DEFORESTATION FRONT

BRAZILIAN AMAZON

The Brazilian Amazon is one of the largest areas of tropical forests at 395 million ha[2], and provides significant environmental services, including carbon sequestration and some of the world’s richest biodiversity[3]. The southern and eastern portions of the Amazon have faced high pressures in the last four decades. The biome is close to reaching a tipping point, at which the forest will no longer be able to sustain processes such as water recycling, that keep it alive[4], and the most affected portions will suffer diminished rainfall and prolonged dry seasons[5].

Drivers of deforestation

<table>
<thead>
<tr>
<th>Drivers of deforestation</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Cattle ranching</td>
<td>Expanding predominantly under extensive and low-production systems, in some cases linked to land speculation that leads to establishment of pasture to justify land ownership[6, 7].</td>
</tr>
<tr>
<td>Roads expansion</td>
<td>Mainly through the paving of main transport corridors[8]. Also, the growing network of unofficial roads[9] facilitates logging operations followed by active land occupation[10].</td>
</tr>
<tr>
<td>Large-scale agriculture</td>
<td>Commercial agricultural crops tend to expand by taking over pasture lands, but may contribute to deforestation through displacement of ranching for beef production[11, 12].</td>
</tr>
<tr>
<td>Smallholder farming</td>
<td>Linked to the expansion of subsistence and cash crops (e.g. cocoa), and combined with the adoption of cattle ranching in smallholder systems, including agrarian reform settlements[13, 14].</td>
</tr>
<tr>
<td>Large-scale logging</td>
<td>While commercial logging has dropped over time, illegal activities have continued, linked to small-scale logging but also promoted by organized criminal networks[15, 16].</td>
</tr>
<tr>
<td>Mining operations</td>
<td>Large-scale mining has limited direct impacts on deforestation, but may generate waste and affect local livelihoods[17]. Illegal gold mining also threatens indigenous lands[18].</td>
</tr>
<tr>
<td>Hydroelectric power</td>
<td>Hydroelectric dams play a significant role in deforestation, not just from the area flooded but by the settlement that they attract – a recent example is the Belo Monte Dam[19], the Bolsonaro administration has signalled its intention to expand dams in the Amazon basin.</td>
</tr>
<tr>
<td>Fires</td>
<td>Used for clearing primary forests and preparing the area for agriculture[20], though fires occur also on already cleared land[21] and can get out of control, invading standing forests[22].</td>
</tr>
</tbody>
</table>

Underlying causes

Underlying causes are insecure tenure and land speculation that is also associated with land grabbing or encroachment of public lands, protected areas and indigenous lands[23]. In addition, large-scale investments in infrastructure and hydroelectric dams and expansion of logistics for supporting agribusiness development have also prompted land occupation and growing pressure on forestlands[24]. More recently, relaxed environmental controls[25, 26] and the national government’s support of agribusiness and extractive industries in the Amazon have countered previous governments’ perspectives on forest conservation in the Amazon[27, 28], suggesting that it is no longer a federal government priority.

KEY FACTS

<table>
<thead>
<tr>
<th>Countries, region</th>
<th>Brazil, Amazon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest type</td>
<td>Humid tropical forests</td>
</tr>
<tr>
<td>Total area</td>
<td>118.7Mha</td>
</tr>
<tr>
<td>Forest area in 2018</td>
<td>85.9Mha (72.3% of total deforestation front area)</td>
</tr>
<tr>
<td>Forest loss 2004-2017</td>
<td>15.5Mha (15.4% of forest area in 2000)</td>
</tr>
<tr>
<td>Location of deforestation</td>
<td>Mainly in the south and east[24]</td>
</tr>
<tr>
<td>Total forest core area in 2018</td>
<td>49.8Mha (58.0% of forests in 2018)</td>
</tr>
<tr>
<td>Fragmented forests 2000–2018</td>
<td>11.4Mha (11.4% of forest area in 2000)</td>
</tr>
<tr>
<td>Accumulated burned area, 2002-2019</td>
<td>14.2Mha (14.1% of forest area in 2000)</td>
</tr>
<tr>
<td>Deforestation trend</td>
<td>Downward trends from 2004 to 2012; upward trends since 2013 but still at a relatively lower rate[29] compared to early 2000s</td>
</tr>
<tr>
<td>Future trends</td>
<td>Increase in deforestation during 2018 and 2019 suggests that deforestation in the Amazon will follow an upward trend</td>
</tr>
</tbody>
</table>

Responses

<table>
<thead>
<tr>
<th>Responses</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Protected areas</td>
<td>Active establishment of a mosaic of protected areas and conservation units (103M ha) intended to protect biodiversity and contain the agricultural frontier expansion[30, 31].</td>
</tr>
<tr>
<td>Recognition of IPLCs</td>
<td>Extended recognition of indigenous territories and other traditional tenure rights (115M ha)[32], constituting an important strategy to support local livelihoods and protect forests.</td>
</tr>
<tr>
<td>Moratoria</td>
<td>Soy Moratorium (2008) to halt the expansion of soy into forestlands[33], and a cattle agreement (2009) to avoid sourcing beef from deforestation-risk areas[34].</td>
</tr>
<tr>
<td>Land-use zoning</td>
<td>Land-use regulations – including a rural environmental registry and reform of the Forest Code – and credit constraints to halt conversion and restore legal forest reserves[35].</td>
</tr>
<tr>
<td>Deforestation monitoring</td>
<td>Brazil has developed one of the most reliable systems for monitoring deforestation in the Amazon (INPE)[36], along with an independent system of deforestation alerts (SAD)[37].</td>
</tr>
<tr>
<td>Timber legality</td>
<td>Growing investments in enforcement and monitoring of illegal forest clearing[38, 39], but some loopholes in the system still allow for the laundering of illegal timber[40]. More recently, there has been a significant weakening of enforcement operations.</td>
</tr>
<tr>
<td>REDD+ projects</td>
<td>Several REDD+ projects were established in the Amazon. The Amazon Fund (2008) was created to finance conservation, monitoring and sustainable use projects[41].</td>
</tr>
<tr>
<td>Traceability of supply</td>
<td>Main soy traders are tracing their sources of supply to comply with the Soy Moratorium, as are meat-packing groups, but some loopholes persist[42].</td>
</tr>
</tbody>
</table>

Deployment at wider scale | Actively used and expanding | Project-specific, experimental |
Main outcomes

The establishment of protected areas and recognition of indigenous rights have proven effective in containing deforestation, securing carbon stocks and protecting biodiversity(46). The Soy Moratorium has helped halt the expansion of soy in the Amazon biome(26), yet the cattle agreement has been unable to control indirect suppliers and “cattle laundering” has become a widely adopted practice(46). Persisting deforestation has been associated with land speculation and encroachment of public lands(46). In the recent past, a gradual weakening of law enforcement has stimulated a growth of illegal activities.

Recommended future actions

- Eliminate land grabbing and land speculation.
- Reduce deforestation on private properties by facilitating payments for environmental services (PES) combined with market initiatives for sustainable sourcing.
- Incentive increased productivity through targeted investments.
- Provide technical assistance to enhance smallholders’ performance(26).

References


The Colombian Amazon comprises about two-thirds of the forests in Colombia, containing important biodiversity and water resources. Main pressures to the region originate from colonization programmes established in the Andes-Amazon foothills (piedemonte), which expanded along the Caquetá, Putumayo, Cauquén and Orteguaza rivers and main roads that opened over time. Spontaneous occupation by smallholders followed, triggered by opportunities for timber extraction and land for farming, including coca cultivation. Cattle ranching associated with a speculative process of land occupation has also contributed to active frontier expansion and deforestation. In addition, armed conflict has been a key influence on land-use occupation and decision-making in Colombia.

### Drivers of deforestation

| Cattle ranching | Cattle herds of about 5 million heads (18% of the total cattle herd in the country) are located in the Amazon region, with a higher concentration in Meta and Guaviare. Cattle ranching expands through low-production extensive systems associated with land speculation and concentration. |
| Smallholder farming | Mainly linked to the expansion of coca cultivation, which increased from the mid-2010s but shrunk in 2018. About 27% of coca production is located in the arc of deforestation (Meta, Guaviare, Caquetá and Putumayo). New areas need to be established in small patches non-contiguous with previously cleared areas. |
| Road expansion | Deforestation used to occur mainly along rivers, but more recently about 76% of deforestation took place in areas closer to roads. More recent deforestation was associated with the expansion of the “Marginal de la Selva” road that connects the deforestation expansion areas of southern Meta and northwestern Guaviare. |
| Timber extraction | Timber extraction places pressures on forests, following the opening of local roads. There is no consistent estimate about the magnitude of timber extraction in the Amazon, particularly informal extraction, but it may be increasing as frontiers expand. |
| Mining operations | Linked to mainly alluvial gold mining that attracts people from outside and within the region, in particular along the Caquetá, Orteguaza and Vaupés rivers. Gold mining tends to oscillate depending on the market dynamics, and has decreased since 2017. |

### Underlying causes

Global demand for commodities produced in the region, such as gold and coca, tends to stimulate production, as does domestic demand for beef and investments in the expansion of secondary roads. These factors are accompanied by the expansion of informal and illicit economies, and the lack of more aggressive policies and budgets to support environmental protection and contain deforestation. The armed conflict had different impacts on forests in different places, depending on local conditions – deforestation in conflict zones increased after the 2016 peace process.

### Future trends

Deforestation may continue at current rates.

### Responses

**Protected areas**

There are 18 protected areas in the Colombian Amazon comprising 9.4Mha, and no major pressure was observed in these protected areas, which are still distant from the frontier areas. The “Heritage Colombia” programme has been established to support the management of protected areas.

**Recognition of IPLCs**

Some 206 indigenous reserves (resguardos indígenas) were recognized in the Amazon over 26Mha. Only 9.3% of total deforestation took place within indigenous lands.

**Land-use zoning**

A law for territorial zoning was issued in 2011, which included a goal to zone the forestry reserves in the Amazon region, and specified the competences of different levels of government, granting more responsibilities to subnational governments.

**Payments for ecosystem services**

Payment for ecosystem services (PES) mechanisms, including the Forestry Incentive (Certificado de Incentivo Forestal), issued in 1994, originally targeted reforestation actions but has also embraced conservation targets since 1997.

**REDD+ projects**

Under the REDD+ programme, the government formulated a strategy to control deforestation and support forest management (EICDGB), but major project and funding commitments are behind this initiative. As part of the EICDGB, several supply chain-based zero-deforestation agreements and conservation agreements with communities are planned. Conservation agreements with farmers and communities in the Caquetá and Guaviare are being implemented.

**Forest legality**

There is a long-standing pact aimed at legal timber in Colombia (PMIL), and since 2007 the government of Colombia has negotiated the implementation of FLEGT with the EU.

**Deforestation monitoring**

A system to monitor forest cover and carbon (SMBYC) under the Institute of Hydrology, Meteorology and Environmental Studies (IDEAM) includes remote sensing data analysis, and developing community participatory processes.

**Conservation agreements**

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**Countries, region**

| Colombia, Amazon |

**Forest type**

| Humid tropical forests |

**Total area**

| 8.2Mha |

**Forest area in 2018**

| 5.8Mha (76.4% of total deforestation front area) |

**Forest loss 2004-2017**

| 0.4Mha (6.8% of forest area in 2000) |

**Location of deforestation**

| Deforestation has moved from Putumayo to the southern portion of Meta, along the “deforestation arch”, comprising also Caquetá and Guaviare. |

**Total forest core area in 2018**

| 3.3Mha (37.8% of forests in 2018) |

**Fragmented forests 2000-2018**

| 0.5Mha (8.6% of forest area in 2000) |

** Accumulated burned area, 2002-2019**

| 0.8Mha (12.4% of forest area in 2000) |

**Deforestation trend**

| Increasing mainly in the two last years, according to national sources. |

**Future trends**

Deforestation may continue at current rates.

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[16] – deforestation in conflict zones increased after the 2016 peace process.


[18] – deforestation in conflict zones increased after the 2016 peace process.


[21] – deforestation in conflict zones increased after the 2016 peace process.

[22] – deforestation in conflict zones increased after the 2016 peace process.

[23] – deforestation in conflict zones increased after the 2016 peace process.


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**Key Facts**

- **Drivers of deforestation**
  - Cattle ranching
  - Smallholder farming
  - Road expansion
  - Timber extraction
  - Mining operations

- **Underlying causes**
  - Global demand for commodities produced in the region, such as gold and coca, tends to stimulate production, as does domestic demand for beef and investments in the expansion of secondary roads. These factors are accompanied by the expansion of informal and illicit economies, and the lack of more aggressive policies and budgets to support environmental protection and contain deforestation. The armed conflict had different impacts on forests in different places, depending on local conditions – deforestation in conflict zones increased after the 2016 peace process.

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**Definitions**

- **Drivers of deforestation**
  - Cattle ranching
  - Smallholder farming
  - Road expansion
  - Timber extraction
  - Mining operations

- **Underlying causes**
  - Global demand for commodities produced in the region, such as gold and coca, tends to stimulate production, as does domestic demand for beef and investments in the expansion of secondary roads. These factors are accompanied by the expansion of informal and illicit economies, and the lack of more aggressive policies and budgets to support environmental protection and contain deforestation. The armed conflict had different impacts on forests in different places, depending on local conditions – deforestation in conflict zones increased after the 2016 peace process.
Main outcomes

The government has embraced different responses to halt deforestation targeting not only the Amazon but also other regions. The most important is the EICDGB strategy to control deforestation and support forest management. This has attracted some external finance under a results-based mechanism to avoid carbon emissions, and has led to the establishment of a fund to support actions on the ground along with conservation agreements in value chains. However, several challenges must be addressed to prove the effectiveness of this strategy; these include the outcomes from the peace agreements on deforestation[14, 22].

Recommended future actions

- Strengthen monitoring and control systems for deforestation.
- Enhance transparency in land registration and tenure rights.
- End encroachment of protected areas and indigenous territories.
- Embrace more actively actions to close the agricultural frontier.
- Facilitate incentives to local farmers to comply with territorial planning while improving their production practices and building alternative livelihoods.
- Support indigenous people to manage their forests according to their cultural values.
- Support new conservation agreements linked to the peace process to enhance local governance of land and forest resources, while increasing benefits for local people.

References

1. IDEAM. 2019. Resultados monitoreo de la deforestación 2018. Available from: pidamazonia.com/content/ resultados-monitoreo-de-la-deforestacion-2018
DEFORESTATION FRONT

PERUVIAN AMAZON

The Peruvian Amazon’s large areas of primary forest support a rich biodiversity and the livelihoods of numerous indigenous groups and local communities. In the past, large number of smallholders from the highlands have moved to the region and have developed active local economies linked to commercial crops. A large informal economy has also developed in the region involving illegal logging and small-scale illegal gold mining activities.

Drivers of deforestation

- **Smallholder farming**: Associated with the growth of small-scale coffee and cacao plantations, along with coca cultivation[2-4] which are expanding northwards[5]. In Ucayali, some indigenous lands have been encroached on by smallholder colonists from traditional coca production zones[6].
- **Cattle ranching**: The Ucayali/Huánuco region in the central Peruvian Amazon has faced pressure from cattle ranching[7]. Much of this expansion takes place outside areas defined for agricultural use[8].
- **Mining operations**: Small-scale illegal gold mining in rivers and floodplains in Madre de Dios attracts people to forest zones, places pressure on protected areas[2] and leads to deforestation[8,9]. It also contributes to mercury contamination from terrestrial to aquatic environments[9].
- **Commercial logging**: About eight major market circuits supply timber to the main urban markets in Peru. Around two-thirds of the total comes from informal sources, involving a significant number of smallholders, small-scale chainsaw operators and intermediaries[10].
- **Large-scale agriculture**: In Ucayali and Loreto/San Martin, a handful of projects for expanding large-scale oil palm plantations placed pressure on indigenous communities lacking tenure rights and took advantage of informal land markets. Other projects did not materialize as expected[11].
- **Roads expansion**: The opening and expansion of local and secondary roads, often associated with illegal logging operations, indirectly contributes to livestock activity and smallholders expansion[12]. Project road expansion (e.g. a road in the buffer zones of Manu National Park and Amakarerí Communal Reserve) is expected to produce uncontrolled colonization and deforestation[13].

Underlying causes

Underlying causes are mainly linked to a process of land occupation that has been triggered by the expansion of relatively large informal economies. These are connected to speculative land markets, as well as illegal logging, small-scale gold mining and illicit coca cultivation. Local regional elites have also stimulated extractive and industrial expansion in the Peruvian Amazon[14]. The government, however, has issued legislation to address illegal activities and support forest conservation, and there are several initiatives to support alternative economic activities for local communities[15].

