

Reducing Deforestation

Basic knowledge



This module is intended for forest and land managers and stakeholders in all sectors involved in joint efforts to reduce deforestation. It provides specific guidance on the analysis of deforestation drivers and how to address them at different scales, and what forest managers can do within their spheres of influence and control. Readers may find it helpful to read this module in conjunction with the [Reducing Forest Degradation module](#).

Deforestation and its impacts

Deforestation is the long-term or permanent conversion of forest to other land uses, such as agriculture, pasture, water reservoirs, infrastructure and urban areas. The term deforestation does not apply to areas where the trees have been removed as a result of harvesting or logging and the forest is expected to regenerate (either naturally or with the aid of silvicultural measures), but it *does* apply to situations in which logging is followed by the conversion of the logged-over forest to other land uses.

Deforestation can have huge impacts – at the local to global scale – on societies and the environment. Globally, deforestation and forest degradation contribute about [one-fifth of total greenhouse gas emissions](#). Other environmental impacts of deforestation include damage to and the fragmentation of habitat and the resultant loss of biodiversity; the disruption of water cycles; soil erosion; and desertification.

Deforestation can have severe socioeconomic consequences: for example, it can threaten the livelihoods, cultures and survival of people who depend on forests, including indigenous peoples; weaken local and national economies; trigger social conflicts over natural resources; increase the impact of natural disasters; and cause population displacements.

Although, in many places (especially some developing countries), the rate of deforestation is worrisome, some studies suggest that deforestation may often be part of a process in which [declines in forest cover are followed by periods of forest-cover gains](#). Such “forest transitions” have been found to occur in countries with two sometimes-overlapping circumstances: 1) economic development leading to the abandonment of agricultural lands and the spontaneous regeneration of forests; and 2) a scarcity of forest products, leading to the active planting of trees instead of crops or pasture grasses. The conditions under which forest transitions occur vary, and in some places such transitions have not occurred at all. The forest transition theory highlights the importance of considering the drivers of both deforestation and forest restoration.

The role of SFM and forest managers in reducing deforestation

Deforestation is a major concern for forest users and managers because it threatens their livelihoods. Deforestation not only leads to a reduction of available forest, it may also have adverse effects on the productivity, biodiversity and health of nearby remaining forests.

Drivers of deforestation exist both inside and outside the forest sector and may have local, national or global dimensions. It is often better addressed at several scales and through cross-sectoral approaches that encompass all land uses in a landscape. Although forest managers have a role to play, most deforestation drivers – particularly underlying socioeconomic and political drivers – are outside their sphere of influence and control.

Forest managers can contribute to curbing deforestation by raising awareness of the **roles of forests in landscapes** and the negative impacts that deforestation can have on other land uses. For example, deforestation can lead to reductions in water quality and quantity, with consequent impacts on agricultural productivity and on other downstream water users.

Forest managers and other stakeholders can help reduce deforestation by demonstrating that forests can be a **viable land-use option**, with benefits for other land uses, when sustainable forest management (SFM) is applied as part of a landscape approach (and a suitable enabling policy environment exists). They can do this by, for example, exploring the sustainable use and commercialization of diverse forest products and services; assessing market opportunities and the development of forest enterprises; fostering wider recognition of the full value of forests and their environmental services; seeking opportunities for payments for forest environmental services; contributing to the diversification of rural livelihoods; and promoting the dissemination of experiences – particularly successful and exemplary cases in which forests are important sources of livelihoods.

In addition to promoting forests as a viable land use, other actions that can be taken to address deforestation include:

- reinforcing and expanding forest protected areas; and
- adopting agroforestry, afforestation and reforestation and sustainably managing existing planted forests to meet demand for wood, thereby reducing pressure on natural forests.

Most deforestation drivers need to be addressed beyond the forest sector – nationally and, where possible, globally. [REDD+](#), for example, is part of ongoing international efforts to reduce deforestation and its associated greenhouse gas emissions, particularly in developing countries.

