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Illegal Logging and Related Timber Trade – Dimensions, Drivers, Impacts and Responses

A Global Scientific Rapid Response Assessment Report

Editors: Daniela Kleinschmit, Stephanie Mansourian, Christoph Wildburger, Andre Purret

CPF
Collaborative Partnership on Forests

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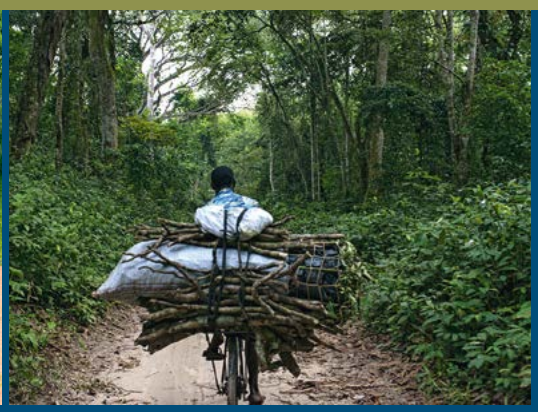

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Preface
A Novel Look at Illegal Logging and Related Timber Trade

Illegal logging and associated timber trade constitute complex and serious challenges for the international community. Various resolutions and decisions on this topic have been passed at the highest levels of international diplomacy, and several UN bodies have been directed to assist in fighting environmental crime. Against this background, IUFRO was mandated by the Collaborative Partnership on Forests (CPF) to undertake a scientific assessment on the topic of illegal logging and related timber trade in the framework of the Global Forest Expert Panels (GFEP) initiative.

GFEP responds to key policy questions related to forests by assessing and synthesizing available scientific evidence at a global scale. Assessment reports, prepared by internationally-recognized scientists from around the world, aim to provide decision-makers with the most up-to-date, relevant, objective and accurate scientific information on key issues of high concern in a comprehensive, interdisciplinary and transparent way. In order to capitalize on existing political momentum, the topic of illegal logging and associated timber trade was taken up as a "rapid response" assessment, aiming to complete the scientific report in less than one year's time.

This report entitled "*Illegal Logging and Related Timber Trade – Dimensions, Drivers, Impacts and Responses*" reflects the rich, yet finely nuanced results of this collaborative international scientific effort. The report synthesizes the many facets of illegality affecting forests and people, including the various definitions of illegal forest activities. Based on available scientific evidence, the report gives an overview of the markets, actors, wood flows and supply chains involved in illegal timber trade. It discusses the impacts of illegal logging and related timber trade across various situations of production and consumption, as well as the drivers behind these illegal activities.

The report also presents related governance frameworks and response options, including an analysis of the latest global initiatives to combat illegal timber trade. One particularly novel aspect contained in the report is a criminological analysis of organized forest crime with suggestions from timber forensics.

This assessment and the accompanying policy brief provide an authoritative source of information for policymakers and stakeholders involved in the fight against illegal logging and associated timber trade, and it is my sincere hope that they will support effective action in tackling this pressing global problem.

Alexander Buck
IUFRO Executive Director

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Acronyms

AFLEG	Africa Forest Law Enforcement and Governance
APP	Areas of Permanent Protection (Brazil)
BRIICS	Brazil, Russia, India, Indonesia, China and South Africa
BRIK	*Badan Revitalisasi Industri Kayu* (Indonesian Institute for the Revitalization of the Timber Industry)
CAF	Chinese Academy of Forestry
CAR	Central African Republic
CBD	United Nations Convention on Biological Diversity
CIF	Cost, Insurance and Freight
CIFOR	Center for International Forestry Research
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CoC	Chain of Custody
CPF	Collaborative Partnership on Forests
CSO	Civil Society Organization
CTLVS	China Timber Legality Verification Scheme
DFID	Department for International Development
DOF	Document of Forest Origin (Brazil)
DRC	Democratic Republic of the Congo
EGAIS	Uniform State Automated Information System (Russian Federation)
EIA	Environmental Investigation Agency
ETPIK	*Ekspor Terdaftar Produk Industri Kehutanan* (Indonesia)
EU	European Union
EU-FLEGT	European Union Forest Law Enforcement, Governance and Trade
EUTR	European Union Timber Regulation
FLEG	Forest Law Enforcement and Governance
FLEGT	Forest Law Enforcement, Governance and Trade
FM	Forest Management
FMP	Forest Management Plan
FMU	Forest Management Units
FOB	Free on Board
FPIC	Free Prior and Informed Consent
FSC	Forest Stewardship Council
GFEP	Global Forest Expert Panels
GPS	Global Positioning System
HTI	Industrial forest concessions (Indonesia)
IAASTD	International Assessment of Agricultural Knowledge, Science and Technology for Development
IASS	Institute for Advanced Sustainability Studies
IBAMA	Environmental Inspection Agency (Brazil)
ICCWC	International Consortium on Combating Wildlife Crime
IEO	International Energy Outlook
IFAD	International Fund for Agricultural Development
ILPA	Illegal Logging Prohibition Act (Australia)
IM-FLEGT	Independent Monitoring of Forest Law Enforcement and Governance Trade
INCRA	Institute for Colonisation and Agrarian Reform (Brazil)
IPK	Timber utilization permit (Indonesia)
ITTO	International Tropical Timber Organization
IUCN	International Union for Conservation of Nature
KPK	Anti-Corruption Commission (Indonesia)
LEAF	Law Enforcement Assistance for Forests
LTPA	Legal Timber Protection Act
LTV	Legal Timber Verification
MINFOF	*Ministère des Forêts et de la Faune* (Cameroon)
MONUSCO	United Nations Organization Stabilization Mission in the DRC

MoU	Memorandum of Understanding
NGO	Non-Governmental Organization
NIRS	Near-Infrared Spectroscopy
NTFP	Non-Timber Forest Product
NWO	Dutch Organisation of Scientific Research
ODI	Overseas Development Institute
PEFC	Programme for the Endorsement of Forest Certification
PFD	Permanent Forest Domain
PNG	Papua New Guinea
PTPA	United States-Peru Trade Promotion Agreement
RAFT	Responsible Asia Forestry and Trade
REDD	Reducing Emissions from Deforestation and Forest Degradation
RIFPI	Research Institute of Forestry Policy and Information (China)
RL	Legal Reserves (Brazil)
RWE	Roundwood Equivalent
SABL	Special Agricultural Business Lease
SDG	Sustainable Development Goal
SEFA	Para's state Finance Agency (Brazil)
SEMAS	Para's Environmental and Sustainability Secretariat (Brazil)
SEMMA	Municipal Environment Secretariat (Brazil)
SFA	State Forestry Administration (China)
SFM	Sustainable Forest Management
SME	Small- and Medium-Scale Enterprise
SNP	Single Nucleotide Polymorphism
SNUC	National Conservation Area System (Brazil)
SVLK	*Sistem Verifikasi Legalitas Kayu* (Indonesian Timber Legality Verification System)
TLAS	Timber Legality Assurance System
TTP	Timber Transport Permit
TREE	Timber Regulation Enforcement Exchange
UN	United Nations
UNCED	United Nations Conference on the Environment and Development
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNGA	UN General Assembly
UNODC	United Nations Office on Drugs and Crime
UNTOC	United Nations Convention against Transnational Organized Crime
US	United States
VPA	Voluntary Partnership Agreement
WCO	World Customs Organization
WTO	World Trade Organization
WWF	World Wide Fund for Nature

Chapter 1
Introduction: Understanding the Complexities of Illegal Logging and Associated Timber Trade

Lead authors: Daniela Kleinschmit, Sina Leipold and Metodi Sotirov

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1.1 Definition and Scope of the Problem

Ingredients for a good media story often include a bad guy, source of all problems, a helpless victim and a knight in shining armour who will save the day. Similar simplistic stories exist about illegal logging and associated timber trade. The media have been presenting "bad guys" logging for their own economic benefits, creating environmental and social victims, and demanding a - mostly political - response to solve the issue and giving credit to those who have enforced this response. Probably, as in most other cases, simplification does not account for all aspects of the story and in particular, not for the complexity of illegal logging and associated timber trade which results from different interconnected problems and challenges.

One of the basic challenges is the diverse understandings of what illegal logging means - and to whom. This ambiguity has consequences not only for estimating the scale of illegal logging and associated trade but also for identifying its drivers and impacts. Depending on the dominant understanding of illegal logging, governance responses might address particular activities while disregarding others.

Though there have been diverse reports about illegal logging recently (e.g. Hoare, 2015; Lawson and MacFaul, 2010; Nellemann et al., 2016), a detailed and comprehensive review of the multi-faceted and complex nature of illegal logging and associated timber trade as well as response options is missing (Hoare, 2015). For this reason, the Collaborative Partnership on Forests (CPF) tasked the Global Forest Expert Panels initiative (GFEP) to initiate and coordinate a global scientific "Rapid Response Assessment" on illegal logging and related timber trade (hereafter the "assessment").

This assessment is designed to gain a deeper understanding of the meaning of illegal logging and associated timber trade, its scale, drivers and consequences as well as to identify the opportunities and constraints of existing policy and governance initiatives. It aims to provide a global structured synthesis of existing scientific and expert knowledge on illegal logging and associated timber trade while adding to existing studies and reports by providing new insights, e.g. a criminology perspective, and new information about timber and timber product trade flows. This comprehensive and unified assessment also explores future policy options regarding illegal logging by reaching out to international as well as national policymakers and stakeholders concerned with legal and sustainable forest management. Furthermore, it brings together scientists from various academic disciplines (e.g., forest-related policy, law, governance, economics, management, timber trade) working on the advancement of the state of knowledge related to illegal logging and associated timber trade.

In order to achieve these aims this assessment first seeks to understand the full meaning of illegal logging which varies depending on who responds (see Chapter 2). Existing definitions range from a rather narrow understanding of illegal logging that refers to taking timber from outside authorized forest concessions or exceeding assigned timber quotas, to broad definitions comprising the entire value and supply chains, including the processing and trading of timber and timber products. Many studies and programmes have acknowledged that there is no such thing as *the* illegal logging but rather various types of illegal logging that can be differentiated, e.g. the "ten ways to conduct illegal logging" (Nellemann and INTERPOL Environmental Crime Programme, 2012). It is however recognized that many of these activities are interrelated and therefore a clear differentiation becomes difficult.

For an empirical analysis following Hoare (2015), illegal logging and related timber trade can be defined as including all practices related to the harvesting, processing and trading of timber inconsistent with national and sub-national laws. The restriction to the national level is given not least because there is neither an overarching international regulation against illegal logging nor an internationally-accepted definition of what illegal logging encompasses. However, domestic law differs from country to country and changes over time. Another caveat of using the given national law as the baseline against which to measure illegality is the question of the legitimacy of this law. Whether legal statutes are accepted as legitimate and valid depends on the perspective taken (see Chapter 2). The validity of law can be challenged if it does not follow a legally valid procedure. Furthermore, a society as a whole, or particular societal groups, may not accept the whole basis of a legal framework or a particular approach to legislation. For example, conflicts over forest tenure rights might lead to non-acceptance of any other statutes that do not acknowledge this struggle. At the other end of the spectrum, illegal logging can be conducted in networks of organized crime. These often

Carpenter chainsawing a felled tree in a forest near the Ovangoul village, Center Region, Cameroon.
Photo © Ollivier Girard for CIFOR

stretch across different economic sectors, other areas of crime and across national borders.

The different understandings of illegal logging result in a large number of partly conflicting "guesstimates" (Bisschop, 2012) about its consequences. Some scholars and experts depict illegal logging as a (hidden) crime in an "abysmally regulated" (Leipold and Winkel, 2016) forest sector. They argue that illegal logging and associated timber trade is supported by both voracious businesses and corrupt governments in the Global South as well as the opportunism of (some) importers in the Global North (see, for instance, Von Bismarck, 2007; INTERPOL and The World Bank, 2009). Others depict illegal logging as an ambiguous phenomenon with different expressions across the variety of affected countries arguing that it often results from unclear legal situations (e.g. regarding informal or traditional tenure rights) and the illegalization of subsistence logging (see, for instance, Cerutti et al., 2013; McDermott et al., 2015). Finally, a third group of scholars and experts specifically highlights international competition in the wood (products) markets as a significant dimension of illegal logging and associated trade (e.g. Seneca Creek Associates LLC and Wood Resources International LLC, 2004; Jaakko Pöyry Consulting, 2005; Schwer and Sotirov, 2014; Leipold et al., 2016).

Illegal logging and related trade is often associated with far reaching environmental, social and economic consequences (see Chapter 6). It is accused of being a constraint to sustainable forest management, resulting, among other things, in a loss of biodiversity and habitats in addition to contributing to climate change (Putz et al., 2012; Edwards et al., 2014). At the same time, illegal logging has been connected to highly sensitive economic and development issues such as the distortion of markets and free trade, loss of government revenues and tax evasion, increasing income disparities resulting in impoverished rural communities (McElwee, 2004; Sotirov et al., 2015). Furthermore, illegal logging is considered to undermine the principles of statehood such as national sovereignty over natural resources or good forest governance. Though the political and scientific discourse has focused on these perceived negative impacts, it has become increasingly evident that illegal logging and its consequences are much more nuanced than this (Cerutti and Tacconi, 2006). Illegal logging may result for example, in income for poor and unemployed people, in alternative land uses like farming, in higher revenues for local or national governments or in lower prices for consumers (Tacconi et al., 2003). In turn, banning illegal logging does not automatically guarantee the sustainable management of forests.

The multitude of consequences ascribed to illegal logging activities are strongly related to a number of underlying causes that vary between places and show high complexity covering structural, economic and political reasons. Contreras-Hermosilla (2002) acknowledges that these roots are contextual and are influenced by such factors as policies, traditions, level of democracy etc. The drivers of illegal logging are strongly interrelated with drivers of deforestation and forest degradation. Indeed, forest loss and degradation may result from legal activities as well (see Chapter 4).

Though there is a common understanding that accurate data on the scope of illegal logging is hard to obtain, scientific studies as well as reports and programmes, time and again release detailed figures (see Chapter 3). These appear to show a large variation, depending on the definition of illegal logging taken, but also on the dimension used for estimating, e.g. land area, cubic metre or economic valuation, and methods applied. Despite this variation, studies agree in highlighting the potentially severe extent of the problem. For instance, the World Bank estimated in 2005 that losses from illegal logging in terms of a global market value were more than USD 10 billion annually with a loss of government revenues totalling about USD 5 billion (World Bank, 2005). In a later study, the total global market value increased to at least USD 30-100 billion. Sources in the report noted that "an area of forest equivalent in size to the territory of Austria disappears worldwide every year as the result of illegal logging" (INTERPOL and The World Bank, 2009). A key challenge for political decision-makers given these diverse figures is to find a common methodology to interpret them in order to extract reliable conclusions.

Given the uncertainties surrounding data about illegal logging, it is not surprising that reports present conflicting views on whether illegal logging is declining or not. Hoare (2015) states that "important progress has been made in reducing illegality in the forest sector over the last decade"; in contrast, the report on "Green Carbon, Black Trade" three years earlier (Nellemann and INTERPOL Environmental Crime Programme, 2012) claims that illegal logging has remained high in many regions and has even increased in some areas. It is argued that illegal logging becomes more advanced with better organized activities, and laundering operations masking criminal activities (Nellemann and INTERPOL Environmental Crime Programme, 2012). It is further argued that forest law enforcement and certification and management efforts only have had short term effects on illegal logging (Nellemann and INTERPOL Environmental Crime Programme, 2012). This may lead to "leakage" or the shifting of illegal logging activities to other countries with lower standards.

Since the 1990s, improvements in government responses to illegal logging and related trade can be observed in both producer (and processing) and consumer countries (Lawson and MacFaul, 2010; Hoare, 2015). In producer countries, particularly in Brazil (Lawson and MacFaul, 2010) and later in Indonesia, progress has been highlighted (Hoare, 2015). National policies are strongly interlinked with and have been fuelled and supported by international political processes and nongovernmental organizations. The observed improvements are categorized mainly as procedural rather than substantive. Furthermore, reports indicate persisting weaknesses in policy responses of producer countries, e.g. concerning forest-related information, law enforcement, transparency and corruption (Lawson and McFaul, 2010; Hoare, 2015). Another challenge for policies in mainly (but not exclusively) producer countries is the, at times, limited capacity for legally valid procedures for law-making.

Box 1.1

Definition of illegal logging and related trade

Building on the report by Hoare (2015) and an article by Smith (2002) this assessment report uses as broad definition of **illegal logging and related timber trade** as being **"all practices related to the harvesting, processing and trading of timber inconsistent with national and sub-national law"**. Such practices include, for instance, operating under a licence that has been obtained illegally, e.g. involving corruption or collusion, logging in protected areas, exceeding permitted harvest quotas, processing logs without the necessary licences, tax evasion and exporting products without paying export duties. The definition encompasses "related trade" when timber-based products are exported or imported in contravention to import or export laws or when illegal timber products are exported or imported. Hence, this definition describes illegal logging as a phenomenon that stretches across global timber supply chains.

Consequently acceptance or fairness in the exercise of power might be missing (Tacconi, 2008).

In order to support producer countries, bilateral arrangements have emerged, either between neighbouring countries or between primary export and import countries. For instance, the EU Forest Law Enforcement, Governance and Trade Action Plan (FLEGT) supports countries in developing more effective forest laws and law enforcement. Yet, a formal overarching international treaty remains absent - except for the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) protecting some specific endangered tree species. In addition to voluntary cooperation between countries, large "consumer" countries and jurisdictions have developed measures (e.g. the European Timber Regulation (EUTR) or the US Legal Timber Protection Act (LTPA)) banning the import of illegally-logged timber and timber products and requiring legality verification systems. Although the legal requirements are similar in all three schemes, the process by which economic operators and traders adhere to laws differs significantly within and across "consumer" countries and jurisdictions (Leipold et al., 2016). In addition, these consumer-driven policies have perverse consequences inside and outside their jurisdictions. Apart from a general decline in timber import and in particular tropical timber import (Giurca et al., 2013) that might put pressure on domestic forests to further increase domestic timber production, "producer" countries have the option to trade with other partners with less legally-stringent regulatory frameworks (Schwer and Sotirov, 2014). Consequently, some policy programmes demand concerted action across "consumer" and "producer" countries, and multiple political levels. At the same time, many Southern countries have developed a range of individual national responses including national law-making and enforcement efforts or the development of their own legality verification schemes with support from the EU FLEGT Action Plan. It is essential to identify effective policy response options to understand failures and success stories of governance responses (Chapter 7).

It is only recently that illegal logging and associated timber trade have been framed not only as a legal problem but also as a criminal one. To date, reports point to the increasing professionalization of illegal logging fuelled by its interlinkage with organized criminal cartels, e.g. by laundering drug money (Nellemann et al., 2016). To understand illegal logging and associated timber trade as a criminal activity requires in particular the examination of professional criminal business networks and the poor enforcement of applicable regulations (see Chapter 5).

1.2 Context of the Assessment: A Brief History of Framing Illegal Logging and Related Timber Trade in the Political Arena

The multi-faceted nature of illegal logging and related timber trade signifies that it means different things to different countries, organizations and individuals. In turn, these different understandings determine how a policy problem is defined, how policy discussions are framed and what solutions are found.