Responses

- **Protected areas**: About 20Mha have been designed as protected areas, a significant proportion covering forestlands[16]. A new initiative, “National Parks: Peru’s Natural Legacy”, was signed in 2019 involving the national government and donors to mobilize financial support for managing these protected areas[17].
- **Recognition of IPLCs**: Recognition of indigenous tenure rights has increased over time. By 2016, 12Mha were titled, and 5.8Mha were pending. In addition, 2.8Mha were set aside as reserves to protect semi-nomadic groups and another 2.2Mha as communal reserves comprising various communities[18].
- **Land-use zoning**: Subnational governments hold decision-making power over natural resources through a law on territorial planning[19]. Several regions have finalized their ecological zoning plans including Ucayali and San Martin (the latter has also approved the zoning of forest reserves).
- **Timber legality**: Organismo de Supervisión de los Recursos Forestales y de Fauna Silvestre (OSINFOR) is the state agency in charge of monitoring and controlling timber extraction in the Peruvian Amazon, while Servicio Nacional Forestal y de Fauna Silvestre (SERFOR) is in charge of granting permits. However, the limited mandate of OSINFOR, and the lack of support of regional governments, makes this a difficult task[20].
- **REDD+ projects**: About 7.4Mha in the Peruvian Amazon were allocated to forest concessions but a portion of those concessions are inactive[21]. Only 0.7Mha are under FSC certification[22].
- **Voluntary standards**: About 7.4Mha in the Peruvian Amazon were allocated to forest concessions but a portion of those concessions are inactive[21]. Only 0.7Mha are under FSC certification[22].
- **Payments for ecosystem services**: The Programa Bosques, created in 2010 and implemented by the Ministry of Environment (MINAM), aims to conserve 54Mha by compensating indigenous communities with titles (around US$3.20 per ha/year), and includes capacity building, monitoring and financial reporting[23].
- **Sustainable landscape finance**: A project on “unlocking forest finance” was implemented to promote sustainable supply in San Martin, supported by the International Climate Initiative (IKI) (2013-18), in agreement with the Regional Environmental Authority, and Agrobanco to develop a green agricultural credit line[24].
Main outcomes

Protected areas have proven effective in halting deforestation but there is pressure from illegal logging. Forest concessions also face that pressure, and no significant differences in deforestation rates have been observed between certified and non-certified concessions[56]. Regional governments have not always been able to put in place the mechanisms to enforce their land use plans[24]. While active financial and institutional support has been deployed under REDD+ readiness programmes, Measurement, Reporting and Verification (MRV) has been only partially adopted and institutional support has been deployed under REDD+ readiness programmes, in place the mechanisms to enforce their land use plans

● Advance recognition of tenure rights in forest areas, and support formalization of smallholders’ tenure rights supporting them to improve their farming systems and develop alternative livelihoods.
● Improve national and sub-national monitoring systems and financial and technical means to improve farmers’ compliance with land-use plans.
● Provide the institutional conditions for small-scale and informal chainsaw loggers to undertake sustainable forest management.
● Continue efforts to formalize and regulate illegal gold mining.

Recommended future actions

- Advance recognition of tenure rights in forest areas, and support formalization of smallholders’ tenure rights supporting them to improve their farming systems and develop alternative livelihoods.
- Improve national and sub-national monitoring systems and financial and technical means to improve farmers’ compliance with land-use plans.
- Provide the institutional conditions for small-scale and informal chainsaw loggers to undertake sustainable forest management.
- Continue efforts to formalize and regulate illegal gold mining.

References

20. Deforestation fronts
26. Forests
27. Deforestation fronts
DEFORESTATION FRONT

BOLIVIAN LOWLANDS

The Bolivian lowlands comprise a diverse mosaic of tenure systems, land uses and actors. These range from indigenous people and local communities (IPLCs) to agribusiness and traditional cattle ranchers, along with smallholders increasingly engaged in commercial agriculture. The expansion of agriculture and cattle ranching in frontier areas, also promoted by government policies, is placing increasing pressures on forests.

Drivers of deforestation

- **Cattle ranching**: A large portion of deforestation has been driven by mid- to large-scale extensive cattle ranching in the deciduous forests of the Chiquitania region, often taking over public lands[9].

- **Smallholder farming**: Expansion of smallholder farming producing commercial crops, linked to a governmental process of land allocation to smallholders or occupation of public forestlands and forest reserves stimulated by a legal and regulatory framework that is more supportive of small-scale deforestation[1,2].

- **Large-scale agriculture**: Large-scale agriculture for grain production (e.g. soy, sunflower, rice) has been a major driver of deforestation in the new frontier areas in northwestern and southern Santa Cruz[3,5]. Part of this expansion is triggered by the expansion of Mennonite settlements in the new fronts.

- **Road expansion**: Public investments in transport corridors in northern La Paz, northeastern Santa Cruz and southern Beni, and transboundary highways have facilitated land occupation[1].

- **Fires**: There is a long-lasting occurrence of fires in lowland Bolivia, yet fire outbreaks in 2019 were more severe, with more than a third (2Mha) affecting forestlands[7]. Fires, however, lead more to forest degradation and were associated with forest conversion.

- **Commercial logging**: Logging has persisted, particularly in the forest fringes in northern La Paz and Pando, leading to further degradation of primary forests[8]. Timber extraction has shrunk dramatically as a result of growing imports of cheaper wood products.

Underlying causes

- Primary cause of forest loss and/or severe degradation
- Secondary cause of forest loss and/or severe degradation
- Less important cause of forest loss and/or severe degradation

Responses

- **Protected areas**: About 21Mha have been designated as protected areas, a significant proportion covering forestlands[6], yet oil and gas exploration activities have been allowed in some protected areas[11]. Some expansion of protected areas has taken place in recent years at the departmental and municipal level.

- **Recognition of IPLCs**: About 19Mha have been granted to IPLCs, 5Mha of which are inside protected areas[11]. These areas have different degrees of protection[2].

- **Land-use zoning**: All departments in the lowlands (i.e. Santa Cruz, Beni, Pando) have land-use zoning plans, yet there is a lack of economic incentives and enforcement to ensure compliance[11]. The departmental government in Beni has revised land-use plans removing constraints for agriculture expansion, and the forestry agency has relaxed some of the land-use regulations.

- **Voluntary standards**: A large portion of forest concessions were certified under FSC[11]. No progress has been made in the adoption of sustainable practices on large-scale farms, with some few exceptions[1].

- **Timber legality**: The government has developed a national system of monitoring and verification of timber legality, but it has been accompanied by a discretionary policy of granting forest permits[15]. Lack of enforcement by government entities, corruption and traffic of permits are widespread.

<table>
<thead>
<tr>
<th>Countries, region</th>
<th>Bolivia, Amazon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest type</td>
<td>Tropical and deciduous forests</td>
</tr>
<tr>
<td>Total area</td>
<td>19.9Mha</td>
</tr>
<tr>
<td>Forest area in 2018</td>
<td>12.8Mha (64.2% of total deforestation front area)</td>
</tr>
<tr>
<td>Forest loss 2004-2017</td>
<td>1.5Mha (10.6% of forest area in 2000)</td>
</tr>
<tr>
<td>Location of deforestation</td>
<td>Mainly in northern and eastern Santa Cruz and Chiquitania region[1,2]</td>
</tr>
<tr>
<td>Total forest core area in 2018</td>
<td>7.5Mha (59.0% of forests in 2018)</td>
</tr>
<tr>
<td>Fragmented forests 2000-2018</td>
<td>1.2M ha (3.3% of forest area in 2000)</td>
</tr>
<tr>
<td>Accumulated burned area, 2002-2019</td>
<td>3.2Mha (22.5% of forest area in 2000)</td>
</tr>
<tr>
<td>Deforestation trend</td>
<td>Increasing; deforestation decreased after a peak in 2010, but has resurfaced since 2016</td>
</tr>
<tr>
<td>Future trends</td>
<td>Deforestation to continue expanding</td>
</tr>
</tbody>
</table>

| Protected areas | About 21Mha have been designated as protected areas, a significant proportion covering forestlands[6], yet oil and gas exploration activities have been allowed in some protected areas[11]. Some expansion of protected areas has taken place in recent years at the departmental and municipal level. |
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| Timber legality | The government has developed a national system of monitoring and verification of timber legality, but it has been accompanied by a discretionary policy of granting forest permits[15]. Lack of enforcement by government entities, corruption and traffic of permits are widespread. |
Main outcomes

A system of protected areas accompanied by land-use plans at the departmental level and the recognition of tenure rights for indigenous people have helped contain the expansion of the agricultural frontier\(^1\). However, pressures from new smallholder settlements, road growth and growing connections to markets continue to drive deforestation and forest degradation\(^2\). Despite its conservationist rhetoric of “living in harmony with Mother Earth”, the government has stimulated quite aggressively agribusiness and biofuel production as well as the expansion of human settlements, while the lack of control of genetically modified crops has allowed grain production to expand into new areas\(^3\). This has been in part reflected in the fire outbreaks in the Chiquitania during the 2019 fire season\(^4\).

Recommended future actions

- Revise the process of forestland allocation in the lowlands, particularly in areas identified as public forestlands, and develop actions to contain encroachment into protected areas and forest reserves.
- Account for the environmental impacts of new investments in infrastructure development, including roads and hydroelectric dams.
- Intensify agricultural activities in already occupied lands and restore productivity, along with promoting habitat corridors in frontier areas.
- Provide compensation for local communities to protect their forests while building alternative livelihoods in areas that still maintain an important amount of primary forests.
- Reverse the erosion of the national system of protected areas and provide more financial and human resources.
- Support capacities of indigenous people to manage their territories.

References

The region still holds large forest areas; about 60% of Venezuela is covered by natural forest, and 90% of Guyana is forested\(^1\). 84% of the whole deforestation front is covered by natural forests. Deforestation is lower compared to other fronts, and main pressures originate from mining and smallholder farming. Guyana has been active in adopting measures in the context of REDD+ to protect its forests and as such has maintained low annualized deforestation rate, averaging 0.053% since 2018\(^2\).

### Drivers of deforestation

| Mining | Deforestation related to gold mining has been an increasing driver of deforestation in both Venezuela and Guyana, especially around 2012\(^3,4\). In Guyana, mining is estimated to account for up to 84% of deforestation\(^5\). Infrastructure and road-building related to mining are also important\(^6\). |
| Smallholder farming | Small-scale shifting agriculture has been a persistent and large driver of deforestation in Venezuela, responsible for the majority of deforestation every year from 2001 to 2015. In Guyana, small-scale agriculture is also a primary driver of deforestation\(^1\). |
| Large-scale agriculture | Large-scale commodity crop agriculture has been a persistent but minor driver of deforestation, responsible for approximately a quarter of deforestation in Venezuela from 2001 to 2015\(^1\), and a far smaller proportion in Guyana\(^1\). |
| Cattle ranching | Small-scale shifting agriculture in Venezuela is often accompanied by some livestock activities and thus is paired with agriculture as a driver of deforestation\(^7\). |
| Commercial Logging | Forestry is a consistent but very minor driver of deforestation in Venezuela, responsible for just a small percentage of overall deforestation in recent years\(^1\). |

### Underlying causes

In Guyana, market forces, such as increasing gold prices followed by the expansion of other markets in the country, are likely responsible for the rise and subsequent recent decrease in deforestation.
Main outcomes
The most prominent driver of deforestation, particularly in Guyana, continues to be mining, though mining activity has decreased in recent years\(^9\). Future trends are likely to depend on changes in the underlying market drivers that influence mining.

Recommended future actions
- Continue deforestation monitoring associated with REDD+, which has been significant as a response to deforestation, especially in Guyana.
- Ensure protected areas are managed effectively.
- Incorporate methodologies and technologies which allow for more real-time, predictive monitoring to address deforestation proactively and to support better land-use planning.
- Ensure expansion of protected areas to meet CBD target and continue to maintain so that protected areas are managed effectively.
- Ensure decisive action on the increasing deforestation from gold mining, which can have lasting negative impacts on Guyana’s REDD+ efforts.

References
DEFORESTATION FRONT

GRAN CHACO

The Gran Chaco has one of the highest rates of deforestation in the world, driven particularly by genetically modified soy production and large-scale cattle ranching. Most efforts to control the rate of loss have so far been unsuccessful, although deforestation rates are slowing in some areas.

Drivers of deforestation

Large-scale agriculture

Large- and medium-scale mechanized agriculture has been the most important driver of deforestation in the Chaco, particularly for soybean production in Argentina, and a proportion of previously converted grazing lands are being switched to soy. Traditional small farms have been replaced by larger fields. These are considered future pressures in Paraguay.

Cattle ranching

Clearance of forest to create cattle pasture is the primary driver of deforestation in parts of the Chaco, particularly in Paraguay, and remains important in Argentina, mainly under extensive systems. The soy and cattle industries are increasingly closely interlinked in the region, including through transnational investments.

Smallholder farming

Indigenous people and traditional criollos farmers are being displaced by large-scale agriculture and cattle ranching and are moving into remaining forests, potentially adding further deforestation pressure. Much of the displacement took place through uneven competition in the land markets that works against local farmers and communities.

Charcoal production

Commercial charcoal production for export is significant, particularly in Paraguay, although it is mainly from areas that are being cleared for other purposes. Charcoal-making by smallholders causes mainly degradation in Argentina.

Small-scale timber extraction

Small-scale timber extraction for fuelwood is only a minor forest use and the number of users is declining, in part because deforestation means supplies are no longer available and different energy sources are being introduced.

Underlying causes

Agricultural demand is a major driver of deforestation, and it is also accompanied by land-use intensification. Regulation of deforestation in the region has been hampered by a number of factors, including the importance of the agricultural sector, relatively low carbon stocks compared with other forest areas and the prevalence of private land tenure. In addition, uneven land competition stimulated by government policies has led to the concentration of agricultural activities on a smaller number of large-scale farms in the Chaco, to the detriment of small-scale farmers who have tended to be marginalized.
Responses

Protected areas
- The region is currently under-represented by protected areas with poor representation of terrestrial vertebrates; in 2009 protected areas covered 9% of the Chaco[23] and isolation of protected areas is a serious problem[24].

Payment for ecosystem services
- A payment for ecosystem services (PES) scheme in Argentina provides funding for farmers. WWF has promoted a PES scheme in Paraguay[25].

Voluntary standards
- The Roundtable on Responsible Soy (RTKS) operates in the countries of the Chaco and is promoting production without further conversion of natural ecosystems.

Land-use zoning
- Zoning policies apply in the Argentine Chaco to balance agriculture and conservation under the 2007 Forest Law, yet the environmental outcomes remain unclear[19].

Recognition of IPLCs
- Granting indigenous land title in Argentina is still fairly limited. In Bolivia, 17 indigenous territories were formalized in favour of Guaraní communities covering 1.7Mha, out of a total of 6.7Mha that were claimed[22].

Land tenure security
- Only a few small-scale farmers are involved in land tenure claims in the Argentine Chaco; many do not have formal title and are in danger of being evicted. So far, land tenure policies have not substantially reduced forest loss[15].

Forest laws
- A national “Forest Law” was passed in Argentina in 2007. In Bolivia, several regulations have been passed in recent years favouring expansion of the agricultural frontier[22].

Outcomes

Existing protected areas are important, but currently insufficient and their isolation is a serious problem[20]. PES schemes pay far less than could be earned through conversion to soy and are for a length of time of the farmer’s choosing so that lands of high potential value tend to stay in the scheme for less time[21]. Success is partly due to the strength of different sub-national governments[20]. In spite of existing and new forest regulations, the pressures on indigenous people’s land appear to have increased, with effects on deforestation[22]. The extent to which the forest law in Argentina has been successful in conserving forest is disputed: some analysts claim that it has reduced deforestation[22], while others highlight continued deforestation[22] even within protected areas[22], and say provincial governments are unable to enforce the law effectively.

Recommended future actions
- Urgently strengthen the protected area system, making it more representative, and conserve ecological corridors.
- Use consumer pressure to step up moratoria and use of certification for soy and beef, including pressure on companies deeply involved in the trade[21].

References

2. Volante, J.N. and Seghezzo, L. 2018. Can’t see the forest for the trees: Voluntary Zoning policies apply in the Argentine Chaco to ecosystems.
DEFORESTATION FRONT

BRAZILIAN CERRADO

The Brazilian Cerrado, which covers over 200Mha, is the world's most biodiverse savannah. With more than 11,000 native plant species, as well as large sums of mammal, fish, bird, amphibian and reptile species, it is recognized as a global biodiversity hotspot[1, 2]. The Cerrado plays an essential role in supporting Brazil’s water cycle as the source of eight of the country's 12 river basins[3, 4]. Pasture and large-scale agriculture have expanded rapidly across the region over the past four decades, rapidly transforming the Cerrado[5]. Ongoing clearing may reduce precipitation and increase local temperatures, putting remaining vegetation, livelihoods and continued agricultural production in this region at risk[6].