** REDD+: reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries.*

Reducing deforestation contributes to SDGs:



Related modules

- [Climate change adaptation and mitigation](#)
- [Forest and landscape restoration](#)
- [Forest management planning](#)
- [Participatory approaches and tools for SFM](#)
- [REDD+](#)
- [Reducing forest degradation](#)

In more depth

Drivers of deforestation

The dynamics and causes of deforestation are multi-faceted and complex, and they vary from place to place. There are direct drivers of deforestation, which are associated with a complex set of indirect (“underlying”) drivers that also need to be tackled if efforts are to be successful in the long term. Drivers can also be classified as human-induced or natural.

The principal **direct drivers** of deforestation at the global level are:

- commercial agriculture for food, feedstock, fibre and biofuel (e.g. palm oil, soybeans, beef, maize, rice, cotton and sugar cane);
- local or subsistence agriculture;
- infrastructure expansion;
- mining; and
- urban expansion.

Illegal or otherwise unsustainable logging is principally an agent of forest degradation, but it may also be a precursor to deforestation: selectively logged forests are often deforested within a few years of logging if governance is weak and logging roads provide ready access to the land for agriculture and other development.

Underlying drivers are complex interactions of social, economic, political–institutional, technological and cultural factors that affect the direct drivers. They act at multiple scales, such as:

- global (e.g. market forces, commodity prices, and a lack of international agreements or their enforcement);
- national (e.g. population growth or movement, domestic markets, unsound national policies, conflicting cross-sectoral policies, weak governance and institutions, market failures, lack of law enforcement, illegal activities, civil conflict, diverging interests, unequal power relations, and the centralization of services); and
- local (e.g. poverty, changes in household behaviour, landlessness, the unclear and asymmetric allocation of rights, technological change in agriculture, and a lack of investment in SFM).

The distinction between direct and underlying causes, and between human-induced and natural change, is often unclear. Deforestation usually involves long, complex chains of cause and effect.

The main drivers of deforestation are all likely to increase in coming years as a result of continued increases in population and economic growth; urbanization; meat consumption; global demand for wood products and agricultural commodities; and the impacts of climate change, such as increased fire frequency and intensity, and pest and diseases.

How to address deforestation

Identifying and analysing drivers

Location-specific, comprehensive assessments of the drivers of deforestation are the essential first steps in addressing deforestation. The general requirements for such analyses are as follows:

- **Identify deforestation areas** (location and extent) using the most recent data obtained from existing monitoring systems or remote sensing, complemented by historical data, local knowledge, relevant reports and statistics, and an assessment of potential future threats in order to anticipate and minimize risk.
- **Analyse the specific drivers** based on data obtained from existing monitoring systems, local knowledge, and other available sources of information.
- **Evaluate the impact of drivers** at the local, national and, where possible, global scales, looking beyond the forest sector and considering the relationship of such drivers to all land-use activities.
- **Analyse the underlying drivers**, particularly those at the international level. This may need to be done using economic and social indicators, statistical analyses and modelling. It should include the **mapping of the main actors** associated with specific deforestation drivers and with forest restoration drivers.
- **Collect qualitative information from stakeholders** in order to understand the dynamics of the drivers. Of particular interest are the views of stakeholders living or working in areas where deforestation or forest degradation are occurring, and those living or working at sites that are showing signs of forest recovery. Such information can be gathered through, for example, key informant interviews, focused group discussions, participatory rural appraisals, and livelihood analyses, including household surveys.

Note that the identification and analysis of drivers should be done with the full and informed **participation of all stakeholders**, such as the people involved in the various land uses and those benefiting from, or incurring costs due to, deforestation. Care should be taken to ensure that marginalized stakeholders, such as women and youth, minority groups, and indigenous peoples and other forest-dependent people, are able to participate meaningfully.