Although the issue has been high on the international political agenda for many years, political framing of the problem often focused on particular aspects while excluding others. In the late 1980s and early 1990s, for instance, "illegal" logging was an international non-issue (Humphreys, 2006) because countries viewed as major exporters of timber did not want to accept sole blame for the problem (Leipold et al., 2016). Hence, illegal timber trade first appeared as "undocumented trade" (Humphreys, 2006) in the International Timber Trade Agreement in 1994. The term "illegal" logging was for the first time prominently promoted by the G8 Action Programme on Forests (Humphreys, 2006). Here, the term became accepted by producer countries because the Action Programme "did not anymore point the finger only at them [producer countries] but also held the consumers responsible" (Leipold et al., 2016). Despite the shared responsibility, the majority of studies and policy papers in the 1990s highlighted the criminal, environmental and public finance aspects of the issue and focused on solutions in "producer" countries of illegal wood. The UK and the US, for instance, prominently supported the Forest Law Enforcement and Governance (FLEG) initiative of the World Bank, launched in 2001. Only two years after FLEG, the European Union launched its own initiative: the Forest Law Enforcement, Governance and Trade Action Plan (FLEGT) (Sotirov et al., 2015). The UK further pursued bilateral trade agreements with timber-producing

countries in the tropics (e.g. a Memorandum of Understanding between the UK and Indonesia (Leipold et al., 2016)). All these initiatives pursue similar goals: targeting developing countries that were seen as major producers of illegal wood (e.g. Indonesia or Ghana - see for e.g., Wiersum and Elands, 2013). They are supposed to support "producer" countries to enforce their own forest laws and, thus, advance their economic development as well as social and environmental stewardship in the forest and land use sector (see for e.g., van Heeswijk and Turnhout, 2013).

In the late 2000s, international competition entered into the picture. Specifically, political discussions in consumer countries, such as the US or Australia, increasingly portrayed illegal logging as a decisive factor in the global wood (products) trade between "producers" and "consumers". As economic globalization in the forest products sector accelerated the marketing of tropical forest products to consumers in the North, leading industry associations in Europe and North America came to increasingly view illegal logging outside their own borders as an issue of competitiveness (Schwer and Sotirov, 2014; Leipold et al., 2016), while environmental groups presented illegal logging as a problem for tropical developing countries and highlighted the environmental dimension of the problem. The convergence of these two objectives - to protect both Southern forests and Northern wood (products) markets - led to the emergence of national policies that prohibit the import of wood (products) harvested or traded in contravention to the laws of the country of origin (Leipold et al., 2016). These policies include the US Lacey Act (LTPA) 2008, the EU Timber Regulation (EUTR) 2010 and the Australian Illegal Logging Prohibition Act (ILPA) 2012. All three laws together have been portrayed as forming a newly emerging global legality verification regime (Bartley, 2014; Overdevest and Zeitlin, 2014). Together with earlier initiatives that target producer countries directly, this regime is viewed as holding the potential to promote global economic development and environmental goals related to forest management and the entire forest product supply chain. Yet, the more ambiguous aspects of "illegal" logging such as local livelihoods and potentially sustainable but nominally illegal small-scale production hardly gained a prominent position in political debates (Lesniewska and McDermott, 2014). Hence, the applicable laws focus on large scale producers trading internationally.

This narrow problem focus has led to emerging critique of the new "timber legality regime" (Bartley, 2014). Some analyses caution of possible adverse effects on local forest governance due to "disproportionate burdens on smallholders" (McDermott et al., 2015) or see even incentives for "governments to weaken their laws" (Bartley, 2014; see also Cashore and Stone, 2012). They, hence, criticise existing interventions as ineffective in mitigating global deforestation. Other analyses however, expect existing initiatives to promote enhanced environmental stewardship in the forest sector (Cashore and Stone, 2014; Overdevest and Zeitlin, 2014). A third group of studies argues that due to diverging environmental and economic goals, their success will likely develop in a dynamic way and depend on reconciling both goals in the implementation process (Leipold et al., 2016). Finally, the focus of these initiatives on international trade has been criticized as leaving out consumption and trade of wood (products) within producer countries which may in some cases far exceed the amount traded internationally (see for e.g., Cerutti and Lescuyer, 2011).

These diverging assessments relate to the policies specifically designed to tackle illegal logging and related timber trade. In particular, they relate to "Western" responses to internationally-traded wood and wood products. Next to these policies, however, Southern countries also developed a range of national responses. Indonesia, for instance, pioneered the development of its own legality verification scheme in cooperation with the EU under FLEGT. Other countries, like Ghana or Malaysia, are still deliberating whether to develop a legality verification system under the EU FLEGT. More generally, it is common for countries in the Global South to develop constantly their national and regional forest laws and to support their enforcement as a means to tackle illegal logging. Although these do not necessarily ensure sustainable forest management and in many cases are not being strictly and coherently enforced (McDermott et al., 2015; Sotirov et al., 2015), they are the basis for any legal forest activity.

In addition to these national efforts, a wide range of governance initiatives exist that may also have an effect on illegal logging and related trade but have been designed for other (usually broader) purposes. These include international governance initiatives and organizations such as the UN Programme for Reducing Emissions from Deforestation and Forest Degradation (REDD+) or the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), which support the aim to eliminate illegal logging as one of the drivers for greenhouse gas emissions resulting from deforestation and trade with endangered species respectively. In addition, non-state market driven mechanisms like certification schemes under the Forest Stewardship Council (FSC) and the Law Enforcement Assistance for Forests (LEAF) project by INTERPOL and the United Nations Environment Programme (UNEP), support existing policies by, amongst others, building capacities and providing training to enforce national forest laws. Furthermore, international bodies and initiatives like the World Trade Organization (WTO), the UN Universal Declaration of Human Rights or the UN Sustainable Development Goals (SDGs) relate to the topic without being directly concerned with illegal logging. Given the space and time limitations of this rapid response assessment, the present report will not review the entire range of governance frameworks but instead focus on policies specifically on illegal logging and related timber trade.

This differentiation in governance frameworks points to a gap between the scientific and expert literature on illegal logging and associated timber trade highlighting the multi-dimensional and multifaceted nature of the phenomenon on the one hand, and on the other, the governance frameworks designed to tackle the issue that are

based on much narrower problem definitions. Hence, governance interventions exclude certain, important aspects of the phenomenon they aim to tackle. Following from this discrepancy, this report aims to shed light on the different definitions, dimensions, drivers and effects of illegal logging and related timber trade found in the scientific and expert literature with the aim to better inform future governance efforts.

Despite the broad acknowledgement and repeated efforts to address illegal logging internationally over the last decades, further actions and future efforts are still required. Recent reports demonstrate that in many countries the vast majority of timber production remains illegal (Hoare, 2015). Hence, the need for increased international collaboration to combat illegal logging and related timber trade has been strongly recognized at the highest level of intergovernmental cooperation. The UN General Assembly (UNGA) emphasized that "coordinated action is critical to eliminate corruption and disrupt the illicit networks that drive and enable trafficking in wildlife, timber and timber products, harvested in contravention of national laws" (United Nations Environment Assembly, 2014), which was supported by decisions of the UN Convention against Corruption and the UN Environment Assembly. In this context, international organizations and UN bodies, such as INTERPOL and the United Nations Office on Drugs and Crime (UNODC) have been mandated to assist their members to fight environmental crime. Furthermore the 2030 Agenda for Sustainable Development and the related Sustainable Development Goals, passed by the UNGA in September 2015, link environmental security and sustainable development, highlighting that combatting illegal logging and related timber trade is vital for the future, and needs highest attention.

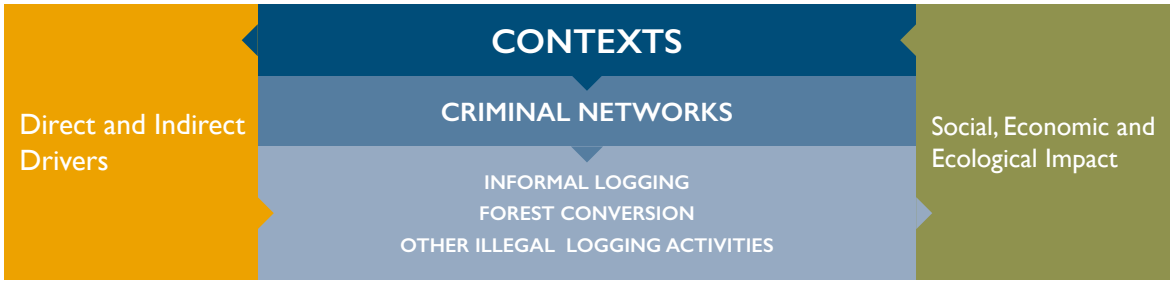
1.3 Scope and Methodology of the Rapid Response Assessment

The substantive scope and main data sources of this assessment include relevant studies carried out within different academic disciplines including economics, ecology, political science, sociology and criminology. The knowledge base also includes studies in the complex global market places related to illegal logging and associated timber trade (including supply and demand). In terms of geographical coverage, the report reviews relevant studies that span multiple levels of governance (international, regional, national and local) and their interactions; as well as studies from industrialized, emerging and developing economies. Its main focus is on forest sector activities, impacts and drivers, but it also takes into account inter-linkages with other sectors. It illustrates some key aspects of illegal logging and related timber trade by providing an in-depth analysis of representative and/or typical country or regional case studies. The case studies were selected to capture the variety of socioeconomic, political, cultural and ecological settings in large producer and consumer countries and/or regions. In so doing, the assessment report covers existing knowledge on past and current developments, drivers and impacts of illegal logging and associated timber trade as well as the emergence and evolution of existing governance initiatives. Based on this, it identifies knowledge gaps and research needs as well as pathways and options for future efforts dealing with this complex issue.

In order to better capture the complex aspects of illegal logging, to better understand the causal links between drivers and consequences, and to identify potentially effective governance responses, this report differentiates three key definitions and dimensions of illegal logging (see Figure 1.1):

I. The first dimension refers to illegal **forest conversion** defined as the illegal clearance of natural forests not primarily targeting the use of timber or other forest products but aiming to create other land uses like plantations, commercial agriculture or mining. Illegal forest conversion is often supported by weak or unclear governance.
II. The second dimension comprises **informal logging**. This term refers to logging activities by small-scale producers that may operate illegally due to unclear legislation (e.g. tenure rights) or unreasonable and disproportionate costs of compliance (e.g. excessive charges or bureaucratic procedures).
III. The third dimension includes **all other illegal forest activities** not covered in the two former dimensions. Recognising that this is a broad categorization deserving further nuance, additional details will be addressed throughout different chapters.

Three dimensions of illegal forest activities Figure 1.1



The main methodology for the preparation of the present report included a multi-disciplinary review and synthesis of existing studies, reports and data sources reflecting current scientific and expert knowledge. In this way, the report is informed by multiple reported data from various relevant sources including content analysis of relevant documents, analysis of quantitative surveys and qualitative in-depth interviews, ethnographic research, participatory observations, production and trade statistics, trade data discrepancies, wood-balance analysis, import source analysis and review of criminological studies. The present report has also been subject to intensive in-group expert discussions and external expert peer review prior to its completion.

1.4 Structure of the Assessment Report

This assessment introduces the different conceptualizations of illegal logging and their associated socioeconomic dimensions, drivers and impacts. It relates them to existing governance initiatives and their implementation, and provides a number of key findings and options for future actions (see Figure 1.2 for an overview).

Specifically, Chapter 2 examines the diverse concepts of illegal logging and associated timber trade. It identifies the main, yet significantly diverging, definitions and interpretations of illegal logging that can be found in political and scholarly literature. On this basis, it compares and critically assesses the different paradigms of how decision-makers, stakeholders and scientists think about and, hence, attempt to tackle illegal logging and its varied effects.

Chapter 3 defines products subject to illegal logging and identifies global and regional markets and players, but also highlights national and sub-national markets. Specifically this chapter provides an overview of the magnitude of trade and flows as well as assessing, comparing and relating existing figures which allows for the identification of data gaps. Additionally, it presents both historical changes and forecast studies in relation to market development results.

Chapter 4 addresses the drivers of illegal logging and timber trade. It adds to the existing literature by not only presenting the broader problem of deforestation or concentrating on specific criminal actors but also by assessing the role of the socio-economic contexts and individual motivations. These insights are based on categories built from behavioural economics, criminology sciences and deforestation studies; and by exploring the relevance of the conceptual driver categories regarding different forms of illegal logging taking place in different contexts and realized by different actors.

Chapter 5 provides a criminological analysis of illegal logging and the consequent illegal timber trade. It provides a typology of actors and networks involved in illegal logging and presents suggestions for law enforcement and crime prevention also addressing technical opportunities for forensic timber and monitoring.

Chapter 6 assesses the ecological, social, economic, as well as political impacts of illegal logging and associated timber trade as well as informal logging on global and regional scales, and includes examples from the national and sub-national scales.

Chapter 7 assesses past, present and evolutionary potential of three types of global interventions aimed at curbing illegal logging: domestic legislation that regulates the import of forest products; comprehensive bilateral agreements among producer and consumer countries; and, regional "good forest governance" initiatives that seek to generate learning among similar states for promoting support for, and compliance with, laws and policies.

Finally, Chapter 8 provides a synthesis of the major findings and identifies key areas requiring further research.

Conceptual structure of the assessment report — Figure 1.2

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Chapter 2
Defining Illegal Forest Activities and Illegal Logging

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2.1 Introduction

A dictionary definition of the term illegal tells us that it means something "not allowed by the law".[1] According to the same dictionary, a law is "the system of rules of a particular country, group or area of activity". To further clarify the meaning of illegal, it is also useful to consider its synonyms, which include "criminal", "illegitimate" and "irregular".[2] The term "criminal act" is often used interchangeably with the term "illegal act". However, the former has a more markedly negative connotation, as it refers to an act that is sanctioned under criminal law. Furthermore, a crime may be carried out by someone whose activities are normally legal, such as a logging company, or by a criminal organization whose main goal is to carry out criminal acts, as discussed in Chapter 5. The term "irregular", on the other hand, refers to "a behaviour or action not according to usual rules or what is expected"[1]. It may refer, for instance, to an action that deviates from a certain procedure specified in a voluntary code of conduct that does not have the status of law. Though not a synonym, the term "informal" has also become quite prominent in recent discussions about illegality in the forest sector. It deserves some qualification to avoid conflation with the term "illegal" and it will be considered in the following section.

This general discussion about the meaning of illegality highlights that to clarify the concept of illegality in the forest sector we need to consider several questions:

- Which are the activities whose illegality has been considered in the context of forest management?
- How has the illegality of those activities been defined in the laws of specific countries?
- How can the equity of legal frameworks regulating forest activities in timber producing countries be ensured?

These questions will be addressed in turn in the following three sections.

2.2 Definitions of Illegal Forest Activities and Illegal Logging from the Literature

There are many activities that affect forests and that may be considered to be illegal. This section discusses definitions of illegal forest activities and illegal logging. It then notes, very briefly, key trends in those activities to highlight the illegal activities that could be having significant impacts on forests and people.

The Forest Law Enforcement and Governance (FLEG) East Asia Ministerial Conference, held in Bali on 11-13 September 2001, was one of the cornerstone international events of what the Ministerial Declaration, issued at the conference, called "the fight against forest crime" (see Chapter 7 for a more detailed discussion of the development of illegal forest activities as a global policy issue).

Box 2.1

Selected indicative actions agreed at the East Asia FLEGT Ministerial Conference*

National Level Actions

- High level expression of political will
- Legislative / judicial, including stronger penalties, integration of customary law into formal law
- Decentralization, including clarifying rules, responsibility and authority between different levels of government, private sector, civil society, and rationalization of conflicting formal and customary norms and laws
- Institution and capacity building, including support for education, technology transfers, and strengthening of forestry and other institutions
- Concession policy, including allocation and management processes
- Conservation and protected areas, including environmental education and involvement of local authorities in programmes to benefit local communities
- Public awareness, transparency and participation, including increased public awareness of forest crimes, and provision of alternative livelihood opportunities for communities
- Bilateral actions, involving transboundary cooperation for protected areas and voluntary agreements for combating trade in timber and illegal forest products

Regional and Inter-regional Actions

- Information/expertise sharing, including timber tracking mechanisms and chain of custody audits
- Trade/customs, including protocols for sharing export/import data, and prior notification between importing and exporting countries
- Bilateral actions, including voluntary bilateral agreements to cooperate on issues of combatting illegal logging and trade, and use of certification schemes that are accessible and cost-effective for smaller forest enterprises
- Research, including systematic comparative analysis of patterns of regulatory systems and extra-sectoral links, and survey patterns in forest crime and related corruption

* The indicative actions amount to three pages of dot points, and cannot be fully listed due to space constraints. However, all the top tier indicative action points are reported. Only some of the second tier indicative action points are included.

[1] dictionary.cambridge.org/dictionary/english/illegal
[2] www.thesaurus.com/browse/illegal?s=t

Although the Ministerial Declaration did not define the concept of forest crime, it did provide a sense of its complexity. First, the text of the declaration states that forest ecosystems were threatened "by negative effects on the rule of law by violations of forest law and forest crime, in particular illegal logging and associated illegal trade": this clearly defines illegal logging and related trade as subsets of violations of forest law. Second, the comprehensive list of indicative actions that should be implemented to improve forest law enforcement and governance includes not just measures related to illegal logging and trade, but also measures to deal with trade in illegal forest products in general, customary norms and laws, and addressing communities' livelihoods (Box 2.1). This broad perspective on forest law enforcement and governance is significant for the scope of this chapter and the following ones. In fact, the research that followed the FLEG East Asia Ministerial Declaration provided more detailed characterizations of illegal forest activities, including illegal logging and trade while reflecting the broad scope and complexity of the problem as set out in the Ministerial Declaration.

Illegal forest activities were defined by Tacconi et al. (2003:3) to include "all illegal acts that relate to forest ecosystems, forest-related industries, and timber and non-timber forest products. They range from acts related to the establishment of rights to the land to corrupt activities to acquire forest concessions, and activities at all stages of forest management and the forest goods production chain, from the planning stages, to harvesting and transport of raw material and finished products, to financial management." A broadly encompassing definition of "illegal logging" is used in a recent assessment carried out by Chatham House that defines it "as all illegal practices related to the harvesting, processing and trading of timber" (Hoare, 2015: 2). The report stresses that the definition also includes illegal clearance of forests for other land uses (a practice known as "illegal forest conversion"). The practice can involve converting forest land without the necessary permit or operating under a licence that has been obtained illegally, including through corrupt processes. Such conversion may involve illegalities in other sectors – for example, the breach of requirements enshrined in agricultural or mining legislation. The harvesting of timber from illegally-established plantations is also included in this definition of illegal logging (Hoare, 2015: 2). However, the term logging commonly implies "the activity of cutting down trees in order to use their timber".[3] From a research perspective, which requires clear definition of the terms used, it might appear appropriate to use the concept of illegal logging in the literal sense, that is, all illegal practices related to the harvesting of timber. This definition excludes however, activities such as processing of illegal timber (or illegally processing timber if the processing operation does not have the appropriate licenses to operate), trading of illegal timber, illegal expropriation of customary forest lands, illegal conversion of forest land, and the other categories presented in Table 2.1.

As noted in the introduction, so-called informal logging has been considered in the context of illegal forest activities. It is generally recognised that the nature of small-scale, sometimes informal, logging is very different from large-scale logging (Wit et al., 2010; Cerutti et al., 2014; Putzel et al., 2015) (see Box 2.2 for an example of this type of logging activity). Small-scale producers are also referred to as artisanal producers. They harvest significantly smaller volumes of timber compared to logging companies, the large scale operators. The International Conference of Labour Statisticians (Hussmanns, 2003) provides definitions of informal sector and informal employment that are useful to shed light on the difference between "illegal" and "informal". Informal sector refers to "unincorporated enterprises that may also be unregistered and/or small" (Hussmanns, 2003). Therefore, small-scale, often informal, activities are not automatically illegal given that: i) small-scale logging may be regulated; ii) operating informally could involve working in an unregulated area. However, there has been a tendency to include such small-scale informal activities in the published rates of illegal logging of many countries (e.g. Hoare, 2015 for recent estimates). Obviously, it is also true that in some cases, informal producers may be carrying out illegal activities banned by the law (e.g. logging in protected areas) or simply without complying with the law because they find it difficult (Hoare, 2015) (e.g. logging in allowed areas but without complying with over-complicated regulations). We will return to the treatment of small-scale logging in Sections 3 and 4.