Drivers of deforestation

<table>
<thead>
<tr>
<th>Drivers</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle ranching</td>
<td>The majority of cleared areas become pasture, but stocking rates on most pastures are low[7]. Expansion of pasture is also connected with land speculation and future transition to soy and other high-priced crops.</td>
</tr>
<tr>
<td>Large-scale agriculture</td>
<td>Most soy produced in the Cerrado is used for animal feed, supplying both domestic and international markets[8]. Unlike in the cattle sector, productivity in the soy sector is generally high[9]. Cotton, maize, coffee and silkculture are other important crops.</td>
</tr>
<tr>
<td>Fires</td>
<td>Fire is traditionally used in the Cerrado as a land management strategy, putting farmers at odds with environmental agencies which seek to limit fires around protected areas[10].</td>
</tr>
<tr>
<td>Mining operations</td>
<td>Increasingly a risk as measures that expand the area available to mining and that reduce the requirements for environmental assessments of new mines make their way through Brazil’s legislative bodies[11, 12].</td>
</tr>
<tr>
<td>Charcoal production</td>
<td>For use in the steel industry, which has large mills in Minas Gerais[13]. Previously solely produced from native vegetation, now wood from eucalyptus plantations is also used[14].</td>
</tr>
</tbody>
</table>

Underlying causes

Underlying causes include weak public protection for natural vegetation, especially compared to the Amazon. Only 7.5% of the Cerrado falls in public protected areas[15], and private landowners are only required to maintain 20-35% of their property under native vegetation under Brazil’s Forest Code. The proximity of the Cerrado to international markets, including Europe, and to large national markets along the country's coast increases incentives to expand agriculture and ranching, and the importance of the region for production of steel and hydroelectric power. Land speculation is a significant additional cause of conversion, linked to the opportunity for a future transition to agriculture.

Key facts

<table>
<thead>
<tr>
<th>Countries, region</th>
<th>Brazil, Cerrado</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest type</td>
<td>Dry forests, gallery forests, woody savannah, grasslands</td>
</tr>
<tr>
<td>Total area</td>
<td>71.7Mha</td>
</tr>
<tr>
<td>Forest area in 2018</td>
<td>5.6Mha of forests (7.8% of total deforestation front area) when looking only at forest estimates based on a global assessment; 46.9Mha (65.0% of total deforestation front area) when looking at all natural ecosystems based on INPE[17] (*)</td>
</tr>
<tr>
<td>Forest loss 2004-2017</td>
<td>3.0Mha of forests (32.8% of forest area in 2000) when looking only at estimates from Terra-i; 9.6Mha (16.9% of all natural ecosystems area in 2000) based on INPE[17] (*)</td>
</tr>
<tr>
<td>Location of deforestation</td>
<td>Throughout, but mostly concentrated in Matopiba (northern region) and Mato Grosso state</td>
</tr>
<tr>
<td>Total forest core area in 2018</td>
<td>0.4Mha (7.7% of forests in 2018) when looking only at forest estimates based on a global assessment</td>
</tr>
<tr>
<td>Fragmented forests 2000-2018</td>
<td>0.3M ha (3.5% of forest area in 2000) when looking only at forest estimates based on a global assessment</td>
</tr>
<tr>
<td>Accumulated burned area, 2002-2019</td>
<td>3.7Mha (40.5% of forest area in 2000) when looking only at forest estimates based on a global assessment</td>
</tr>
<tr>
<td>Deforestation trend</td>
<td>Decreased between the early 2000s and the late 2000s but has recently ticked up</td>
</tr>
<tr>
<td>Future trends</td>
<td>Trends to persistent deforestation</td>
</tr>
</tbody>
</table>

Key responses

<table>
<thead>
<tr>
<th>Key responses</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protected areas</td>
<td>Protected areas cover about 210,000 ha; the majority of these are “sustainable use” protected areas, in which certain extractive activities are permitted[18, 19].</td>
</tr>
<tr>
<td>Recognition of IPLCs</td>
<td>Indigenous reserves cover nearly 100,000 ha of the Cerrado (about 5%)[20].</td>
</tr>
<tr>
<td>Land-use zoning</td>
<td>The Forest Code specifies a certain portion of each property must be set aside for conservation; the national environmental registry allows landowners to plan these set-asides and declare them to environmental agencies[18, 19].</td>
</tr>
<tr>
<td>Deforestation monitoring</td>
<td>Official annual monitoring of vegetation loss was recently launched[21], allowing for the assessment of overall clearing trends and deforestation trends on individual properties when overlaid on the national environmental registry.</td>
</tr>
<tr>
<td>Traceability of supply</td>
<td>Some soy companies are moving toward mapping their suppliers and assessing their land use[22]. In late 2017, more than 70 companies (soy and meat producers and traders) signed the Cerrado Manifesto to prevent further destruction of natural vegetation in the Cerrado[23].</td>
</tr>
<tr>
<td>REDD+ projects</td>
<td>National REDD+ strategy could be integrated into public Cerrado protection policies by creating incentives for retaining and restoring Cerrado vegetation[24].</td>
</tr>
</tbody>
</table>

* Primary cause of forest loss and/or severe degradation
* Secondary cause of forest loss and/or severe degradation
* Less important cause of forest loss and/or severe degradation

Note: Estimates form national sources are considered here instead of Terra-I estimates. 

(*)
Main outcomes

The Cerrado has long been Brazil's environmental “sacrifice zone”\[9\], due to the relatively weak protections it is afforded under the Forest Code and the protected areas system. As a result, most deforestation and conversion in the Cerrado is permissible under law\[8\]. Private sector initiatives to monitor soybean and cattle producers have not materialized\[10\].

Recommended future actions

- Expand protected areas to at least 17% of the minimum called for under the Convention on Biological Diversity (CBD)\[28\].
- Reduce deforestation on private properties with market initiatives for sustainable production and through payments for environmental services (PES)\[16, 19\].
- Expand technical assistance to incentivize productivity in the cattle sector\[27\].

References

CHOCÓ-DARIÉN

The moist forests of the Chocó-Darién, separated from the Amazon by the Andes, are rich in biodiversity. There are still intact forest areas, despite continuing large-scale forest loss. Protected areas are helping, along with efforts to introduce carbon credit schemes and sustainable forest management.

### Drivers of deforestation

<table>
<thead>
<tr>
<th>Driver</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle ranching</td>
<td>The most significant driver overall(^{10}) and the largest agent of change in 2010-2015 in all three countries (94% in Panama, 76% in Colombia, and 59% in Ecuador(^{14})).</td>
</tr>
<tr>
<td>Smallholder farming</td>
<td>Relatively small-scale farming, including coca production(^{11}), bananas(^{13}) and oil palm(^{12}), is responsible for much of forest loss in Colombia and Panama and is important in Ecuador(^{14}).</td>
</tr>
<tr>
<td>Large-scale agriculture</td>
<td>Significant, particularly in Colombia and Ecuador (mainly oil palm).</td>
</tr>
<tr>
<td>Mining operations</td>
<td>Concessions covered over 960,000ha by 2011 and there are 20 oil blocks in Colombia(^{11}). Most current mining is illegal, uncontrolled and thus hard to measure(^{16}).</td>
</tr>
<tr>
<td>Road expansion</td>
<td>Road building and proximity to roads(^{15}) are both important drivers of forest loss in some areas.</td>
</tr>
<tr>
<td>Urban expansion</td>
<td>Small impact(^{11}).</td>
</tr>
</tbody>
</table>

### Underlying causes

Population growth, insecure tenure, corruption and armed conflict. New roads, railroads, ports and oil infrastructure are planned\(^{23}\).

### Responses

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protected areas</td>
<td>Protected areas and indigenous territories cover over 2.5Mha of the Chocó. They are generally successful(^{23}), although losses have been noted by the Ministry of Environment in Colombia(^{10}).</td>
</tr>
<tr>
<td>Carbon trading</td>
<td>The Chocó-Darién Conservation Corridor leverages carbon credits to protect community-owned forests on Colombia’s Atlantic coast(^{14}).</td>
</tr>
<tr>
<td>Sustainable production</td>
<td>WWF is supporting sustainable production capacities of local communities in Ecuador in order to reduce agricultural frontier expansion.</td>
</tr>
<tr>
<td>Policy initiatives</td>
<td>The 5 Great Forests Initiative is a multi-government initiative to protect Mesoamerican forests, including the Darién; its aims include eliminating illegal cattle ranching. In Ecuador, the Socio Bosque programme provides economic support for poorer private and communal landholders who maintain forest cover, and the country’s Nationally Determined Contributions (NDC) and REDD+ strategy prioritizes the Choco.</td>
</tr>
<tr>
<td>Sustainable forestry</td>
<td>Some sustainable harvesting methods have been introduced in Panama(^{12}).</td>
</tr>
<tr>
<td>Land-use zoning</td>
<td>A major land-use planning exercise by WWF has identified priority areas for conservation(^{13}).</td>
</tr>
<tr>
<td>Restoration</td>
<td>Forest restoration in the Ecuadorian Choco has been prioritised in the government’s National Reforestation Plan.</td>
</tr>
</tbody>
</table>

### Main outcomes

Much of the area remains intact, but efforts have yet to reduce the rate of forest loss significantly; indeed, it has been increasing in some parts. There are now some government commitments to limit the scale of conversion.

### Recommended future actions

- Establish more protected areas.
- As much of the forest will continue to be used, explore alternatives that retain forest cover, including particularly carbon credits.
References


DEFORESTATION FRONT

THE MAYA FOREST

The Maya Forest constitutes one of the largest tropical forest areas in the Americas. It provides significant environmental services, including carbon sequestration and biodiversity, as well as vital forest resources for rural communities. While this region has long been subject to deforestation, frontiers of forest loss have changed over time. In the last decade, deforestation has shifted from southern to north-western Petén (Guatemala), and has increasingly advanced over north-eastern Campeche and southern Quintana Roo (Mexico)\[1\]-\[3\]. Deforestation drivers have also changed. If cattle ranching and slash-and-burn were the main drivers in the past, commercial farming (small-scale but especially large-scale) now plays an increasingly important role\[3, 4\].

Drivers of deforestation

- **Cattle ranching**: Extensive cattle production causing forest degradation and clearance of primary forests and secondary vegetation\[1\]-\[12\] in certain regions, this is linked with land speculation, drug trafficking\[11\] and even money laundering\[12\].
- **Smallholder farming**: Linked to expansion of traditional smallholder agriculture, including shifting cultivation, and extensive cattle production\[12\], but also increasingly to cash crop production\[10\],\[13\].
- **Large-scale agriculture**: Expansion of intensive cropland production (oil palm and soybean, particularly in Mexico) over pastures but in certain regions, such as northern Campeche\[1\]-\[2\] and southern Petén\[3\]-\[4\], over forests.
- **Fires**: Fire is associated with deforestation, as it is often used as a tool to clear land (in both subsistence and commercial farming)\[12\], but also because large-scale fires affect large areas in the region\[2\] and may facilitate permanent land-use conversion from forest to agricultural land\[12\].
- **Logging**: Industrial logging is less important than in the past\[1\]. Negative environmental effects are associated with illegal logging\[12\],\[14\] as well as with some cases of unsustainable community forestry\[14\].
- **Fuelwood and charcoal**: Selective logging for fuelwood and charcoal is common in the region\[1\]-\[12\]. Under some circumstances, these practices are related to forest degradation\[12\].
- **Urban expansion**: Growing urban centres and tourist developments have led to deforestation in some regions, such as in coastal Yucatán\[1\]-\[14\].

Main outcomes

Protected areas along with secure collective land tenure regimes have proven effective in containing deforestation\[1\]-\[9\]. Persisting deforestation has been associated with land speculation and encroachment of public land\[10\]. Agricultural intensification incentives can, under some circumstances, be effective in halting deforestation, but lack environmental safeguards and sufficient integration with environmental policies\[14\],\[15\]. Efforts at ensuring value chain sustainability through voluntary standards or other mechanisms have been insufficient.

Recommended future actions

- Strengthen inclusive and participatory governance arrangements and improve capabilities for effective protected areas management.
- Secure land tenure or resource rights for rural communities.
- Strengthen and scale up community forestry projects, which have been shown to be linked to low deforestation rates, and reverse unsustainable timber extraction in community lands where it is still occurring.
- Improve the linkage between agricultural intensification incentives, positive livelihoods and environmental outcomes.
- Monitor and improve value chain sustainability.
- Evaluate the effect that current public policies and infrastructure plans are having or will have in the region, such as:
  - The Mexican federal programme Sembrando Vida, which is incentivizing reforestation of degraded lands with milpa and fruit trees – it has been suspected that some well-conserved areas might purposefully be degraded in order to access such incentives.
  - The Tren Maya, which seeks to connect various cities of the Peninsula and will also create a new population and tourist centre, which might impact forest cover.
  - The Mirador Basin Project within the Maya Biosphere Reserve, which proposes increasing tourism access and infrastructure (hotels and trains) and changes to the current scheme of land management.

Underlying causes

The shift from collective (sometimes customary) to more individual land tenure regimes has been associated with land purchases by large-scale producers and greater levels of deforestation\[9\]-\[21\]. In some regions, organized crime has fuelled sales of forested land for cattle ranching and, to a lesser extent, large-scale agriculture\[20\]. Additionally, in certain regions of the Maya Forest, the government has been promoting farming of certain cash crops, like oil palm, which might lead to forest loss and degradation\[21\],\[22\].

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### Key Facts

<table>
<thead>
<tr>
<th>Countries, region</th>
<th>Belize, Guatemala and Mexico</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest type</td>
<td>Humid and sub-humid tropical forests</td>
</tr>
<tr>
<td>Total area</td>
<td>13.4Mha</td>
</tr>
<tr>
<td>Forest area in 2018</td>
<td>10.2Mha (75.9% of total deforestation front area)</td>
</tr>
<tr>
<td>Forest loss 2004-2017</td>
<td>0.5Mha (5.0% of forest area in 2000)</td>
</tr>
<tr>
<td>Location of deforestation</td>
<td>South-eastern Chiapas, southern and north-eastern Campeche, southern Quintana Roo, northern and central Petén, and central Belize.</td>
</tr>
<tr>
<td>Total forest core area in 2018</td>
<td>5.1Mha (49.7% of forests in 2018)</td>
</tr>
<tr>
<td>Fragmented forests 2000-2018</td>
<td>1.5Mha (14.0% of forest area in 2000)</td>
</tr>
<tr>
<td>Accumulated burned area, 2002-2019</td>
<td>2.4Mha (22.1% of forest area in 2000)</td>
</tr>
<tr>
<td>Deforestation trend</td>
<td>Downward trend in Calakmul[1], but upward trends in northwest Petén and northeast Campeche[1].</td>
</tr>
<tr>
<td>Future trends</td>
<td>An increase in commercial farming is expected, at a small scale and particularly at a large scale, which will lead to additional deforestation</td>
</tr>
</tbody>
</table>

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- Primary cause of forest loss and/or severe degradation
- Secondary cause of forest loss and/or severe degradation
- Less important cause of forest loss and/or severe degradation
Key responses

Protected areas
Conservation areas protect over 5.8Mha of tropical forest from conversion to cattle ranching and agriculture. Some of these areas have proven effective[12], while others face increasing threats[5,15].

Recognition of IPLCs
The Maya Forest has large areas titled as indigenous and local community lands, particularly in Mexico. This is associated with low deforestation rates, particularly where forests are managed collectively[16,17].

Agricultural intensification
In order to prevent the expansion of the agricultural frontier, government subsidies have increasingly fostered agricultural intensification[20,21], but not always with sufficient safeguards to prevent deforestation[22,23].

Payment for environmental services
PES programmes have been partially effective at temporarily halting deforestation in the Maya Forest[24,25], but their coverage has been limited.

Community forestry
Community forestry is associated with lower deforestation rates across the Maya Forest[26]. The number of communities successfully managing their forest resources is still limited as constraints sometimes outnumber opportunities in forest management[27,28].

REDD+ projects
Several REDD+ projects have been implemented in the region. Recent studies point to mixed results, both at environmental and social level[29,30].

Voluntary standards
Environmental certification has become increasingly common for certain commodity crops such as palm oil. There is, however, little information on their effectiveness in containing deforestation in the context of the Maya Forest.

References
12. Soberanes, R. 2019. México: la palma aceitera amenaza una local community lands, particularly in Mexico. This is associated with low deforestation rates, particularly where forests are managed collectively[16,17].
## DEFORESTATION FRONT

### LIBERIA/IVORY COAST/GHANA

The forests of West Africa, also referred to as the Upper Guinea forest, stretch from Guinea to Ghana. They are under pressure not only from the expansion of commercial agriculture and mining, but also from local peoples’ resource use in their quest for improved livelihoods. Different initiatives are in place to support smallholders and communities, ensure sustainable supply of agricultural commodities such as cocoa and palm oil, and regulate and control illegal logging.

