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3
DRIVERS OF DEFORESTATION AND FOREST DEGRADATION

REDD+ ACADEMY
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ABOUT US

UN-REDD

The UN-REDD Programme is the United Nations collaborative initiative on Reducing Emissions from Deforestation and forest Degradation (REDD) in developing countries. The Programme was launched in 2008 and builds on the convening role and technical expertise of the Food and Agriculture Organization of the United Nations (FAO), the United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP).

The UN-REDD Programme supports nationally-led REDD+ processes and promotes the informed and meaningful involvement of all stakeholders, including Indigenous Peoples and other forest-dependent communities, in national and international REDD+ implementation.

REDD+ACADEMY

The REDD+ Academy is a coordinated REDD+ capacity development initiative led by the UN-REDD Programme and the UNEP Environmental Education and Training Unit, which seeks to match the scale of the global climate change mitigation challenge and enable systematic, focused capacity development to deliver REDD+ on the ground.

The REDD+ Academy is a comprehensive response to capacity building needs identified by the countries receiving support from the UN-REDD Programme. The main aim of the REDD+ Academy is to empower potential "REDD+ champions" with the requisite knowledge and skills to promote the implementation of national REDD+ activities.

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METTE L. WILKIE

DIRECTOR,
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Dear Learner,

Welcome to the second edition of the REDD+ Academy Learning Journals. The journals provide you with state of the art knowledge on REDD+ planning and implementation, developed by some of the world's leading experts at the UN-REDD Programme.

The journals have been designed to accompany you in your learning journey and equip you with the necessary knowledge to understand the various components of REDD+, from the basics to the finer points of setting reference levels, monitoring, allocation of incentives and stakeholder engagement.

With deforestation and forest degradation being the third largest source of greenhouse gas emissions globally, action to reduce deforestation and to rebuild forests globally is vital. By realizing social and economic benefits, REDD+ is also fundamental to delivering on the Sustainable Development Agenda.

Following the adoption of the Paris Agreement, the focus of many developing countries is now firmly on REDD+ implementation. I encourage you to take the REDD+ Academy online course, and apply your knowledge to make REDD+ a national and a global success!

Mette L. Wilkie

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Drivers of Deforestation and Forest Degradation

This module presents the main drivers of deforestation and forest degradation (from here on referred to as DDFD) and proposes a framework to analyse them.

The module contains sections on:

- What DDFD are
- Trends that will affect future deforestation and forest degradation
- Barriers to the 'plus' activities
- Analysing drivers and barriers
- Prioritising drivers and barriers

What do you already know about this topic?

3. DRIVERS OF DEFORESTATION AND FOREST DEGRADATION

WHAT ARE DRIVERS OF DEFORESTATION AND FOREST DEGRADATION?

Before exploring the concept of drivers, it is important to understand what is meant by the processes of deforestation and forest degradation. Deforestation is the process of converting forest land to another land use (as per the six land-use categories identified by the Intergovernmental Panel on Climate Change (IPCC): forest land, cropland, grassland, settlement, wetland and other land). In other words, the primary use of the land ceases to be forest and becomes one of the other land-use categories. Forest degradation is the process of losing carbon stock from forest land – i.e. the land use remains forest, but the amount of carbon stock in the forest is reduced.

'Drivers' are actions and processes that result in deforestation and forest degradation. Understanding the DDFD is particularly important for the development of policies and measures (PAMs) that will be detailed in national REDD+ strategies and/or action plans (NS/APs) (see ***Module 7: Policies and Measures for REDD+ Implementation*** and ***Module 4: National Strategies or Action Plans***).

UNFCCC decisions related to DDFD

Several decisions made by the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) refer to DDFD. In these decisions, developing countries are encouraged to identify DDFD (decision 4/CP.15), to address these in their national strategies or action plans (decision 1/CP.16), and to ensure that the responses to drivers are adapted to national circumstances (decision 15/CP.19). Excerpts from these three decisions can be found below[1].

Paragraph 1 of decision 4/CP.15:

> *"Requests* developing country Parties, on the basis of work conducted on the methodological issues set out in decision 2/CP.13, paragraphs 7 and 11, to take the following guidance into account for activities relating to decision 2/CP.13, and without prejudging any further relevant decisions of the Conference of the Parties, in particular those relating to measurement and reporting:
>
> (a) To identify drivers of deforestation and forest degradation resulting in emissions and also the means to address these; … "

Paragraph 72 of decision 1/CP.16:

> *"Also requests developing country Parties, when developing and implementing their national strategies or action plans, to address, inter alia, drivers of deforestation and forest degradation, land tenure issues, forest governance issues, gender considerations and the safeguards identified in paragraph 2 of annex I to this decision, ensuring the full and effective participation of relevant stakeholders, inter alia, indigenous peoples and local communities;"*

Warsaw Framework decision on drivers (decision 15/CP.19):

> *" … Also noting that livelihoods may be dependent on activities related to drivers of deforestation and forest degradation and that addressing these drivers may have an economic cost and implications for domestic resources,*
>
> *1. Reaffirms the importance of addressing drivers of deforestation and forest degradation in the context of the development and implementation of national strategies and action plans by developing country Parties, as referred to in decision 1/CP.16, paragraphs 72 and 76;*
>
> *2. Recognizes that drivers of deforestation and forest degradation have many causes, and that actions to address these drivers are unique to countries' national circumstances, capacities and capabilities …"*

1 The UNFCCC has gathered the full text of all COP decisions relevant to REDD+ in the 'Decision booklet REDD+' (UNFCCC, 2014).

Direct and indirect drivers

Drivers can be separated into:

- **'Direct drivers'** (also called 'proximate causes') i.e. human activities or immediate actions that directly impact forest cover and lead to the loss of forest carbon;
- **'Indirect drivers'** (also called 'underlying causes' or 'driving forces') i.e. the complex interactions of social, economic, political, cultural and technological processes that bring about direct drivers.

Examples of DDFD are set out in Table 3.1.

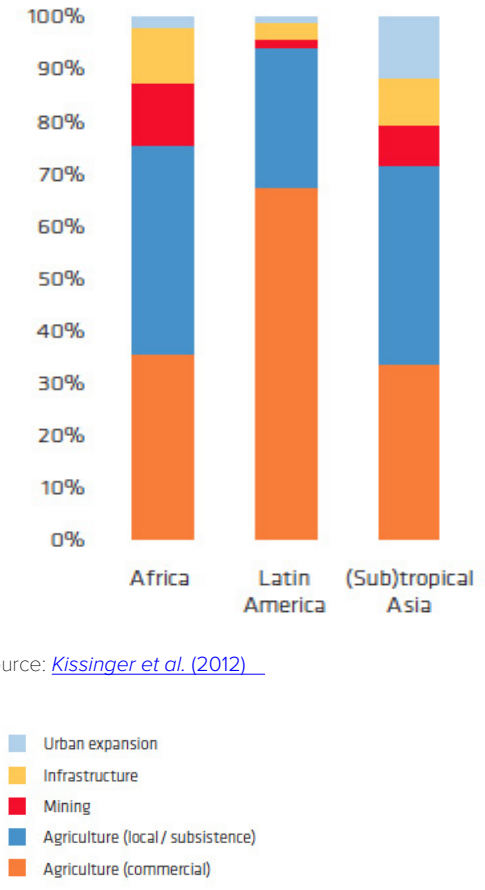
Table 3.1 Examples of DDFD

Direct drivers	Indirect drivers
• Deforestation: subsistence and commercial agriculture, surface mining, infrastructure development and urban expansion • Forest degradation: legal and illegal timber extraction (logging), forest fires, livestock grazing in forests, fuelwood collection and charcoal production	• At the international level: e.g. market behaviour (supply and demand), fluctuation in commodity prices, fluctuation in currency exchange rates • At the national level: e.g. population growth, behaviour of domestic markets (particularly for agricultural goods), national policies that favour non-forest land uses, poor governance, fiscal incentives and subsidies (e.g. government subsidies for production of certain agricultural crops) • At the local level: e.g. poverty, food insecurity, changes in household behaviour • Many REDD+ readiness plans identify weak governance and institutions, poor cross-sectoral coordination, weak law enforcement and poverty as critical indirect drivers.

