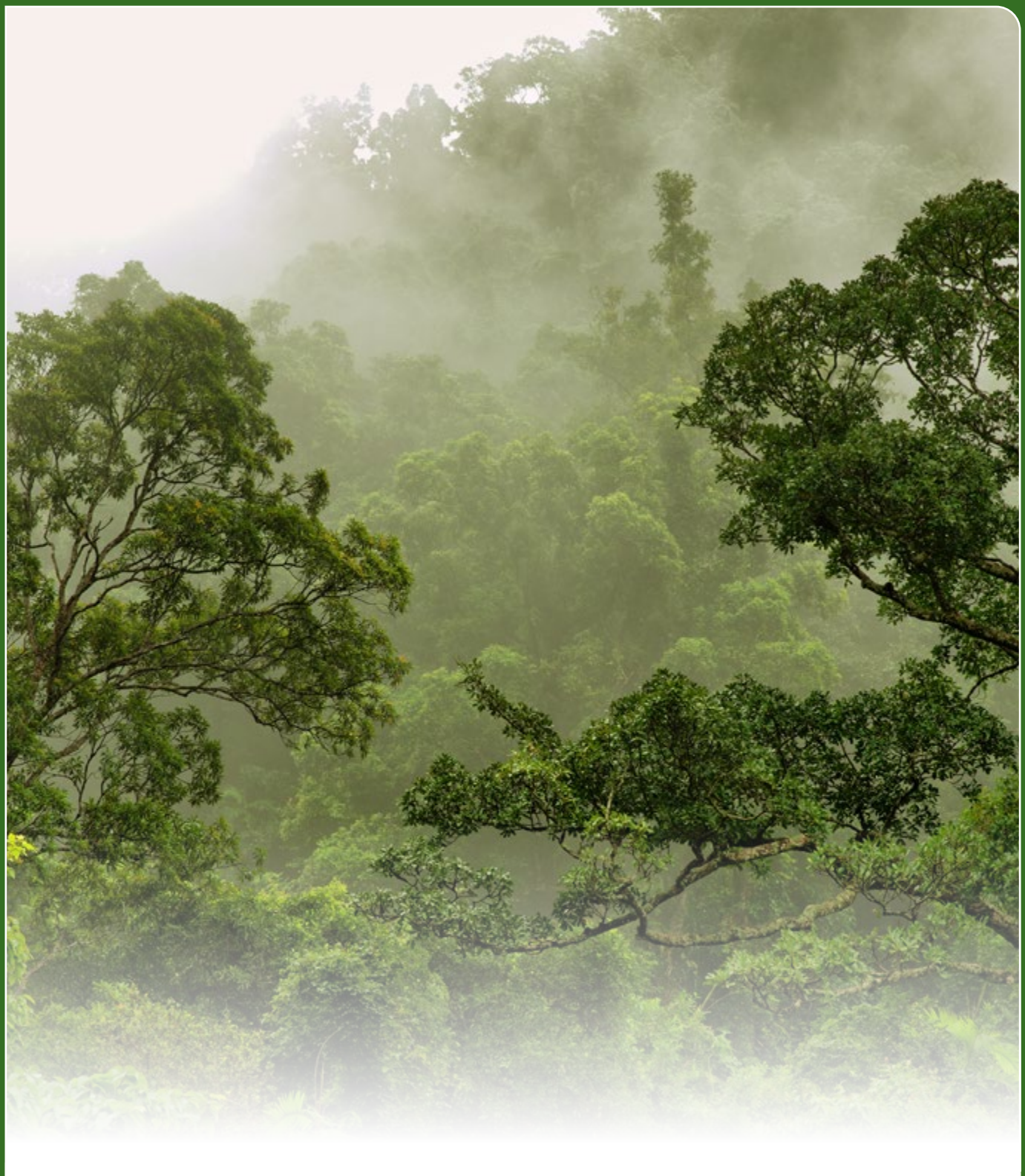

FOREST TRENDS

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