### Drivers of deforestation

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smallholder farming</td>
<td>Shifting cultivation and expansion of tree crops(^1,2), including cocoa, the latter mainly in Ghana. Some of these crops are established after forest clearing, and smallholders migrate into new forestlands looking for more fertile ground after plantations age(^3,4).</td>
</tr>
<tr>
<td>Commercial logging</td>
<td>Under way legally and illegally, also in protected forest reserves (e.g. in some southern regions of Ghana) which constitute the main remaining tracts of primary tropical forests(^5). Logging is stimulated by demand from local and foreign buyers(^6). In Liberia, logging companies are behind community forestlands(^7).</td>
</tr>
<tr>
<td>Fuelwood and charcoal</td>
<td>People rely on fuelwood and charcoal as their energy source. This has profound effects on the standing forests, which are the source of raw materials. Some charcoal production originates from smallholder lands and some from non-designated public lands(^8).</td>
</tr>
<tr>
<td>Mining operations</td>
<td>A threat for biodiverse areas in western Liberia(^9), and expanding in some forest reserves in Ghana. This is associated with the opening of roads to prospective mining sites under construction(^10), but also triggered by illegal gold mining(^11), such as in the Dunkwa region in Ghana where some cocoa farmers have sold their lands to miners(^11).</td>
</tr>
</tbody>
</table>

### Underlying causes

Link to an increase in settlements close to forest reserves with unclear tenure, and tenure issues relating to settlements that existed before the reserves’ demarcation\(^12\). A growing urban population and presence of foreign investors increasing the demand for timber and minerals add pressure on the forests\(^13\).

### Responses

<table>
<thead>
<tr>
<th>Response</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protected areas</td>
<td>Nearly 2,000 protected areas cover around 10% of West Africa as a whole, but around 90% of these protected areas are small and dominated by forest reserves. There are 53 protected areas with international designations, including 17 Biosphere Reserves(^14).</td>
</tr>
<tr>
<td>Timber legality</td>
<td>Ghana signed a voluntary partnership agreement (VPA) with the EU which includes a wood traceability system from production zones to end buyers(^15), although progress is slow due to strong vested interests among political elites(^16). Liberia has also signed a VPA with the EU, but the process in practice is slower(^17).</td>
</tr>
<tr>
<td>Voluntary standards</td>
<td>Some palm oil companies have embraced RSPO standards to reduce impacts of plantation development on high conservation value (HCV) areas. Public and private partnerships for supporting sustainable commodity supply linked to zero deforestation goals have been set up in the context of the African Palm Oil Initiative (APOI) and the Cocoa and Forests Initiative (CFI)(^18). Companies have signed on to the TFA 2020 Alliance aimed at achieving zero deforestation.</td>
</tr>
<tr>
<td>Recognition of IPLCs</td>
<td>Initiatives to enhance local tenure rights are in place in Ghana through the Community Resource Management Area (CREMAs)(^19); a Land Rights Act in Liberia allows communities ownership of ancestral lands but does not apply retroactively(^20).</td>
</tr>
<tr>
<td>Concessions</td>
<td>Around half the land in Liberia has been allocated for concessions for logging, agriculture, mining and conservation(^21). Most of the industrial concessions have not yet been developed, so future deforestation and forest degradation depends heavily upon how these allocated areas are developed in the context of rising population and consumption.</td>
</tr>
<tr>
<td>REDD+ projects</td>
<td>Liberia made a zero-deforestation commitment and entered a partnership with the government of Norway for REDD+ and agricultural development in 2014(^22), yet efforts aimed at building the reference level are still ongoing(^23). In Ghana, the REDD+ programme includes support to climate-smart cocoa practices by improving access to inputs and services, including replanting, to enhance the productivity of farms(^24). Ghana has agreed on performance-based payments for carbon reduction of up to US$50 million under the Forest Carbon Partnership Facility (FCPF)(^25).</td>
</tr>
</tbody>
</table>

### Future trends

Increase may continue over time.
Main outcomes

Efforts to tackle deforestation and forest degradation have still to prove effective. RSPO sustainability standards have to be embraced more extensively by palm oil companies, for protecting HCA areas and local people’s rights. Initiatives for enhancing performance of smallholder cocoa producers are showing good results and committing all key companies, traders and processors across the value chain. While efforts to halt illegal logging are in place, persistent extraction driven by expanding demand makes it a difficult to control timber harvesting.

Recommended future actions

- Improve enforcement against illegal logging while providing the means for smallholders and communities to undertake sustainable forest management.
- Support agricultural intensification on existing farmlands to reduce pressure on forest areas for expansion of commercial crops.
- Monitor compliance with environmental regulations for plantations development and mining operations, along with compliance with social safeguards.

References

The region still holds huge forest areas, with approximately 40% forest cover across the country\(^2\). Multiple drivers are present in the forest frontiers in Cameroon from mining, logging, and agriculture. Both, traditional and artisanal practices embraced by local populations co-exist with industrial economies, which tend to interact in multiple ways. Major causes of deforestation are linked to agriculture, particularly linked to the expansion of commercial crops. Industrial logging and artisanal timber harvesting contribute to forest degradation. Progress has been made to halt deforestation, but significant institutional, social and economic challenges still persist.

### Drivers of deforestation

<table>
<thead>
<tr>
<th>Farmer Type</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smallholder farming</td>
<td>Small-scale farming and shifting cultivation are a major cause of forest loss(^2)-(^4), though some estimate that commodity crop farming is now a more important driver(^2). Commodity crop farming in Cameroon for palm oil production in particular is still often undertaken at a small scale, though production is for sale rather than subsistence(^1). The same can be found for maize and peanuts(^1)-(^3).</td>
</tr>
<tr>
<td>Large-scale agriculture</td>
<td>Large-scale commercial agriculture is also cited as an important and growing driver of deforestation(^2), particularly for rubber and oil palm in southwest Cameroon(^2)-(^4). Some palm oil smallholders may not be strictly large scale but still manage hundreds of hectares(^1).</td>
</tr>
<tr>
<td>Fuelwood charcoal</td>
<td>Wood energy demand, for both charcoal and fuelwood, is an ongoing moderate driver of degradation and deforestation; it has less impact than agriculture, though the two are connected(^1)-(^4).</td>
</tr>
<tr>
<td>Large-scale and small-scale logging</td>
<td>Commercial logging makes a moderate contribution to deforestation in Cameroon(^2)-(^12), and has a larger impact on forest degradation. The domestic market, mostly supplied by small-scale logging, is bigger than the export market supplied by larger commercial operators(^1).</td>
</tr>
<tr>
<td>Infrastructure expansion</td>
<td>Infrastructure expansion is present but less frequently cited as a driver of deforestation(^2)-(^4). Cameroon has received infrastructure investment from China. Most of these infrastructure projects have been in forested areas, and have been linked to deforestation(^2)-(^13).</td>
</tr>
<tr>
<td>Urban expansion</td>
<td>Urban expansion is minor driver of deforestation, including as connected to fuelwood and charcoal demand(^1)-(^4).</td>
</tr>
<tr>
<td>Cattle ranching</td>
<td>Cattle ranching is present but not a frequently cited driver of deforestation(^2)-(^4).</td>
</tr>
<tr>
<td>Mining operations</td>
<td>Mining has been cited as an emerging driver of deforestation that must be monitored in the coming years(^2).</td>
</tr>
</tbody>
</table>

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### Underlying causes

Underlying drivers of deforestation include institutional and policy factors (property rights and policies), demographics (population growth and population pressure), and economic changes (market growth and economic structures)\(^2\). Policy failure and corruption have played a role in continued illegal logging in Cameroon\(^1\)-\(^4\).

### Main outcomes

Small and large-scale agriculture continue to be primary drivers of deforestation, while wood energy demand along with industrial and artisanal logging are important secondary drivers. Underlying drivers of deforestation related to property rights and policies indicate that deforestation will continue unless these root causes are adequately addressed. Focus on Forest Law Enforcement, Legality, and Governance (FLEGT) has been particularly prominent, but its effectiveness is uncertain.

### Recommended future actions

- Enforce existing policy responses to address deforestation, including sustainable forest management, forest monitoring and diversification of livelihoods\(^4\).
- Complement efforts focused on illegal timber with enhanced responses related to agriculture as a primary driver of deforestation.
- Promote certification of agricultural commodities to improve the practices and livelihoods of medium- and small-scale producers.

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### Key Facts

<table>
<thead>
<tr>
<th>Countries, region</th>
<th>Cameroon, Central Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest type</td>
<td>Tropical moist forest</td>
</tr>
<tr>
<td>Total area</td>
<td>10.3Mha</td>
</tr>
<tr>
<td>Forest area in 2018</td>
<td>8.2Mha (79.4% of total deforestation front area)</td>
</tr>
<tr>
<td>Forest loss 2004-2017</td>
<td>0.4Mha (4.9% of forest area in 2000)</td>
</tr>
<tr>
<td>Location of deforestation</td>
<td>Deforestation is primarily located in the south, south-west and north-east of the country</td>
</tr>
<tr>
<td>Total forest core area in 2018</td>
<td>4.5Mha (55.4% of forests in 2000)</td>
</tr>
<tr>
<td>Fragmented forests 2000-2018</td>
<td>1.1M ha (12.6% of forest area in 2000)</td>
</tr>
<tr>
<td>Accumulated burned area, 2002-2019</td>
<td>1.4Mha (16.9% of forest area in 2000)</td>
</tr>
<tr>
<td>Deforestation trend</td>
<td>Decreased with some oscillations until 2014, but has increased again more recently</td>
</tr>
<tr>
<td>Future trends</td>
<td>Deforestation linked to agriculture may continue, though a variety of responses may help decrease deforestation rates</td>
</tr>
</tbody>
</table>
Key responses

Timber legality and assurance systems
Forest Law Enforcement, Legality, and Governance (FLEGT) activities include a voluntary partnership agreement (VPA) with the EU, to which Cameroon exports about 60% of its timber[1]. The VPA encourages legal timber production, and also works to improve forest governance and law enforcement.

Protected areas
Empirical evidence has shown that protected areas have low rates of deforestation, but also that low deforestation rates are likely more influenced by the remote locations of parks rather than by park designation[11].

PES including REDD+
REDD+ has been a focus of deforestation studies and response options in recent years[9, 10]. Increased coordination among stakeholders on REDD+ in Cameroon has improved progress, and further implementation may be successful if it offers multiple benefits for people and biodiversity[12].

Forest landscape restoration
Cameroon pledged to restore a very ambitious 12Mha of forest under the Bonn Challenge. This effort has included FLEGT VPA efforts[11, 12] and a review of forest law[13].

Integrated land-use planning
The forest law of the 1990s provides for 1) a permanent forest estate that is intended to remain forested and 2) a non-permanent forest estate that can be converted to other land use. In addition, a law was passed in 2011 defining the framework for land-use planning and sustainable development planning.

Recognition of IPLCs
Community forest legislation was put in place in 1994, and 182 community forests were active in Cameroon by 2016. Results have been mixed: community forests have struggled with illegal logging, and are seen by some as an impediment to FLEGT VPA efforts[14, 15].

Improving agricultural yields
Increasing farm yields may limit deforestation, while also noting that land tenure laws can incentivize deforestation, as well as the lack of tenure security[16].

Voluntary standards
To manage deforestation related to oil palm expansion, efforts have been undertaken to establish RSPO standards for sustainable palm oil production in Cameroon[17, 18]. Forest certification has been found to have potential to reduce unsustainable use of forests in Cameroon[19]. A recent study did not find reduced deforestation in certified forest concessions, but did assert potential for future impacts under expanded certification[20].

References
1. EU-FLEGT. The Cameroon-EU Voluntary Partnership Agreement.
22. ZSL. Sustainable palm oil and conservation in Cameroon. Zoological Society of London.
GABON/CAMEROON/REPUBLIC OF CONGO

Spread over three countries – Gabon, Cameroon and the Republic of Congo – the Tri-National Dja-Odzala-Minkébé (TRIDOM) region still holds large forest areas, but deforestation, particularly driven by smallholder farming and large-scale agriculture, is expected to increase with likely future development of roads. Mining also places pressures on the forest frontiers. Improved policies are in place aimed at sustainable forest management, forest monitoring and diversification of livelihoods but are in need of more effective enforcement as well as wider resources and institutional support.

Drivers of deforestation

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smallholder farming</td>
<td>Currently small-scale farming and shifting cultivation is a major cause of forest loss. Commodity crop farming is increasing, with medium-scale cocoa plantations along the roads throughout TRIDOM. Commodity crop farming for palm oil production in particular is still often undertaken at a small scale.</td>
</tr>
<tr>
<td>Large-scale agriculture</td>
<td>Large-scale commercial agriculture is an important and growing driver of deforestation, particularly for palm oil and rubber production. In the Republic of Congo, the government has allocated 120,000 ha for oil palm development in the middle of TRIDOM. In Cameroon a rubber plantation near the Dja reserve has plans to expand. All three countries have expansion of industrial agriculture in their national development plans. Large-scale agriculture not only directly impacts deforestation but also has significant indirect impacts such as through the influx of workers, families and services into thinly populated places.</td>
</tr>
<tr>
<td>Fuelwood and charcoal</td>
<td>Wood energy demand, both for charcoal and fuelwood, is an ongoing moderate driver of deforestation and degradation.</td>
</tr>
<tr>
<td>Large-scale logging</td>
<td>Commercial logging makes a moderate contribution to deforestation in TRIDOM but contributes significantly to forest degradation.</td>
</tr>
<tr>
<td>Mining operations</td>
<td>Artisanal small-scale mining is significant in Gabon, and has expanded into forest landscapes, including the border with Cameroon. Artisanal and small-scale miners in Gabon who primarily mine gold and, to a lesser extent, diamonds. In buffer zones of parks, artisanal mining is explicitly allowed by law.</td>
</tr>
<tr>
<td>Infrastructure expansion</td>
<td>Infrastructure expansion is a present but less frequently cited driver of deforestation. All three countries have received significant infrastructure investment from China. The Sangmelima-Ouesso road, which has been improved and is being paved, opens up the heart of the TRIDOM, and facilitates logging, bushmeat trade and migration processes. Another road with major impact is the Ouesso–Brazzaville road (now completely paved), which has opened the forest east of Odzala National Park. The 600 MW Chollet hydropower dam, to be built on the Dja river in a pristine area on the Cameroon-Congo border, could have a huge impact on forests. Most infrastructure projects have been in forested areas, and they have been linked to deforestation.</td>
</tr>
<tr>
<td>Urban expansion</td>
<td>Urban expansion is a minor driver of deforestation, including as connected to fuelwood and charcoal demand.</td>
</tr>
</tbody>
</table>

Underlying causes

Underlying drivers of deforestation include institutional and policy factors (property rights and policies), demographics (population growth and population pressure), and economic changes (market growth and economic structures). Policy failure and corruption have played a role in continued illegal logging in Cameroon, Gabon and the Republic of Congo.

Main outcomes

Small- and large-scale agriculture continue to be primary drivers of deforestation, while wood energy demand and industrial and artisanal logging are important secondary drivers. Underlying drivers of deforestation related to property rights and policies indicate that deforestation will continue unless these root causes are adequately addressed.