Differences in drivers between regions

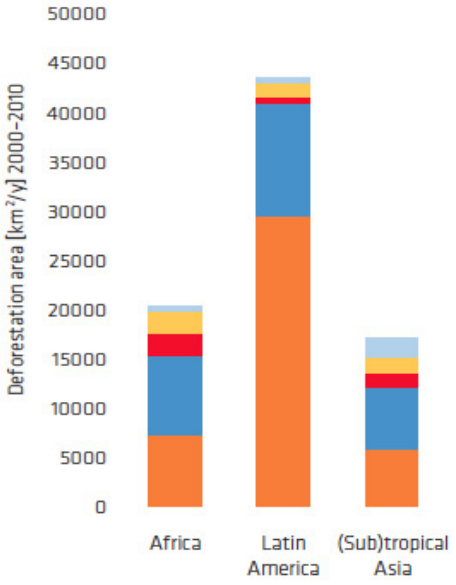
Figures 3.1 and 3.2 present estimates of the importance of different direct drivers for deforestation in Africa, Latin America and (sub)tropical Asia, from 2000-2010. Figure 3.1 presents the relative importance of each driver, based on national-level rankings weighted by rates of forest area change per country, while Figure 3.2 presents the same data as a sum of the area of forest loss for which each driver has been responsible according to the national rankings.

Figure 3.1 Relative importance of drivers of deforestation per region (2000-2010)



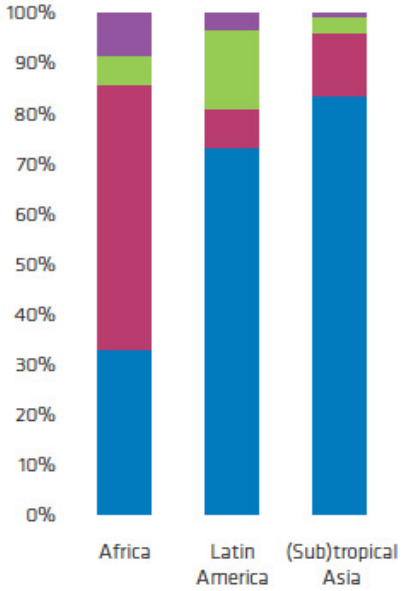
Source: *Kissinger et al.* (2012)

Figure 3.2 Total areas estimated to be affected by drivers of deforestation (2000-2010)

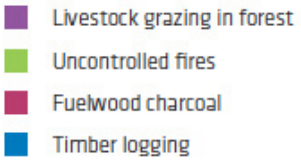


Source: *Kissinger et al.* (2012)

Figure 3.3 Relative importance of drivers of forest degradation



Source: *Kissinger et al.* (2012)



As the graphs show, agriculture (commercial and subsistence) is estimated to drive about 80 per cent of deforestation worldwide. Large-scale commercial agriculture is seen as the biggest driver in Latin America, accounting for two-thirds of total deforestation, while in Africa and (sub) tropical Asia commercial agriculture is regarded as the driver for one-third of total deforestation. Subsistence agriculture accounts for a similar proportion in each region.

The relative importance of key direct drivers of forest degradation is depicted in Figure 3.3, based on the same approach.

The graph in Figure 3.3 shows that in Latin America and (sub)tropical Asia, timber extraction is considered to be the cause for more than 70 per cent of total forest degradation, while in Africa, the most important drivers are fuelwood collection and charcoal production.

Indirect drivers can be harder to identify, but are crucial for understanding what drives various actors to clear or degrade forests. Based on a review of 31 national REDD+ readiness roadmaps, countries identified weak forest sector governance and institutions, including conflicting policies beyond the forest sector, and illegal activity (related to weak enforcement) as critical underlying drivers of deforestation and degradation (93 per cent of countries). Population growth is the next most commonly reported underlying driver (51 per cent), followed by poverty (48 per cent) and insecure tenure (48 per cent). Meanwhile, 41 per cent of countries explicitly mention international and market forces, particularly commodity markets, prices, and foreign direct investment as key underlying drivers. Notably, some countries that reference agricultural export commodities as direct drivers

REFLECTION POINT

Which of the drivers mentioned in Table 3.1, direct and indirect, do you think would be the most difficult to address, generally or in your own country? Make a list.

of deforestation do not make the linkage to international and market forces as underlying drivers (*Kissinger et al.* 2012).

TRENDS THAT WILL AFFECT FUTURE DEFORESTATION AND FOREST DEGRADATION

Drivers will change over time, as well as over space, and will be influenced by a number of factors from the local to the global level. Therefore, rather than seeing the analysis of DDFD as a 'one-off' study, it should be seen as an iterative process, to be repeated over time as circumstances evolve. Also, while initial studies can be carried out building on existing knowledge and information (as described below), the understanding of direct and indirect drivers should be deepened over time as required. Some of the global trends that can lead to changes in DDFD are related to the following:

Global population

Global population is projected to rise from around 7.3 billion individuals in 2015 to 8.5 billion in 2030, driven by the increases forecast for Asia (+530 million) and Africa (+493 million). World population is expected to continue to increase throughout this century, albeit at a slowing rate, reaching an estimated 11.2 billion by 2100 (UN DESA, 2015). With an increase in the number of people will come increased demand for food, energy and infrastructure, which is likely to place increasing pressure on forests.

Agricultural commodities

Driven by rising population and incomes in developing countries, global food production is expected to increase by 60 per cent between 2005/2007 and 2050. Over the same period, cereal production is predicted to rise by 46 per cent, meat production by 76 per cent, sugar cane/beet output by 75 per cent and oil crops by 89 per cent (Alexandratos and Bruinsma, 2012). Rising demand for biofuels is a significant factor in the increased output of both vegetable oil and sugar cane. While increased productivity on existing cropland will account for some of the production increase, agriculture will continue to be a major driver of forest loss.

Wood products

It is expected that global annual forest plantation production capacity will rise to 1.8 billion m^3 by 2020 to meet growing demand for wood products, e.g. for furniture and construction. The increase is likely to come primarily from tropical developing countries. By 2020, Brazil, China and Russia are likely to dominate the market for the international trade of wood products (FAO, 2007). Finally, even though import controls in the European Union and the United States are beginning to reduce imports of illegally logged wood products, it is thought that global and domestic trade in illegal wood will increase in general, unless many countries can improve their law enforcement capacities in the forestry sector.

Fuelwood and charcoal

The number of people relying on traditional biomass such as fuelwood for energy is predicted to decrease globally by 175 million between 2008 and 2030. Still, consumption of wood-based energy in sub-Saharan Africa is expected to remain stable or increase, leading to up to 4,000 premature deaths per day in addition to significant GHG emissions (IBRD and World Bank, 2011). Demand for charcoal (another traditional fuel) is likely to increase due to increased urbanization.

Fiscal Policies and Incentives – a closer look

Fiscal policies and incentives (the ways in which governments use taxes and government revenue to incentivize or penalize certain actions or behaviours) are particularly important indirect drivers of forest conversion because they influence land-use behaviour in some of the sectors that encroach on forests (especially agriculture). They can have an impact at different stages in commodity supply chains, ranging from land access to production, downstream processing and manufacturing. They also include domestic and international demand-side measures such as market-price support or fuel blending mandates[2]. Such measures are currently applied to stimulate production of crops such as oil palm, sugar cane and soy, and

2 More information on fuel blending mandates, including current updates on fuel blending mandates by country, can be found at the following address: http://globalrfa.org/biofuels-map/. Note that this covers CURRENT mandates, not percentage increases over time.

can have a globally significant impact on forests. The 2016 New Climate Economy Report notes that many countries subsidise key agricultural inputs, such as irrigation water and fertiliser, in order to boost productivity. Evidence suggests ill-designed subsidies can lead to waste of financial resources and environmental damage. Table 3.2 provides a list of types of fiscal incentives, as well as examples, demonstrating the complexity of the topic.