Main considerations

The following issues need to be considered when designing actions to address deforestation drivers:

- **Taking a holistic approach that considers all scales.** The drivers of deforestation are dynamic and interlinked and should therefore be addressed holistically. Because they occur at many scales (from local to global), strategies must integrate actions at various scales. Addressing regional or global drivers of deforestation is especially challenging and requires collaboration among countries.
- **Different types of interventions.** At all scales, three kinds of interventions may be considered: 1) incentives; 2) disincentives; and 3) creating an enabling environment. The table provides examples in each of these categories of measures that might be taken at various scales.

Incentives	Disincentives	Enabling
Global/regional		
<ul style="list-style-type: none"> • Procurement and sourcing commitments: <ul style="list-style-type: none"> - Certification and sustainable wood and agricultural procurement policies - Government-facilitated commitments to the sustainable sourcing and importing of agricultural products linked to deforestation (e.g. soybeans) - Public-private partnerships - Commodity roundtables (e.g. palm oil, soybeans, cotton, biofuels, beef) - Environmental education in consumer countries - Revision of food production practices beyond labelling • Public disclosure of greenhouse gas emission reductions and use of high-risk commodities 	<ul style="list-style-type: none"> • Import controls • Mandatory labelling 	<ul style="list-style-type: none"> • Bilateral agreements and trade accords (e.g. voluntary partnership agreements under the European Union's Forest Law Enforcement, Governance and Trade initiative; and the United States Lacey Act) • Codes of conduct for providing international finance (e.g. Equator principles, International Finance Corporation standards) • Effective information systems
National		
<ul style="list-style-type: none"> • Tax reductions • Subsidies • Insurance protection • Equitable benefit-sharing • Deforestation-free requirements for public procurement • Consumer awareness campaigns • Payments for environmental services 	<ul style="list-style-type: none"> • Import moratoriums • Fees • Land-use zoning 	<ul style="list-style-type: none"> • Improvement of governance and policies • Strengthening of institutional capacity • Secure tenure and use rights • Zoning, land-use planning and cross-sectoral coordination • Effective information systems • Stakeholder consultation • Inclusion of assessment of risks and benefits in decisions on direct foreign investment • Adaptive research • Improving access to services such as (environmental) education, health and financial services • Policies that lead to greater economic diversity, beyond agricultural production
Local		
<ul style="list-style-type: none"> • Credit guarantees • Support for alternative livelihoods and revenue-generating activities • Benefit-sharing 	<ul style="list-style-type: none"> • Taxes • Fines for forest clearing • Laws and regulations to protect forest • Limits on production • Zoning • Enforcement 	<ul style="list-style-type: none"> • Participatory landscape and forest management • The resolution of tenure issues and conflicts over natural resources • Enhancement of governance and capacities • Environmental awareness • Protected-area strategies (expansion and management) • Targeted research















Actions to reduce deforestation should be formulated and implemented with the engagement of all stakeholders in order to achieve legitimacy and buy-in. Because the most powerful drivers of deforestation are outside the forest sector, a cross-sectoral approach is crucial. An assessment of sectoral policies (e.g. those in the forest, agriculture, mining, infrastructure and energy sectors), integrated land-use planning (taking a landscape approach), and the commitment to action by actors across sectors, are all essential for aligning sectoral






interests in efforts to combat deforestation. Strategies should take into account the impacts of proposed actions on food security, local livelihoods, and climate-change mitigation and adaptation.

Actions to address deforestation drivers

The table below provides examples of actions that could be taken to address deforestation drivers in various sectors and at different scales. Some of the suggested actions in the forest sector could be undertaken by forest managers in the context of REDD+ (such actions are also called “policies and measures” – PAMs – see the [REDD+](#) module).