Box 2.2

Small-scale informal timber extraction in Ecuador (Mejía and Pacheco, 2014)

Informal logging operations provide a lot of flexibility to smallholders in terms of volumes being extracted. These volumes range between one and three cubic metres per operation, with an extraction rate between two to seven times per year, which makes a maximum of 21 cubic metres per year. Smallholders tend to sell planks produced with chainsaws using timber which originated from informal small-scale operations mobilized through an extensive network of small depots and sawmills established within the communities or in the outskirts of the main cities. The timber is transported by small-scale intermediaries and sold to depots, sawmills or carpentries who transform the pieces into intermediate products for construction or final products, such as furniture and fruit boxes. The processed timber is subsequently transported with a purchase receipt to other depots, sawmills or stores where it is sold to end- consumers.

[3] dictionary.cambridge.org/dictionary/english/logging

A detailed classification of illegal forest activities based on the definitions discussed above is presented in Table 2.1 (see Box 2.3 for some examples of illegal activities). Tacconi et al (2003) – from whom the table is drawn and modified as noted later – highlighted the types of laws infringed by those activities. Violations of public trust and public, communal or private ownership rights may involve acts against constitutional, civil, criminal or administrative law. Violations of forest management regulations and other contractual agreements in either public or private forestlands are acts against forest legislation; this is the category that includes most of the acts that may be most appropriately referred to as illegal logging. Violations of transport and trade regulations include acts that violate forest legislation, but they may be related to legally or illegally harvested forest products. This category is referred to as illegal timber trade. Timber processing activities may be regulated by industry and trade-related legislation, as well as forestry legislation. In this category, a violation directly linked to illegal logging is the use of illegally harvested logs. Violation of financial, accounting and tax regulations may involve acts related to legally or illegally harvested and/or traded timber. This category is referred to as illegal financial activities.

The many different illegal activities may be linked to each other in different ways (Tacconi et al., 2003). Two of the most significant links identified are as follows. First, violations of public trust and ownership rights may result in the establishment of forest operations that appear to be legal. Timber extracted by those operations may seem legal to unaware traders and consumers, unless schemes aimed at certifying legality also assess that due process is followed in the allocation of land to forest activities and in the allocation of forest concessions. Second, all violations can occur as the result of corrupt activities. Corruption can affect the allocation of forest land, monitoring of forest operations and law enforcement (e.g. Tacconi et al., 2009). Therefore, it could be a significant factor contributing to illegal forest activities.

Table 2.1. has been modified from the original presented by Tacconi et al. (2003) in order to highlight the actors that may be potentially involved in carrying out illegal activities. It should be stressed that the attribution of certain illegal activities is based on the general nature of the activities that those actors carry out, and therefore can only be indicative.

A detailed analysis of the extent of specific illegal forest activities will be presented in the following chapters. However, it is useful here to briefly summarise recently reported trends in illegal activities in order to exemplify the relevance of the classification of the illegal activities presented above. In recent years, there appears to have been a decline in the illegal allocation and management of large-scale forest concessions for selective logging (which are common in many tropical timber-producing countries) and that unlicensed large-scale logging by logging companies is now less prevalent in many countries, particularly in Brazil and Indonesia (Hoare, 2015). Conversely, there seems to have been an increase in illegal timber production from forest conversion and from informal small-scale logging (Hoare, 2015). Several issues are worth noting in relation to these trends and their relationship to the definitions discussed earlier:

- Quantitative assessments of the extent of illegality in the forestry sector have focused to a significant extent on the volumes of illegal timber produced and traded, as will also become apparent from the data presented in the following chapter. There is therefore a lack of data on the extent of the many other illegal forest activities that have been summarized in Table 2.1. This gap will need to be addressed in order to fully understand the phenomenon of illegal forest activities, as well as illegal logging and related timber trade given that many of the illegal activities are thought to be connected.
- Illegal production of timber from forest conversion is without doubt a significant problem, however illegal forest conversion without timber production should be better documented and considered by policy initiatives aimed at reducing illegality in the sector as it can be expected to have significant negative environmental impacts.
- Small-scale informal logging should not be equated with illegal small-scale logging (see Section 2.3.2). Whilst the apparent increase in the production of illegal timber by informal small-scale producer has been reported above, more scrutiny will need to be applied to studies that address that topic for two reasons. The first is that whether those informal activities are actually illegal will need to be ascertained. The second reason is that whether the legislation regulating small-scale logging is appropriate and equitable needs to be ascertained, as in several countries there appears to be some bias against small-scale producers, as discussed in Section 2.3.2.

Let us now turn to discussing if and how the legality/illegality of forest activities is dealt with in the regulatory frameworks of key countries.

2.3 Definitions of Illegality According to the Law of Key Countries

2.3.1 Illegal Forest Activities in the Laws of Timber Importing Countries

United States of America, European Union and Australia

With the aim to close off key markets to illegal timber, the US, the EU and Australia adopted laws prohibiting illegally-harvested timber products from entering their markets. In 2007, the US adopted the Legal Timber Protection Act (LTPA) to amend the Lacey Act Amendments of 1981. In 2010 the European Union (EU) adopted the EU Timber Regulation (EUTR) – which covers a wide range of timber products, including plywood, veneer, particle board and furniture – and in 2012 Australia passed the Illegal Logging Prohibition Act (ILPA). In order to ensure

Illegal forest activities and actors — Table 2.1

Typology of Illegal Activities	Actors most likely to commit a specific illegal activity		
	Public officials	Formal companies	Small-scale loggers
Violations of public trust			
Forestlands allocated unlawfully to other uses	✔		
Issuing and implementing regulations conflicting with other/higher regulations to legalize illegal timber products and activities	✔		
Issuing logging concessions, permits and authorizations in exchange for bribes and other private economic and political benefits	✔	✔	✔
Using bribes, threats and violence to avoid prosecution/penalties or to obtain complacency		✔	
Using funds from illegal forest activities for political purposes	✔		
Violations of public, communal or private ownership rights			
Illegal expropriation of indigenous, community or private land and/or forests	✔	✔	
Illegal occupation of public forestlands, including slash and burn agriculture		✔	✔
Illegal harvest on public lands (outside concession areas)		✔	✔
Illegal harvest on indigenous lands		✔	✔
Violations of forest management regulations and other contractual agreements in either public or private forestlands			
Logging without authorizations and/or required plans		✔	✔
Logging in excess of permitted cut		✔	
Logging unauthorized volumes, sizes, species (including protected ones)		✔	✔
Logging in prohibited areas such as steep slopes, riverbanks and water catchments		✔	✔
Girdling or ring-barking to kill trees so that they can be legally logged		✔	
Logging in protected areas		✔	✔
Arson to force conversion to other land use		✔	✔
Violations of transport and trade regulations			
Transporting logs without authorization		✔	✔
Smuggling timber		✔	✔
Exporting and importing tree species banned under international law, such as CITES		✔	
Exporting and importing timber in contravention of national bans		✔	
Violations of timber processing regulations			
Operating without a processing licence		✔	✔
Expanding capacity without authorization		✔	
Using illegally-obtained wood in industrial processing		✔	
Operating in violation of environmental, social and labour laws		✔	✔
Violations of financial, accounting and tax regulations			
Untrue declarations of volumes, species, values		✔	
Declaring inflated prices for goods and services purchased from related companies, including transfer pricing		✔	
Evasion and avoidance of taxes		✔	✔
Money-laundering through forest activities, or from illegal forest activities		✔	

Source: Based on Tacconi et al. (2003), who drew on Contreras-Hermosilla (2001).

Box 2.3

Examples of illegal forest activities

Illegal financial activities in the Peruvian Amazon (based on Mejía and Pacheco, 2014)

In Pucallpa, Peru, there is a cluster of companies that are run with Chinese investments under an informal value transfer system. This system avoids transferring funds from China to Peru; other enterprises, such as restaurants and markets, provide local cash in exchange for direct payments in China. This procedure avoids national taxation and provides some rapid cash to purchase timber. Chinese buyers in Pucallpa use street moneychangers to make payments to timber sellers, since most of the time they deal in small quantities and bills are settled at the end of the week. Priority is given to hardwood species used for decking (*Dipteryx micrantha*) on which these buyers practically exert a market monopoly.

Illegal logging associated with forest concessions in Cameroon (based on Cerutti et al., 2016)

In Cameroon, forests on national lands are included into the Permanent Forest Domain (PFD) in the form of protected areas and Forest Management Units (FMUs). The PFD covers about 16.3 million hectares, of which about 46 percent is covered by 114 FMUs which have been attributed over the period 1996-2013. The prevalent type of illegal logging in the 1990s – when much of the designated PFDs were still "free" and no management plans were approved and implemented – was harvesting outside boundaries. As more FMUs were granted to companies, it became gradually more and more difficult to harvest trees outside the FMUs' established boundaries, and thus the prevalent types of illegalities shifted within the borders of the FMUs and outside the PFD. Illegal logging inside the FMUs' boundaries consisted initially of over-harvesting, i.e. harvesting species in higher volumes or numbers than those legally authorised. But these also tended to decrease over the years because more and more companies adopted and implemented (albeit partially) forest management plans. The latter type, i.e. illegalities outside the PFD, consisted largely in harvesting timber through special logging authorisations (e.g. timber recovery permits) that were not meant for such purpose.

Criminal network for illegal logging and trade in Brazil (based on Greenpeace, 2015)

In August 2015, Brazil's Federal Police and Federal Prosecutor started an investigation against a large illegal logging and trade network. Fraudulent timber credits and transport documents gave a legal appearance to illegally-logged timber. A large timber (exporter) company in Santarem (Pará) that also owned several sawmills coordinated the illegal timber scheme. It was found to have used fraudulent documents for trading illegal timber. Corrupt officials were found at the Federal level (Environmental Inspection Agency IBAMA, Institute for Colonisation and Agrarian Reform INCRA), at the state level (Pará's state Finance Agency SEFA and Pará's Environmental and Sustainability Secretariat SEMAS), and at the municipal level (Municipal Environment Secretariat SEMMA). Among those arrested were a high-ranked super intendant of INCRA, a politician, and a municipal secretary for the environment.

compliance, economic operators are required to exercise due care (LTPA) or due diligence (EUTR, ILPA). Although all three laws prohibit the import of illegally-harvested wood products, each has a distinct definition (Leipold et al., 2016).

The LTPA makes it unlawful in the US to import, export, transport, sell, receive, acquire or purchase in interstate or foreign commerce plants or their parts taken in violation of the laws of a US State or Tribal Law, or any foreign law, or to make or submit any false record, account, label or false identification (Legal Timber Protection Act of 2008). The EUTR prohibits "[t]he placing on the market of illegally harvested timber or timber products derived from such timber" (EUTR, 2010, Article 4). The ILPA "prohibits the importation of illegally logged timber and the processing of illegally logged raw logs" (ILPA, 2012, Article 6).

Considering the above-three laws in relation to the categorization of illegal forest activities and illegal logging presented in the previous section, the ILPA defines illegality solely in relation to the act of "logging" or "harvesting". The LTPA's provisions, in contrast, may include violations of trade or transport law. In a similar fashion, the EUTR includes all rights related to harvesting, tenure rights affected by harvesting as well as trade and customs laws to the extent that these concern the forest sector. The EU further promotes broader definitions of illegal timber through its Voluntary Partnerships Agreements (see Section 2.3.2). Hence, the LTPA and the EUTR recognize the complexity of the phenomenon by acknowledging that different illegal activities may be linked to each other and that a large number of wood-based products is processed from illegally-harvested timber and then traded globally. The ILPA, in contrast, applies a narrower focus on "harvesting" and on raw logs.

The major aim of all three laws is to prohibit international trade in illegal timber products that had been traded until then without impediments by customs authorities (Humphreys, 2006; Leipold et al., 2016). For the first time, the laws used a mandatory approach to regulate illegal logging, thus they have been portrayed as a shift from voluntary to mandatory measures on a global scale (Leipold et al., 2016). This shift has been viewed by some authors as necessary and beneficial for global forest stewardship (Bartley, 2014; Cashore and Stone, 2012; Overdevest and Zeitlin, 2014). However, concerns have been raised about the potential negative effects on small-scale producers (McDermott et al., 2015) and that the focus on "legality" promotes a much narrower perspective on global forest management and, thus, draws attention away from the more comprehensive concept of sustainability (Bartley, 2014; Leipold et al., 2016). Considering the latter point is beyond the scope of this chapter, but we do return to the issue of legal frameworks concerning small-scale producers in Section 2.3.2.

China

Since the introduction of a domestic logging ban in 1998, China has become the world's largest importer of tropical timber (see Chapter 3). It is also a key processing country: for example, it is the leading manufacturer of

furniture worldwide with 40 percent of the global market share (Richer, 2016) and much is exported to the US and Europe. Therefore, how China defines legality and/or illegality of timber products matters for the debate on illegal logging and trade worldwide.

Unlike the other countries mentioned above, China does not have dedicated legislation aimed at curbing illegal timber imports. However, the Regulation on the Implementation of the Forestry Law of the P.R.C. (2000) refers to legality in two articles:

- Timber-sourcing companies and individuals are not allowed to source timber without harvesting permits (in the case of timber produced in China) or other evidence of legal origin (Article 34).
- To obtain timber transportation permit, one needs to provide the following documents: 1) timber harvesting permit or other evidence of legal origin… (Article 36).

A problem related to the implementation of this regulation is that it does not define what constitutes "other evidence of legal origin".

Apart from the Forestry Law, timber importers and exporters need to comply with several other laws and regulations that apply generally to operating a business – such as business law, tax law, customs law – as well as those more specific to an importing and/or exporting business – such as obtaining the appropriate import and export licences and permits, including those relevant to plant material, such as phytosanitary and fumigation certificates (requirements that also apply in the countries considered in the previous section).

Despite the lack of specific legislation on illegal timber trade, partly in response to the increasing pressure from international NGOs (e.g. EIA, 2012; Global Witness, 2014), the Chinese government and industry stakeholders have launched several voluntary certification and membership initiatives: Legal Timber Verification (LTV) certification[4], the China Responsible Forest Product Trade and Investment Alliance[5] and the China Timber Legality Verification Scheme (CTLVS)[6]. These initiatives emphasise the importance of supply chain traceability and due diligence. In addition, the State Forestry Administration has published voluntary guidelines emphasising legal timber production, trade and investment for Chinese timber companies (Li et al., 2015). It is worth noting that these are voluntary initiatives and do not carry the same weight as laws and regulations.

After considering the definitions of illegality in timber importing countries, the next section addresses those of producing countries, including countries that have signed Voluntary Partnership Agreements (VPAs) with the European Union, and Brazil, the country with the largest forest area and illegal forest clearing estimated at between 68 and 90 per cent of total forest clearing between 2000 and 2012 (Lawson, 2014). Another significant country from the perspective of forest area and illegality, Indonesia, is addressed in the section on VPAs.

Stock of logs and sawnwood at Canton harbour (China)
Photo © Fotolia: valleemarie

2.3.2 Definitions of Legality of Timber in the Laws of Timber Producing Countries

Countries that have signed VPAs

The EU's Forest Law, Governance and Trade (FLEGT) Action Plan established in 2003 aims to reduce illegal logging by strengthening sustainable and legal forest management, improving governance and promoting trade in legally-produced timber (FLEGT Briefing Note 2). The Action Plan identifies seven broad measures, one of which is to promote legal timber trade through the negotiation of VPAs between the EU and timber exporting countries outside the EU (VPA partner countries). The VPA seeks to ensure that timber and timber products imported into the EU from a partner country comply with the laws of that country (FLEGT Briefing Note 6). Each VPA includes a definition of timber legality, which represents a core element of the timber legality assurance system that has to be negotiated and agreed between the two sides before the signing of the VPA. Timber and timber products must comply with this definition in order to receive FLEGT licences. VPAs define legality according to existing national laws and regulations. As part of the VPA negotiation process, multi-stakeholder discussions on the legality definition have identified gaps or inconsistencies in existing laws as well as legal and/or policy

[4] Led by the China National Forest Products Industry Association. For more information: http://forest-trends.org/documents/files/doc_4296.pdf

[5] Led by the Research Institute of Forestry Policy and Information (RIFPI) of the Chinese Academy of Forestry (CAF) with support from the State Forestry Administration. For more information: www.greentimes.com/green/news/lscy/cjxw/content/2016-04/28/content_333270.htm (Chinese)

[6] Led by the Research Institute of Forestry Policy and Information (RIFPI) of the Chinese Academy of Forestry (CAF) with support from the State Forestry Administration. For more information: www.illegal-logging.info/sites/files/chlogging/Day%201_Session%201_Chen%20Shaozhi.pdf

reforms to address these gaps. Timber-related laws in producing countries are not always consistent and sometimes establish conflicting responsibilities between government agencies. Moreover, some laws may favour some actors while marginalizing others in society.

A partner country has the right to decide which laws are applicable for defining legal timber, but the EU suggests that the definition of legality should include the laws that address economic, social and environmental objectives (FLEGT Briefing Note 2), such as:

- Complying with harvesting rights within legally-established areas;
- Complying with relevant environment, labour and community welfare requirements;
- Complying with requirements on tax, import and export duties, royalties and fees related to harvesting and trade;
- Respecting local tenure rights;
- Complying with trade and export procedure requirements.

VPA partner countries present information on legality in different ways according to their needs, circumstances and existing systems. As a result, an annex on the legality definition may include several legality matrices that apply different standards to different sources of timber, such as community forests, plantations or logging concessions. For example:

- Indonesia has several legality matrices for different kinds of rights holdings;
- Cameroon has several legality matrices for different types of forests and selling rights;
- Ghana has a single legality matrix that applies all along the supply chain for timber and to timber products from all types of forest.

As of July 2016, six countries had signed a VPA with the EU (Box 2.4) and another nine countries were involved in negotiations.[7] The countries that have signed VPAs are timber producing countries, but there are countries (like Vietnam and Thailand) negotiating VPAs that are importing timber for processing. The timber legality definitions in the countries that have already signed a VPA broadly follow the EU's indication of the elements to be included into the definition itself.

The scope of the timber legality definition in these countries is different from that in timber producing countries. The legality definition being developed in Vietnam is divided into two sections: one for organizations (operators registered as business, including private, state-owned and cooperatives) and one for households (local households, individuals and communities) which helps in clarifying the different legal requirements for harvesting, processing and trade that apply to these types of operators. As Vietnam imports timber from more than 90 different sources (To et al., 2016), controlling the legality of those imports may be a significant challenge. Therefore, one of the seven principles used to define legal timber in Vietnam is directly related to imported timber.

Brazil

The management of Brazil's forests is based on a broad set of laws, norms and regulations that establish the conditions under which logging and other forest-related activities can occur. While Brazil has a relatively stringent and prescriptive forestry legislation, it does not have a specific and straightforward definition of illegal forest activities or illegal logging. To determine whether timber or deforestation is illegal, federal, state and municipal legislation need to be considered, because those are the three levels of government involved in forest management (Toni, 2011). As an important producer, processor and consumer of timber products, Brazil's efforts to slow down deforestation in the Amazon during the last decade have been internationally acknowledged. Yet illegal forest activities are a serious and persisting issue.