Table 3.2 Types of fiscal incentives

Type	Examples
Grants and other direct payments	Transfers to companies or producers to cover specific costs; payments or vouchers to consumers to cover a portion of costs *E.g. Cooking oil subsidies, subsidised land, subsidies for fertiliser or other inputs (planting materials, herbicides), rural development grants*
Tax concessions	Tax exemptions, credits or deferrals *E.g. Income tax deduction, lower foreign taxes, accelerated depreciation and amortization, loss-carry forward provisions, Value-Added Tax exemptions, biofuel import and stamp duty relief, tax holidays*
In-kind subsidies	Non-monetary benefits that confer a benefit on the recipient *E.g. Privileged or streamlined land access and permitting, publicly-funded research*
Cross-subsidies	Market transfer or price discrimination between different products or activities within the scope of one unit *E.g. Cross-funding electricity and irrigation use within a public utility*
Credit subsidies and government guarantees	Below-market interest loans, underwriting risk and loan guarantees, incentives promoting foreign investment *E.g. Loss compensation, concessionary interest rates*
Hybrid subsidies	Instruments utilizing the tax system to lower the costs of private investment *E.g. Tax-free bonds, tax increment financing*
Derivative subsidies	Subsidies to counter the distortions caused by other subsidies upstream, such as higher input prices for downstream manufacturers or consumers *E.g. Compensatory or countervailing support, subsidy clusters*
Procurement	Preferential public purchasing, special financing arrangements *E.g. Public procurement commitments seeking to support domestic producers*
Market price support (in the producer country)	Deficiency payments or artificial price support to cover the gap between target price for a good and actual market price *E.g. Fuel blending mandates*

Source: *McFarland et al.* (2015)

REFLECTION POINT

Think about the drivers of forest loss or degradation, direct or indirect, in your country in the past. Which drivers do you think will still be important in the future? Do you expect there to be new ones? Make a list.

BARRIERS TO THE 'PLUS' ACTIVITIES

Depending on a country's situation, the success of REDD+ may hinge not only on tackling the drivers of deforestation and forest degradation, but also on addressing barriers to the 'plus' activities of REDD+: forest conservation, enhancement of forest carbon stocks and sustainable management of forests. The term 'barriers' here refers to the various obstacles that can hinder the implementation of these activities. The barriers will often be similar in nature to the direct and indirect drivers of deforestation and forest degradation, and may significantly overlap with them. However, they may also be linked to different elements of the legal framework and/or associated with different institutional actors and agents.

For example, in the Democratic Republic of Congo (DRC) the current regulatory framework on land tenure may be considered both a driver of deforestation and a barrier to the enhancement of forest carbon stocks. Indeed, on the one hand the relevant law recognizes forest clearing as a way to demonstrate economic use of the land, which in turn facilitates the process of entitlement. The law thus provides an incentive for deforestation for those wishing to obtain legal rights towards a unit of land. On the other hand, the inadequacy of the legal framework to provide tenure security inhibits reforestation.

Examples of possible barriers are given below:

i. Enhancement of forest carbon stocks:
   a. Inside forests: repeated and uncontrolled use of fire to clear grassland for agriculture which prevents natural or assisted regeneration of forests; dependence on fuelwood with demand exceeding regeneration capacity; legal or fiscal frameworks that do not support the sustainable management of forest resources.
   b. Outside forests: tenure insecurity, fiscal frameworks that promote the marketing of timber products, legal frameworks restricting access to forest products, social complexities and traditions (e.g. unwillingness to change land use or out-migration leading to labour shortages).

ii. Conservation of forest carbon stocks: population dynamics, lack of alternatives to certain land uses and/or uses of forest resources, weak law enforcement, fiscal and regulatory framework leading to inefficient land use.

iii. Sustainable management of forest carbon stocks: barriers may include those mentioned for the two activities above, as well as the cost of low impact logging and/or certification measures, and the lack of tools, training and technical capacities for sustainable forest management among government staff and/or forestry companies.

THE IMPORTANCE OF ANALYSING DRIVERS AND BARRIERS

Why analyse drivers and barriers?

In order to reduce emissions from forests and enhance carbon storage, it is important to identify, understand and address the most important drivers and barriers. Without a solid analysis of the drivers and a consensus on which are the most important, the capacity to achieve tangible REDD+ results and to access results-based payments is compromised. Countries aiming to focus their PAMs and NS/AP on the 'plus' activities also need to analyse barriers to the enhancement and conservation of carbon stocks and sustainable management of forests.

A robust and comprehensive analysis of drivers and barriers, and a consensus on the key issues to be addressed across all national stakeholders[3] can potentially contribute to a country's efforts to:

- Agree at the national level on a vision for REDD+;
- Formulate a NS/AP with clear priorities;
- Justify the selection of particular REDD+ activities;
- Inform the design of PAMs to address priority drivers and efficiently achieve GHG emission reductions;

3 Stakeholders could be relevant government agencies, private sector entities, CSOs, and women, men and youth from forest-dependent communities, indigenous peoples and smallholders.

- Effectively engage key stakeholders, especially in the non-forest sectors, which are in many countries the main agents of DDFD;
- Link information on drivers to safeguards processes (e.g. in order to assess the potential socio-economic benefits and risks that could result from different PAMs);
- Define priorities for forest monitoring and MRV; and
- Gain information on national circumstances for adjusting forest reference (emission) levels (see ***Module 6. Forest Reference [Emission] Levels***).

HOW TO ANALYSE DRIVERS AND BARRIERS

A DDFD analysis might present the first opportunity to engage with different sectoral actors (e.g. various ministries, civil society, and private sector) and to foster an inclusive dialogue with the goal of reaching a national consensus.

As mentioned above, the analysis should not be treated as a 'one-off' study, but should be an iterative process that builds on existing and new knowledge and information. Further analytical work, especially after new issues have arisen, should provide additional insights on particular issues. This analytical process may start with an overall analysis of drivers and barriers based on the existing and often prolific literature, which may allow building an overall picture of the issues across the country. It should lead as far as possible to a formal consensus over the main direct and related indirect drivers, as well as barriers, across all stakeholders.

While the primary direct drivers are often known, there may not be consensus about their importance, and further understanding may need to be built. The indirect drivers are usually less obvious and understood, yet have a strong influence on decision-making by different stakeholders (e.g. rising or falling commodity prices).

REFLECTION POINT

There are considerable benefits from analysing drivers and barriers. What problems do you think might arise if they are not analysed effectively?

Analysing the interactions between the indirect and direct drivers may require a range of approaches, e.g. statistical analysis and modelling using economic and demographic indicators, as well as socio-economic analyses, studies of market dynamics and commodity production/consumption patterns, etc.

An analysis of drivers and barriers might include:

- Collecting national and local data, which is often not easily available and scattered among different sources, sectors and ministries;
- Linking forest area changes to specific activities and land-use changes (remote sensing analysis);
- Evaluation of spatial context and location, and other features (e.g. roads, settlements) to help with interpretation;
- Local and regional knowledge (e.g. experts, representatives of civil society, women and men from indigenous groups and local communities, etc.) and ground observations;
- Analysis of the various economic activities responsible for deforestation in order to identify a set of current economic incentives and disincentives and barriers to change;
- Analysis of the social dimension of deforestation: traditions, cultural factors, individual and collective behaviours underpinning deforestation and degradation;
- Analysis of policy and governance issues (global, national).

Analysing drivers and barriers will ultimately help design **effective**, **efficient** and **equitable** policies and measures. Well-informed PAMs design requires an understanding of the economic, social and gender-specific interactions at work behind the observed drivers, as well as a proper assessment of the social and economic costs and benefits of the drivers for the various stakeholder groups. For instance, subsistence agriculture has limited economic benefits but critical social and welfare implications. Conversely, commercial and mechanized agriculture can have large economic benefits (employment, profits that drive national economic development, etc.), but in some cases more limited welfare potential.

The initial analysis of drivers may be followed by a set of studies targeting specific issues that appear to be of particular relevance, such as trends linked to a particular agricultural

commodity, barriers to the expansion of forest plantations, or governance issues. These studies will be an opportunity to deepen the understanding of particularly complex issues, and to start the identification of potential entry points and PAMs to address them. In reaching out to specific key stakeholders (e.g. relevant line ministries at the central and subnational level, businesses or research and education institutions), the process of analysing drivers and barriers can help to build the case for REDD+ for them and with them. This will be key in ensuring the appropriation and validation of the PAMs and overall national strategy by those stakeholders, and help secure their necessary active participation in implementation.

In the process of analysing drivers and barriers, particularly at the local level, it is helpful to consider the gender-differentiated use and knowledge of forests. Both women and men are key stakeholders whose unique but often differentiated knowledge, skills, and experience are vital to understanding the mechanisms behind the drivers, and both of their perspectives should be actively and meaningfully taken into account. Understanding the varying roles men and women play can enable a more accurate analysis of the problem, who is driving deforestation, where and how, and also help to identify potential solutions. For example, women are often the primary users of forests, whose practices can include traditional agroforestry systems, gathering wild plants for food and medicinal purposes, collecting non-timber forest products and forest patrolling. Thus, their use and knowledge of the forest can help to identify drivers of forest degradation and deforestation. However, given the social, economic and cultural inequalities and legal impediments women often face, they (as well as other marginalized groups, such as youth, poor, disabled, etc.) are often excluded from discussions and their knowledge and perspectives are not considered.