DEFORESTATION DRIVERS	ACTIONS	Sector
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<p>Expansion of commercial agriculture (e.g. cash crops, biofuels, livestock production)</p>	<p>Integrated landscape approaches, including by:</p> <ul style="list-style-type: none"> - Promoting cross-sectoral approaches to ensure the development, harmonization and coherent enforcement of sectoral laws, policies and plans - Undertaking participatory land-use planning and management so as to clarify which areas should be used for different land use. 	
	<p>The sustainable intensification of commercial crop production to avoid the further expansion of agricultural land and forest conversion, including by:</p> <ul style="list-style-type: none"> - Adopting sustainable intensification practices (e.g. conservation agriculture; practices that maintain healthy soils, such as no-tillage and cover crops; water- and energy-efficient practices; the use of a wide range of species and varieties in associations, rotations and sequences, including agroforestry systems; the use of quality seeds and other propagation materials of well-adapted, high-yielding varieties; and the integrated management of pests, diseases and weeds) - Transferring new technologies (e.g. high-yielding varieties, new crops, integrated fertilizer application and pest management, and improved fallows) - Strengthening the supply chain to reduce the amount of food loss and waste during harvest, storage and processing and therefore increasing the overall productivity of agricultural systems - Setting up financial incentives (e.g. payments for environmental services, payments for greenhouse gas emission reductions, preferential loans, tax incentives, grants, insurance, public/private partnerships, and funds for transition costs) - Establishing agricultural commodity roundtables, such as for soybeans and palm oil, in which producers cooperate and commit to eliminating deforestation from their supply chains <p><i>The tools section presents other practices and approaches, such as the Climate-smart agriculture source book and "Save and grow" Actions should always be coupled with forest conservation policies; otherwise, they may exacerbate deforestation (e.g. an increase in agricultural revenue due to efficiency gains may cause further deforestation).</i></p>	  
	<p>The sustainable intensification of livestock systems in an integrated management approach, including by:</p> <ul style="list-style-type: none"> - Increasing the productivity of grassland production (e.g. through fertilization, association with nitrogen-fixing herbs and trees, grass-cutting regimes and irrigation practices) - Improving herd management through breeding to select more productive and resilient animals (for example, making use of locally adapted breeds that are tolerant of heat, poor nutrition, parasites and disease) - Targeting animal health, including through veterinary services, preventive health programmes and improved water quality 	 
	<p>Sustainable bioenergy/wood energy initiatives, including by:</p> <ul style="list-style-type: none"> - Substituting the use of fossil fuels with biofuels, while carefully considering the practical implications (e.g. avoiding deforestation and impacts on food security, and waste management) 	 
	<ul style="list-style-type: none"> - Addressing demand for timber and woodfuel through afforestation, reforestation and the sustainable management of planted forests 	
	<p>Increasing agricultural production on degraded lands, including by:</p> <ul style="list-style-type: none"> - Restoring soil fertility and curbing degradation processes (e.g. erosion, salinization and pollution) - Adopting targeted practices (e.g. conservation agriculture, agroforestry systems, cover crops, and integrated soil management) - Promoting economic incentives, extension services and adaptive research 	 
	<p>Forest protection, including by:</p> <ul style="list-style-type: none"> - Reinforcing and expanding networks of protected areas and indigenous reserves - Enforcing laws against forest encroachment - Encouraging sustainable ecotourism activities - Putting in place disincentives such as fines for forest clearing, laws and regulations to protect forest, and zoning for production and protection 	
	<p>Demand-side policies aimed at influencing demand for, and consumer attitudes towards, sustainable products, including by:</p> <ul style="list-style-type: none"> - Providing market-based incentives for sustainable products (e.g. public procurement policies, labelling, and consumer awareness campaigns about sustainably produced commodities) - Strengthening supply chains and business-to-business links (e.g. private-sector responsible sourcing policies, and certification schemes) - Promoting accountability and transparency (e.g. by sharing information on best practices and by monitoring and reporting on commitments on sustainable sourcing and production) - Fostering pledges from private-sector actors for "deforestation-free supply chains" 	 