There are several relevant laws. The Forest Code (introduced in 1934, with the most recent amendment taking place in 2012) establishes the minimum parameters for conservation of forests within private landholdings, including Areas of Permanent Protection and Legal Reserves. The Environmental Crimes Law (1998) sets criminal and administrative sanctions for behaviour and activities that harm the environment, including crimes against the flora, such as the destruction or damage of Areas of Permanent Protection and Legal Reserves. The legal framework is also composed of the National Conservation Area System (2000), which establishes protected areas with specific restrictions and conditions on land use, and the Public Forest Management Law (2006), which regulates the exploitation of public forests. Applicable regulations also relate to timber tracking and control systems at the national and state levels, requiring timber transportation to be accompanied by documents of origin and corresponding cargo invoices. Therefore, illegal forest activities take place in Brazil when there is violation of laws on forest use and conservation, and breaches of requirements related to the production, processing, transportation and commercialization of timber.

According to Brazilian legislation, logging must be carried out in accordance with a government-approved forest management plan, or through an authorization by the environmental authority to eliminate native vegetation or to convert the forest to other land uses, while observing the limits and conditions established by law. Logging is thus illegal when it occurs without the proper approval, or when it is not in accordance with the obtained permit. Conversely, timber is legal when it complies with all regulations, whether originating from forest management or deforestation, as long as it has been authorized by environmental agencies. Timber is illegal when sourced from public areas or protected areas. Brazil's domestic law enforcement efforts have sought to curb illegal deforestation and

[7] The nine countries are Cote d'Ivoire, Democratic Republic of the Congo, Gabon, Guyana, Honduras, Laos, Malaysia, Thailand and Vietnam. For detailed information see www.euflegt.efi.int/vpa-countries

Box 2.4

Definitions of legality in Voluntary Partnership Agreements

Cameroon

VPA signed on 6 October 2010, entry into force on 1 December 2016

Legality of timber is defined as "based on compliance with national laws and regulations and duly ratified international legal instruments, […] in order to guarantee the viability of forest management by the producing and/or exporting enterprises, its suppliers and subcontractors in the name of the owners of the forest (the State, the local government district, a private owner or a community" (EU – Cameroon VPA, 2011). Eight legality matrices have been developed to define legal timber from different supply sources and from processing units: forest management units, state logging in communal forest, salvage licence, harvested timber removal licence, cut timber sale, state logging in community forests, special permit and timber processing units. In addition to these legality matrices, four other matrices are foreseen to be created in future for the following supply sources: private forests, lumber permits, personal timber licences, and non-state logging in communal and community forests.

Central African Republic

VPA signed on 28 November 2011, entry into force 1 July 2012

The timber legality definition comprises indicators that are grouped into ten main themes: i) the company is legally established, ii) the company has legal access rights to forest resources in its area of operation, iii) compliance with environmental legislation, iv) the rights of workers, local and indigenous communities, v) legislation on forest logging, vi) processing of forest products, vii) general and forest taxation, viii) the transport and traceability of timber forest products is in accordance with the regulations, ix) compliance with contractual obligations and x) relationship with sub-contractors in activities rather than timber production. The legality definition also spells out different legal requirements for different logging concessions such as those on State natural forests, plantations, on areas with 10 ha or less, and on community forests with no more than 5,000 ha.

Ghana

VPA signed on 4 September 2009, entry into force on 1 December 2009

Ghana's definition of legal timber involves "a subset of laws contained within the legal framework for timber harvesting, processing and export" (EU – Ghana VPA). Ghana's legality standards set out seven principles: i) source of timber – timber originated from prescribed sources and concerned individual, group and owners have given their written consent to the land being subjected to the grant of timber rights; ii) timber rights allocation, iii) timber harvesting operation, (iv) transportation, (v) processing, (vi) trade, and (vii) fiscal obligations. Under each principle, there are criteria and verifiers that allow the identification of legal timber.

Indonesia

VPA signed on 30 September 2013, entry into force 1 May 2014

Timber is deemed legal "when its origin and production process as well as subsequent processing, transport and trade activities are verified as meeting all applicable Indonesian laws and regulations." (EU – Indonesia VPA). There are five legality standards which inform the constitution of legally-produced timber: i) for concessions within production forest zones on state-owned lands; ii) for community plantation forests and community forests within production zones on state-owned lands; iii) for privately-owned forests; iv) for timber utilisation rights within non-forest zones on state-owned lands, and v) for primary and downstream forest-based industries. Each standard includes a series of principles, criteria, indicators and verifiers. FLEGT licensing started in 15 November 2016.

The Republic of Congo

VPA signed 17 May 2010, entry into force 1 March 2013

Under the VPA, legally-produced timber is defined as "Any timber from acquisition, production and marketing processes that meets all of the statutory and regulatory provisions in force in Congo applicable to forest management and logging." There are two matrices for assessing the legality of timber, one for natural forests and the other for forest plantations. Besides the logging, processing and trade of timber, the legality matrices also consider the following elements in the legality definition: condition stipulated for the existence of a forest company, compliance with tax rules and environmental protection and conservation, worker conditions, local participation and tenure rights, compliance with timber transportation regulations.

Liberia

VPA signed 11 July 2011, entry into force 1 December 2013

The VPA covers all timber exported or used domestically. The legality definition covers five main areas: i) harvesting rights: granting of legal rights to harvest timber within legally-gazetted areas, ii) forest operations: compliance with legal requirements regarding forest management, including requirements on labour and environment obligations, iii) fees and taxes: compliance with requirements on taxes and fees related to timber harvesting and harvesting rights, iv) other users: respect for other parties' legal tenure or rights of use of land and resources that may be affected by timber harvesting rights, where such rights exist, and v) trade and customs: compliance with requirements for trade and customs procedures. The definition also identifies timber sources and the legal requirements for those sources. The sources are: domestically grown timber (excluding Private Use Permit), rubberwood and other timber harvested under agricultural concessions, abandoned timber, confiscated timber and imported timber. However, currently the VPA includes specific requirements only for timber harvested under Forest Management Contract (50,000 – 220,000 ha) and Timber Sales Contracts (max 5,000 ha), and the other sources would require amendments of the VPA legality definition, as the regulations were not yet written when the VPA was signed.

Small-scale production of timber in selected countries and its significance Table 2.2

	Cameroon	Gabon	Democratic Republic of the Congo (DRC)	Indonesia	Ecuador
Annual domestic consumption from informal chainsaw milling (sawn-wood, 000 m^3)	662	50	1,024	1,408	60–76
Annual formal production* (sawn-wood, 000 m^3)	360	150	36	1,199	170
Estimated informal jobs (,000)	45	1	25	1,500	3.6
Contribution to the economy (million Euro)	32	1.6	34	63	9
Profit per m^3 harvested (Euro/m^3 RWE)	5	6	4–24	85	7–183

* Almost all formal sawnwood production is exported, apart from the case of Indonesia.
RWE = round wood equivalent

Source: Cerutti et al., 2014

improve legal forest management, however the myriad of strict regulations and complex bureaucracy have also made legality difficult to achieve for many small-scale producers (McDermott et al., 2015).

Regulatory treatment of small-scale logging

The volumes of timber harvested by small-scale, often individual and informal chainsaw millers and their financial contribution to the sector (both in rural and urban areas) have been growing over the past two decades and are nowadays substantial (Wit et al., 2010; Cerutti et al., 2014). The small-scale logging sector supports the livelihoods of hundreds of thousands of local forest users including farmers, indigenous communities, chainsaw millers, traders and service providers such as transporters.

The sector is characterized by the activities of smallholders, chainsaw millers and traders, who rarely own a legal harvesting permit and extract and process small quantities of timber with chain or mobile saws. The resulting low-quality timber is traded in domestic markets or across the borders of neighbouring countries, with little formal taxation. However, as the product moves along the production chain, varying and generally large percentages of the total costs incurred by informal operators are paid in bribes to representatives of ministries, local police, the military and customs officials (Cerutti et al., 2013). Often, national forest policies have banned or suspended the only legal titles available to small-scale loggers (Table 2.3). This approach pushes small-scale producers into the informal sector and often makes their production outright illegal. This brief discussion about the treatment of small-scale producers highlights the need to consider the legitimacy and the equity of the law.

2.4 Legislation and Equity

As with any law, the implementation of measures to address illegal forest activities, and illegal logging more specifically, may lead to inequitable outcomes. These potential inequitable effects were raised a decade ago when specific policies to address illegal forest activities were starting to take shape in some of the timber producing and importing countries (Colchester et al., 2006). In this respect, it is important that the design and implementation of legislation concerning illegal forest activities takes heed of existing practices that have been devised to avoid inequitable outcomes.

Practices like social and environmental safeguards (Savaresi, 2016) benefit-sharing arrangements (Morgera, 2014) and environmental and social impact assessments (Craik, in press) are designed to address concerns over the equitable implementation of natural resource laws and policies. The significance of this guidance and best practices for the purposes of illegal logging is twofold. On the one hand, legislation and regulations concerning illegal forest activities should be elaborated with meaningful participation of forest stakeholders, including indigenous and local communities. On the other hand, the implementation of these measures needs to take into account the rights of forest stakeholders, including those provided for under customary laws and human rights. When violations are alleged, individuals and/or groups affected ought to be given access to adequate grievance mechanisms (Savaresi, 2012).

These matters are all explicitly mentioned in intergovernmentally-agreed international guidance concerning the protection of biodiversity. Parties to the Convention on Biological Diversity (CBD) have over the years adopted guidelines specifically aimed at balancing conservation needs with indigenous peoples and local communities' rights and interests. In 2000, CBD Parties adopted the Akwé: Kon "Voluntary guidelines for the conduct of cultural, environmental and social impact assessments regarding developments proposed to take place on, or which are likely to impact on, sacred sites and on lands and waters traditionally occupied or used by indigenous and local communities" (CBD, 2004).

Status of permits for small-scale logging in key Central and West African countries

Table 2.3

Country	Available permits	Current situation
Cameroon	Timber exploitation permit	Suspended 1999-2006; volumes not adjusted; prohibitively expensive
Gabon	Discretionary permit	Suspended
Congo	Special permit	Suspended in parts of the country; no permits issued in other parts
DRC	Artisanal exploitation permit	Suspended in parts of the country; incomplete regulation
Central African Republic	Artisanal exploitation permit	Lack of implementing regulation
Ghana	Chainsaw milling	Suspended since 1998
Liberia	Chainsaw milling	"Considered illegal" / Suspended

Source: Cerutti et al., 2014

The guidelines assert that activities in sacred sites and on lands traditionally occupied or used by indigenous and local communities should ensure that tangible benefits accrue to such communities, such as payment for environmental services, job creation within safe and hazard-free working environments, viable revenue from the levying of appropriate fees, access to markets and diversification of income-generating (economic) opportunities for small and medium-sized businesses. Equally, the 2011 Tkarihwaié:ri "Code of ethical conduct to ensure respect for the cultural and intellectual heritage of indigenous and local communities" (CBD, 2011) specifies that indigenous and local communities should receive fair and equitable benefits from activities related to biodiversity likely to impact on their sacred sites and lands they traditionally occupy or use.

The acknowledgement of the importance of customary laws and practices also features prominently in CBD guidance. The Akwé: Kon Guidelines assert that any development proposals should be assessed for possible impacts on the customary laws of an affected community. They furthermore recommend that if a development requires the introduction of an outside work-force, or requires changes in local customary systems (e.g. regarding land tenure, distribution of resources and benefits) it may be necessary to codify certain parts of customary law, clarify matters of jurisdiction and negotiate ways to minimize breaches of local laws. Similarly, the Tkarihwaié:ri Code asserts that activities occurring on lands traditionally occupied or used by indigenous and local communities should not interfere with access to traditional resources except with the approval of the community concerned. Instead, these activities should respect customary rules governing access to resources whenever this is required by the community concerned.

These elements feature also in safeguards adopted under the climate regime concerning the reduction of emissions from deforestation and forest degradation in developing countries (REDD+). REDD+ safeguards adopted by the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) require that REDD+ activities promote and support transparent and effective national forest governance, public participation and respect the knowledge and rights of indigenous peoples and local communities; and, more generally, that they enhance other social benefits (UNFCCC, 2010).

Equally, the 2015 Voluntary Guidelines for the Sustainable Management of Natural Tropical Forests from the International Tropical Timber Organization (ITTO Voluntary Guidelines) emphasise, amongst others, the need to: empower communities to collaborate in sustainable forest management; create effective formal systems for ensuring the security of forest tenure; ensure that traditional use rights are clear and respected; address the local livelihood needs of people, including indigenous peoples and local communities; consult with local communities on the management of natural forests; and monitor the distribution of the costs and benefits of forest management among stakeholders (ITTO, 2015).

While UNFCCC safeguards, and ITTO and CBD guidelines do not impose obligations upon States, their guidance is meant to assist Parties in the implementation and interpretation of their obligations under the respective treaties. This guidance resounds with state obligations under human rights law. A host of human rights are closely connected with forest uses, including the right to life, the right to food, the right to property, the right to culture, indigenous peoples' right to self-determination, as well as procedural rights revolving around access to information, participation and justice. The protection of these rights in relation to forest uses has emerged across jurisdictions as particularly sensitive. Even in jurisdictions where human rights are formally acknowledged as a result of domestic or international law, their protection has to be balanced with that of other rights and societal priorities. With specific reference to natural resources, human rights law typically requires the establishment of procedures enabling

On the way from Kisangani to Masako village. Democratic Republic of the Congo. Photo © Ollivier Girard for CIFOR

those affected by new laws, regulations or developments to be informed and heard during their elaboration, and to have access to adequate remedies to address grievances concerning their implementation (Savaresi, 2012; 2013 and 2016). These principles are enshrined in the notion of Free Prior Informed Consent (FPIC), which has been increasingly recognised in the case law and practice of human rights bodies, as well as in human rights documents, such as the UN Declaration on the Rights of Indigenous Peoples. The role of FPIC has been increasingly recognized also in the context of international environmental agreements, including under the CBD (CBD, Article 8j) as well as in REDD+ guidance adopted by the UN-REDD Programme (UN-REDD, 2013). The ITTO Voluntary Guidelines recognize that indigenous peoples and local communities' right to FPIC "offers a means for achieving greater equity and a natural pathway to a co-management approach involving local communities in large development projects" (ITTO, 2015).

2.5 Conclusions

This chapter has discussed definitions of illegal activities that affect forest ecosystems and warns against conflating the concepts of illegal forest activities, illegal logging and informal logging. Drawing on the literature, a categorization of illegal forest activities has also been provided (Table 2.1) which includes an indication of the potential types of actors associated with them.

There has been a reported increase in illegal timber production from forest conversion and from informal small-scale logging (Hoare, 2015). The statistics that are being reported (see also Chapter 3) raise the following points:

- quantitative assessments of the extent of illegality in the forestry sector have mainly focused on the volumes of illegal timber. Consideration should be given to the collection of data on other illegal forest activities presented in this chapter in order to fully understand the phenomenon, given that many illegal activities may be connected;
- the definition of informal logging highlights the fact that it should not be equated with illegal logging. The apparent increase in the production of illegal timber by informal small-scale producers needs to be further analysed to ascertain whether those informal activities are also illegal.

In relation to definitions of illegality of forestry activities in the laws of specific countries, the legal frameworks of the US and the EU embrace the complexity of illegality in the forest sector which has also been highlighted in the literature. This appears to be less so in the case of the framework adopted by Australia. The legislation adopted by timber-importing countries defines illegal timber as timber harvested in contravention of producing countries' laws. Several timber producing countries have defined illegal timber – in their VPAs with the European Union – as that which contravenes a range of laws and regulations, including those on forest management, tax laws, trade regulations and land tenure rights. These experiences demonstrate that it is possible to enshrine the complexity of the concept of illegal forest activities in legislation. Other timber producing countries that aim at addressing illegal forest activities should consider adopting those broad definitions of illegality.

Whilst illegal forest activities by definition involve activities that are against the law, the equity of those laws also needs to be considered.

Informal, small scale logging has been made illegal in several countries which could be a factor contributing to the apparent increase in small scale illegal logging. It is also likely to have a direct negative effect on people's livelihoods.

- The illegalization of small scale operators should therefore be taken into account in researching local and global trends in illegal forestry activities and in the design and implementations of policies aimed at reducing illegal forest activities.

Like other measures aimed at the conservation of natural resources, measures aimed to address illegal forest activities should take particular heed of existing guidance devised to avoid and minimize the negative impacts on the livelihoods of vulnerable indigenous and other rural communities.

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Chapter 3
Quantifying Illegal Logging and Related Timber Trade

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3.1. Introduction

Understanding the magnitude of illegal logging and related timber trade as well as illegal trade flows is critical to addressing the problem. This chapter provides an overview of the estimates of illegal logging and related international timber trade, as well as providing a summary and comparison of estimation methods. Major legal and illegal international timber trade flows are portrayed along with domestic, regional and global wood products markets, and supply chains representing key agents in producer, processing and consumer countries. The chapter also presents financial flows associated with illegal logging and timber trade. Finally, data gaps are identified, and new developments in illegal logging and timber trade are discussed along with possible solutions.

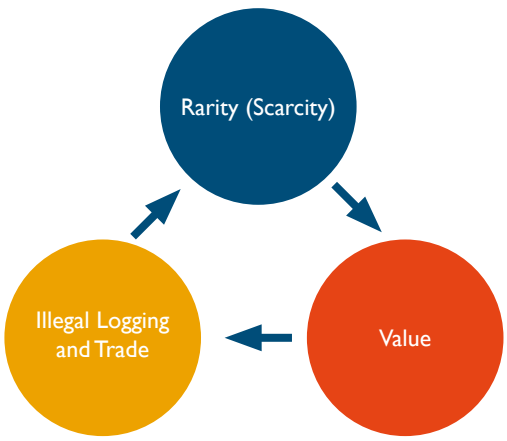
3.2 Species, Markets and Trade Patterns of Wood Products

3.2.1 Species Rarity, Value and Illegality

Illegal logging and related timber trade affects many timber species, but highly valuable - often rare and endangered - species that are protected under harvest and/or trade regulations are a key target.

Economic theory indicates that the marginal cost of a natural resource will increase as its stock decreases. Thus, if the price (marginal benefit) of the good remains relatively stable or increases at a lower rate than its marginal cost, at some point (as the stock declines) the marginal cost will be higher than the price, preserving the resource from depletion (Clark, 1990). While this is still true for some species, for some rare species, their rarity will drive their prices up more than their marginal costs, potentially leading to their depletion, which is called the "anthropogenic Allee effect" (Courchamp et al., 2006).

Vicious cycle among value, rarity and illegality Figure 3.1



This phenomenon coupled with illegal activities can create a vicious cycle among value, rarity (scarcity) and illegality (see Figure 3.1). Many rare and endangered tree species have higher economic values than others because of their unique physical and chemical properties (e.g. colour, texture, odour and hardness of the wood) and cultural values, and these values are positively related to rarity/scarcity. The higher value generates higher incentives for illegal commercial harvesting and trade. Increased logging and trade in turn enhances the rarity/scarcity of the species, intensifying their threatened status and even driving them to extinction.

Among the rare and endangered species targeted by illegal logging and timber trade are mahogany (genus Swietenia), rosewood (genus Dalbergia) and ebony wood (genus Diospyros) (Huang and Sun, 2013; TRAFFIC, 2012; Youatt and Cmar, 2009). For each of these genera, there are many species. These wood species are generally used in niche markets of high-value products such as parquets, boats, furniture, musical instruments and other items, and actively traded in domestic and global markets (TRAFFIC, 2012). Because of their threatened status, some species have been put under the protection of international conventions, such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, 2016), and on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species (IUCN, 2016).