Recommended future actions

- Enforce existing policy responses to deforestation, including sustainable forest management, forest monitoring and diversification of livelihoods.
- Promote land-use planning taking into account high conservation value areas to prevent allocation of prime forest areas for industrial development.
- Complement efforts focused on illegal timber with enhanced responses related to agriculture as a primary driver of deforestation.
Key responses

<table>
<thead>
<tr>
<th>Timber legality and assurance systems</th>
<th>Cameroon has a voluntary partnership agreement (VPA) with the EU that encourages legal timber production, and works to improve forest governance and law enforcement. Gabon declared in 2019 that by 2021 all timber needs to be FSC certified. Gabon also plans to aggressively increase forest cover under community forestry arrangements to reduce illegal logging.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PES including REDD+</td>
<td>REDD+ and other climate funding mechanisms have been a focus of deforestation studies and research options in recent years[7,8]. This has resulted in tangible funding for Gabon through the Central African Forest Initiative (CAFI). The Republic of Congo is also on track to receive CAFI funding. Several other initiatives (Green Climate Fund, Nationally Appropriate Mitigation Actions) may result in additional funding for these countries in the near future to offer multiple benefits for people and biodiversity[9].</td>
</tr>
<tr>
<td>Integrated land-use planning</td>
<td>The Cameroon forest law of 1994 provides for a permanent forest estate that is intended to remain forested and a non-permanent forest estate that can be converted to other uses. In addition, a law was passed in 2011 defining the framework for land-use planning and sustainable development planning. Cameroon, under the new GEF-7 programme, aims to harmonize land-use planning for the TRIDOM zone. Gabon and Congo both aim to harmonize land-use planning under their respective CAFI programmes. There is no TRIDOM transboundary land-use planning initiative active across the three countries.</td>
</tr>
<tr>
<td>Improved agriculture</td>
<td>The Republic of Congo has declared that it will focus its agricultural development in the savannah zone to protect the forest zone. Gabon intends to focus its agroindustry development outside areas of high conservation value (HCV); its current oil palm expansion is mainly in the savannah zone.</td>
</tr>
<tr>
<td>Protected areas</td>
<td>Empirical evidence has shown that protected areas have low rates of deforestation, but also that low deforestation rates are likely more influenced by the remote locations of parks rather than by park designation[10].</td>
</tr>
<tr>
<td>Forest landscape restoration</td>
<td>Cameroon pledged to restore 12Mha of forest under the Bonn Challenge[11].</td>
</tr>
<tr>
<td>Improving agricultural yields</td>
<td>One study suggests that increasing farm yields may limit deforestation, while also noting that weak land tenure laws can incentivize deforestation[12].</td>
</tr>
<tr>
<td>Voluntary standards (RSPO)</td>
<td>To manage deforestation related to oil palm expansion, efforts have been undertaken to establish RSPO standards for sustainable palm oil production in Cameroon, Congo[13, 14]. The Gabonese government has already stated that it wants to develop certified palm oil.</td>
</tr>
<tr>
<td>Voluntary standards (forest certification)</td>
<td>Forest certification has been found to have potential to reduce unsustainable use of forests in Cameroon[15]. A recent study in Cameroon did not find reduced deforestation in certified forest concessions, but did assert potential for future impacts under expanded certification[16]. However, several FSC-certified logging operators have sold their concessions or dropped FSC certification. A recent change was the decision by the government of Cameroon to degazette the previously FSC-certified Wijma logging concession to make it a oil palm concession. Republic of Congo currently holds the largest areas of FSC-certified natural tropical forest in the world. Gabon intends to move to 100% FSC for all its industrial logging concessions.</td>
</tr>
<tr>
<td>Recognition of IPLCs</td>
<td>Community forest legislation was put in place in Cameroon in 1994, and 182 community forests were active in Cameroon by 2016. In the Republic of Congo, community forestry is not yet a legal instrument. Results have been mixed: community forests have struggled with illegal logging, and are seen by some as an impediment to FLEGT VPA efforts[17].</td>
</tr>
</tbody>
</table>

Deployment at wider scale | Actively used and expanding | Project-specific, experimental |

References

DEFORESTATION FRONT KEY FACTS

Democratic Republic of the Congo and Central African Republic

This region still holds large and intact forest areas, although the rate of deforestation has accelerated in recent years. Much of the forest conversion is driven by small-scale shifting agriculture, and timber harvest for charcoal production which contributes to deforestation and forest degradation. The growth of large-scale agriculture is limited mainly due to poor development of infrastructure. Main challenges are linked to support development, green energy sources for cooking fuel and alleviating poverty while protecting existing natural forests, and biodiversity.

Drivers of deforestation

**Smallholder farming**
Small-scale, shifting agriculture causes over 90% of forest loss

**Charcoal production**
Significant in DRC, particularly closer to large towns and cities, with estimates of over 90% of the population using charcoal for cooking, due to lack of affordable energy alternatives, although likely more related to degradation than deforestation.

**Large-scale agriculture**
A minor driver for oil palm, rubber, soy and cocoa; some estimates are as low as 1% of total loss. Fall in oil and gas prices is likely to drive additional industrial-scale agriculture in the region.

**Timber extraction**
Less significant than other drivers and smaller than other Congo Basin countries but it occurs widely, is increasing, is probably unsustainable, and opens up forests for agriculture. Includes much illegal logging mainly for domestic markets, and also some to Chinese and other export markets.

**Mining operations**
Increasing, particularly in DRC, involving foreign investors like China and small-scale, often illegal artisanal miners, including in protected areas but mainly in savannas.

**Roads and infrastructure**
Doubled inside concessions in the Congo Basin since 2003, associated with increased forest loss and foreign investment. However, DRC has seen less expansion than other countries in the region and also some abandonment of logging roads.

Underlying causes
Population increase is a major, perhaps the most important, cause, along with poor market access and lack of affordable energy alternatives to charcoal. Profits from oil and gas may have spurred rural-to-urban migration, reducing the rate of forest loss. Conflict occurs widely; this can increase forest loss by increasing illegal cutting, but can also reduce rate of loss due to mining. Research suggests that even in areas that have largely been cleared, almost half the land may still be primary or secondary forest. Policy and weak governance or corruption are also important contributory factors to current forest loss.

Countries, region
Democratic Republic of the Congo (DRC) and Central African Republic (CAR), Central Africa

Forest type
Tropical moist forest, dry forest

Total area
45.6Mha

Forest area in 2018
36.3Mha (79.8% of total deforestation front area)

Forest loss 2004-2017
0.7Mha (1.8% of forest area in 2000)

Location of deforestation
Main fronts in east and south of the region

Total forest core area in 2018
17.4Mha (48.0% of forests in 2018)

Fragmented forests 2000-2018
6.9M ha (18.1% of forest area in 2000)

Accumulated burned area, 2002-2019
7.4Mha (19.4% of forest area in 2000)

Deforestation trend
Increasing, but still relatively low in both DRC and CAR. Intensified loss radiating from cities like Beni and Kisangani.

Future trends
Likely to increase

Responses

**Protected areas**
Protected areas cover 1.18Mha of CAR, 18% of the country; and 32.4Mha of DRC, almost 14% of the country. They are judged fairly successful at maintaining forest cover, even in conditions of conflict.

**REDD+**
There is much interest in REDD+, and some schemes, but institutional structures in DRC hamper progress and have created competition between state and customary authorities. CAR has a grant to develop a national REDD+ investment framework.

**Restoration**
CAR has committed to restore 3.5Mha under the Bonn Challenge, and DRC 8Mha.

**Voluntary standards**
DRC has a national FSC standard, but is required to have certified concessions, although following a complaint from Greenpeace one FSC certificate was withdrawn in 2011. DRC and CAR had no active FSC certificates as of 2018.

**Timber legality**
DRC signed the Brazzaville Declaration in 2018, aimed at protecting some of the world’s great peat deposits, although recent plans put this commitment in doubt.

Deployment at wider scale
Actively used and expanding
Project-specific, experimental

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**Deployment at wider scale**

- Primary cause of forest loss and/or severe degradation
- Secondary cause of forest loss and/or severe degradation
- Less important cause of forest loss and/or severe degradation
Main outcomes
Smallholder agriculture that results from the development of human settlements in the forest frontiers continues to be the main driver of deforestation in DRC and CAR, since there is still a relatively low pressure from commercial activities. Forest degradation and deforestation is also due to a high reliance of people on charcoal as the main source of energy for cooking, and timber markets beyond the countries’ boundaries. Efforts to support local livelihoods and compensate for local conservation efforts, largely embraced withing REDD+, still need to be consolidated and scaled up to achieve meaningful impacts.

Recommended future actions
● Increase public and private sector commitments to sustainable development of agriculture through adoption of best management practices and multi-stakeholder initiatives aimed at deforestation-free commodity supply. WWF is testing an “integrated agribusiness-conservation model” in Cameroon to encourage smallholder farmers in deforestation-free food supply chains, which if successful could be replicated in the entire Congo Basin.
● Large scale investment in alternative (green) energy projects to convert urban dwellers from charcoal for cooking. Such alternatives must be competitively priced to reduce the demand, which is increasing apace with the rate of population growth

References
ANGOLA

Angola has large areas of miombo forest remaining. These were preserved and even expanded slightly during the long civil war, but are now being converted on a large scale, mainly for subsistence agriculture but also larger-scale cropping and charcoal making.

Drivers of deforestation

- **Smallholder farming**: The major driver of change since the end of hostilities has been conversion of miombo woodland to agriculture (including slash-and-burn)[2], particularly small-scale crops suitable for drylands[3], as people moved back into former conflict areas[5]. Degradation is often a precursor to complete conversion of forests in farming areas[2].

- **Fuelwood and charcoal**: Charcoal and fuelwood are major priorities for many rural dwellers, and influence large areas of miombo. They are a primary factor in forest degradation[6], rather than complete deforestation[1]. Charcoal is particularly important along roads[2].

- **Transport infrastructure**: Deforestation often begins along new roads and was also associated with construction of the Benguela railway in the past[7].

- **Large-scale agriculture**: Large-scale land acquisitions, covering several million hectares, started in the late 1980s and accelerated after 2002. Produce has been mainly for domestic consumption; companies are often foreign-owned[8].

- **Timber extraction**: The timber trade has oscillated over time but is now increasing again. It is important for both domestic use and for export[9]. Illegal logging takes place on a large scale, including for Chinese companies[10].

- **Fire**: Bushfires are used to clear for agriculture[10]. Uncontrolled fires are destroying large areas of forest and also harming the livelihoods of local San communities[11].

- **Urban expansion**: Deforestation tends to spread out from major cities[11], although urban development is also reducing shifting agriculture and other practices that degrade or destroy forests.

- **Tree plantations**: Angola had 100,000ha of plantations before independence[12]; it is not clear if new plantations are being established. Some plantations are logged illegally[12].

- **Mining operations**: Mining has large environmental impacts and is a cause of deforestation in some areas[13].

Underlying causes

The 27-year civil war damaged nature[14] but also meant that whole areas were effectively left alone; the end of hostilities has rapidly increased the rate of land-use change. This has been fuelled by population growth, an influx of oil wealth and continuing issues relating to corruption.

Key responses

- **Protected areas**: There are 14 protected areas covering around 12% of the country[15]. During the war these areas were badly poached, and habitats destroyed. There is currently some optimism of greater management effectiveness[16], although there is also a need for more protected areas; few of the current total are in miombo, and most are effectively unmanaged.

- **Recognition of IPLCs**: Angola voted in favour of the UN Declaration on the Rights of Indigenous Peoples on 13 September 2007, but the San, Himba and other groups continue to experience land expropriations and other problems[17].

- **Timber legality**: The government of Angola announced new rules to curb illegal logging in the timber trade in 2018[18], but loss grew sharply after the civil war. Increasing, with oscillations over time

- **Land-use zoning**: There are efforts to address land tenure, but they remain partial and not always effective[19]; issues of expropriation of land by the elite and companies continue to occur.

- **Fire management**: Angola has been seeking collaboration with FAO in addressing the issue of fire, including through community education programmes[20].

- **REDD +**: Angola had no REDD+ projects in 2016[21], although the potential is recognized[21].

<table>
<thead>
<tr>
<th>Key facts</th>
<th>Angola, Central Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest type</td>
<td>Miombo</td>
</tr>
<tr>
<td>Total area</td>
<td>10.5Mha</td>
</tr>
<tr>
<td>Forest area in 2018</td>
<td>4.2Mha (39.6% of total deforestation front area)</td>
</tr>
<tr>
<td>Forest loss 2004-2017</td>
<td>0.1Mha (3.1% of forest area in 2000)</td>
</tr>
<tr>
<td>Location of deforestation</td>
<td>Mainly in the south and east</td>
</tr>
<tr>
<td>Total forest core area in 2018</td>
<td>1.1Mha (27.4% of forests in 2018)</td>
</tr>
<tr>
<td>Fragmented forests 2000-2018</td>
<td>0.3Mha (6.5% of forest area in 2000)</td>
</tr>
<tr>
<td>Total burned area</td>
<td>1.9Mha (43.4% of forest area in 2000)</td>
</tr>
<tr>
<td>Deforestation trend</td>
<td>Historically a slight increase in miombo 1990-2000[11], but loss grew sharply after the civil war. Increasing, with oscillations over time</td>
</tr>
<tr>
<td>Future trends</td>
<td>Deforestation has increased over the past decade; future direction is unclear</td>
</tr>
</tbody>
</table>

Countries, region

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<th>Forest type</th>
<th>Total area</th>
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<tr>
<td>Miombo</td>
<td>10.5Mha</td>
<td>4.2Mha (39.6%)</td>
<td>0.1Mha (3.1%)</td>
<td>Mainly in the south and east</td>
<td>1.1Mha (27.4%)</td>
<td>0.3Mha (6.5%)</td>
<td>1.9Mha (43.4%)</td>
<td>Historically a slight increase in miombo 1990-2000[11], but loss grew sharply after the civil war. Increasing, with oscillations over time</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Protected areas</th>
<th>Recognition of IPLCs</th>
<th>Timber legality</th>
<th>Land-use zoning</th>
<th>Fire management</th>
<th>REDD +</th>
</tr>
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<tr>
<td>There are 14 protected areas covering around 12% of the country[15]. During the war these areas were badly poached, and habitats destroyed. There is currently some optimism of greater management effectiveness[16], although there is also a need for more protected areas; few of the current total are in miombo, and most are effectively unmanaged.</td>
<td>Angola voted in favour of the UN Declaration on the Rights of Indigenous Peoples on 13 September 2007, but the San, Himba and other groups continue to experience land expropriations and other problems[17].</td>
<td>The government of Angola announced new rules to curb illegal logging in the timber trade in 2018[18], but loss grew sharply after the civil war. Increasing, with oscillations over time</td>
<td>There are efforts to address land tenure, but they remain partial and not always effective[19]; issues of expropriation of land by the elite and companies continue to occur.</td>
<td>Angola has been seeking collaboration with FAO in addressing the issue of fire, including through community education programmes[20].</td>
<td>Angola had no REDD+ projects in 2016[21], although the potential is recognized[21].</td>
</tr>
</tbody>
</table>

- **Deployment at wider scale**: Actively used and expanding
- **Project-specific, experimental**
Main outcomes

Most of the responses seem to be at an initial stage of discussion and pronouncements rather than concrete actions; even the protected area system is recognized as being ineffective and too small. The need for a national certification scheme is still being discussed[20].

Recommended future actions

- Increase coverage and management within protected areas.
- Ramp up responses such as certification and REDD+.
- Strengthen enforcement of government regulations, particularly regarding logging, land acquisition and fire management.

References

**KEY FACTS**

<table>
<thead>
<tr>
<th>Countries, region</th>
<th>Zambia, Southern Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest type</td>
<td>Tropical dry forest (miombo)</td>
</tr>
<tr>
<td>Total area</td>
<td>15.9Mha</td>
</tr>
<tr>
<td>Forest area in 2018</td>
<td>10.3Mha (64.5% of total deforestation front area)</td>
</tr>
<tr>
<td>Forest loss 2004-2017</td>
<td>0.4Mha (3.7% of forest area in 2000)</td>
</tr>
<tr>
<td>Location of deforestation</td>
<td>Principally in the southeast of the country</td>
</tr>
<tr>
<td>Total forest core area in 2018</td>
<td>4.1Mha (40.1% of forests in 2018)</td>
</tr>
<tr>
<td>Fragmented forests 2000-2018</td>
<td>1.1Mha (10.4% of forest area in 2000)</td>
</tr>
<tr>
<td>Accumulated burned area, 2002-2019</td>
<td>7.5Mha (70.1% of forest area in 2000)</td>
</tr>
<tr>
<td>Deforestation trend</td>
<td>Increasing, more than doubled from 2010-2018 compared to the previous decade</td>
</tr>
<tr>
<td>Future trends</td>
<td>Likely to increase</td>
</tr>
</tbody>
</table>

**Drivers of deforestation**

- **Smallholder farming**: The main driver, linked to rural population growth[11] and the demand for land for subsistence agriculture[12], expansion of cash crops like tobacco and cotton, and poor farming that exhausts soils and encourages additional land clearance[11].
- **Charcoal**: The key driver in some areas[13]; extraction increases fire risk[14]. Urban charcoal use persists even if electricity is available due to frequent outages and load shedding[6, 7]. Supplies close to 87% of domestic energy needs and 30% of rural industry requirements, e.g. brickmaking.
- **Timber extraction**: Significant, for domestic use and export, and opens up the forest to disturbance including fire[15]. Illegal felling is rampant, e.g. illegal rosewood costs Zambia US$3.2 million a year[16]. Zambia exports mainly to the Southern African Development Community (SADC) region but also to China and Taiwan.
- **Fire**: FAO estimates 5% of forest burns each year[17]; often through accidental spread during burning of crop residues and cropland preparation[18].
- **Livestock grazing**: Significant in some places and overgrazing is reported[19]; burning to increase grazing also results in fires in forests.
- **Mining operations**: Causes some deforestation but is a minor factor overall[20].
- **Road expansion**: Stimulates deforestation by opening to agricultural expansion and charcoal production[21].

**Underlying causes**

Amidst underlying causes, population pressure has direct impacts on forest cover through pressure for land[22]. Greater security of forest tenure is associated with better forest condition, while greater dependence on forests for livelihoods tends to create poorer forest condition[23].

<table>
<thead>
<tr>
<th>Primary cause of forest loss and/or severe degradation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary cause of forest loss and/or severe degradation</td>
</tr>
<tr>
<td>Less important cause of forest loss and/or severe degradation</td>
</tr>
</tbody>
</table>

**Main outcomes**

Despite efforts by the government, donors and NGOs, deforestation is continuing in Zambia, driven primarily by rising numbers of people using inefficient agriculture. Major structural interventions will be needed to reverse these trends. The San people remain seriously disadvantaged in the country.