Identifying the agents of deforestation

Given that a key objective of analysing drivers is the development of appropriate PAMs, it is important to understand what actors or stakeholders – referred to from here on as 'agents' – are driving deforestation and forest degradation. In this way, PAMs can be designed with specific agents in mind and, for example, incentives and/or disincentives structured accordingly. The agents of direct drivers are often quite clear, such as smallholders (clearing forest for subsistence agriculture) or the owners and employees of a logging company. The agents of indirect drivers are often less readily identifiable and may be multiple, for example involving national-level government policy makers, provincial government officials, law enforcement officers, multinational companies and consumers around the world.

REFLECTION POINT

Why is it so important to consider the social costs and benefits of actions that affect forests when analysing drivers and barriers?

HOW TO PRIORITIZE DRIVERS AND BARRIERS

Analysing the drivers and barriers should not only serve to identify them but also to compare them according to their importance for REDD+. The most tractable approach for prioritisation is to compare and rank the land uses representing the direct drivers of deforestation or forest degradation (or the land uses that compete with the 'plus' activities in the case of barriers), and subsequently identify the underlying causes that are linked to the prioritised direct drivers or barriers. There are several criteria that can be used to rank the different factors. The choice of criteria is critical to ensure that the analysis provides the right kind of information for the overall objectives and strategies pursued. For example, a straightforward cost-benefit analysis for each land use may be appropriate if the main aim is to ensure that REDD+ makes an efficient contribution to the national economy. However, where there are potential socio-economic impacts on vulnerable groups that should be considered, an analysis of livelihood alternatives may need to be added.

Four indicators can be particularly useful when comparing the direct drivers of deforestation and forest degradation:

- The amount deforested or degraded for a unit of measurement associated with a particular driver, such as a unit of a particular agricultural output (e.g. palm oil) per hectare of deforestation;

- The benefits (social/economic/environmental) for a unit of measurement related to a particular driver (e.g. benefits per ha of forest cleared for cultivation of a certain type of crop);
- The costs (social/economic/environmental) for a unit of measurement related to a particular driver; and
- Availability of REDD-compatible alternatives to obtain the benefits associated with the driver in question.

These indicators need to be assessed over the lifetime of the productive systems created by the drivers to account for their short-term and long-term impacts, as well as benefits and costs. Comparing these indicators across the different drivers will help highlight the drivers that should be prioritized by PAMs. In the case of the costs and benefits, the approach for measuring them might be different for each driver. It is therefore common to 'normalize' them by reporting their value over a defined period of time. This value is often calculated in monetary terms but other metrics can be used instead, such as an overall livelihood index, or an ecosystem performance indicator. The aim of normalization is to provide a common scale to measure and compare drivers that are intrinsically different in nature and impact, and ultimately help decision-makers select areas of intervention. For example:

- One hectare of oil palm plantation in Indonesia has an estimated financial opportunity cost of US$6,000 over its 30-year lifetime.
- However, the same hectare of oil palm plantation has associated costs and risks pertaining to the destruction of local ecosystems that provide critical environmental services: food, raw material, access to water, and pest and disease control; the difficulty being the accurate measurement of these services.
- One hectare of low-productivity subsistence crops is valued as the cost of equivalent produce that would have to be bought at a local market minus the cost of production. Possible costs and risks derived from the activity are the depletion of soil nutrients, increased prevalence of uncontrolled fires, and potentially shrinking underground aquifers.

Numbers obtained from this normalization exercise will represent the value derived from each land use. Negative values represent a net cost, and positive values represent a net gain. The normalized monetary value, if analysed in isolation, might not reflect other social dimensions that comprise the land uses' total value. This is why drivers should in principle not only be compared on the basis of their economic costs and benefits but also include their social costs and benefits. These normalized 'true' prices for the outputs obtained from different drivers or competing land uses can then be compared, and drivers can be prioritized according to the overall value (economic, social, environmental) they create or destroy.

Other indicators should reflect social and cultural acceptability of addressing drivers, the enabling environment that can support or be a barrier to change, governance and institutional factors, and others. These considerations can be based on the analysis of the indirect drivers linked to each direct driver, and of those barriers that are not related to competition with other land uses (such as weaknesses in the legal framework). As an example, it might be important to include in any analysis of drivers the possible influence of illegality, non-compliance and corruption to understand how these factors might interfere with PAMs and limit their effectiveness. In some cases, addressing a particular driver might be considered so costly or difficult (taking into account the effort that would be needed to overcome constraints in institutional capacity or the resistance of powerful stakeholder groups) that it is considered preferable to focus on other drivers or barriers first.

Common pitfalls in analysing drivers

There are some frequently encountered challenges to analysing DDFD. Fine-grained analyses of the mechanisms at play might be too expensive to be carried out for each driver, or data might be missing for some drivers. The implications of information gaps for the selection of PAMs should therefore be explicit. On the one hand, a lack of data might justify increased efforts to collect data on drivers that have been identified as prioritized areas of intervention in an initial scoping. On the other hand, where 'no regrets options' exist to address a data-deficient driver (i.e. options that are expected to serve multiple benefits and carry low risk) a government may choose to initiate early action even in the absence of conclusive evidence on the importance of this driver relative to others.

Coordination between ministries, and between government and non-government actors/agents, should be promoted in order to minimize the risk of focusing too much on forest-based drivers and missing key non-forest (e.g. agricultural) drivers. This is particularly important in contexts where the largest pressures on forests come from outside the forestry sector (e.g. mining expansion or conversion to agricultural use).

Other common pitfalls include:

- Analysing historical trends only without looking at potential future scenarios;
- Omitting an analysis of indirect drivers;
- Reductionist approaches that neglect non-forestry sectors and their plans for the future;
- Not separating the drivers of deforestation from the drivers of forest degradation, as they are usually not the same;
- Not fully understanding or assessing the agents involved; and
- Being fixated on particular solutions (e.g. community forestry) before a drivers and barriers analysis even starts.

Next steps

Once the analysis of drivers and barriers has been completed, it can inform, among other sources of information, the following:

- The national vision for REDD+;
- The formulation of the NS/AP and its priorities, or the refinement or modification of existing plans or strategies (see ***Module 4: National Strategies or Action Plans***;
- Agreement on and development of PAMs to address the key drivers (see ***Module 7: Policies and Measures for REDD+ Implementation***).

As mentioned above, since new issues are bound to arise, such as changes in commodity prices and exchange rates (which can have significant impact), or modifications to incentive systems and/or laws and regulations, any drivers analysis must undergo a reality check from time to time.

CASE STUDIES

NEPAL

Methods

This study adopted a political ecology perspective to analyse the drivers of deforestation and forest degradation, and to emphasize the underlying political and socio-cultural causes beyond the proximate drivers. Multiple data collection, analysis and validation methods were used including desk review, expert consultations, interviews, field visits and focus group discussions, and regional and national validation workshops. The approach included a highly collaborative process involving the concerned actors and stakeholders.

The study built on previous work in the Readiness Preparation Proposal that had led to the initial identification of priority drivers in Nepal.

Results

Following the consultations and analyses, 4 priority proximate drivers and 11 priority underlying causes were identified. These are:

Priority proximate drivers	Priority underlying causes
Illegal logging Fuelwood consumption Encroachment Road construction	Increased demand for forest land and products High dependency on forests Lack of a deliberative and inclusive forest policy process Poor transparency and corruption Weak law enforcement Weak land tenure Prolonged political transition and instability Social differentiation and inequality Population growth Migration, pressure on resources and related conflicts Limited access to improved technology

The underlying causes were further categorized into economic, social, governance-related, socio-political, demographic and technological factors. The study found that most of the underlying causes are relevant to all of the four proximate drivers. For example, the lack of a deliberative and inclusive forest policy process leads to weak engagement with stakeholders in relation to each driver. There is little support among local populations for attempts to enforce legal requirements on the different uses of the forest, and sustainable practices are being ignored due to a low sense of ownership. Limited access to improved technologies is another example of a factor that increases pressure on the forest from all four proximate drivers, as wider application of technologies with lower environmental impacts could help to reduce the size of the forest areas affected by timber and fuelwood extraction, road construction and subsistence agriculture around illegal settlements.

The study further found that complex interactions and feedback mechanisms exist between and amongst some of the drivers and underlying causes. Also, the scope, intensity and impacts of drivers and causes vary across Nepal, with some causes being more prevalent in some regions than others.