3.2.2 Domestic, Regional and Global Wood Products Markets and Supply Chains

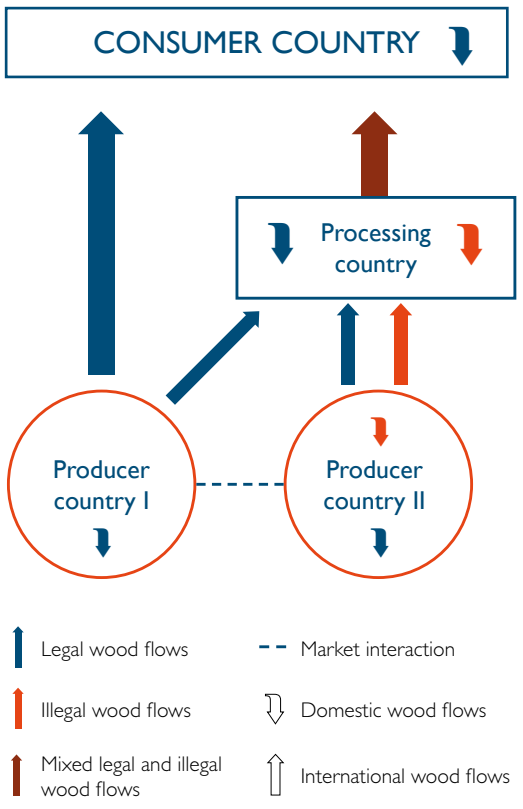
There are multiple market layers for wood products. In terms of geographic scope, there are domestic (local and national), regional and global markets. Additionally, there are legal and illegal markets as well as formal and informal markets (see Chapter 2 for more details on these definitions). These different layers and types of markets are interlinked, constituting a complex web of timber production, trade and markets.

Figure 3.2 illustrates the interlinkages between the domestic, regional and global markets of legal and illegal wood products. This simplified web consists of two producer countries (one producing legal timber and the other producing both legal and illegal timber), one processing country and one consumer country. Each country in the web has its own domestic market that is further connected to the regional and global markets. The entire web represents the global network of wood products markets. A more complex global web of wood products markets comprises multiple producer, processing and consumer countries.

Timber supply to domestic markets in many tropical forest countries is largely provided by informal logging/milling, namely chainsaw milling (Box 3.1). Although chainsaw milling in some countries is allowed under certain conditions, it is illegal in most tropical countries (Wit et al., 2010). Chainsaw milling does not require sophisticated and expensive equipment. As a result, its cost is relatively low, thus meeting the needs for providing cheap timber to the domestic markets. Its barriers to entry are also low. Hence, although individual chainsaw milling

Figure 3.2

Interlinkages between domestic, regional and global wood products markets



operations are small scale their aggregate production level can be substantial (Bayol et al., 2013), creating difficulty for monitoring and controlling.

Regional and global markets involve producer, pass-through, processing and consumer countries. Large and well-connected operators are often the key players in these markets although small operators of informal logging/milling are also involved (Kishor and Lescuyer, 2012). Regional markets particularly involve neighbouring or adjacent countries. A neighbouring country could be a "pass-through", processing or consumer country. A "pass-through" country can play various roles in timber trade and laundering. Some pass-through countries may not engage in timber processing while some others may. They transit timber from the original producer country to the next country in the regional or global supply chain, and in some cases they re-export the timber back to the original producer country (Nellemann and INTERPOL Environmental Crime Programme, 2012).

The supply chains of wood products differ across different market types and layers. From domestic to global markets, the complexity of supply chains increases. In general, the key players of domestic, regional and global supply chains all include loggers, transporters, traders, financers and buyers. However, the characteristics of these players may differ across these supply chains.

The supply chains for domestic markets are relatively simple with key players generally being locally- or domestically-orientated. Timber transport to domestic markets is of shorter distance with fewer barriers to market access compared to regional or global markets. Thus, there are few

Box 3.1

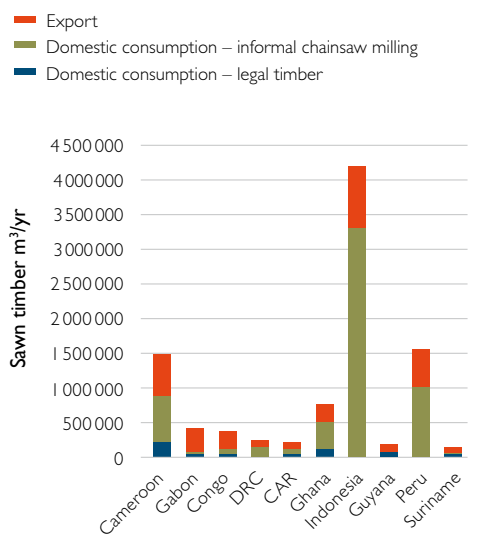
Timber supplies to domestic and export markets by informal logging in selected tropical countries

Informal or chainsaw logging is widely used in tropical forest countries while it is often not in full compliance with regulations. It constitutes 30-40 percent of total timber production in Guyana, Republic of Congo, Democratic Republic of the Congo (DRC) and Uganda; over 50 percent in Ghana, Cameroon and Peru; and almost 100 percent in Liberia (Wit et al., 2010).

Most of the timber produced by the informal sector is consumed in domestic markets (Figure 3.3). Yet, informal logging also contributes to timber supply in regional and global markets, though to a lesser extent (Kishor and Lescuyer, 2012; Wit et al., 2010). The export share of timber produced from informal logging may vary across countries and over time and be affected by domestic, regional and global market conditions and policy. In Cameroon, 92 percent of timber produced from informal logging was consumed domestically in 2009 (Cerutti and Lescuyer, 2011). In the DRC, timber from informal logging was 13 times more than that produced in the formal sector, and only 15 percent of timber produced in the informal sector was exported in 2012 (Lescuyer et al., 2014).

Figure 3.3

Timber supplies to domestic and export markets in selected tropical countries



Source: Kishor and Lescuyer, 2012

middlemen along domestic timber supply chains. However, given the large size of some domestic markets, many operators can be involved, as well as state officials collecting bribes all along the supply chain (Cerutti et al., 2013).

The complexity of regional supply chains varies depending upon the nature, scope and structure of the regional markets (Forest Trends, 2010; Schloenhardt, 2008). The existence of a regional market is often due to the differences in forest resource endowments and wood processing capacity across the countries in the region as well as their historical, economic, cultural and political ties (Schloenhardt, 2008). Geographic proximity also facilitates the forming of a regional market as it reduces transport costs and the risk associated with illegal activities (e.g. border crossing) (Forest Trends, 2010).

The global supply chains of illegal wood products are the most complex. Unlike the players of domestic (and some regional) supply chains, the players of the global supply chains are often large and more sophisticated operators, who have more resources and means to facilitate illegal production and cross-border trade (Kishor and Lescuyer, 2012). Timber laundering can take place in multiple stages along a complex global supply chain, making it difficult and costly to monitor illegality (Nellemann and INTERPOL Environmental Crime Programme, 2012).

3.2.3 Global Trade Patterns of Wood Products

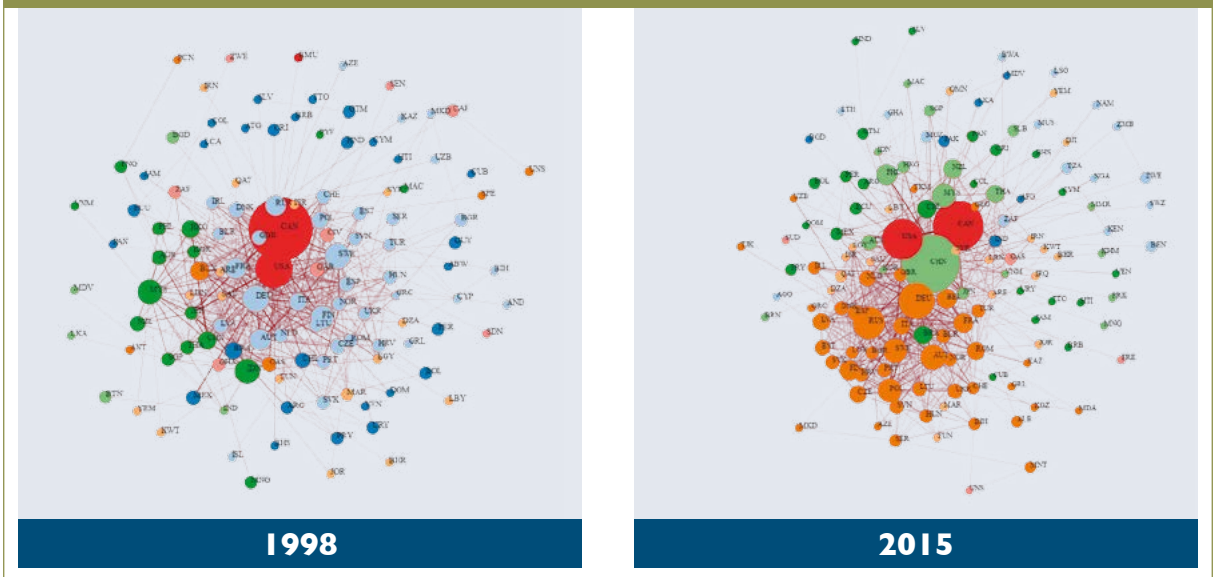
The annual average value of international trade of overall wood products (primary and secondary wood products including roundwood, sawnwood/lumber, and pulp and paper products but excluding furniture) amounted to USD 360 billion during 2012-2014, of which approximately USD 20 billion was roundwood and USD 36 billion sawnwood (DESA/UNSD United Nations Comtrade Database, 2016). Historically, bilateral trade of wood products took place primarily between producer and consumer countries in the developed world and between consumer countries in the developed world and tropical timber producer countries. As China has become the global processing hub of wood products and the demand for wood products in emerging economies has increased, this trade pattern has changed dramatically (Figure 3.4). China now is the world's largest importer and exporter of wood products (DESA/UNSD, United Nations Comtrade database, 2016). Although wood products trade among developed countries remains an essential part of total global wood products trade, trade with China and other emerging economies has become increasingly important in overall wood products trade in general and illegal timber trade in particular.

The magnitude of global wood products trade has risen over time (DESA/UNSD, United Nations Comtrade database, 2016) due to income growth, population expansion and globalization, among other factors. For example, from 2000 to 2014, total global trade of primary wood products (roundwood, sawnwood, plywood and veneers) increased by 41 percent in quantity and doubled in value. The growth trend, however, was not monotonic: all four commodity groups showed a decrease in 2008-2009 as a result of the global financial crisis (see Figure 3.5).

Global illegal timber trade patterns differ from global overall timber trade patterns. Illegal timber trade has been primarily associated with tropical hardwood; only in recent years has Russia, especially its Far East region, become a

Figure 3.4

Global trade network of overall wood products from the supplier's point of view *(with node size proportional to export market share and node colour representing geographic regions; the country codes are presented in Appendix 3.2)*



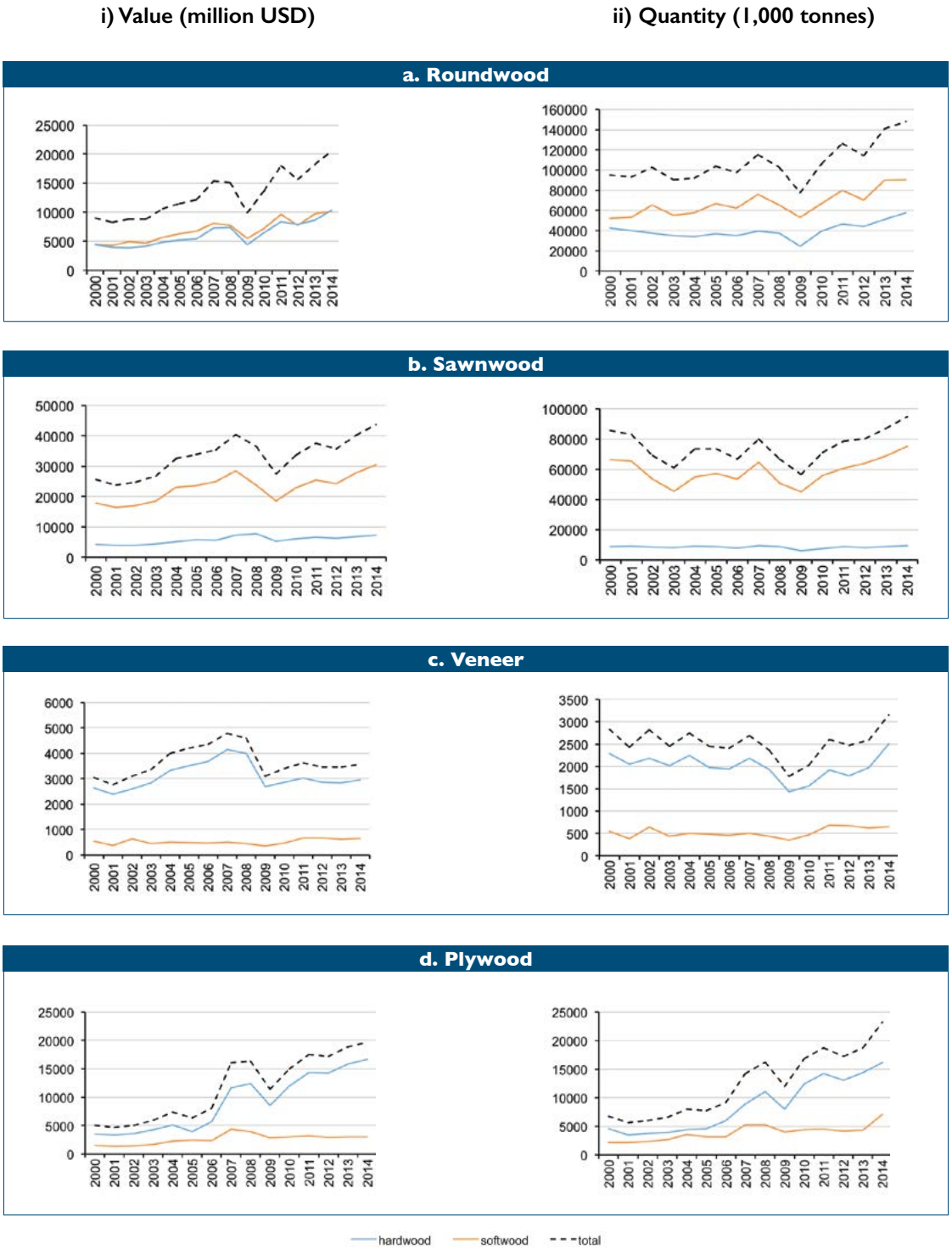
Source: WITS, 2016

significant source of illegal non-tropical timber. Most of the tropical hardwood trade at high risk of illegality has taken place in route from countries where the rapid growth in overall hardwood trade has occurred (Hoare, 2015a; Nellemann and INTERPOL Environmental Crime Programme, 2012).

3.2.4 Major Producers and Importers of Tropical Timber

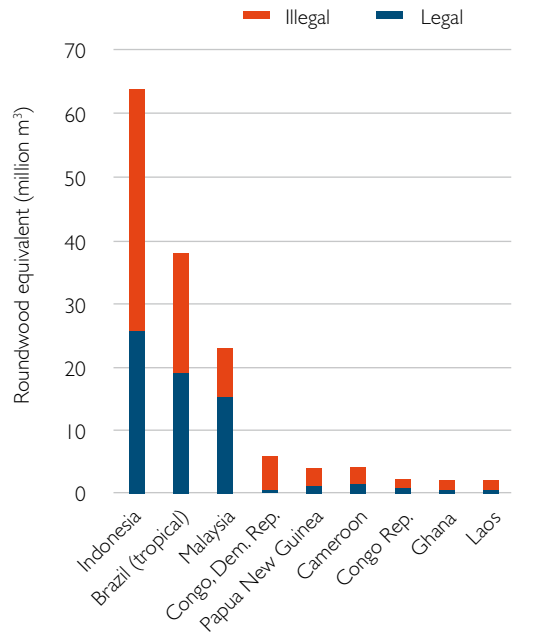
Illegal logging is widespread across all tropical forest regions. Yet, Brazil, Indonesia and Malaysia remain the three dominant suppliers of legal and illegal tropical timber (see

Trends in international trade of primary wood products — Figure 3.5



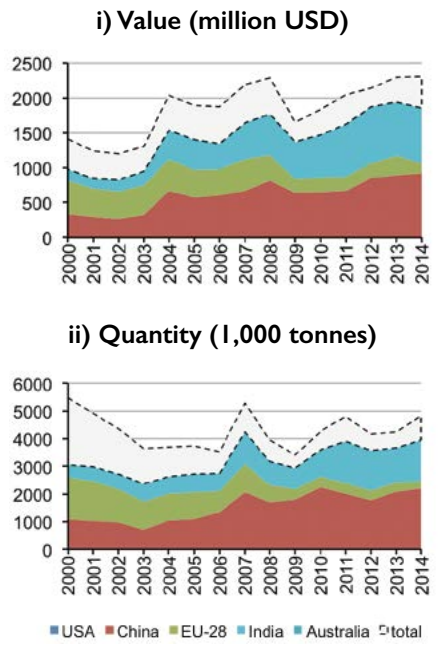
Source: own elaboration with data from DESA/UNSD, United Nations Comtrade database

Estimated production of legal and illegal timber by selected tropical countries, 2013 Figure 3.6



Source: Adapted from Hoare, 2015a with modification

Tropical roundwood imports by selected countries Figure 3.7



Source: own elaboration with data from DESA/UNSD, United Nations Comtrade database

Figure 3.6) despite a decrease in the extent of illegal logging in recent years. Indonesia, Brazil and Malaysia respectively supplied 50, 25 and 10 percent of total estimated illegal tropical timber in 2013 in the nine countries reported by Hoare (2015a) although other producer countries may have higher percentages of illegality.

Traditionally, the EU, the US and Japan were the major importers of tropical wood products. In recent years, China and India have surpassed them to become the two main global importers of tropical roundwood, together covering 72 percent of global tropical log imports in 2014 compared to 28 percent in 2000 (see Figure 3.7), while Japan remains the largest importer of tropical hardwood plywood (DESA/UNSD, United Nations Comtrade database, 2016).

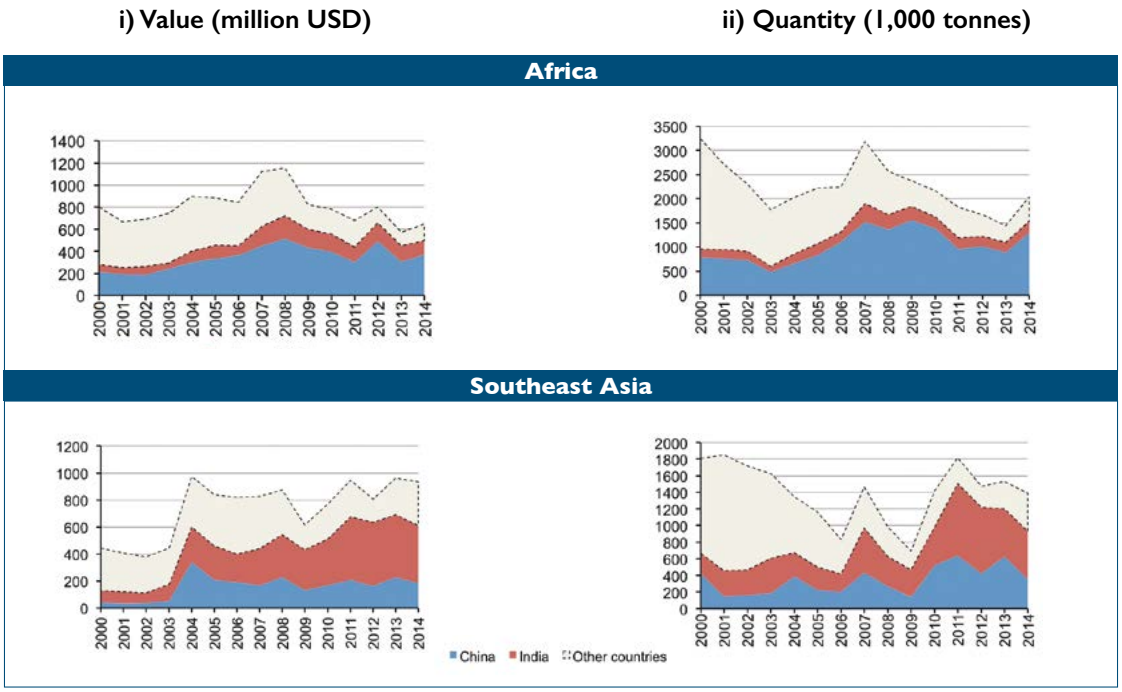
Approximately 70 and 67 percent of the tropical roundwood exported, respectively, from Africa and Southeast Asia were destined to China and India in 2014 (see Figure 3.8). In 2000 these figures were 25 percent from Africa and 34 percent from Southeast Asia. The increased imports of tropical roundwood by China and India are attributable to at least three reasons. First, rapid economic growth in China and India increased their domestic demand for wood products in general, and tropical wood products in particular, partly because of the cultural values associated with some tropical timber species (Huang and Sun, 2013). Second, as an export-orientated economy, China converts primary wood products into secondary wood products (including furniture) for exports. Given its limited available domestic forest resources (timber in particular) and logging ban in place on natural forests, China has to depend upon imported wood materials to produce secondary products for exports (Zhang and Gan, 2007). Third, traders may prefer exporting timber to markets characterized by less stringent regulatory frameworks (e.g. China and India) since legality requirements set by other market destinations (e.g. the EU and the US) are often associated with extra costs necessary to provide certification and/or required documentation (Giurca et al., 2013).