**Recommended future actions**

- Increase effectiveness of the existing protected area network, particularly the large number of forest reserves, possibly through a planned rationalization of the system.
- Develop carbon markets.
- Address the worrying lack of certified forests.
References


9. PROFOR. 2018. Food and forests: We can have them both. www.profor.info/content/food-and-forests-we-can-have-them-both


Mozambique remains a highly forested country, but deforestation has been steadily increasing since 2000. The majority of deforestation and forest degradation is related to unsustainable agricultural practices and timber extraction. Mozambique’s forests contribute with multiple social, economic and environmental benefits, which continue to be threatened in spite of current responses.

Drivers of deforestation

Smallholder farming
Small-scale agriculture is a major cause of forest loss (1, 4), accounting for 46% of biomass loss in one study of central Mozambique (5, 6). According to Global Forest Watch (GFW), small-scale agriculture accounted for more than 90% of total forest cover loss from 2001-2015 (7).

Fuelwood and charcoal production
Fuelwood and charcoal production are the next most cited drivers of deforestation (1, 4, 6, 10), including both local fuelwood collection (8) and charcoal production to meet urban energy demand (9).

Urban expansion
Urban expansion has been associated with 12% of deforestation in Mozambique (7). According to GFW data, this was a small but consistent driver of permanent deforestation between 2001-2015 (5).

Small-scale timber extraction
Logging is a small but steady driver of deforestation (11, 12, 13). Illegal logging has been a persistent problem (12), but has also received government attention for reform (13). Mozambique is among the top African timber exporters to China (11, 14).

Large-scale agriculture
Large-scale agriculture is a very small contributor to deforestation (8, 10). Limited to 3% of biomass loss for one study in central Mozambique (11). Large-scale agriculture expansion into forest land has accordingly been much smaller than small-scale agriculture expansion in forest land (1).

Fires
Wildland fires have long been a cause of some deforestation in Mozambique, primarily linked to purposefully set fires for land clearing (12, 13).

Underlying causes
Underlying drivers of deforestation in Mozambique are broadly linked to technological (such as inefficient use of fuelwood), demographic (high demand for wood from urban areas), economic (inefficient commercial agriculture markets) and institutional factors (limited institutional and law enforcement capacity) (10). Additional underlying drivers include urban energy demand (11), population pressure and food insecurity (13).

Key responses

<table>
<thead>
<tr>
<th>Countries, region</th>
<th>Mozambique, Southern Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest type</td>
<td>Subtropical forests</td>
</tr>
<tr>
<td>Total area</td>
<td>21.9Mha</td>
</tr>
<tr>
<td>Forest area in 2018</td>
<td>9.0Mha (40.9% of total deforestation front area)</td>
</tr>
<tr>
<td>Forest loss 2004-2017</td>
<td>0.3Mha (2.7% of forest area in 2000)</td>
</tr>
<tr>
<td>Location of deforestation</td>
<td>Mostly in the west and east, although relatively scattered</td>
</tr>
<tr>
<td>Total forest core area in 2018</td>
<td>2.8M ha (31.0% of forests in 2018)</td>
</tr>
<tr>
<td>Fragmented forests 2000-2018</td>
<td>1.5M ha (15.6%, of forest area in 2000)</td>
</tr>
<tr>
<td>Accumulated burned area, 2002-2019</td>
<td>5.0Mha (51.5% of forest area in 2000)</td>
</tr>
<tr>
<td>Deforestation trend</td>
<td>Increasing, with oscillations</td>
</tr>
<tr>
<td>Future trends</td>
<td>Small-scale agriculture is likely to remain an important driver of deforestation</td>
</tr>
</tbody>
</table>

Land-use zoning — community forestry
Zoning exercises have been conducted in several areas (5). Integrated policies (9) and additional support for community forestry and agroforestry have been called for (4).

Recognition of IPLCs
Community registration of land-use rights for local communities has been ongoing since the 2000s. Mozambique’s legislation on community land-use rights is thought to be among the most progressive in Africa (9).

Timber legality
Mozambique introduced governance reforms in the forest sector to limit illegal logging in 2018 (21), and has implemented export bans on raw logs and total bans on several species (22).

Protected areas
Protected areas in Mozambique, such as the Niassa National Reserve, have been found to have lower deforestation rates than surrounding areas (22).

REDD+ strategy
REDD+ is often listed as a response option (4, 8) and the country has developed its national REDD implementation strategy (23).

Voluntary standards
Mozambique had 60,000ha of FSC-certified forest as of 2015 (24). This is a small area but represents the majority of planted forest land in Mozambique.

Fire management
Various fire management policies have been implemented, including both support for fire management in parks and community-based fire management.
Main outcomes

Small-scale agriculture continues to be a primary driver of deforestation, while wood energy demand, illegal logging and urban expansion are important secondary drivers. Underlying drivers of deforestation related to limited institutional and law enforcement capacity indicate that deforestation may continue.

Recommended future actions

- Implement policy and governance initiatives for curbing deforestation\(^{(25)}\), building on recent efforts around land-use zoning and timber legality.

References

5. WRI. Global Forest Watch Dashboard.
7. IUCN. Mozambique Restoration Opportunities Assessment (ROAM).
DEFORESTATION FRONT

MADAGASCAR

Madagascar has been impacted by significant deforestation in the past, but primary forests still account for a quarter of forest cover. The island nation of Madagascar has developed its own distinct ecosystems and extraordinary wildlife. Around 95% of Madagascar’s reptiles, 89% of its plant life, and 92% of its mammals exist nowhere else on Earth. The forests are under growing pressure from agriculture, fuelwood and charcoal extraction, and also from uncontrolled fires.

Drivers of deforestation

Smallholder farming
Small-scale agriculture, largely slash-and-burn, is a major cause of forest loss, and has cultural importance(1-5). Some small-scale agriculture is for cash crops, such as maize and peanuts(6), and for international markets, such as vanilla(7).

Fuelwood and charcoal
Fuelwood and charcoal demand is an important driver of deforestation(1-4, 7-9). As charcoal is a primary cooking fuel in urban areas, charcoal-related deforestation grows out of urban areas(8).

Fires
Both uncontrolled wildfires and fires set for grazing lands, often related to cattle ranching, have contributed to deforestation for a long time(9). Fires are also sometimes accidentally started by charcoal makers(10).

Cattle ranching
Cattle ranching has been a long-time driver of deforestation in Madagascar(2, 7).

Small-scale logging
Commercial logging is a minor driver of deforestation(10). Illegal logging of rare wood such as rosewood is significant(12, 13).

Mining operations
Both large-scale and artisanal mining, including gemstone mining, are contributing to deforestation in remaining forest areas(14).

Road expansion
Transport infrastructure is a persistent factor in deforestation in Madagascar(15, 16).

Underlying causes
Underlying drivers of deforestation include migration and property rights(7), as well as demographic growth and governance(2), and limited law enforcement. Economic factors are also important: a sustainable financial mechanism to combat deforestation is lacking.

Main outcomes
Small-scale agriculture and wood energy demand continue to be primary drivers of deforestation.

Recommended future actions
- Enforce existing laws to combat deforestation(20), in combination with a sustainable financing mechanism for forests.
- Initiate spatial coordination of agricultural and forest land at the district or landscape level.
- Promote reforestation, agroforestry and alternatives to cooking with wood and charcoal, as this is a primary driver of deforestation.
References


Cambodia boasts diverse forest ecosystems, including the largest intact dry forests in Indochina—a mosaic of habitats home to large quantity and diversity of species. Deforestation between 2001 and 2018 was among the highest in the world and the remaining high value forests continue to be under pressure from population growth, illegal logging and land concessions. In recent years, the government has implemented stricter measures to crack down on illegal timber trade and land deals.

**Underlying causes**

Forest governance challenges include limited law enforcement capacity and lack of coordination between ministries responsible for forest management, ELCs and land titles. This can lead to overlapping claims as well as weak management coordination of social land concessions and ELCs in high value forests areas. Illegal logging also remains a challenge. Forest sector reform suffers from limited technical and institutional capacity and resources in forest management (knowledge, human resources, etc.). Increasing regional and global market demand for agricultural commodities and forest sector reforms in neighbouring countries, such as logging bans, have increased pressure on Cambodia’s land sector.

**Drivers of deforestation**

<table>
<thead>
<tr>
<th>Drivers of deforestation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large-scale agriculture</td>
<td>Large-scale industrial agriculture plantations are established through economic land concessions (ELCs) by local and international companies. Rubber is the most significant commodity in the deforestation front, accounting for half of total ELC areas of 2.2Mha. In some cases, the use of ELCs has been alleged as an instrument to legally log timber (conversion timber).</td>
</tr>
<tr>
<td>Smallholder farming</td>
<td>In 2014, 1.2Mha of forest area was de-gazetted to issue land titles to landless communities. Alongside legal conversion, there is also illegal conversion by land speculators. The relative role of subsistence farming as a deforestation driver has been decreasing over time but remains significant in relatively remote areas (e.g., north-western uplands).</td>
</tr>
<tr>
<td>Urban expansion</td>
<td>Expansion of settlements in rural areas has been triggered by population growth and social policies encouraging rural migration and resettlement.</td>
</tr>
<tr>
<td>Illegal logging</td>
<td>Timber concessions for selective logging are effectively suspended, but illegal logging of high value species from forestlands adjacent to ELCs, mining concession areas and hydropower projects has been alleged; timber is then “laundered” to become legal.</td>
</tr>
<tr>
<td>Fuelwood/charcoal</td>
<td>Over 80% of the population (both rural and urban) relies on traditional biomass for cooking. It is estimated that a typical household may consume 1-2 tonnes of fuelwood per year.</td>
</tr>
<tr>
<td>Fire</td>
<td>90% of dry season forest fires are caused by smallholders and industrial plantations clearing land for crops. Climate change is exposing forests to a longer dry period, reducing forest productivity and resilience, and increasing the risk of fire.</td>
</tr>
<tr>
<td>Tree plantations</td>
<td>Over 100,000ha of ELCs allocated for pulp and paper plantations. Outside ELCs, instances of conversion of natural forests to tree plantations by foreign aid programmes within the context of climate change mitigation have been reported (e.g., in Prey Long forest).</td>
</tr>
<tr>
<td>Mining operations</td>
<td>The mining sector in Cambodia is considered not well developed and small scale. Most mining concessions are in east and northeast Cambodia for metals, industrial minerals, energy and gemstones, with few in production. Actual mining operations may have limited deforestation impact, but can be a source of illegal logging and forest degradation. Unlicensed artisanal gold mining operations are widespread and bring multiple social and environmental challenges.</td>
</tr>
<tr>
<td>Hydropower</td>
<td>As of 2019, seven dams are in operation with combined output of 4,700GWh in 2018, a more than 60% increase from 2017. The latest and biggest Lower Sesan II dam, with reservoir size estimated at 7,560ha to 33,560ha, has caused large-scale destruction and community displacement via roads, reservoir and flooding.</td>
</tr>
<tr>
<td>Road expansion</td>
<td>Presently not a major driver, road networks will become increasingly important. Cambodia has over 61,000km of road network, most of which is unpaved rural roads. The proposed development of national roads, such as the Northern Sub-corridor (which runs through the deforestation front), can trigger large-scale destruction and community displacement via roads, reservoir and flooding.</td>
</tr>
</tbody>
</table>

**Main outcomes**

Protected areas are found to be representative of forests of biodiversity priority and high carbon density. Lower deforestation rates are found inside protected areas than outside, but not all types are equally effective. Allocation of social land concessions to poor landless families is linked to forest loss, but tenure security of local communities can be an effective strategy to reduce deforestation and forest degradation. Approximately one-third of forest loss nationwide between 2000 and 2016 may be attributable to ELCs, but the rate may be slowing due to moratoria on new concessions and cancellation of some ELCs. Recent government efforts to tackle illegal logging and timber trade have sent positive signals about its commitment to improving resource governance.
Key responses

Protected areas

- Protected areas have expanded significantly in Cambodia, totalling 7.5Mha (41% of country land cover)[27]. New protected areas totalling more than 62,000ha were established in 2018[28].

Recognition of IPLCs

- Through social land concession allocation and land registration, increasing areas of forestland are being granted to poor landless households for residential use and farming. Additionally, the National Forest Programme (2010-2029) set a target to allocate 29Mha of production forest for establishing community forestry and to allow those living within protected areas to establish community protected areas[29].

Moratoria

- Timber concessions for selective logging are effectively suspended[30]. The moratorium on granting new ELCs in 2012 increased the rate of forest loss inside existing ELCs in the short term due to the fear of concession licences being revoked[31]. The government has also postponed the construction of new hydropower dams on the Mekong River for 10 years[32].

Payment for ecosystem services (PES)

- PES schemes are currently being implemented at small scale with some success in reducing deforestation[33]. Well-designed PES projects have large potential as a vehicle for developing a green economy[34], but some of these PES projects face challenges including unclear legal frameworks and property rights and the lack of sustainable financing mechanisms[35].

REDD+ projects

- The national REDD+ strategy was officially endorsed in 2017 and is at the core of Cambodia’s nationally determined contributions (NDC) to the Paris Agreement. The REDD+ action and investment plan was drafted in 2019 and several pilots are now in place[36].

Timber legality

- In earlier 2019, the government established a National Commission on Anti-Forestry Crimes aiming to crack down on all illegal logging and timber trade across the country. As a result, a few ELCs have been confiscated and several high-profile illegal-logging perpetrators have been arrested and prosecuted.

Recommended future actions

- Invest more resources in proper management with adequate capacity in protected areas.
- Promote spatial planning for land use at landscape level to better allocate land for economic development and conservation.
- Continue efforts to strengthen land management, forest governance and law enforcement.
- Improve agricultural productivity for smallholders to decouple population growth and deforestation[37].

References

23. WWF. 2018. WWF-Cambodia congratulates government on the designation of Sambo and Phraos as Wildlife Sanctuaries.
LAOS

Laos maintains some of the largest remaining intact forests in mainland Southeast Asia, which are home to diverse species. People are heavily dependent on forests for food, water, energy and income. Surrounded by more economically advanced neighbours, the country is susceptible to external investment in the land and energy sectors driving deforestation.

Drivers of deforestation

Smallholder farming
Under contract farming schemes, large areas of forest are converted to annual crops (e.g. maize, cassava, sugarcane) and commercial perennial plantations (e.g. rubber, coffee, cacao, pepper) for regional and global markets[3]. Shifting cultivation practised by nearly 70% of Lao population drives forest degradation rather than deforestation[4]; however, fallow lands are more prone to conversion[4,5,6]. When plantations are established on fallow lands, communities go further into forests to clear land for farming[6].

Large-scale agriculture
Rubber, sugarcane, biofuel and coffee are the major commodities in southern Laos[7]. Commercial agriculture is fragmented with average concession size under 500ha[7]; often in areas relatively accessible from the nearest district capital[8]. In some cases, the granting of concessions has been used as a mechanism to circumvent the timber logging ban[9].

Tree plantations
Both concessions and smallholder plantations of fast-growing trees such as eucalyptus and acacia have been promoted[8,9]. Approximately 0.5Mha of plantations have been established in Laos[10,11]. Legally, industrial tree plantations can be developed only on degraded or barren land, but in reality they are often established on forested land[11].

Hydropower
Several dam projects and power line construction have led to large-scale forest clearance. Displacement of communities by hydropower projects indirectly contributes to deforestation away from the project sites[11].

Transport infrastructure
Distance to main roads was one of the most important predictors of forest cover decrease between 2006 and 2012[4]. Laos has the least developed rail, waterway and road network in the region. More investment in transportation infrastructure, including major projects such as East-West Corridors, will have impact on forest cover change[11,12].

Mining operations
Mining is the most significant subsector in terms of total projects and area under investment (21% and 50% respectively)[13,14], though the forest area cleared for mining sites is much smaller than the concession area. Estimated 5,000ha-14,000ha deforestation by mining, per year, with both large-scale and artisanal mining contributing[15].

Logging
Commercial logging as a driver may be declining in recent years due to stricter law enforcement[14,15]. but logging for household consumption has increased as rural population grows[16]. Despite stricter law enforcement, illegal logging remains widespread, often carried out by local villagers who may work as hired laborers for Vietnamese traders or by concession holders who clear forest beyond their premises[17].

Fuelwood and charcoal
Mostly for subsistence consumption but also for local and regional markets through vast web of informal networks[16,17].

Responses

Protected areas
The 2007 Forest Law classifies two types of forest for protection – protection forests (for ecosystem services) and conservation forests (for nature and biodiversity)[18,19]. Laos has 24 national protected areas[20] but no complete inventory exists for provincial or district protected areas. IUCN-registered protected areas cover 3.86Mha (16.7% of land area)[21].

Tenure rights
Customary tenure rights associated with shifting cultivation exist in most rural, mountainous areas. A land titling programme funded by donor agencies in the 1990s and 2000s sought to promote land rights by delineating village boundaries and developing village land management plans[22].