For the most part, forest degradation in Nepal takes place as a precursor to deforestation. Forest degradation generally starts when a few selected trees are illegally logged by timber smugglers, often protected by powerful elites and having close ties with political parties or other power centres. Subsequently, in many cases, land mafias encourage and facilitate landless people to take refuge in such lands. The settlers are then encouraged to harvest and to uproot the remaining trees, and they gradually start cultivating agricultural crops. Eventually the land mafia and the political parties assist the settlers to obtain full land titles, again usually involving the bribery of officials on the frequently formed land reform commissions. This completes the process of conversion of forest to non-forest land.

CROSS RIVER STATE, NIGERIA

Methods

This study employed remote sensing and social surveys within an interdisciplinary framework. The remote sensing methods were used to measure the rate of forest area change as well as to identify the locations where deforestation took place. Change analysis based on satellite imagery was conducted for the two periods from 2000 to 2007 and from 2007 to 2014, respectively. Additional data points from previous deforestation studies were used to develop a trend analysis over a 38-year period (1976-2014). Social survey methods were then used to ascertain the drivers of deforestation and forest degradation at the hotspot locations. Focus group sessions were conducted in each of the communities located near one of the hotspots in order to obtain information on direct drivers. Survey participants were also invited to provide recommendations on ways to mitigate the loss and degradation of forest. Information on the indirect drivers linked to the identified direct drivers was collected from secondary sources.

Results: direct/proximate drivers of deforestation and forest degradation

Subsistence agriculture: subsistence cultivation of crops including cassava, yams and plantain is essential for livelihoods in Cross River State, particularly in the rural areas. Shifting cultivation is widely practiced and is the major process leading to deforestation, while while permanent cultivation drives forest degradation.

Commercial agriculture: commercial agriculture by smallholders as well as large-scale operations is a major source of deforestation in the state. For example, the analysis of satellite images revealed a deforestation hot spot in Awi, Akamkpa local government area, where 1,408 hectares of forest land were converted to large-scale plantation. Prevailing cash crops include cocoa, plantain, oil palm, pineapple, and to some extent rice.

Fuelwood consumption: fuelwood extraction is mainly a cause of forest degradation. All the communities visited during the focus group sessions rely on dead wood collected from forests as the primary source of energy for cooking, preservation and processing agricultural produce such as cassava flour. The fuelwood is collected mostly in proximity to the community, leading to the removal of nutrients and negative impacts on forest growth.

Logging and timber extraction: logging and timber extraction in the state is a contentious issue, and a moratorium on timber harvesting has been in place since 2010. As a result, fear of prosecution made it a major challenge to quantify the extent of timber extraction in the communities visited. However, two visits to timber markets provided a clearer picture of the traded volume of wood and related revenues. The investigation revealed that trade from these two markets has declined considerably. However, the market vendors argued that forest degradation has in fact increased due to corruption and the proliferation of illegal timber harvesting and trade.

Infrastructural development: one of the aims of development policies in the state is to attract foreign direct investment. The associated expansion of road infrastructure has significant implications for deforestation, as previously remote patches of forest become more vulnerable to logging. Examples of forest loss resulting from construction of a road and a power plant project were identified in the study.

Results: indirect drivers of deforestation and forest degradation

Economic considerations: in Cross River State, the key economic driver affecting deforestation is overall market growth (in particular for forest products) and the associated intensified pressures on natural resources. For example, according to the focus group results, about 80 per cent of households in the communities derived as much as 70 per cent of their income from the sale of non-timber forest products. The situation is further aggravated by the state's dependence on agriculture and agro-based industries as one of its mainstays for internally generated revenue.

The agricultural investment opportunities promoted in the state include large-scale cultivation of oil palm, cassava, cocoa and rice, as well as modernized production of poultry and cattle as well as fisheries. The dependence on agriculture and agro-based industry is further driven by the 2012 supreme court judgment ceding the ownership of 76 offshore oil wells to Akwa Ibom State, which led to a loss of revenue for Cross River State.

Demographic factors: according to census data, Cross River State has experienced a population increase of over 50 per cent between 1991 and 2006. With an annual growth rate of 3 per cent, the population is projected to surpasssurpass 5.2 million by 2025. This will increase the pressure to clear forest areas for farmland and infrastructure, and logging is expected to increase in line with wood demand.

Policy and institutional factors: government policies relating to forest management and the institutions set up to implement such policies can serve as indirect drivers of deforestation and forest degradation. A case in point is the anti-deforestation task force in Cross River State, which was set up in 2008 and mandated to assist the State Forestry Commission in its legal functions, such as arresting those engaged in illegal forest exploitation or those who trespass into the forest reserves and plantations. Participants in the focus groups alleged that corrupt practices by some members of the task force promote continued illegal logging. The liberalized state government policy on plantation will also continue to encourage the conversion of forest land to cropland. International policy promoting biofuels could lead to conversion pressure in the future. Other drivers of deforestation linked to policy and institutional factors include declining capacity of the State Forestry Commission, such as lack of vehicles for enforcement, training and extension; and land tenure uncertainties.

Technological factors: lack of appropriate technology for the sustainable management of forests and/or croplands can indirectly cause deforestation and forest degradation. One of the direct drivers of deforestation in Cross River State is the slash-and-burn method used by subsistence farmers for farmland expansion. This can be discouraged by the availability of organic fertilizers and sustainable agro-forestry practices. However, the availability of high technology farming methods can also pose a risk when it supports the establishment of large-scale plantations.

Socio-cultural factors: the majority of forest communities visited in the state do not have access to sources of livelihood other than forest exploitation. In all studied communities, land ownership is driven by local cultural practices, such as the tradition that land becomes the property of a farmer if it has been farmed for a certain period of time, or if he is the first person to convert it from virgin forest to farmland. These traditions provide an incentive for farmers to clear more land.

Urbanization: The reasons for migration to urban areas are manifold, and include the loss or degradation of farmland and pastures due to development, pollution, land grabs, or conflict, alongside hopes for a better life in the city. Urbanization in Nigeria is characterized by city slums with serious environmental consequences, including the clearance of forest for housing, roads, industries, and market areas. Projections based on 1991 figures show that the urban population of Cross River State is expected to double by the year 2025. Eventually, this increase in urban areas will cause further forest clearance.

Recommendations

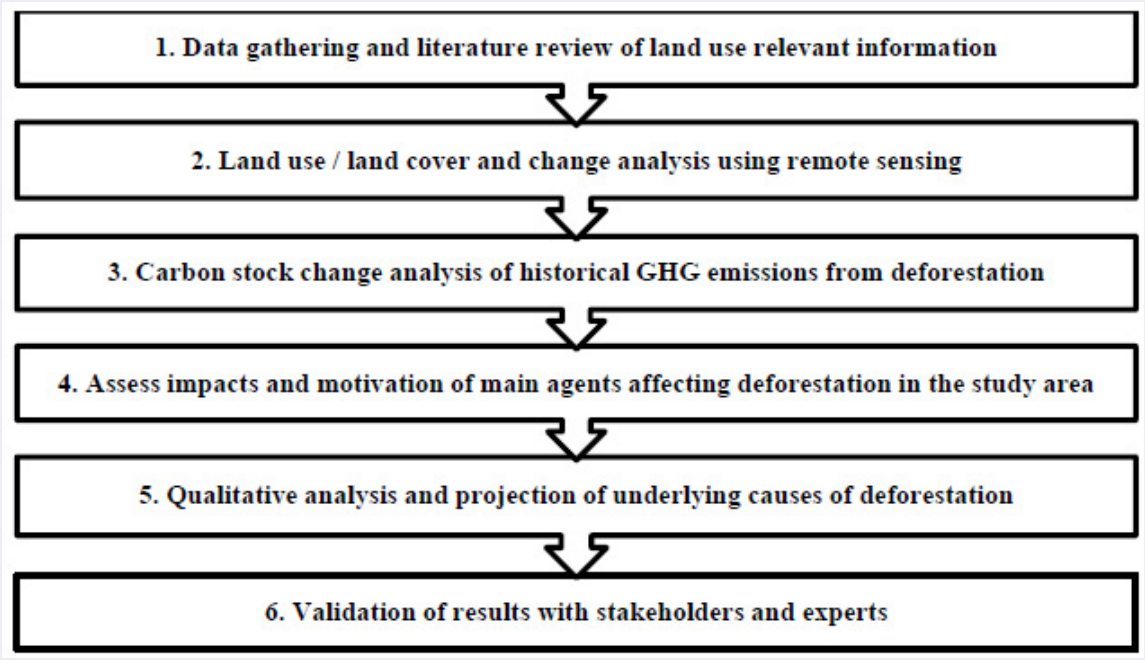
The recommendations on ways to mitigate deforestation in Cross River State made by survey participants included the following:

- Promoting alternative sources of livelihood for the communities, e.g. by employing young people as forest rangers, helping women to acquire technical skills, supporting cooperative loans and improving education.
- Training on sustainable forest management practices, such as the management of nurseries.
- Developing hydroelectricity generation.
- Providing adequate security back-up to youths that guard the forests against illegal loggers.
- Helping communities to enhance agricultural production, reduce shifting cultivation, and process and market food.
- Raising awareness within the communities on forest conservation and related state laws.
- Returning management of the forests to the Cross River State Forestry Commission and abolishing the task force on anti-deforestation.
- Fighting corruption, including by providing concessions for local usage in the ban on timber extraction, ensuring that those arrested are prosecuted without selective justice, and requiring fines to be paid directly into the Cross River State treasury.
- Recognizing timber merchants as stakeholders; for example, the timber traders are willing to plant trees to ensure the sustainability of the forests, and could contribute to consultations on the sustainable management of logging.