Subsistence and smallholder farming/ shifting cultivation	Intensification/strengthening of smallholder systems , including by: <ul style="list-style-type: none"> - Promoting capital/input-saving practices and technologies (e.g. crop-residue management strategies, erosion control measures, integrated pest management practices and legume cover crops) - Promoting labour-saving technologies (e.g. timing of soil preparation and sowing) - Promoting agroforestry and silvopastoral systems - Undertaking capacity development (e.g. farmer field schools) - Enhancing the access of farmers to capital and inputs (e.g. micro-loans, tailored credit, funds for transition costs and government inputs) - Reinforcing local institutions and research and extension services - Enforcing land-tenure security and clarifying forest and tree rights - Undertaking participatory land-use planning <i>See also the section above, "Sustainable intensification of commercial crop production"</i>	
	The diversification of farmers' livelihoods and income , including by: <ul style="list-style-type: none"> - Strengthening community forestry (e.g. the production and sale of wood and non-wood forest products, such as beekeeping, and forest services), promoting forests as a viable land use, and enhancing their socioeconomic and environmental contributions to local development - Silvopastoral and agroforestry systems that minimize deforestation/degradation - Increasing the diversity of production systems (e.g. a broad range of crop varieties, livestock breeds and forest trees), including the genetic diversity of species - Supporting small-scale forest enterprises and outgrower schemes - Providing incentives, such as payments for environmental services, subsidies, credit guarantees and benefit-sharing - Undertaking participatory landscape and forest management, including cost-benefit analyses of different land uses and collaborative conflict management - Promoting ecotourism 	
Coastal farming (e.g. aquaculture), causing deforestation of mangroves and other coastal forests	Sustainable coastal farming with an integrated approach , including mangrove management, for example by: <ul style="list-style-type: none"> - Developing long-term management plans for coastal environments that consider the requirements and aspirations of indigenous peoples and local communities, as well as the various natural resources involved 	
Unsustainable/illegal logging	Strengthening forest governance , including by: <ul style="list-style-type: none"> - Reviewing and improving the policy, legal and regulatory frameworks (e.g. taxes, incentives, trade regulations and export/import controls) - Promoting forest law enforcement - Institutional strengthening - Enforcing the security of land tenure and use - Setting up incentives and disincentives (e.g. taxes, fines for forest clearing, limits on production, zoning) Strengthening local forest management , including by: <ul style="list-style-type: none"> - Strengthening capacities and extension services for the sustainable management of forests, including community forestry and joint forest management schemes - Supporting farmer-assisted natural regeneration, reforestation and tree planting in agriculture lands to reduce pressure to natural forest and current stocks Strengthening demand-side policies , including by: <ul style="list-style-type: none"> - Supporting government-facilitated commitments to sustainable sourcing and imports - promoting certification and sustainable wood procurement policies 	
Infrastructures (roads, hydropower), mining, oil and gas extraction, settlement expansion	Encouraging integrated land-use planning and management , including by: <ul style="list-style-type: none"> - Institutional strengthening, cross-sectoral coordination and adequate information systems - Harmonizing policies and laws among sectors - Enforcing harmonized laws to prevent different ministries operating at cross-purposes - Assessing the benefits and risks of foreign direct investment Promoting forest protection , including by: <ul style="list-style-type: none"> - Reinforcing and expanding protected areas - Enforcing laws against forest encroachment Promoting best industry practices (e.g. those of the International Council on Mining and Minerals, and Good Practice Guidance on Mining and Biodiversity), including by: <ul style="list-style-type: none"> - Seeking continual improvement of environmental performance - Benefit-sharing with local communities 	

Prioritization, implementation and monitoring

The identified actions should be ranked based on predefined criteria (e.g. objectives, estimated costs and potential for funding, existing implementation capacities, and alignment with national development priorities and plans). This will help in determining which drivers should be addressed first, the most suitable actions to take, and which drivers should not be addressed, or should be addressed later, and the rationale for the choices made.

An implementation plan for the selected interventions should be developed, establishing mechanisms for stakeholder consultations and coordination. The plan should include an efficient monitoring system to enable the assessment of interventions, stakeholder engagement and perceptions, and socioeconomic and environmental impacts, in the light of which the plan can be adapted as required.