3.2.5 Financial Flows Associated with Illegal Logging and Related Timber Trade

Financial flows follow the opposite direction of timber or wood product flows. International transactions associated with illegal timber trade are often in large volume and involve banks in consumer, pass-through, processing and producer countries. Because of large volumes and the well-developed banking systems in consumer and processing countries, it is relatively easy to trace money flows associated with illegal trade. On the other hand, the money flows in producer countries are more informal and in small volume, and the banking systems in most tropical timber producer countries are poorly developed. Although the volume of transactions is small, the number of transactions is large, making it difficult to trace the money flows in tropical timber producer countries (Kishor and Lescuyer, 2012).

The distribution of benefits from illegal logging and related timber trade is highly skewed (see Box 3.2). Most benefits associated with international illegal timber trade accrue to middlemen -processors, traders and financers - in the producer, pass-through, processing and consumer countries, (particularly those in the pass-through and processing

Tropical roundwood imports by China and India from Africa and Southeast Asia Figure 3.8



Source: own elaboration with data from DESA/UNSD, United Nations Comtrade database

countries). As to the portion of timber revenues left in the local communities of producer countries, most of it goes to a few local "elites." Local loggers receive only minimal compensation although it is usually higher than the income that they would otherwise obtain (Kishor and Lescuyer, 2012). Hence, local loggers also have incentives to engage in illegal logging.

While the actors associated with illegal logging and timber trade gain from their illegal activities, such activities are also reported to cause annual losses in the order of billions of US dollars in assets, revenues, taxes and royalties (World Bank, 2006; Nellemann and INTERPOL Environmental Crime Programme, 2012). Moreover, revenues from illegal timber trade have been used to finance corruption and other illegal activities. In some African and Southeast Asian countries (e.g. Liberia, DRC, Sierra Leone, Cambodia and Myanmar), revenues from illegal timber trade were a major financial source for wars and conflicts (Seneca Creek Associates and Wood Resources International, 2004).

3.3 Existing Estimates on Illegal Logging and Related Timber Trade

3.3.1 Estimation Methods

By their very nature, statistics on illegal forest activities are difficult to find, therefore, indirect methods are used to estimate illegal logging and related timber trade. The estimation methods commonly used include trade data discrepancies, wood balance analyses, import source analyses, expert surveys and hybrid methods. More detailed descriptions of these methods are presented in Appendix 3.1. Due to data limitations and/or for the purposes of comparisons and mutual confirmation, several estimation methods are often employed in a single study.

3.3.2 Existing Estimates and their Comparisons

There have been several attempts to estimate illegal logging and related timber trade. Most of these estimates have focused on illegal production and international trade of timber for commercial use (Hoare, 2015a; Seneca Creek Associates and Wood Resources International, 2004). Recently, some effort has been made to estimate the extent of illegal forest conversion for agricultural production (crop and livestock) and their associated timber production and trade (Lawson, 2014a).

Table 3.1 shows some recent estimates of the magnitude of illegal logging in high risk producer countries. Seneca Creek Associates and Wood Resources International (2004) employed wood flow (import source) analysis coupled with interviews conducted in the producer countries; Hoare (2015a) was based on the work of Chatham House, which used a variety of methods including wood balance analysis, expert surveys and other methods. The World Bank (2006) primarily drew on Seneca Creek Associates and Wood Resources International (2004). Nellemann and INTERPOL

Box 3.2

Revenue distribution among the key players in the Ramin value chain

Ramin (listed on CITES Appendix II) was produced in Indonesia and illegally exported to the US and European markets. Most of the revenue from this trade accrued to the middlemen, particularly those in the pass-through and processing countries where illegal timber was legalized via timber laundering and processing (Kishor and Lescuyer, 2012).

For one cubic metre of timber, the local logger received only USD 2.20 while it was sold at USD 1,000 in the final market (Figure 3.9). The price multiplier from the local logger to the local broker, measured by the ratio of the price received by the logger to the price received by the broker, was about nine. But it jumped to 73, 323 and 455 from the logger to the middleman in the pass-through country, to the foreign processor, and to the US trader, respectively. This suggests high profit margins for the middlemen engaged in the illegal trade.

Figure 3.9

Ramin value chain and benefit distribution

Source: Kishor and Lescuyer, 2012

Table 3.1

Estimated percentages of illegal logging

Country	Source of estimate			
	Seneca Creek Associates and Wood Res. Intl. (2004)	World Bank (2006)	Hoare (2015a)	Nellemann & INTERPOL (2012)
Bolivia	80	80		
Brazil (Amazon)	20-47	20-47	> 50	
Cambodia	90	90		
Cameroon	50	50	65	
Colombia	42	42		
Democratic Republic of the Congo			> 90	
Ecuador	70	70		
Gabon	50-70	70		
Ghana	34-60		70	
Indonesia	70-80	70-80	60	
Laos	45	45	80	
Liberia	80			
Malaysia	35	35	35	
Myanmar	50	50		
Papua New Guinea	70	70	70	
Peru	80-90	80		
Republic of Congo			70	
Russia	20-50	10-50		
Thailand	40	40		
Vietnam	20-40	20-40		
World				15-30

Notes: All these estimates were derived from syntheses of different sources of information and using a combination of different estimation methods. Seneca Creek Associates and Wood Resources International (WRI) (2004) used wood flow analysis and interviews; World Bank (2006) was primarily based on Seneca Creek Associates and WRI (2004) with additional information from other sources. Hoare (2015a) was mainly based on the information gathered by Chatham House using a variety of methods. Nellemann and INTERPOL Environmental Crime Programme (2012) was based on synthesis and reviews of existing reports.

Estimated percentages (in terms of volume) of illegal production and trade of primary wood products at the global level Table 3.2

Product	Illegal production in total production	Illegal trade in total trade	Illegal trade in total production	Illegal trade in illegal production	Legal trade in legal production
Roundwood (logs)	8	14	1	14	7
Softwood		12	1		
Hardwood		17	1		
Lumber	6	6	2	27	30
Softwood		2	1		
Hardwood		23	5		
Plywood	17	23	9	53	35
Softwood		4	1		
Hardwood		30	17		

Source: synthesized from Seneca Creek Associates and Wood Res. Intl., 2004

Environmental Crime Programme (2012) did not provide estimates of illegal logging in individual countries, instead gave a range of the estimated illegal logging at the global aggregate level based on the synthesis of existing reports including Seneca Creek Associates and Wood Resources International (2004) and the World Bank (2006).

These four different reports all focused on commercial timber. Yet, the years of their estimates were different as were their methods. Additionally, some estimates were drawn from others. As such, caution should be taken when using and comparing these estimates.

In general, the majority of illegally-produced timber (except for plywood) is consumed in domestic markets of producer countries (Seneca Creek Associates and Wood Resources International, 2004). Domestic consumption (in volume) accounts for 86 percent of illegally-produced roundwood, 73 percent of illegally-sourced lumber and 47 percent of illegally-produced plywood. Of the three types of primary wood products (roundwood, lumber and plywood), plywood has the highest percentage of illegal production and international trade. Hardwood is more likely to be illegally harvested and traded than softwood for all three types of products. Illegally-produced wood products (except for lumber) are also more likely to be internationally traded than legally-produced wood products (Table 3.2).

Only a handful of attempts have been made to estimate the volumes and values of illegal international trade of wood products at the multiple-country or global level (Table 3.3). These estimates were derived in different years using different methods and covered different scopes of products and geographic areas and may therefore, not be readily comparable.

Seneca Creek Associates and Wood Resources International (2004) estimated that the annual value of suspicious (likely illegal) primary wood products produced worldwide

Estimates of illegal timber trade Table 3.3

Source of estimate	Volume (million m³)	Value (USD billion)	Products covered	Countries covered
Seneca Creek Associates and Wood Resources International (2004)	18 (roundwood) 6.9 (lumber) 5.2 (plywood)	5	Primary wood products (roundwood, lumber, and plywood)	Worldwide
Hoare (2015a)	60 (roundwood equivalent)	17	Primary and secondary wood products (including furniture)	Imports into 10 countries (China, France, India, Japan, Netherlands, South Korea, Thailand, UK, USA and Vietnam) from nine tropical countries (Brazil, Cameroon, DRC, Ghana, Indonesia, Laos, Malaysia, Papua New Guinea and Rep. of Congo)

Estimated exports of timber from forest conversion in tropical countries, 2012 Table 3.4

Country	Total RWE[a] primary tropical product exports (million m³)	% of exports from forest conversion (main estimate[b])	Implied conversion exports RWE (million m³)
Malaysia	15.6	65	10.1
Indonesia	10.4	75	7.8
Papua New Guinea	3.2	30	1.0
Burma	2.6	50	1.3
Solomon Islands	2.1	15	0.3
Cameroon	1.8	5	0.1
Laos	1.6	55	0.9
Brazil	0.5	20	0.1
Gabon	1.1	10	0.1
Congo	0.9	2	0.0
Ivory Coast	0.7	4	0.0
Ghana	0.5	1	0.0
Others	3.4	14	0.5
Total	44.4		22.2

[a] RWE (roundwood equivalent) measures the volume of wood-based products as equivalent to the volume of roundwood (logs) used in the manufacture of the same products, by considering appropriate conversion factors.

[b] In Lawson (2014a), both the main estimate and the low-end sensitivity analysis results are presented with the latter using the most conservative assumption (i.e. zero percent of exports from forest conversion) for countries with little or no information.

Source: Lawson, 2014a

was USD 22.5 billion. Of this total value, about USD 5 billion was internationally-traded, accounting for approximately 10 percent of global trade value of primary wood products in 2002.

Hoare (2015a) reported that the share of illegal wood products trade had remained relatively stable (about 10 percent of total trade volume of wood products) since 2000. From 2006 to 2013, the import volume of illegal wood products by China, India and Vietnam increased by more than 50 percent whereas the illegal import volume slashed by one-third for the US and one half for the EU, respectively (Hoare, 2015a).

A significant portion of illegal logging and related timber trade stems from illegal forest clearance (Table 3.4). Thirty-one percent of tropical timber internationally-traded originates from illegal forest conversion (Lawson, 2014a). A large part of illegal forest conversion is for commercial agricultural production, particularly export-orientated agricultural production. For the period 2000-2012 total and illegal conversion of forestlands for commercial agriculture contributed to 71 percent and 49 percent respectively of total tropical deforestation. In the same period, 24 percent of total tropical deforestation was directly caused by illegal conversion for agricultural exports. Brazil and Indonesia have witnessed the largest area of forest conversion for commercial agriculture. They together accounted for 75 percent of total tropical forest area that was illegally converted for commercial agriculture between 2000 and 2012 (Lawson, 2014a).

3.4 Following the Trade Data

3.4.1 Recent Trends in International Trade Flows of Illegal Wood Products

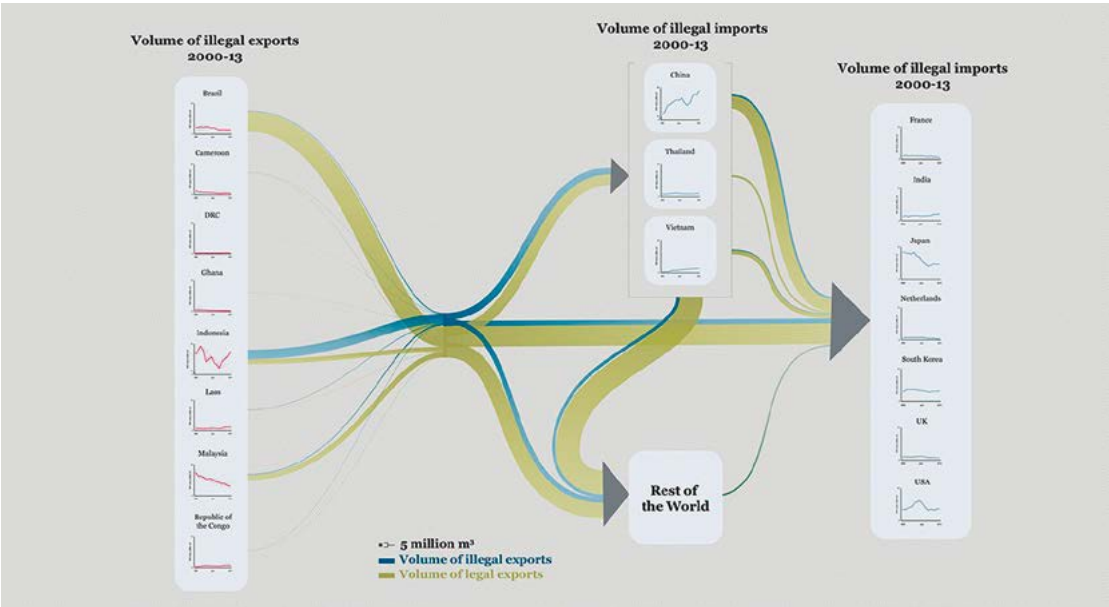
Since 2000, although the import share (in volume) of primary and secondary wood products at high risk of illegality has decreased for most of the 10 major processing and consumer countries studied by Hoare (2015a), no persistent declining trend in total volume of illegal imports by these countries has been observed. China has emerged as the largest importer of overall wood products (DESA/UNSD, United Nations Comtrade database, 2016) and those at high risk of illegality (Hoare, 2015a), while a significant portion of China's imports is processed for exports to other countries including the US, the EU, Japan and the rest of the world (Zhang and Gan, 2007).

As discussed above (Section 3.3.2), some estimates have been made on international trade flows of illegal wood products using different methods with different scopes. One recent study reported by Hoare (2015a) focuses on trade flows of wood products at high risk of illegality originating from selected tropical producer countries to 10 processing and consumer countries (see Figure 3.10). These studies together provide useful information about illegal timber trade.

Given the limited availability of estimates of global illegal timber trade flows, here we aim to expand existing work by focusing on the values and flows of international

The scale and flows of illegal timber trade among selected producer, processing and consumer countries in 2013

Figure 3.10



Source: Chatham House, 2016

trade of roundwood and sawnwood at high risk of illegality for two reasons. First, the information on trade flows of primary wood products is critical to understanding illegal logging and related timber trade as they are the material for secondary products. Second, it is difficult to accurately estimate the illegality associated with the trade of secondary wood products given limited data on the share of illegal wood in various secondary products of different origins.

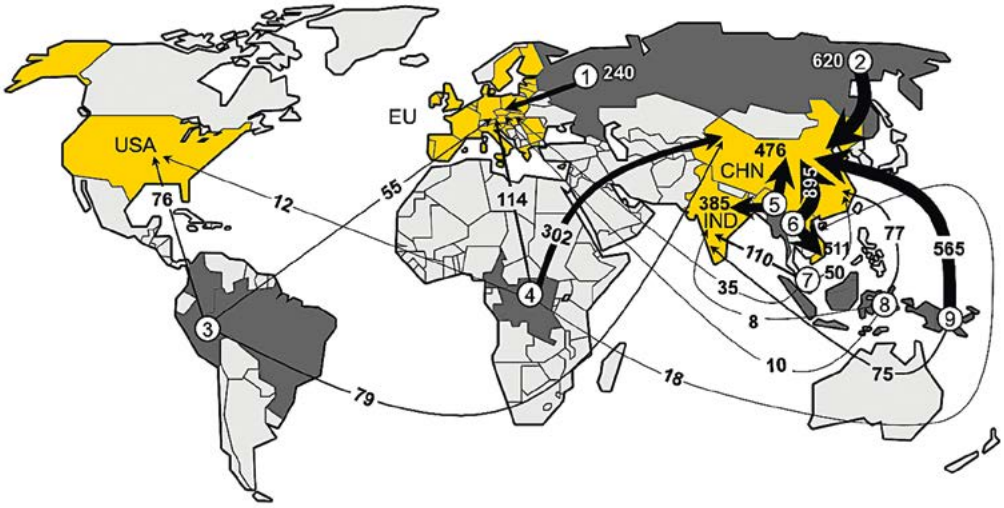
We use import source analysis, i.e. by multiplying estimated illegal logging rates in producer (source) countries by trade volumes reported in the United Nations Commodity Trade Statistics Database (DESA/UNSD, United Nations Comtrade database, 2016). The illegal logging rates used in our assessment are based on the synthesis of existing estimates reported in Section 3.3.2 and from other sources. Our assessment covers five key producer regions, i.e. the Russian Federation, South America (Brazil, Colombia and Peru), the Congo Basin (Cameroon, DRC and the Republic of Congo), Southeast Asia (Cambodia, Indonesia, Laos, Malaysia and Myanmar) and Oceania (Papua New Guinea (PNG)). For each source country/region, its total export and top three trade partners (export designation countries) are identified and analyzed. With few exceptions (Brazil and Malaysia) trade flows are quite concentrated and the top three trade partners account for on average 88-89 percent of total exports and in some cases (e.g. Cambodia, Laos and PNG) almost the entire export from the producer country.

Import source analysis is preferred over other methods because it allows for using officially-recorded international trade statistics and making reference to widely-used illegal logging rates. Although it requires considerable efforts to organize trade data, it represents straightforward calculations that can easily be replicated at different scales and by others. The estimates also can easily be updated when new trade figures and illegal logging rates become available. This methodology, however, is not free of limitations. First, the illegal logging rates, despite huge efforts to improve and update them, remain just 'best estimates' produced to give an idea of the scale of the problem. Second, our focus on roundwood and sawnwood, as well as the selection of key source countries, results in some underestimation of total global trade of all wood products, for example by excluding trade flows of finished and semi-finished products (e.g. veneers, wood panels, pulp and paper, furniture, etc.). Finally, this approach does not take into account illegal trade that occurs domestically.

The trade value of roundwood and sawnwood at high risk of illegality is estimated to have totalled about USD 6.3 billion in 2014 (42 percent of total roundwood and sawnwood exports from producer countries). China is by far the leader among the top importers of illegal roundwood and sawnwood, importing more than 50 percent of the total illegal export value from the five producer regions. China together with Vietnam, India, the EU, Thailand and the US cover 84 percent of the total value of imports. As for the exporters, Southeast Asia accounts for some 55 percent of

Main global trade flows of roundwood and sawnwood at high risk of illegality, 2014 (million USD)

Figure 3.11



1. Russian Federation West; 2. Russian Federation Far East; 3. South America (Brazil, Colombia, and Peru); 4. Congo Basin (Cameroon, Democratic Republic of the Congo and Republic of Congo); 5. Myanmar; 6. Laos; 7. Malaysia; 8. Indonesia; 9. Papua New Guinea.