SOUTHERN CAMEROON

Methods

The following flowchart describes the methodological steps that were undertaken in the drivers study for Southern Cameroon:



Results

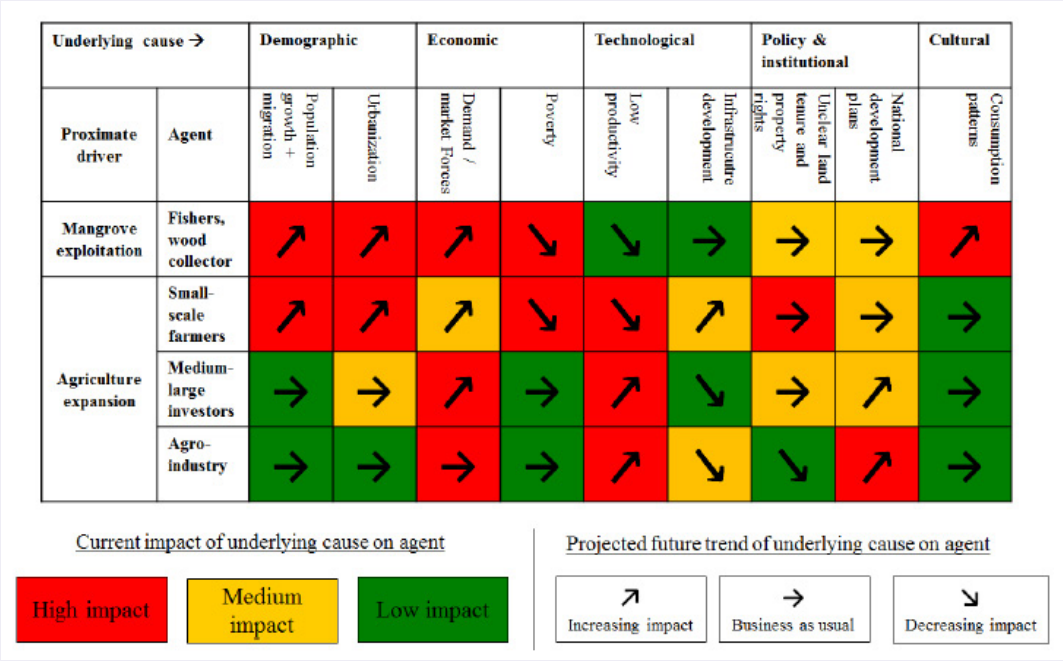
The following table summarizes the findings on direct drivers:

Table 3. Overview of proximate agents of deforestation and degradation in Fako Division.

Activity	Agents Group	Activity Description	NPV at 10% Discount Rate and 20 years	Opportunity Costs of Converting Natural Forest or Mangroves	Key Social and Environmental Benefits
Natural dense forest—extensive use	Mainly smallholders in the Fako Division	Collection of NTFPs and fuel wood	51 USD/ha		Biodiversity and water, NTFPs food and fuel, tourism, spiritual and cultural values, water and soil erosion control, carbon storage
Sustainable mangrove exploitation	Currently not practiced	Utilization of fuel wood and fishing	215 USD/ha		Biodiversity, maintenance of fish population, flood prevention, fuel wood and building material, employment, carbon storage
Unsustainable mangrove exploitation	Fuel wood collectors/fishers	Unsustainable logging of mangroves for fuel wood and fish-smoking	855 USD/ha	640 USD/ha 1.3 USD/tCO_2	
Agricultural expansion	Small-scale farmers	Cocoa cash crop farming combined with subsistence food crops	2,125 USD/ha	2,074 USD/ha 4.7 USD/tCO_2	Food security, income generation, poverty alleviation, fuel wood and construction materials, biodiversity and carbon storage
	Medium–large scale investors	Palm oil production	1,244 USD/ha	1,193 USD/ha 2 USD/tCO_2	Creation of local employment and income; outgrower schemes establishment, infrastructural development, carbon storage
		Rubber production	821 USD/ha	770 USD/ha 1.4 USD/tCO_2	
	Large-scale agro-industry (CDC)	Palm oil production	3,186 USD/ha	3,135 USD/ha 5.2 USD/tCO_2	
		Rubber production	1,959 USD/ha	1,980 USD/ha 3.6 USD/tCO_2	

Note: For the opportunity costs calculation for agricultural expansion natural dense forest is assumed, while for mangrove forest degradation mangrove forests are used as a basis.

The following diagram shows the study's findings about the degree to which the identified indirect drivers currently promote each of the direct drivers, as well as expected future trends.



COLOMBIA

Results

According to a study carried out in Colombia, the principal drivers of deforestation are agricultural expansion, illegal crop cultivation, internal migration, mining, and infrastructure development. Logging and forest fires are the principal causes of forest degradation. In general, deforestation has been found to be greater in non-protected areas with fertile soils, gentle slopes, and near to settlements, roads and rivers.

Agricultural expansion: forest conversion for agriculture has been concentrated in the Andean and Caribbean regions. The process typically begins with the clearing of small areas for subsistence crops. Many such areas have later been abandoned due to loss of soil productivity, rural-urban migration, technology improvement, and globalization of markets. These processes may promote forest recovery, but in some cases abandoned lands remain in a degraded state (see Forest regrowth below).

Migration/colonization: internal migration and colonization of frontier areas is an important driver of deforestation, but figures to assess the magnitude of this effect are scarce. Population movements within Colombia are driven by a variety of interacting factors including social and political unrest caused by conflict between guerrilla movements and government forces, economic destabilization (brought on in part by trade liberalization and increased foreign imports), illegal crop production, and land tenure inequality and insecurity. Colonist-driven forest clearing is primarily for subsistence agriculture, as well as for illegal crop production (depending on the region).

Infrastructure: a large proportion of agricultural and grazing lands throughout the country are located within 10 km of roads, indicating a strong positive relationship between the presence of road infrastructure and forest clearing. In the Amazon and Pacific regions, rivers are also an important means of access. Colonist agriculture in these regions is therefore more dispersed and occurs at distances greater than 50 km from roads. Roads and railways are currently concentrated in the Andes, Orinoco, and Caribbean coastal regions. Hydroelectric projects are also concentrated in the centre of the country.

Mining: gold and other mineral mining and oil drilling contribute to forest clearing and contamination of soils and water sources in Colombia. The magnitude of the impact on forests is unclear. It is likely, nonetheless, that this impact will increase, as the Colombian government granted new mining licenses on 176,000 km^2 declared as strategic mining zones in 2012.

Selective logging: annual timber production in Colombia is estimated at 3.4 million m^3; approximately 40 per cent of this harvest is illegal. Illegal logging contributes to 480 km^2 of forest degradation per year and the overexploitation of 21 tree species.

Forest fire: farmers use fire to establish and manage agricultural areas throughout the country. Between 1986 and 2002, 4,000 km^2 of natural ecosystems were affected by fire, primarily in the Orinoco basin grasslands and the Andes. The extent of burned forests in the Amazon basin is very small in comparison. While burning decreased in recent years

both at a national level and in the Orinoco and Andes regions, burned areas in the Amazon basin increased from 0.01 km^2 between 2000 and 2005 to 16 km^2 between 2005 and 2010. Burning of forests also increased in the Caribbean coastal zones.