Gender and reducing deforestation

Women are key actors in halting and reducing deforestation and in addressing related drivers. Worldwide, women have played an important role in preserving tropical forests. For example, in Zimbabwe, women's groups (over half of the 800 000 families living in communal areas are headed by women) manage forest resource and development projects through woodlot ownership, tree planting and nursery development.

The most important driver of deforestation is agriculture, which is estimated to be the proximate driver for around 80 percent of deforestation worldwide. Given that women play a major role in small scale agricultural activities in most countries, they must actively engaged and play a major role in the design and implementation of REDD+ actions to ensure that their experiences, knowledge and needs are duly considered.

Women must also actively participate in land-use planning, which is a crucial action to halt deforestation, so as to guarantee a participative and representative process that considers the needs and aspirations of women and girls.

Women are among the social groups more affected by deforestation processes. Given their responsibility for meeting household food and fuel needs, the depletion of forest resources increases the burdens on women. A study in Malawi found deforestation was forcing elderly women to walk more than 10 km a day to collect fuel wood. Women spend on average 800 hours a year in Zambia and 300 hours a year in Tanzania on the same task. In East Africa, fuel wood scarcity has led to a reduction in the number of meals cooked in poor households.

What can be done to include women in the efforts against deforestation?

Afforestation, reforestation, or forest preservation projects that receive payment for ecosystem services, such as carbon sequestration, should mainstream gender. Women should be included in the design and implementation of the projects, as well as in the distribution of benefits. Both women and men must be trained in methods to increase carbon sequestration through new forestry technologies, including nursery techniques, site selection, and selection of species, land preparation, planting, weeding and maintenance. Responses to global climate changes should avoid a narrow criterion that leads to environmentally and socially harmful consequences. These responses should have broad goals that aim to reduce climatic change, protect natural resources, improve social well-being, promote equality and recognize that women are key agents in climate change processes.

E-learning

[Forests and transparency under the Paris Agreement](#)



The objective of this course is to learn about the Enhanced Transparency Framework (EFT) under the Paris Agreement. It will be useful to those wishing to understand the importance of forest-related data collection, analysis and dissemination in meeting the Enhanced Transparency Framework...

[Sharing the experience on “Forest and land monitoring for climate action – SEPAL” facilitated course](#)



The overall objective of this course is to support knowledge and skills development to operationally apply high-resolution satellite imagery to critical forest and land monitoring in tropical forest countries. More specifically, the course focuses on how the System for Earth Observation Data Access...

[Sharing the "Forests and Transparency under the Paris Agreement" MOOC multilingual experience](#)



This Massive Open Online Course (MOOC) was based on the FAO e-learning course “Forests and transparency under the Paris Agreement” available on the FAO e-learning Academy. In this course participants learnt about the importance of forest-related data collection, analysis...

Further learning

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Lovera, S. 2003. [Going to the roots: addressing the underlying causes of deforestation and forest degradation](#)

Streck, C. & Zurek, M. 2013. [Addressing Agricultural Drivers of Deforestation](#). ClimateFocus.

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FAO. 2011. [Submission to the UNFCCC Secretariat on issues identified in decision 1/CP. 16, paragraph 72 and appendix II](#), in answer to the invitation of paragraph 5 of draft conclusions UNFCCC/SBSTA/2011/L.25.

FAO. 2013. [Climate change guidelines for forest managers](#). FAO Forestry

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Hosonuma, N., Herold, M., De Sy, V., De Fries, R.S., Brockhaus, M., Verchot, L., Angelsen, A. & Romijn, E. 2012. An assessment of deforestation and forest degradation drivers in developing countries. *Environ. Res. Lett.* 7 (2012) 044009 (12pp).

Credits

This module was developed with the kind collaboration of the following people and/or institutions:

Initiator(s): Maria Ruiz Villar - FAO, Forestry Department

This module was revised in 2018 to strengthen gender considerations.

Initiator(s): Gender Team in Forestry

Reviewer(s): Maria Ruiz Villar - FAO, Forestry Department