See Figure 3.12 for details on intra-regional trade flows within Southeast Asia.
CHN = China; EU = European Union; IND = India; USA = United States of America.

illegal roundwood and sawnwood exports (with Myanmar and Laos playing a major role), followed by the Russian Federation (20 percent) and PNG (11 percent). Figure 3.11 and Table 3.5 provide an overview of the main global trade flows of illegal roundwood and sawnwood in 2014. A more detailed analysis for each region follows.

Russian Federation

We assume a 20 percent nationwide average illegal logging rate in the Russian Federation, balancing the higher rates reported for the Russian Far East and the lower ones for the western part of the country (FAO, 2012; Nellemann and INTERPOL Environmental Crime Programme, 2012). Illegal forest activities in the Russian Far East are much more widespread (Smirnov et al., 2013), with some estimates indicating that at least 80 percent of all forest activities are illegal (EIA, 2015). Valuable temperate hardwood species such as Mongolian oak (*Quercus mongolica*), Manchurian ash (*Fraxinus mandshurica*), Japanese elm (*Ulmus propinqua*), Amur linden (*Tilia amurensis*) and Manchurian linden (*Tilia mandshurica*) are often the target of illegal logging and trade. By taking advantage of gaps/weaknesses in existing forest laws and law enforcement mechanisms, illegal operators perpetrate illegal activities, including overharvesting by exceeding legally-permitted harvesting levels, abuse of sanitary harvesting permits for cutting old-growth timber in protected areas, and timber smuggling and laundering of illegally-sourced timber through official permits (EIA, 2014).

China is the main importer of Russian hardwood timber: 96 percent of hardwood roundwood is exported to China to be processed into furniture and flooring for China's domestic consumption and for exports to the European, Japanese and US markets. From 2004-2011 Mongolian oak harvested in the Russian Far East and exported to China exceeded the authorized logging volume by 2-4 times (Smirnov et al., 2013).

Data from UN Comtrade Database (DESA/UNSD, United Nations Comtrade database, 2016) do not allow for differentiating timber exports from different regions of the Russian Federation. Based on the nationwide data we assume that exports towards China (about USD 620 million, equally distributed between roundwood and sawnwood) as well as other East Asian countries (e.g. Japan and South Korea) are likely to originate from the Russian Far East, whereas those towards the EU (USD 240 million, two-thirds of which are sawnwood) originate mostly from the western part of the country.

South America

The total value of illegal roundwood and sawnwood exported from South America was estimated at USD 387 million in 2014. Brazil remains the main illegal wood producer and exporter in the region (74.5 percent of total regional trade value). The country's main export markets are the US, the EU, and China; however, between 2010 and 2014 Brazilian sawnwood exports to the EU decreased by more than 30 percent, whereas its exports to the US increased by 13 percent.

Despite several legislative initiatives to control illegal logging and a 50-75 percent decline in the illegal logging rate in the Brazilian Amazon between 2000 and 2008 (Chatham House, 2010), the enforcement of forest legislation in Brazil is often hampered by a lack of coordination between government agencies, limited resources and inadequate penalties (Wellesley, 2014). Fabrication of official documents and the fraudulent use of genuine ones are increasingly common phenomena. Greenpeace Brazil (2014), for

Table 3.5

Global trade flows of roundwood and sawnwood at high risk of illegality by exporter and importer, 2014 (million USD)

		Source regions (exporters)					Total export from all source regions	Percentage on total illegal export from all source regions
		Russian Federation	South America	Congo Basin	Southeast Asia	Oceania		
Total export		6,328.0	682.0	1,004.9	6,082.8	978.9	15,076.6	
Illegal logging rates (percent)		20[a]	Brazil: 53[b]; Colombia 75[c]; Peru: 72.5[d]	Cameroon: 33[e]; Dem. Rep. of Congo: 87[f]; Rep. of the Congo: 72.5[g]	Cambodia: 94[h]; Laos: 87[i]; Indonesia: 30[j]; Malaysia: 18.5[k]; Myanmar: 72[l]	Papua New Guinea: 70[m]	Total illegal export towards importers	
Importers	China	619.9	78.6	302.0	1730.6	564.7	**3295.7**	52.1
	Vietnam		0.8	18.3	748.2		**767.3**	12.1
	India		10.2	1.4	509.3	75.5	**596.5**	9.4
	EU	239.4	55.2	113.7	45.6		**453.9**	7.2
	Thailand				101.4		**101.4**	1.6
	USA		75.6	12.6			**88.2**	1.4
	South Korea	9.4				13.0	**22.4**	0.4
	Japan			0.7	14.4		**15.1**	0.2
	Malaysia				12.1		**12.1**	0.2
	Australia					1.1	**1.1**	0.0
	Others	396.9	166.7	72.7	309.7	30.9	**976.9**	15.4
Total illegal export from source regions		**1,265.6**	**387.1**	**521.4**	**3,471.4**	**685.2**	**6,330.8**	**100.0**
Percentage on total illegal export from all source regions		20.0	6.1	8.2	54.8	10.8	100.0	

Notes: The illegal trade values are computed by multiplying the total values of roundwood and sawnwood trade flows from source countries (exporters) by their corresponding illegal logging rates. In the case of multiple exporters within the same region (i.e. the Congo Basin and Southeast Asia) the results are summed-up over all exporters for each importer. For example, the value of illegal trade flows from South America to importer C is 0.49 FB + 0.725FC + 0.75FP, where FB, F_C, and F_P correspond to the total value of trade flows to country C from Brazil, Colombia, and Peru, respectively.

The sources used for estimating illegal logging rates are as follows: [a] FAO (2012); [b] Chatham House (2010); [c] van Eynde and Blomely (2015); [d] Finer et al. (2014); [e] Hoare (2015b); [f] Lawson (2014b); [g] Lawson (2014d); [h] World Bank quoted by USAID (2011); [i] Saunders (2014a); [j] Forest Trends and Anti-Forest Mafia Coalition (2015); [k] Hoare (2015c); [l] EIA (2013a); and [m] Lawson (2014c). The illegal logging rates for Malaysia, Peru and the Republic of the Congo correspond to average values computed based on the value ranges reported by the relevant sources.

Source: own elaboration based on data from DESA/UNSD, United Nations Comtrade database

example, highlights five different ways to launder illegal timber harvested in Pará and Mato Grosso States. One of them is the authorization of harvesting permits for areas already harvested, and the permits are then used to provide documentary support for illegal timber logged elsewhere. Another approach is to purposely overestimate the volume of valuable tree species in a certain area covered by a valid harvesting permit in order to use the exceeding volume to launder illegally-harvested timber from other areas. All of these fraudulent mechanisms build on gaps in the existing law enforcement system, as well as negligence or collusion by officials. However, forged documents and papers are not just limited to Brazil; they are also a common issue in Peru (EIA, 2012; Timber Committee, 2016). Peruvian exports are mostly directed to China (50 percent) and the US (10 percent). Colombia exports mainly roundwood, with India and China being the main destinations, each importing about USD 10 million per year.

Congo Basin

The total export value of illegally-sourced roundwood and sawnwood from the Congo Basin amounted to USD 521.4 million in 2014. The Republic of Congo (41 percent) and Cameroon (36 percent) contributed to most of this value. Most (68 percent) of the Cameroon exports was sawnwood, whereas roundwood accounted for 92 percent of total export value from the Republic of Congo. Since 2012 China has surpassed the EU to become the largest roundwood and sawnwood importer from the Congo Basin. In 2007, 90 percent of the DRC's timber exports were destined to the EU, while in 2014 this value decreased to 29 percent (Lawson, 2014b). In 2014 China imported about 58 percent of total value of illegal roundwood and sawnwood from the Congo Basin, mostly (91 percent) in the form of roundwood. The EU imported 22 percent, mostly sawnwood (74 percent). Vietnam (USD 18.3 million), the US (USD 12.6 million) and, marginally, India (USD 1.4 million) altogether covered another 6 percent of the total export value from this region.

Illegal activities in the Congo Basin cover a broad range of typologies. The improper use (or abuse) of logging permits is one of the most common illegal activities, as recent cases in the DRC (with artisanal logging permits) and Cameroon (with timber recovery permits) reveal (e.g. Global Witness, 2012; Greenpeace Netherlands, 2015). Obviously, illegal logging in Africa is not restricted to the Congo Basin; rather it occurs in many other African countries; among them, Mozambique with an estimated illegal logging rate of 50 percent. China imports nearly 90 percent of Mozambican timber exports, mostly logs of valuable hardwood species such as Pau Ferro (*Swartzia madagascariensis*), Monzo (*Combretum imberbe*), Chanate (*Colophospermum mopane*), Jambire (*Millettia stuhlmanii*) and Umbila (*Pterocarpus angolensis*) (EIA, 2013b).

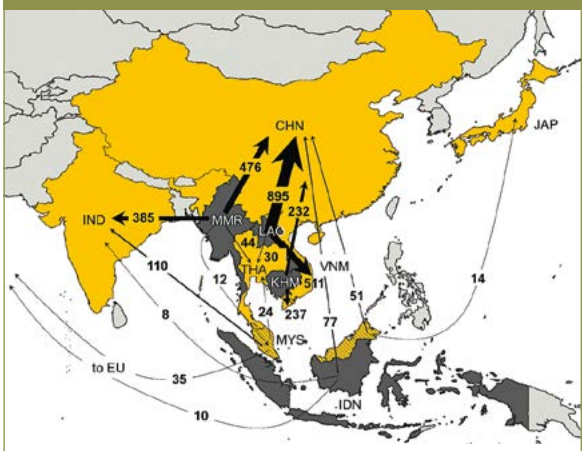
Southeast Asia

The estimated export value of illegally-sourced roundwood and sawnwood from Southeast Asia reached nearly USD 3.5 billion in 2014, on par with the estimate by the United Nations Office on Drugs and Crime (UNODC, 2010). About 50 percent of this value was imported by China and another 17 percent by India. Laos (USD 1,457 million) and Myanmar (USD 1,035 million) were by far the main exporters from the region, whereas the role of traditional producers like Malaysia (USD 182.7 million) and Indonesia (USD 120.1 million) was more limited, though with some relevant trade flows towards the EU (USD 43 million). Although Indonesia is the first Asian timber exporter country to start negotiating a Voluntary Partnership Agreement with the EU and likely the first one that will issue Forest Law Enforcement, Governance and Trade (FLEGT) licences in the next few months, the value of its sawnwood exports to China between 2010 and 2014 almost doubled, while in the same period its exports towards the EU decreased by 40 percent.

Apart from exports towards its neighbouring emerging economies, this region is characterized by quite intense intra-regional trade (see Figure 3.12). In particular, Thailand's imports of illegal wood from regional producer countries reached about USD 101 million, mostly from Myanmar (44 percent) and Laos (30.5 percent) and Vietnamese imports from Laos amounted to more than USD 511 million despite a ban on exports of logs and sawnwood imposed from 1999-2002. Introduced with the aim to encourage the development of domestic timber processing, the ban was either not enforced or circumvented due to numerous permissions issued in "exceptional cases" (Smirnov, 2015). Based on UN Comtrade Database (DESA/UNSD, United Nations Comtrade database, 2016), the export value of wood products from Laos in the period 2009-2014 increased by more than eight times (almost exclusively roundwood and sawnwood). Vietnam is also by far the main destination for

Figure 3.12

Main illegal trade flows of roundwood and sawnwood within Southeast Asia, 2014 (million USD)



CHN = China; EU = European Union; JAP = Japan; KHM = Cambodia; IDN = Indonesia; IND = India; LAO = Laos; MMR = Myanmar; MYS = Malaysia; THA = Thailand; VNM = Viet Nam

Cambodian log exports. The Vietnamese government has signed a number of agreements/commitments for coordination on forest management and protection, law enforcement and trade, including with the governments of Laos in 2008 and Cambodia in 2012; however, so far they have not resulted in a significant reduction in its imports of timber at high risk of illegality (Saunders, 2014b).

Although illegal logging practices are quite differentiated, "conversion timber" is the predominant source of timber in the region. For instance, in Indonesia timber from forest conversion (mainly for oil palm and timber plantations) represented nearly 95 percent of timber harvested from natural forests in 2013 (Forest Trends and the Anti-Forest Mafia Coalition, 2015) and in Malaysia at least 66 percent of timber production was derived from forest conversion in 2010 (Lawson, 2014a).

Oceania

During the last six years PNG has experienced a significant increase in timber harvest and exports, with log exports nearly doubling between 2009 and 2014. The country now ranks among the world's three largest tropical roundwood exporters. The total value of illegal wood exported from PNG in 2014 was estimated at USD 685.2 million, with China being the main destination (USD 564.7 million), followed by India (USD 75.5 million) and South Korea (USD 13 million). Sawnwood exports from PNG were limited (USD 8.6 million) and mostly directed to China, Malaysia and Australia.

A main mechanism behind the recent expansion in PNG's exports is known as Special Agriculture and Business Leases (SABLs) (Lawson, 2014c). The SABLs, originally intended for agricultural projects, are used by many logging companies to expand their operations. Some 5.5 million hectares of land leased under the SABLs are additional to 10 million hectares already allocated by the PNG government through logging concessions. As a result, more than one-third of the country's forests are now exploited by foreign (logging) companies, with detrimental effects on local communities and their rights (Mousseau and Lau, 2013).

3.4.2 New Developments in Illegal Logging and Related Timber Trade

Potential trade diversions caused by recent responses by some consumer countries

Recently, several consumer countries/regions (e.g. the US, the EU and Australia) have adopted laws to protect them from imports of illegally-sourced wood products. While helping reduce their imports of illegal wood products from tropical forest countries and other parts of the world (Gan et al., 2013; Prestemon, 2015), the implementation of these laws are likely to cause trade diversions. The diversions could include increased domestic consumption in the producer countries (though this is less evident so far) and increased imports by countries that have no or less stringent regulations on illegal trade of wood products. Such diversions can undermine the effectiveness of these initiatives by the consumer countries and call for broader global cooperation in combatting illegal logging and related timber trade (Gan et al., 2013).

Increased imports by China and India

China and India are the two largest importing countries of tropical roundwood (see Section 3.2.4), most of which originates from producer countries at high risk of illegality. Their imports are driven by both domestic consumption and exports. Although the share of illegal imports by China between 2000 and 2013 declined from 26 to17 percent, this did not correspond to a reduction in the total volume of illegal imports. Instead, China's imports of wood products at high risk of illegality increased from 17 million m^3 (RWE) in 2000 to 33 million m^3 in 2013 (Hoare, 2015a). China imports illegal timber from all tropical forest regions and Russia while the major source of illegal timber for India is Southeast Asia. Given their huge domestic markets and China's large capacity to process wood products for exports, it is extremely difficult to substantially reduce illegal logging and related timber trade at the global level without engaging these two countries.

Geographic shifts in illegal logging and related timber trade

As illegal logging in Brazil, Indonesia and Malaysia has declined in recent years (Hoare, 2015a), Russia, other Southeast Asian countries (e.g. Cambodia, Laos and Myanmar), PNG and some African countries, have witnessed increases in illegal forest activities. These countries have emerged as new producer countries in the global web of illegal logging and related timber trade. Among these rising producer countries, Russia has gained significantly in its share of global illegal timber production (primarily in its Far East region) and exports (mainly to China) (see Section 3.4.1 for more details).

This phenomenon suggests that illegal logging is highly geographically fugitive and persistent at the global level. Illegal logging and related timber trade is not limited to tropical forest regions; it can occur in and shift to non-tropical forest regions. This is not all due to leakage. Increased demand and changes in drivers, among other factors, can induce geographic shifts in illegal logging and related timber trade.

Timber originating from illegal forest conversion for export-orientated commercial agriculture

Traditionally, traded tropical timber originated mainly from selective logging of natural forests. During recent years, conversion timber - timber produced from forest conversion, especially from illegal forest conversion for export-orientated commercial agriculture - has constituted a significant portion of illegal timber trade. It is estimated that almost one-third of tropical timber traded globally is illegal conversion timber (Lawson, 2014a). Most of the forest conversion has occurred in the Amazon and Southeast Asia. In recent years, forest conversion in the Amazon has been curtailed to some extent, and yet forest conversion in Southeast Asia remains active (Barney and

Canby, 2011; Carlson et al., 2013; Forest Trends and the Anti-Forest Mafia Coalition, 2015).

Agro-commodities illegally produced on land converted from forests are also primarily destined for export markets. These products include beef, soy, cocoa, palm oil and timber from plantations, among other products, with a combined annual trade value of USD 61 billion (Lawson, 2014a). Increased global demand and trade for various agro-commodities have placed tremendous pressure on tropical forests and extended the scope of illegal logging and related timber trade.

In summary, global imbalances in laws and law enforcement against illegal logging and related timber trade (as well as in wealth, resources, global influence, overall governance capacity, etc.) and increased global demand for agricultural and timber products make it very difficult to eliminate or even significantly reduce illegal timber production and trade at the global aggregate level. Furthermore, illegal logging and related timber trade is highly fugitive - it can easily shift from one location to another or from one form to another. For instance, measures taken by a few consumer countries to curtail imports of illegally-sourced wood products could cause trade diversions, leading to only limited success in globally controlling illegal logging and timber trade. Similarly, log export bans or reductions in illegal logging in some producer countries may encourage log exports from some other countries or shift illegal logging elsewhere. As a driver for illegal logging fades out or is controlled, a new driver may emerge, sometimes for disguised "good" reasons (e.g. forest conversion for oil palm plantations). Hence, effectively controlling illegal logging and related timber trade at the global level calls for broader and stronger global cooperation (recognising that such cooperation is itself challenging). Additionally, illegal logging and related timber trade is not merely a forestry problem and thus cannot be resolved by the forestry sector alone. Coordination between forestry and agriculture in terms of land use, production, trade, markets and policy, and among the forestry, fisheries and wildlife sectors in terms of tracking illegal activities would be necessary and beneficial.

3.5 Conclusions

Existing estimates on illegal logging and related timber trade differ substantially, partly because of the estimation difficulty associated with the illegality nature and partly because of the differences in the scope of estimation (e.g. products and time period covered), definition of illegality, data sources and estimation methods used. Despite recent reductions in the production and import shares of illegal wood products in some major producer and consumer countries, illegal logging and timber trade at the global level remain persistent and highly fugitive in terms of geographic location and drivers, calling for broader and closer global cooperation across geographic regions and sectors. Most of the illegally-produced tropical hardwood timber is produced by the informal sector and consumed in domestic markets; only a small portion of illegally-produced timber (nearly 10 percent of total global trade value of wood products) is internationally-traded, which has usually better quality and higher profit margins than domestically-marketed timber. However, timber produced from illegal forest conversion for commercial agriculture has become an increasingly important portion of global illegal logging and related timber trade, whereas the role of traditional, large scale logging has diminished in illegality. High profitability for wood products and agricultural products grown on lands converted from forests and consumer preferences for special wood species drive illegal logging and related timber trade.

The vast majority of illegal primary wood products from tropical forests are produced by Brazil, Indonesia and Malaysia, and imported by China and India. Russia has emerged as the largest single source of illegal timber from temperate and boreal forests. Because of the scale of their illegal production and imports, it is extremely important to engage these countries in global efforts to control illegal logging and related timber trade.

Domestic, regional and global markets for legal and illegal wood products are interlinked, making it difficult to monitor and resolve illegal logging and related timber trade.