Forest regrowth: between 2001 and 2010, woody vegetation increased by 3 per cent from 580,420 km^2 to 597,383 km^2. This regrowth appears to result from secondary forest recovery in abandoned agricultural areas. The observed land abandonment may have been caused by armed conflicts and economic development during the last 10 to 20 years. Land abandonment in rural areas began in the early 1990s when the Colombian government implemented an economic liberalization model, and continued in the late 1990s as a result of the intensification of internal conflicts.

Likely future trends in land use

The Colombian government is focusing simultaneously on increasing biofuel production and demand, livestock yield and efficiency, mining and oil exploration, and the resettlement of former militia-controlled zones stimulated by an incipient peace agreement.

- **Biofuels**: in an effort to increase energy independence, Colombia has begun to develop a biofuel industry, primarily based on ethanol from sugar cane and biodiesel from palm oil. Through government regulations and incentives for both supply and demand, the aim is to bring production to 29,907 barrels a day by 2019, and eventually bring a total of 30,000 km^2 under biofuel cultivation. Currently, oil palm and sugar cane are cultivated on approximately 9,000 km^2.
- **Cattle**: FEDEGAN, the national cattle association, aims for Colombia to become one of the world's leading cattle producers, projecting an increase in the size of the national herd from 22 million in 2005 to approximately 56 million by 2019. This very ambitious expansion is planned through a continuation of the largely grass-fed production system, although with steep increases in yields that would enable growing the herd while shrinking the total area of pasture by 100,000 km^2, to approximately 280,000 km^2. To achieve both goals, FEDEGAN plans to increase productivity and breeding, but it is not clear how and whether these measures will increase yields and avoid pasture expansion.
- **Mining**: traditionally, mining has been concentrated in the Andes region, with about 48,000 km^2 of mining licenses granted. However, new government policies call for expanding mining and oil exploration to other regions. In 2012, the government began to grant new mining concessions over an area of 176,000 km^2. The recent decline in violence in militia strongholds has led to a surge in unlicensed and unregulated mining, leading to forest clearing and other environmental damage. The future impact of mining will depend on the government's ability to control the expansion of both licensed and unlicensed mines.
- **Resettlement**: Land reform is a central issue in the peace agreement with the FARC, and a focus of the current government, with specific proposals for peasant settlement zones. The government has already initiated a process for resettling families who abandoned or were forced off their land as a result of insecurity and conflict. Solicited land restitutions thus far cover an area of 23,689 km^2. It is not clear what impact resettlement will have on land use and forest clearing — this will depend to some extent on where resettlement takes place, whether and to what extent those lands had already been cleared, and what investments are planned for the region.

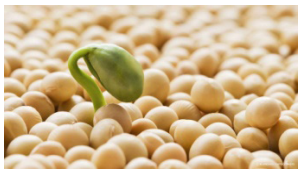
EXERCISE 5

Which of the following criteria could be used to prioritize DDFD to be addressed in your country's NS/AP, and how would you rank them?

- Extent of forest area currently affected by the driver
- Projected future trends in the forest area affected
- Historical trends in the forest area affected
- Contribution of the driver to the national economy
- Importance of the driver for local livelihoods
- Social and environmental impacts linked to the driver
- Availability of alternative ways of obtaining the benefits provided by the driver
- Political, practical and financial feasibility of addressing the driver
- Quality of data related to the importance of the driver and its social and environmental impacts.

EXERCISE 6

This module has introduced the importance of good analysis of the DDFD. Which of the following are made more likely from an analysis of drivers?

Agreement on a national vision for REDD+	Reduction in use of fossil fuels	Clear justification for the selection of particular REDD+ activities
		
Initiation of a safeguards and Safeguards Information System (SIS) work stream	**Formulation of a prioritized national REDD+ strategy and/ or action plan**	**Better understanding of the link between changes in forest area and specific economic activities**
		

KEY MESSAGES OF THIS MODULE

- A good understanding of direct and indirect DDFD, as well as barriers to the 'plus' activities, is necessary to design and implement effective results-based REDD+ actions.
- Indirect drivers very often influence the behaviour of direct drivers and actors.
- Future drivers and barriers can be different from historical and current drivers and barriers.
- Engaging key stakeholders in the analytical work fosters an inclusive dialogue, although countries should base their particular approach on their own national circumstances.
- In order to safeguard public benefits and/or the interests of economic development it will not always be possible to obtain full buy-in and/or agreement from the stakeholders representing key drivers, such as the industrial and commercial sector, particularly in countries where the agricultural sector is a major contributor to GDP.

WHAT FURTHER QUESTIONS DO YOU HAVE ABOUT THIS TOPIC?

NOTES

NOTES

References and resources

- Alexandratos, N. and J. Bruinsma (2012). World agriculture towards 2030/2050: the 2012 revision. ESA Working paper No. 12-03. Rome, FAO. http://www.fao.org/docrep/016/ap106e/ap106e.pdf
- Carodenuto, S., Merger, E., Essomba, E., Panev, M., Pistorius, T., and J. Amougou (2015). A Methodological Framework for Assessing Agents, Proximate Drivers and Underlying Causes of Deforestation: Field Test Results from Southern Cameroon. *Forests* 2015, Vol. 6, 203-224; doi:10.3390/f6010203. Available at: http://www.mdpi.com/1999-4907/6/1/203/pdf
- FAO (2007). FAO Advisory Committee on Paper and Wood Products – Forty-eighth Session – Shanghai, China, 6 June 2007. Available at: ftp://ftp.fao.org/docrep/fao/011/k2597e/k2597e04.pdf
- Global Commission on the Economy and Climate (2016). The Sustainable Infrastructure Imperative. Financing for Better Growth and Development. The 2016 New Climate Economy Report. Available at: http://newclimateeconomy.report/2016/
- Ingwe, R. and L. Oyama (n.d.). Private Sector-Related Drivers of Deforestation in Cross River State Nigeria. (Powerpoint presentation for a workshop on Participatory Governance Assessment). Available at: http://www.unredd.net/documents/global-programme-191/governance-452/participatory-governance-assessments-for-redd-651/pga-in-nigeria-1193/pga-consultation-workshop-calabar-nigeria-16-18-january-2013-2728/9260-private-sector-related-drivers-of-deforestation-in-crs-presentation-9260.html
- IBRD and World Bank (2011). Wood-Based Biomass Energy Development for Sub-Saharan Africa. Available at: http://siteresources.worldbank.org/EXTAFRREGTOPENERGY/Resources/717305-1266613906108/BiomassEnergyPaper_WEB_Zoomed75.pdf.
- Kissinger, G., Herold, M. and De Sy, V. (2012). Drivers of Deforestation and Forest Degradation: Synthesis Report for REDD+ Policymakers. Lexeme Consulting, Vancouver Canada. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/65505/6316-drivers-deforestation-report.pdf
- *Nepstad et al*. (2013). Addressing Agricultural Drivers of Deforestation in Colombia: Increasing Land-Based Production While Reducing Deforestation, Forest Degradation, Greenhouse Gas Emissions and Rural Poverty. Earth Innovation Institute. Available at: http://earthinnovation.org/publications/addressing-agricultural-drivers-of-deforestation-in-colombia-english/
- United Nations, Department of Economic and Social Affairs (UN DESA), Population Division (2015). World Population Prospects: The 2015 Revision. New York: United Nations. Available at: https://esa.un.org/unpd/wpp/publications/files/key_findings_wpp_2015.pdf
- UNFCCC (2014). Decision Booklet REDD+. Available at: https://unfccc.int/files/land_use_and_climate_change/redd/application/pdf/compilation_redd_decision_booklet_v1.1.pdf
- UN-REDD Programme (2014). Understanding drivers and causes of deforestation and forest degradation in Nepal: potential policies and measures for REDD+. Available at: http://www.unredd.net/documents/un-redd-partner-countries-181/asia-the-pacific-333/a-p-partner-countries/nepal-408/targeted-support-2468/technical-2527/12118-understanding-drivers-and-causes-of-deforestation-and-forest-degradation-in-nepal-potential-policies-and-measures-for-redd-12118.html