Land-use zoning
Numerous programmes actively support land-use planning, including a new initiative to in villages around Xe Sap protected area in the south of Laos[23].

REDD+ projects
REDD+ projects in Laos are mostly small-scale, early stage pilots[24].

Voluntary standards
Limited uptake of forest certification; however, a nationwide decade-long effort to promote the development of forest management plans at village level helps the first step of putting sustainable harvesting into practice

Rural livelihoods development
Numerous sustainable livelihoods projects/programmes led by government, local civil society organizations and international NGOs.

Underlying causes
The proximity to Vietnam and Thailand, major regional and global hubs for commodity processing, makes the country susceptible to external investment in the land and energy sectors driving deforestation. Poverty coupled with heavy reliance on natural resources for both livelihoods and national economy put strain of forests[25]. Forest laws and policies are well designed, but lack of capacity and institutional inefficiencies at multiple levels hamper their implementation and enforcement[26].
Main outcomes

Two out of Laos’ three protected area categories have a negligible impact on deforestation, while the strictest protection category has reduced deforestation rates by 24 to 33%; however, many PAs are not in impact on deforestation, while the strictest protection category has

Recommended future actions

- Promote landscape-level land-use planning that includes mapping and strengthening of the management plan of high conservation value forests.
- Establish community-based economic development models in protected area buffer zones that include equitable benefit sharing from ecosystem services provision.
- Scale up improved plantation forest management and sustainable supply chains of timber and other forestry products (e.g. rubber), with the use of forest certification wherever feasible.

References

4. Phompia, C., Lewis, M., Otsendorf, B., and Clarke, K. 2017. Forest cover changes in Laos tropical forests. Physical and socio-economic factors are the most important drivers. (Unpublished).
DEFORESTATION FRONT

The forests of Myanmar are home to incredible biodiversity, including important tiger and Asian elephant populations. But from 2010 to 2015 Myanmar had the third highest annual net loss of forest area in the world, losing an average of half a million hectares of forest every year. Agricultural conversion, logging and infrastructure development threaten the forests that millions of people rely on directly for their livelihoods.

Drivers of deforestation

Large-scale agriculture
Common crops (rice, nut trees, maize, rubber and oil palm) were responsible for 1Mha of forest conversion between 2002 and 2014. Most large-scale agriculture concessions were allocated in forest reserves, mainly in Kachin and Tanintharyi, in heavily forested and politically contested regions. Rubber and oil palm plantations are both concentrated in the south, and suffer from low productivity and lack of oversight. Less than half of rubber plantations are tapped; one-third of plantations are planted outside concession boundaries. Logging is a motivation for companies to acquire agricultural concessions (legal conversion). Based on the government's new economic policy and spatial modelling of cropland expansion, forest conversion for agricultural production is expected to increase.

Logging
Legal and illegal logging are leading causes of forest degradation, but can also be linked to deforestation. Logging in excess of annual allowable cut is common and illegal logging increased significantly after legal logging. A large proportion of logs exported from Myanmar into global markets are illegal, mostly transported by land from Kachin state to China as well as to Thailand and Viet Nam. Based on the government's new economic policy and spatial modelling of cropland expansion, forest conversion for agricultural production is expected to increase.

Smallholder farming
Progressive shift from smallholder farming (1975-1990) to industrial plantations (post-2000). Shifting cultivation's significance has decreased since 2000 and is expected to decrease further. In southern Myanmar, the traditional practice of shifting cultivation has mostly disappeared, but establishment of permanent orchards by smallholders has increased.

Hydropower
Between 2002 and 2014, 140,000ha forests were affected by hydropower development, with an additional 250,000ha potentially affected by planned projects. Logging in anticipation of proposed dam projects is also common (legal conversion). Some projects have been suspended due to public outcry over environmental and social impacts (e.g., Myitsone Dam in Kachin state would inundate 76,600ha of forest).

Mining
90,000ha of potential mining sites identified (including 52,000ha operating sites), mostly in the north (Kachin, Sagaing). Significant expansion in 2002-2015 and new mining legislation intends to encourage more foreign investment.

Fuelwood and charcoal
85% of Myanmar’s population depends on wood and charcoal for fuel. Annual fuelwood extraction increased from 68 million m³ to 86 million m³ between 2000 and 2013. Increase in rural settlement areas has led to greater demand for fuelwood in nearby forest, Additionally, charcoal export to China increased by more than 2,500%.

Transport infrastructure
Road infrastructure tends to be poorly planned and designed, which has contributed directly to forest loss and soil degradation. In Kachin and Shan states, road construction has been followed by the establishment of rubber concessions.

Underlying causes
Overlapping and conflicting priorities and agendas by the forestry and agriculture sectors and weak tenure security are main causes. Political and military conflicts are linked to lower deforestation in conflict areas, but result in higher deforestation elsewhere due to displacement of communities and lack of law enforcement. Deforestation also increased following the ceasefire. Domestic, regional and global demand for natural resources, energy and commodities, especially from China, also puts pressure on forests.

Main outcomes
Area-based interventions can be effective when adequately implemented, but are hampered by the lack of coordination across different government agencies and sectors. Sector-based interventions are only emerging so their effectiveness remains to be seen.

Recommended future actions
- Implement zero-deforestation supply chain commitments for rubber and other commodities.
- Promote timber legality and community forestry.
- Strengthen and scale up land-use planning that incorporates enforcement, community-based support, private sector investment and spatial monitoring.
Key responses

Protected areas
The Myanmar government has a target of formally designating 10% of the country’s area for its protected area system[23] (current 6.35% or 4.277Mha[24]). Preliminary evidence suggests forest loss is lower inside national parks than in surrounding areas[25].

Recognition of IPLCs
The 2012 Farmland Law allows farmland cultivation rights to be attained and traded through land-use certificates, but only 15% of households obtain the certificates[26]. Also ongoing efforts to establish community forestry with 3,840 groups covering 2,170,000ha formed by 2017, with mixed results[27].

Land-use zoning
Inactive concessions on forest reserves with intact forest cover were cancelled under the Vacant, Fallow and Virgin Land Law and efforts to secure remaining HCV forests have been initiated[28]. Multiple international environmental NGOs are engaged in Tannintharyi to help devise land-use planning taking into consideration natural capital and species conservation as well as social needs[29].

REDD+ related initiatives
The government began implementing its UN-REDD national programme in 2016[30]. The government has also proposed to reduce deforestation by 50% and restore 900,000ha by 2030 (pending for final approval) as part of its nationally determined contribution (NDC) under UNFCCC.[31]

Timber legality
Log export ban enacted since 2014, yet cross-border trade with China has continued, especially for high value species[32]. Voluntary partnership agreement (VPA) negotiations with the EU began in 2013 with ongoing progress in capacity building for civil society and development of timber legality assurance systems[33]. Engagement of civil society has potential to address underlying causes of deforestation[34].

Traceability of supply
Myanmar joined the Extractive Industries Transparency Initiative (EITI) in 2014, covering mining and timber sectors. It has achieved “meaningful progress” status[35] but it is too soon to tell if this will have measurable impacts on deforestation. The Global Platform for Sustainable Natural Rubber was launched as a multistakeholder platform to, among other objectives, increase supply chain transparency and traceability[36].

References
24. IUCN. 2020. IUCN Protected Planet Database. Available from: www.protectedplanet.net/country/MM.
SUMATRA

The island of Sumatra has a long history of human intervention and comprises a diversity of land uses involving smallholder farming and large-scale plantations for palm oil and pulpwod production. Much of the population is rural but there is increasing urbanization and infrastructure expansion. A significant portion of Sumatra’s natural forests have been lost since the mid-1980s.

Drivers of deforestation

Large-scale oil palm plantations
Expansion of oil palm plantations (8Mha) has been another important driver of deforestation in both logged forests and peatlands[1]. Palm oil processors have more processing capacity than they can supply from their own plantations, so the industry relies on third party suppliers including ‘independent smallholders’[2] without having full traceability to raw material origins.

Tree plantations
Natural forest clearance to produce pulp and develop pulpwod plantations has been one of the main drivers of deforestation in Sumatra, with Riau province having the highest area of pulpwod plantation concessions (4.8Mha)[1]. There is a gap between wood supply from existing plantations and existing and planned milling capacity[3], exacerbated by extensive forest/land fires in 2015, and the industry continues to be involved in deforestation.

Smallholder farming
Linked to a significant increase in ‘independent smallholder’ supplying palm oil[4]. Often these farmers face several constraints to adopt improved production practices[5].

Fires
Fires are often used to clear land after deforestation before planting crops or developing plantations[6]. Use of fires is problematic, especially on Sumatra’s deforested peatlands that are drained by the pulp and paper and palm oil industries to maintain their plantations and made vulnerable to being burnt for a long time[7].

Road expansion
There is an expanding network of local roads, and the completion of the Trans-Sumatra Highway could threaten three critical areas of remnant forests by facilitating human incursions[8].

Mining operations
There are several large-scale mining operations, along with small-scale coal mining[9] and small-scale gold mining, e.g., in West Sumatra. These operations tend to place indirect pressures on forests[10].

Commercial logging
Encroachment and illegal logging in retired logging concessions has decreased but still occurs. Localized illegal logging at smaller scales is difficult to stamp out[11].

Underlying causes
Underlying causes are related to business and government emphasis on using natural resources as the main driver of economic development, which results in land allocation for plantations and mining. These activities are associated with speculative land occupation and increased rural population pressure. A related issue is the lack of incentive systems for local stakeholders to protect their forests.

Deforestation trends
Deforestation persists but has tended to stabilize, with oscillations, in the last few years. According to official estimates, deforestation in Sumatra was higher between 2006-09 and increased again in 2015, but has decreased since[12]. Only 20% of Indonesian deforestation in 2017-18 was in Sumatra[13].

Main outcomes
Protected areas have not been effective in halting deforestation across the region given their limited coverage, and their exposure to encroachment[14]. The moratorium on new permits for the conversion of primary forest and peatlands[15] and the more recent moratorium on the conversion of peatlands have contributed to reducing deforestation and pressure on peatlands[16]. Voluntary zero-deforestation commitments by palm oil companies have been inadequate in preventing deforestation since they exclude a number of medium-size plantations, and have limited influence on the performance of smallholders[17] – indeed, a lack of plantation traceability means smallholders and their risks are not even identified. Companies have not restored peatlands despite the legal requirements, which have also recently been revoked[18].

Recommended future actions
- Improve alignment between government policies and global market trends and efforts to curb emissions from land-use change and deforestation.
- Ensure that government policies to stop deforestation and conversion and restore peatlands are more strongly implemented and followed by commercial actors in the field.
- Strengthen coordination between key stakeholders across sectors as well as national and provincial governments to ensure that plantation expansion into forest areas and peatlands is being constrained at all levels.
- Enhance monitoring of zero deforestation commitments made by major producers, buyers and investors while ensuring greater transparency and disclosure of progress.
- Expand efforts to support smallholders to implement best management practices and access finance and premiums markets.
- Develop partnerships to link corporate actors and government bodies to advance sustainable supply and conservation, embracing wider landscape approaches.
To regulate forest conversion, the government issued a moratorium on new conversion permits in primary forests and peatlands in 2011[17], and in 2016 enacted a moratorium banning expansion in peatlands[18]. In 2018, the president enacted a moratorium on new oil palm plantation licenses for three years and a review of existing palm oil company licenses.

Some provincial governments have developed land-use plans that guide land allocation decisions and green growth plans, e.g. in Aceh[19] and South Sumatra[20].

Measures to prevent fire have been associated with the moratorium on peatlands as well as with regulations and efforts towards peatland restoration and greater enforcement[21].

The largest palm oil corporate groups embraced Roundtable on Sustainable Palm Oil (RSPO) certification and deforestation-free commitments, yet their implementation has varied. Some corporate groups are individually progressing in putting in place traceability systems, and a coalition of palm oil producers and buyers has taken action to ensure that palm oil comes from RSPO-certified sources. A critical test of the industry’s credulity is whether companies are meeting their deforestation commitments.

Several specific projects and initiatives have been implemented at the local level to support sustainable supply, accompanied by efforts to make deforestation easier to detect.

Several projects and initiatives have been identified by UN-REDD by 2013 with a varied focus on rehabilitation of mangroves, peatland restoration, ecosystem restoration, and others[22]. On rehabilitation of mangroves, peatland restoration, ecosystem restoration projects and others[22]. REDD+ projects were identified by UN-REDD by 2013 with a varied focus on rehabilitation of mangroves, peatland restoration, ecosystem restoration, and others[22].

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Global Environmental Change 57: 101933.

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**DEFORESTATION FRONT**

**BORNEO**

The island of Borneo contains highly biodiverse forests, and communities with rich cultures and strong relationships with the forests. Pressure from logging operations, followed by in-migration and plantation developments have placed pressure on forests, affecting mainly lowland and peat swamp forests. Multiple efforts have been implemented by government and the private sector to guide land use and support local populations, yet several challenges persist to conserve the remaining natural forests.

**Drivers of deforestation**

**Tree plantations**
- Pulp and wood plantations developed in Indonesian Borneo reached about 5.9Mha in 2014. Much of this expansion has been in lowland forests in West and East Kalimantan[10]. In Indonesian Borneo, the expansion of tree plantations has been declining since the early 2000s with some oscillations[11], but tree plantations have increased since 2010 in Malaysian Borneo[10].

**Large-scale oil palm plantations**
- Oil palm plantations are an important source of revenue[12-13], and have expanded in logged forests and peatlands[14]. Oil palm covered 2.4Mha in 2005, doubled to 4.9Mha in 2010, and reached more than 7Mha by 2015[11]. The expansion has recently declined from more than half a million hectares annually on average in 2008-2012[15], but companies hold large forested areas as “land banks”[16].

**Smallholder farming**
- Expansion of smallholder farming systems and, more importantly, adoption of oil palm by smallholders in Indonesian Borneo have increased pressures on forests[17]; this is also linked to in-migration to palm oil production zones, and plantation workers investing in small-scale oil palm plantations[18]. In Sabah state in Malaysian Borneo, smallholder rubber plantations are also leading to deforestation[19].

**Fires**
- Traditionally used for clearing land, but often spreads into drained peatlands. Some burnt tracts of forest do not recover, and tend to convert into shrubland and grasslands[20]. In Sarawak, where oil palm plantations are not allowed to use fire for land clearing, fires are rare.

**Transport infrastructure**
- There is ongoing expansion of tertiary and local roads into the heart of Borneo. Planned road investment associated with the Pan-Borneo Highway may increase pressure on forests[21]; several hydropower dams have been developed in Sarawak that resulted in localized deforestation where dam reservoirs were created, particularly during the period between 2000 and 2015.

**Timber extraction**
- Poor forest management of production forest areas often leads to forest degradation. A portion of these forests that have a lower commercial value for timber have been exposed to encroachment and conversion to other land uses, including plantations[22].

**Mining**
- In Indonesian Borneo, mining operations, mainly for coal, are small in area but have indirect impacts on road expansion and influx of people[23]; dynamics depend on oscillating demand[24]. Gold mining is gaining momentum in Sabah (Malaysian Borneo)[25].

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**Underlying causes**

Underlying causes differ between Indonesian and Malaysian Borneo. In Indonesia, they are linked to misguided policies and processes of land concession allocation, along with land appropriation involving local elites[26]. Foremost among these is the prioritization of mining and plantation licences (considered strategic for national development) over commercial logging in production forests. Investments in mining and plantations, following growing international and domestic demand for commodities (e.g. palm oil, coal), have also fuelled forest conversion, as well as pressures due to in-migration to frontier areas.

**Main outcomes**

Illegal logging has declined due to timber monitoring efforts[27], which have been complemented with increased monitoring of deforestation in Sarawak[28]. In Indonesian Borneo, deforestation from industrial oil palm plantations has decreased over time, which results from strengthened law enforcement to prevent forest fires and land clearing[29], and likely from the moratoria on forest and peatland conversion. Certification of oil palm plantations may have contributed to reduced deforestation, but not fire or peatland clearance[30]. There has not been any significant fire on peat in Sarawak in recent years due to stringent regulations. In Indonesian Borneo, remaining deforestation is associated with pressure from smallholders and medium-size plantations that do not have zero-deforestation commitments or other voluntary commitments. The difficulty for small- and medium-scale operations to comply with these commitments has called into question their potential to prevent deforestation and peatland conversion at regional scales[31].

**KEY FACTS**

<table>
<thead>
<tr>
<th>Countries, region</th>
<th>Malaysia (Sarawak and Sabah), Indonesia (Kalimantan) and Brunei</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest type</td>
<td>Humid tropical forests (lowland and upland), montane forest, peat swamp forests</td>
</tr>
<tr>
<td>Total area</td>
<td>35.5Mha</td>
</tr>
<tr>
<td>Forest area in 2018</td>
<td>21.5Mha (60.7% of total deforestation front area)</td>
</tr>
<tr>
<td>Forest loss in 2004-2017</td>
<td>5.8Mha (21.9% of forest area in 2000)</td>
</tr>
<tr>
<td>Location of deforestation</td>
<td>In Indonesian Borneo, deforestation is slowing in West and Central Kalimantan, and increasing in East Kalimantan. In Malaysian Borneo, deforestation in absolute terms has been higher in the state of Sarawak[32].</td>
</tr>
<tr>
<td>Total forest core area in 2018</td>
<td>11.3Mha (52.7% of forests in 2018)</td>
</tr>
<tr>
<td>Fragmented forests 2000-2018</td>
<td>3.3Mha (12.4% of forest area in 2000)</td>
</tr>
<tr>
<td>Accumulated burned area, 2002-2019</td>
<td>1.2Mha (4.6% of forest area in 2000)</td>
</tr>
<tr>
<td>Deforestation trend</td>
<td>Deforestation increased up to 2015, followed by a decrease since then. In Indonesian Borneo, official estimates indicate that deforestation remained between 200,000 ha and 300,000 ha per year between 2000 and 2014, and was around 500,000 ha in 2015[33], decreasing since then to 150,000 ha in 2017/18[34].</td>
</tr>
<tr>
<td>Future trends</td>
<td>Deforestation may continue expanding, but likely to slower rates</td>
</tr>
</tbody>
</table>

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**Notes**

- Primary cause of forest loss and/or severe degradation
- Secondary cause of forest loss and/or severe degradation
- Less important cause of forest loss and/or severe degradation

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**Forest loss**


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**Protected Areas**

- Forest
- Deforestation Front
Deforestation may continue expanding, but likely to slower2014, and was around 500,000 ha in 2015200,000 ha and 300,000 ha per year between 2000 and1.2Mha (4.6% of forest area in 2000)

In Malaysian Borneo, deforestation in absolute terms hasand Central Kalimantan, and increasing in East Kalimantan.

1.2Mha (4.6% of forest area in 2000)

Implement more active policies supporting local livelihoods and avoiding further

Clarify tenure for local villagers and those settled in public lands, and improve

Cap the expansion of large-scale plantations in Indonesian Borneo, following the

The main palm oil corporate groups (e.g. Cargill, GAR, has varied but ISPO is still very much part of the palm oil requirement for all commercial plantation operators. Progress

place traceability systems to trace third-party suppliers[28]. In Sarawak, certification is mandatory for all timber concessions[32].

To date, 27 REDD+ projects have been established in Kalimantan, and a few in Sabah, with diverse targets, timelines, scope and operational approaches[27].

The largest palm oil corporate groups have embraced Roundtable on Sustainable Palm Oil (RSPO) certification and deforestation-free commitments, and some have put in place traceability systems to trace third-party suppliers[4]. In Sarawak, a timber legality assurance system was issued in 2016, and a similar system was issued in Sarawak in 2018[28].

In 2011, the government of Indonesia introduced the Indonesian Sustainable Palm Oil (ISPO) scheme as a requirement for all commercial plantation operators. Progress has varied but ISPO is still very much part of the palm oil sustainability plans. In 2017, the Malaysian government announced that the Malaysian Sustainable Palm Oil standard would be mandatory for all palm oil areas by 2019[27], yet this deadline was not met and was pushed to 2020.

Several specific projects and initiatives have been implemented at the municipal level to de-risk investments, mainly to support sustainable palm oil supply[27].

Several projects exist to enhance land management and agricultural supply and build alternative livelihoods, such as those implemented by IDH in West Kalimantan[23].

In 2009, the Indonesia government established a timber legality assurance system known as SVLK. It was recognized as the basis of the EU voluntary partnership agreement that came into effect in 2014[12]. In Sabah, a timber legality assurance system was issued in 2016, and a similar system was issued in Sarawak in 2018[28].

Provincial governments have developed land-use plans that guide land allocation decisions, accompanied by green growth policies2014. Sarawak has a land-use policy to set aside at least 57% of land to be used permanent forest and protected areas. In Sabah, the land-use policy aims to set aside 30% of land under protected areas and 50% under forest cover[22].

Key responses

The Indonesian government issued a moratorium on new conversion permits in primary forests and peatlands in 2011[13,14], and in 2016 enacted a moratorium banning expansion in peatlands[15]. Sarawak has announced no more new development on peat and no new licences for timber concessions[22].

Deforestation may continue expanding, but likely to slower

To date, 27 REDD+ projects have been established in Kalimantan, and a few in Sabah, with diverse targets, timelines, scope and operational approaches[27].

Several specific projects and initiatives have been implemented at the municipal level to de-risk investments, mainly to support sustainable palm oil supply[27].

Several projects exist to enhance land management and agricultural supply and build alternative livelihoods, such as those implemented by IDH in West Kalimantan[23].

Recommended future actions

1. Strengthen the coordination and enforcement of land-use regulations, and continue to constraint expansion of plantations in peatlands.
2. Cap the expansion of large-scale plantations in Indonesian Borneo, following the models adopted by governments in Sarawak and Sabah.
3. Clarify tenure for local villagers and those settled in public lands, and improve incentives to enhance the productivity and environmental performance of smallholders.
4. Implement more active policies supporting local livelihoods and avoiding further land encroachment.
5. Integrate support for fire management and alternative livelihoods for local villagers; and build technical, financial and institutional capacity for local villagers to manage and protect their forests.
The island of New Guinea is sometimes seen as the “last frontier”: it still has large natural forests with rich biodiversity and many indigenous groups. These forests, however, have undergone substantial losses — particularly in Papua New Guinea (PNG), but also increasingly in Papua Indonesia. The region is unusual in that the timber trade is still a major driver of forest loss, although it has now been overtaken by pulpwood and palm oil.

Drivers of deforestation

| Substitution agriculture | Probably largest cause of deforestation overall[8], relying heavily on swidden (shifting cultivation), although disputes remain about its relative importance compared to timber. |
| Logging | PNG was the world’s largest tropical timber exporter in 2014[9], as much as raw logs[10], 15Mha have been identified for timber but logging usually causes degradation rather than deforestation[11,2]. Most operations in PNG are probably illegal[12,13], whereas this is not the case in Papua Indonesia[14], where there were 73 concessions in 2018[15]. |
| Commercial agriculture | Increasing, including oil palm expansion[11] especially in PNG but also West Papua[16], where the legality of concession development has been questioned[17]. Smallholders are also changing from subsistence to commercial production of crops like sweet potato[17]. |
| Pulpwod plantations | There were 15 pulpwood concessions in 2018, responsible for clearing about 577,300ha of forest[19]. |
| Road expansion | An increasing pressure, with a decision to double the road network in PNG over the next three years, much of it through lowland forest[18], and for a Trans-Papua highway through Papua Indonesia[19]. |
| Mining operations | Mining is controversial[20] but only a minor direct cause of forest loss[21]. In 2018 in Papua Indonesia there were 120 concessions responsible for 75,500ha of forest loss since 2000[8]. |
| Fire | Fires occur, although their role in permanent forest loss is unclear[11]. |

Underlying causes

Forest loss in both countries has long been exacerbated by weak governance, internal political disputes and land tenure systems susceptible to exploitation by outsiders able to strike deals with local chiefs[21].

Countries, region

| Countries, region | Papua New Guinea (PNG), Indonesia (Papua) |
| Forest type | Upland/lowland tropical moist |
| Total area | 35.7Mha |
| Forest area in 2018 | 30.6Mha (85.7% of total deforestation front area) |
| Forest loss in 2004-2017 | 1.3Mha (4.0% of forest area in 2000) |
| Total forest core area in 2018 | 21.8Mha (71.4% of forests in 2018) |
| Fragmented forests 2000-2018 | 1.3Mha (4.1%, of forest area in 2000) |
| Accumulated burned area, 2002-2019 | 0.4Mha (1.2% of forest area in 2000) |
| Deforestation trend | Increased[17]; low official figures in Papua Indonesia disputed[21,22]. Also fragmentation[23]. According to official estimates deforestation in Indonesian Papua has doubled from about 40,000ha on average per year during 2006-2009 to about 80,000ha during 2014/15 and 2017/18[23]. |
| Future trends | Likely to increase if current trends continue |

Responses

| Protected areas | Protected areas covered 1,724,800ha of PNG, 3.69% of the country, and 6,844,900ha of remaining forest area in Papua Indonesia in 2018[24]. |
| REDD+ | Voluntary governance standards for REDD+ are being developed[22]. Most REDD+ schemes under discussion currently rely on reduced impact logging rather than setting forest aside from development[25]. |
| Land-use planning | The governors of Indonesia’s Papua and West Papua provinces signed a pledge to conserve 70% of the land in their jurisdictions[26]. The UK government is currently supporting work in Indonesian Papua to introduce a number of climate initiatives that aim to replace planned deforestation in the region[27]. |
| Voluntary standards | PNG recently launched a second version of a National Forest Stewardship Standard[28]; in late 2019 there were three certified companies and one application for Forest Stewardship Council (FSC) certified operations although one is currently in dispute[29]. |
| Sustainable forest management | In PNG, six schemes promoting small-scale timber operations by local communities, using portable sawmills, all failed to be financially viable once donor funding ceased[30]. |
| timber legality | Papua Indonesia has made strong commitments to conservation of its remaining forests, although it is still unclear how this will work in practice[31]. |
| Recognition of IPLCs | Customary land formalization has been introduced but the processes have sometimes been captured by powerful individuals or companies, so have contributed to neither poverty reduction nor forest conservation[31]. |

- Primary cause of forest loss and/or severe degradation
- Secondary cause of forest loss and/or severe degradation
- Less important cause of forest loss and/or severe degradation
Main outcomes

There are serious problems with the effectiveness of protected areas[22]. Papua has lost 46,678 ha inside protected areas since 2000[30]. The island is still heavily forested, particularly in the western half, but development is building. West Papua has some of the most intact tropical forest left in the world, so deforestation fronts here are particularly worrying.

Recommended future actions

- In Papua Indonesia, support the implementation of the provincial government declaration that commits to protect 70% of the land mass.
- Provide alternative economic development measures that align with providing incentives for government to maintain forest cover.
- Recognize Indigenous land rights and take local rights into account in any sustainable forest management.
- Increase the protected area network, while recognizing the challenge of integrating this into existing land tenure arrangements: this might be an area where other effective area-based conservation measures (OECMs) and REDD+ projects offer real advantages.
- Develop realistic pathways to promote sustainable forest management.

References

DEFORESTATION FRONT

EASTERN AUSTRALIA

The forests of Eastern Australia are considered a global biodiversity hotspot[1]. Nearly half of the original forested area has been lost, with great variation among forest types[2]. The once vast brigalow and grassy box forests of inland eastern Australia have been cleared below 10% and are now endangered or critically endangered[3]. Over 700 native plant and animal species are threatened by forest habitat destruction including the iconic koala[4]. Deforestation primarily for pasture development is ongoing at a significant level although highly dispersed in the Eastern Australia front[5,6]. Fires of unprecedented ferocity due to climate change are likely also driving forest loss or change, particularly of the unique Gondwanan relict rainforests[7].

Drivers of deforestation

Livestock

Development of livestock pasture is the chief driver of forest loss in Eastern Australia, accounting for 75%[8,9]. There was a spike in large-scale clearing for crops in Queensland after laws were weakened in 2013, but these crops were primarily grain and fodder for livestock[10]. This loophole was closed in 2018[11].

Forestry

Harvest for timber is a minor driver of loss, accounting for 16%, mostly in the state of New South Wales (NSW). Intensified logging of state forests, in addition to significant private native forestry[12], make it the primary driver of deforestation and degradation in NSW[13].

Fire and drought

Increasing frequency and intensity of fires due to anthropogenic climate change, enhanced by forest fragmentation and weed invasion, is predicted to result in transition of large areas of forest to woodland or savannah[14]. The 2019-20 summer bushfires burned 7.3Mha of the Eastern Australia forests, almost all in NSW. For at least 1Mha of this, the forest canopy burned[15]. Half of all Gondwanan rainforests burnt, and may not recover[16].

Cropping

Conversion of grazing land to cropping land is the primary driver of clearing in northwest NSW, driven by increased returns and land speculation to increase land values.

Underlying causes

Grazing land capital value is increased greatly with forest clearing; landholders are often mortgaged to banks and are under pressure to extract more value by clearing[16]. Climate change is a significant and growing cause of deforestation because of increasingly severe droughts, fires and low humidity affecting production and driving forest loss[17].

KEY FACTS

<table>
<thead>
<tr>
<th>Countries, region</th>
<th>Australia, Oceania</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest type</td>
<td>Mostly eucalypt or acacia-dominated subhumid tropical, subropical and temperate forests and woodlands</td>
</tr>
<tr>
<td>Total area</td>
<td>101.5Mha</td>
</tr>
<tr>
<td>Forest area in 2018</td>
<td>20.5Mha (20.2% of total deforestation front) based on forest estimates from a global assessment; ~45Mha remains of original 86Mha (52%), with ~6Mha secondary forest cover based on SLATS[1]</td>
</tr>
<tr>
<td>Forest loss 2004-2017</td>
<td>0.7Mha of forests (3.5% of forest area in 2000) when looking only at estimates from Terra-I; ~2Mha 2004-17 (4%), up to 5Mha including secondary forest clearing based on SLATS[1]</td>
</tr>
<tr>
<td>Location of deforestation</td>
<td>Inland and coastal areas of the states of Queensland and New South Wales</td>
</tr>
<tr>
<td>Total forest core area in 2018</td>
<td>9.9Mha (48.5% of forests in 2018) based on forest area from estimates from a global assessment</td>
</tr>
<tr>
<td>Fragmented forests 2000-2018</td>
<td>1.2Mha (5.7% of forest area in 2000) based on estimates from a global assessment</td>
</tr>
<tr>
<td>Accumulated burned area, 2002-2019</td>
<td>6.5Mha (30.8% of forest area in 2018) based on estimates from a global assessment</td>
</tr>
<tr>
<td>Deforestation trend</td>
<td>Increasing again after a period of decline as legal restrictions weakened[1]</td>
</tr>
<tr>
<td>Future trends</td>
<td>Uncertain – no immediate prospects of decline</td>
</tr>
</tbody>
</table>

Main outcomes

Growth of protected areas has largely stalled due to lack of government interest, except for rapid growth of indigenous protected areas, which are largely in unforest ed arid areas[12]. Vegetation laws are governments’ preferred approach to reduce deforestation but have had a chequered history and are now universally weaker than they were in the mid-2000s. Deforestation-free beef is a major and promising innovation in preventing deforestation, but progress is slow and there is still no accepted operational methodology or facility to verify or certify products as deforestation free[13].

Recommended future actions

- Increase investments in protected areas and strengthen forest protection laws.
- Promote verifiable progress in deforestation-free supply chains, especially for beef.
- Enhance funding to support farmers and graziers to regenerate forests, with incentives for those who demonstrate improved forest condition.
- Develop policies and structures to support a transition from native forest logging to plantations and independently certified forest management.
Key responses

Protected areas
Protected areas growth stalled in Australia when the key national government grants programme was terminated in 2013; at its height the programme resulted in 2.5Mha of high conservation value land protected, although not all of this was in Eastern Australia[12]. Indigenous protected areas have grown dramatically, but these are in areas where deforestation was never an issue[8]. Private protected areas have grown steadily, but these are not generally protected against mining[4].

National threatened species law
The national Environment Protection and Biodiversity Conservation Act, if enforced, could have prevented a great deal of clearing including of secondary forests with threatened species habitats. A comprehensive failure by agricultural developers to observe the law and the regulator to enforce it undermined its effectiveness[20].

State vegetation laws
State vegetation management laws have played a leading role in reducing the loss of primary forests since 2000, but laws have since been weakened in every state[15]. Laws in Queensland were weakened in 2013 and in NSW in 2017. Although laws were partly restored in Queensland in 2018, this has yet to have a significant impact on clearing rates, which have been increasing since 2011 after major declines in the previous decade[26].

Deforestation-free beef
The industry marketing body Meat and Livestock Australia has committed to carbon neutrality for the beef industry by 2030[21]. The Australian Red Meat Council’s Australian Beef Sustainability Framework has begun collecting data on deforestation due to beef[21]. Major retailers have made commitments to remove deforestation from supply chains, but none of these have been operationalised as yet[11].

Land restoration, carbon farming and environmental stewardship
The Australian, Queensland and NSW governments have a range of markets to support carbon offsets and land restoration, particularly to financially reward graziers and farmers who allow natural forest regeneration. Additional financing and long-term funding security is required to expand and improve these schemes, secured with covenants on land titles or carbon farming contracts to provide permanent protection. These would assist conservation of Australia’s globally significant forest carbon stocks, enabling them to be actively managed as a carbon sink to deliver increased carbon abatement and sequestration to support a safe climate.

References