Additional resources

- Angelsen, A. and Kaimowitz, D. (1999). Rethinking the Causes of Deforestation: Lessons from Economic Models. The World Bank Research Observer, vol. 14, no. 1: 73-98. Available at: http://documents.worldbank.org/curated/en/264451468180276699/Rethinking-the-causes-of-deforestation-lessons-from-economic-models
- Enters, T., Kelley, L., Pescott, M. and Durst, P.B. (2010). Growing Green Assets: Removing Constraints to Private Sector Investment in Forestry in Asia and the Pacific. In: Growing Green Assets: Removing Constraints to Private Sector Investment in Forestry in Asia and the Pacific, eds. Pescott, M., Durst, P.B. and Leslie, R.N. RAP Publication 2010/18. Food and Agriculture Organization of the United Nations, Bangkok. pp. 1-25. Available at: http://www.fao.org/docrep/013/i1933e/i1933e00.htm
- Rademaekers, K., Eichler, L., Berg, J., Obersteiner, M. and Havlik, P. (2010). Study on the Evolution of Some Deforestation Drivers and Their Potential Impacts on the Costs of an Avoiding Deforestation Scheme. ECORYS: Rotterdam.
- Boucher, D., Elias, P., Lininger, K., May-Tobin, C., Roquemore, S. and Saxon, E. (2011). The Root of the Problem: What's Driving Tropical Deforestation Today? Union of Concerned Scientists. Available at: http://www.ucsusa.org/sites/default/files/legacy/assets/documents/global_warming/UCS_RootoftheProblem_DriversofDeforestation_FullReport.pdf
- GIZ (2012). Analysis of Key Drivers of Deforestation and Forest Degradation in the Philippines. Gesellschaft für Internationale Zusammenarbeit: Eschborn. Available at: https://www.giz.de/en/downloads/giz2013-en-key-drivers-deforestation-forest-degradation-philippines.pdf
- Hosonuma, N., Herold, M., De Sy, V., De Fries, R.S., Brockhaus, M., Verchot, L., Angelsen, A. and Romijn, E. (2012). An Assessment of Deforestation and Forest Degradation Drivers in Developing Countries. Environ. Res. Lett. 7, 044009. Available at: http://iopscience.iop.org/article/10.1088/1748-9326/7/4/044009/pdf
- Pirard, R. and Belna, K. (2012). Agriculture and Deforestation: Is REDD+ Rooted In Evidence? Forest Policy and Economics 21: 62-70.
- Rautner, M., Legget, M. and Davis, F., (2013). The Little Book of Big Deforestation Drivers. Global Canopy Programme: Oxford. Available at: http://globalcanopy.org/publications/little-book-of-big-deforestation-drivers-24-catalysts-to-reduce-tropical-deforestation
- Streck, C. and Zurek, M. (2013). Addressing Agricultural Drivers of Deforestation. Climate. Climate Focus. Amsterdam. Available at: http://www.climatefocus.com/sites/default/files/addressing_agricultural_drivers_of_deforestation.pdf
- McFarland, W., Whitley, S. and Kissinger, G. (2015). Subsidies to Key Commodities Driving Forest Loss: Implications for Private Climate Finance. Overseas Development Institute. London. Available at: https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/9577.pdf
- UNEP (2016). Fiscal incentives for Indonesian palm oil production: Pathways for alignment with green growth. United Nations Environment Programme. Available at: http://www.unredd.net/index.php?option=com_docman&view=document&alias=15505-fiscal-incentives-for-indonesian-palm-oil-production&category_slug=supporting-documents&Itemid=134
- UN-REDD Programme (2015). Fiscal incentives for agricultural commodity production: Options to forge compatibility with REDD+. Available at: https://www.unredd.net/documents/global-programme-191/redd-and-the-green-economy-1294/forest-ecosystem-valuation-and-economics/14584-un-redd-policy-brief-qfiscal-incentives-for-agricultural-commodity-production-options-to-forge-compatibility-with-reddq.html
- Salvini, G., M. Herold, V. De Sy, G. Kissinger, M. Brockhaus, M. Skutsch (2014). How countries link REDD+ interventions to drivers in their readiness plans: implications for monitoring systems. Environmental Research Letters 9(7): 074004. Available at: http://www.cifor.org/library/4858/how-countries-link-redd-interventions-to-drivers-in-their-readiness-plans-implications-for-monitoring-systems/

Web resource

- Global Forest Watch, http://www.globalforestwatch.org/
- REDD+ Web Platform, at http://redd.unfccc.int/. The UNFCC's hub for sharing information and lessons learned about REDD+ activities.
- UNFCCC website, at https://unfccc.int/2860.php (not unfccc.int). A source of background information on the Convention and, in its 'Land Use and Climate Change' section, on REDD+.
- UN-REDD Programme, at: http://www.un-redd.org/, and its Collaborative Online Workspace, at http://www.unredd.net/. The workspace provides resources and a discussion forum to support countries engaged in REDD+ and promote stakeholder engagement.
- Wageningen University, GOFC-GOLD, World Bank FCPF (2015). REDD+ training materials https://www.forestcarbonpartnership.org/redd-training-material-forest-monitoring

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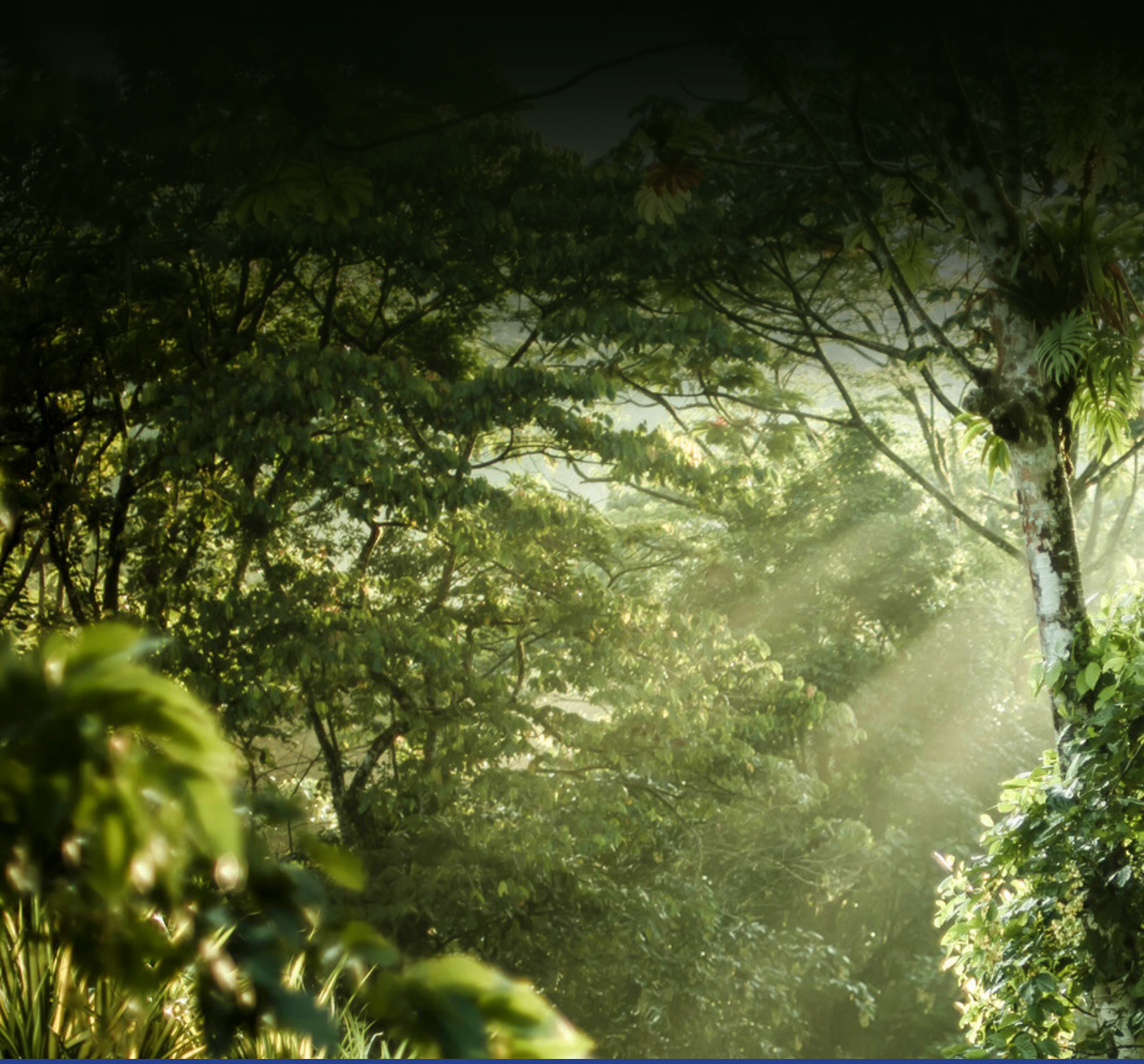

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