Aerial view of wood market in Yaounde, Cameroon.
Photo © M. Edliadi/CIFOR

Data gaps

Several data gaps exist in measuring illegal logging and related timber trade. First, there are no data that directly measure illegal logging and related timber trade. Second, there are scant data that present separate measurements of quantities and values of illegal production and trade originating from informal logging, industrial logging, forest conversion and other illegal activities. Third, there is inadequate work to understand and quantify statistical errors and inconsistencies in the conventional production and trade data from different sources and to separate them and other errors from the results of trade

data discrepancies' analysis. Fourth, there is a lack of approaches developed for mutual confirmation or, at least to some extent, validation of illegality estimates derived from different sources and methods. Finally, data on the share of illegal wood in different secondary wood products are also limited, preventing accurate estimates of illegal trade of these products.

Further efforts are needed to bridge these gaps. Additionally, it is recommended to adopt big data analytics to integrate and utilize large amounts of publicly-available timber, wildlife and fisheries data in a more effective and beneficial way.

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Appendices

Appendix 3.1
Methods for Estimating Illegal Logging and Related Timber Trade

Trade data discrepancies

Export/import discrepancies between trade-partner countries have long been used as an important indicator of illegal timber trade (Brunner et al., 1998; Johnson, 2002). The scientific literature identifies a large number of factors that can contribute to discrepancies in trade statistics between two countries (Castaño, 2007; Chen, 2010; Eastin and Perez-Garcia, 2004; Guangcui, 2003). They can be classified into "primary normal factors" (e.g. imports are recorded as "cost, insurance and freight", CIF and exports as "free on board", FOB), "secondary normal factors" (e.g. differences in product classifications), and "abnormal factors" (e.g. illegal activities) (Castaño, 2007; Goetzl, 2005). While trade data discrepancies offer a hint of problems that may exist with unreported trade, "data discrepancies by themselves are not prima facie evidence that illegal trade has occurred" (Seneca Creek Associates and Wood Resources International, 2004). However, if significant or persistent differences are detected, and if there is additional evidence available, then discrepancies can be assumed as an indicator for illegal timber trade. In particular, discrepancies can become informative about the volume of illegal trade only in cases where large volumes of primary wood products are traded (Chang and Peng, 2015; Lawson, 2007).

In general, trade data quality and consistency remain questionable. Discrepancies might be the result (among others) of poor quality data, errors in collection and compilation of trade statistics, inconsistent product classification, inaccurate measurements and conversion factors, and modified/falsified shipping documentation referring to legally-harvested timber (e.g. to avoid paying royalties or export taxes) (Castaño, 2007).

Wood balance analysis

This approach represents the basis for many estimates of illegal logging rates in producer countries. It compares timber inputs (the sum of production and imports) and outputs (the sum of exports and domestic consumption) at the country (or regional) level. Where a deficit between inputs and outputs emerges and cannot be otherwise explained, it is interpreted as an indication of illegality. The corresponding material shortfall can then be inferred as coming from illicit domestic harvesting and/or imports (Lawson, 2007). Wood balance analysis has been implemented by several authors to analyse illegal logging rates and trade at both global (Dieter, 2009; Johnson, 2003; Seneca Creek Associates and Wood Resources International, 2004) and national levels (Lawson and MacFaul, 2010; Palmer et al., 2001; Prasetyo et al., 2012).

Although largely used to estimate the scale of illegality (in both absolute and relative terms), such analyses have some limitations. For example, official estimates of industrial roundwood production might relate to the formal sector rather than the informal (not necessarily illegal) sector, thus underestimating the extent of illegality. Moreover, production data might not be able to capture some domestic illegal harvests (e.g. roundwood from plantations established through natural forest conversion, informal small-scale logging, etc.) that have increased in recent years (Hoare, 2015a). And, trade statistics per se do not allow for identifying the proportion of illegally-sourced material embodied within imports. Finally, data capture at the national and subnational scales can vary from country to country, and within each country, thus making comparison difficult and not always consistent. Wood balance analysis is not just used for detecting illegal timber; it can also allow for generating an aggregate summary of wood resource availability and use, thus representing key information sources and forecasting tools for the forestry and wood products industry sectors (Knauf, 2015).

Import source analysis

This approach is used to assess illegal trade by multiplying estimated illegal logging rates in source countries by trade volumes reported in official statistics. It largely depends on estimates of illegality at source that are normally elaborated based on existing literature as well as expert perception surveys, field surveys and interviews with stakeholders. Such estimates might be imprecise, vary according to the source, and are rarely updated in a consistent manner over time (Lawson, 2007). Contreras-Hermosilla et al. (2007) developed one of the first sets of estimates. Additional ones were developed and (in some cases) used to

complement each other (Li et al., 2008; Miller et al., 2006; Seneca Creek Associates and Wood Resources International, 2004). Import source analysis is one of the methods used by Chatham House by "calculating roundwood equivalent volumes (RWE) and US dollar values for individual import flows (source country/product) from official import data (for timber products, wood furniture, and pulp and paper) and then multiplying these by estimates of the proportion of wood considered likely to be illegally sourced in each individual wood flow in each year" (Lawson, 2014e).

Expert survey

This method involves surveying experts on their perceptions of illegality. Although this survey method can be applied to estimating both illegal logging and illegal timber trade, most of its applications so far have been in illegal logging (production). To estimate illegal logging, researchers ask a selected group of experts in producer countries about their perceptions of extents of illegal logging in their countries. To estimate illegal trade, on the other hand, the survey respondents include experts from producer, processing and consumer countries. The surveys can be done via mail, phone, face-to-face interviews or online.

This method does not use the existing production and trade data which are not intended/designed to cover the illegal components of production and trade. Hence, it can bypass the weaknesses associated with currently available production and trade data in estimating illegal production and trade. When data on production and trade are not available, this method could be the only tool to estimate illegal production and trade. However, this method has its own limitations. The validity of its estimates depends on the selection (sampling) of experts and their knowledge of the illegal activities. Because costs will incur in the survey, this method may be more expensive than wood balance analysis and trade data discrepancies, which use the data already available.

This survey method has been used to estimate the percentage or a range of percentages of illegal logging in total timber harvest (Hoare, 2015a; Lawson and MacFaul, 2010) and the percentage of illegal conversion of forestland to agricultural production in total forestland conversion or total agricultural production (Lawson, 2014a).

Hybrid method

A hybrid method is any combination of the above estimation methods. It can be more effective and yield better estimates of illegal production and trade if its combined strengths outweigh its combined weaknesses. As described previously, each method for estimating illegal logging and related trade has its own strengths and weaknesses. Hence, a hybrid method, which combines multiple methods described above, can take advantage of strengths of each method to overcome some weaknesses intrinsic to other methods.

Appendix 3.2
Country Codes used in Figure 3.4

Country	Code
Argentina	ARG
Australia	AUS
Austria	AUT
Belgium	BEL
Brazil	BRA
Bulgaria	BGR
Cambodia	KHM
Cameroon	CMR
Canada	CAN
Central African Republic	CAF
Chile	CHL
China	CHN
Columbia	COL
Congo, Dem. Rep.	ZAR
Congo, Rep.	COG
Costa Rica	CRI
Cote d'Ivoire	CIV
Croatia	HRV
Cyprus	CYP
Czech Republic	CZE
Denmark	DNK
Ecuador	ECU
Egypt, Arab Rep.	EGY
Estonia	EST
Finland	FIN
France	FRA
Gabon	GAB
Germany	DEU
Ghana	GHA
Greece	GRC
Hong Kong, China	HKG
Hungary	HUN
India	IND
Indonesia	IDN
Ireland	IRL
Italy	ITA
Japan	JPN

Country	Code
Kenya	KEN
Korea, Rep.	KOR
Lao PDR	LAO
Latvia	LVA
Lithuania	LTU
Luxembourg	LUX
Malaysia	MYS
Mali	MLI
Malta	MLT
Mexico	MEX
Mozambique	MOZ
Myanmar	MMR
Netherlands	NLD
New Zealand	NZL
Nigeria	NGA
Norway	NOR
Papua New Guinea	PNG
Peru	PER
Philippines	PHL
Poland	POL
Portugal	PRT
Romania	ROM
Russian Federation	RUS
Singapore	SGP
Slovakia	SVA
Slovenia	SVN
South Africa	ZAF
Spain	ESP
Sweden	SWE
Switzerland	CHE
Taiwan	TWN
Thailand	THA
Turkey	TUR
Ukraine	UKR
United Kingdom	GBR
United States	USA
Vietnam	VNM

Note: Only the codes of countries most relevant to this study are shown here. More country codes can be found at http://wits.worldbank.org/wits/wits/witshelp/Content/Codes/Country_Codes.htm. These codes may differ from the abbreviations of country names used elsewhere in this report.

Chapter 4
Drivers of Illegal and Destructive Forest Use

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4.1 Congruence Between the Drivers of Deforestation, Forest Degradation and Illegal Logging

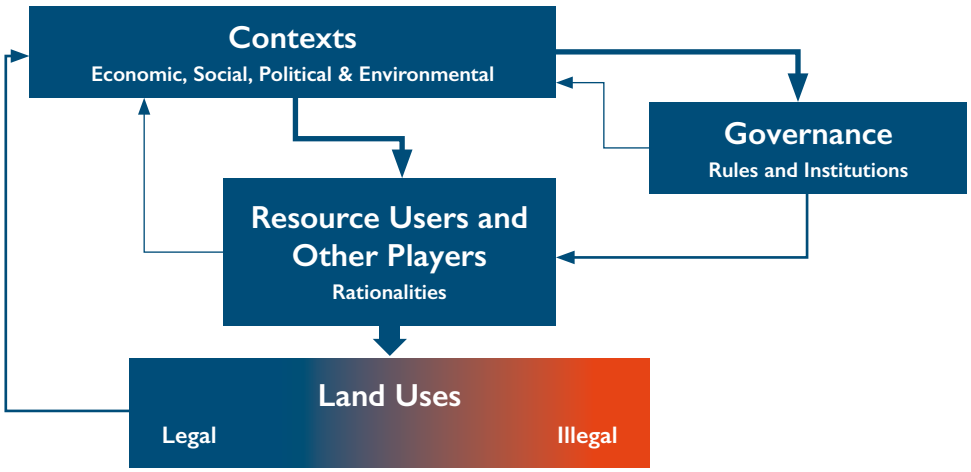
This chapter reflects upon the drivers of illegal logging and associated timber trade. Much of this discussion is related to a broader debate about the drivers of forest degradation and deforestation (FAO, 2016a; Kissinger et al., 2012; Geist and Lambin, 2001). In this debate illegal logging is primarily interpreted as harvesting of timber for export by logging companies that take advantage of flaws in regulations and law enforcement (Kissinger et al., 2012). This framing has been partly driven by the lobbies of timber importing countries to bring the issue of deforestation within the legality debate, and so to extol those policy measures aimed at improving forest legality as a means to tackle deforestation (see Chapter 7). In practice, however, the relationships between logging, legality, forest degradation, deforestation, and various social goods and bads are much more variable and dynamic. For example, the legal use of forest can be quite destructive as in the case of inadequately implemented operations in forest concessions, whereas, illegal or informal forest uses do not necessarily have to be negative when considering, for example, the occasional collection of non-timber forest products by indigenous communities without permission of the national authorities (see Chapters 2 and 7). Furthermore, forest conversion to agricultural land represents a larger amount of both illegal and legal forest activities than the use of timber or other forest products (Pokorny and Pacheco, 2014). The complexity further increases when considering the aspect of legitimacy (see Chapter 2). For example, the legalized harvest of timber in forest concessions can be illegitimate from a human rights perspective if violating the customary rights of indigenous communities.

While, from a conceptual point of view, it is important to parse apart the phenomena of deforestation, forest degradation and illegal logging, this complexity makes it difficult to do so. This is particularly visible in the distinct literature about the drivers for illegal logging, forest degradation and deforestation. Despite different entry points, most of these studies and reports discuss, as a common denominator, the reasons for destructive forest use, and consequently hint at similar, largely congruent, sets of drivers. Accordingly, to draw a comprehensive picture of the drivers for illegal logging, this chapter includes the vast amount of aggregated knowledge generated by studies on the drivers of forest degradation and deforestation. More specific statements regarding the aspect of illegality are made whenever meaningful.

The driver literature basically distinguishes between direct or proximate drivers, and indirect, enabling or underlying drivers. Direct drivers represent human activities that directly affect forests such as harvesting of timber and other forest products, agricultural expansion and the construction of roads. These activities are triggered by indirect drivers covering the complex interactions of economic, political and institutional, technological, cultural, socio-political and demographic factors (Geist and Lambin, 2001; MEA, 2005; Kissinger et al., 2012; FAO, 2016a). Additionally, some studies consider a layer of immediate individual drivers that consider the rationalities and decision-making parameters of land users (Kaimowitz and Angelsen, 1998; Perz, 2002; Walker, 2004).

To discuss the drivers for illegal and destructive forest use, based on these considerations, a conceptual framework is proposed that puts the motivations of resource users and other economic players such as traders, brokers, processing industries, dealers and consumers in the centre (Figure 4.1). In this framework, actors decide about the use of forest and land in response to societal contexts determined by local and global factors which, in turn are affected by these decisions. Accordingly, the sum of illegal and destructive land uses may reinforce the conditions that lead to these. In this context, forest governance

The conceptual framing of drivers for illegal and destructive forest uses Figure 4.1



is interpreted as a bundle of measures to control and channel the effect of societal reality on economic actors and their decisions. The framework recognizes that these measures are also influenced by the same reality or contexts.

4.2 Rationalities of Individual Decisions

Forests are managed, exploited, converted or destroyed by people. Thus, before an activity with potential impacts on forests is realized, resource users make a decision. Understanding the nature of this decision-making process is a fundamental prerequisite to discuss the drivers of illegal and destructive forest uses.

4.2.1 Decision-making

There is broad agreement that resource users essentially make rational decisions. However, in practice this is a complex process, and several theories attempt to explain this phenomenon. The academic debate particularly discusses the interference and roles of individual agents versus societal structures in decision-making processes (Sewell, 2005) notably along a continuum starting from individual rational decisions to behavioural theories, to discussions about how individual trajectories are bounded by and even determined by their societal context. We briefly present some of these theories in the following paragraphs.

Rational choice

There is broad consensus that the desire for personal benefit is the driving force behind individual decisions. Classic neoliberal thinking sketches the *homo oeconomicus* as a rational agent narrowly interested in the pursuance of subjectively-defined interests to maximize individual utility (Rittenberg and Trigarthen, 2009). Accordingly, only those costs and benefits perceived by the decision-maker as immediately relevant matter, while so-called externalities are ignored. In the decision process, the individual costs and benefits of available alternatives are compared. A decision for one option necessarily implies waiving a number of alternative options. These forgone opportunities to generate benefits are called opportunity costs (Gregersen et al., 2010). Rational decisions also take into account the risk of not achieving an expected benefit in the future because of, for example, price fluctuations, fire, storm, wind, robbery and changing policy frameworks. The higher the risk, the less attractive is an economic option. Generally, economic actors prefer short-term investments because of lower risks and shorter repayment periods (Da Silva et al., 2009). Accordingly, investors with access to many attractive economic alternatives tend to set high profit expectations to compensate for the risk of long-term investments.

Behavioural economics

Although economic rationality plays a significant role in individual decisions, in practice, people themselves influence their assessment by subjectively framing their decision on the basis of their own experiences and opinions provided by trusted peers (Kahneman and Tversky, 1979). Often, these reference points represent the status quo. Outcomes of decisions above these reference points are considered as gains and below them as losses (Thaler, 1980). Accordingly, individuals perceive relative changes rather than absolute values, particularly those near the reference point, and again rely in their assessments on subjective feelings, which they tend to interpret as objective and valid information. Losses and gains are not

Box 4.1

Why do people break laws?

Criminologists hold different and sometimes competing views about the causes of law-breaking behaviour. The conceptual levels at which law-breaking behaviour is explained vary from individual (micro) to group (meso), to society (macro) levels (Walklate, 2007): the individual level is being stimulated by certain biological factors, or genetic or psychologic predispositions, such as personality disorder, limited self-control or empathy, and a desire for thrill-seeking behaviour possibly triggered by certain social or environmental factors; at the level of family, group or neighbourhood, law breaking behaviour is learned from important others or where socialisation into conventional behaviour and social ties to society are weak; at the level of society and state, law-breaking is interpreted as a coping mechanism for people experiencing pressure that results from an imbalance between social structures (accepted means) and culture (accepted goals).

Law breaking can also be interpreted as the result of a rational decision based on risk-benefit interpretations. Thus, opportunity is required for a crime to be acted upon, which is in itself an influencing motivation (Katz, 1988). If motivation is sufficiently high in the presence of an attractive opportunity, a crime may occur if the person has the ability to commit it. The more attractive and more easily accessible an opportunity, the lower predisposed individual motivation has to be. Thus, even people with a low criminal motivation may become engaged in crimes if the opportunity is big enough. This phenomenon partly explains why well-paid politicians or managers become engaged in white-collar crime despite their social and economic status. Finally, laws and the degree of their enforcement can be reasons for crime. This perspective highlights that regulations result from specific decision and power relationships within a society at a certain moment in time (Becker, 1963). Examples of laws being increasingly questioned are those that prohibit homosexuality and marijuana or, related to illegal logging, indigenous forest uses. Examples of law enforcement that is being questioned is if law enforcers merely go after the "small fish" (e.g. drug sellers on the street, or poor forest dwellers who sell a few logs to sustain their families), and not after the "big fish" (e.g. leaders of criminal drug gangs, white collar criminals or businesses well organized in timber trafficking networks).

considered equivalent: losses hurt more than gains feel good (Kahneman and Tversky, 1979). Consequently, people tend to systematically overestimate the status quo and require (a belief in) disproportionally high payoffs to change their behaviour; a net benefit alone is insufficient. This phenomenon, called "endowment effect" or "status-quo-bias" partly explains why people often maintain their daily practices even if they are not meaningful from a more objective standpoint. Also, consumers are relatively unresponsive to small changes (Thaler, 1980) and require strong incentives to change behaviour (Kahneman et al., 1991).

Bounded individual trajectories

Individual decisions are not always amenable to axiomatic constructions but derive from specific environments. They are bounded within subjective framing and assessments determined by specific experiences and societal contexts (Berg, 2003). Complex interactions between genes and environment influence the intellectual, emotional and physical attributes of an individual person, affect the value placed on material and symbolic resources, as well as the ability to successfully access relevant options (Fishbein, 1990). These processes, at least to a certain degree, are transmitted from generation to generation and thus may shape typical traits, such as being a farmer, a trader, a politician, as well as being altruistic, a leader, or a criminal (Berg, 2003). Accordingly, individual views on the world reflect a specific cultural and social imprinting induced by knowledge, belief, art, morals, law, custom and any other capabilities and habits that the surrounding society has developed over time (World Bank, 2015; James, 2015). From this collective action perspective, individuals behave to maximise their interests based on shared expectations about the behaviour of others (Ostrom, 1998). Accordingly, it is difficult for individuals to take decisions that contradict existing cultural and societal norms. This is particularly obvious regarding the societal phenomenon of corruption (see Section 4.4.2) and criminality (see Box 4.1).

Political ecology

In addition to the surrounding environment and the behaviour of others, the scope of individual land use decisions is also strongly restricted by a context characterized by inequality and unfair power structures as suggested by the literature on political ecology (Bryant and Bailey, 1997; Bryant, 1998; Blaikie, 1999; Neumann, 2008; Nygren and Rikoon, 2008) and the chronicles of power (Green and Hulme, 2005; Harriss, 2007). Centuries of exploitation, colonisation, settlement and exploration in many rural regions worldwide have shaped a societal structure that continues to impact events today. Since the beginning of the colonial period, Europeans have established mechanisms to exploit people and resources of interest (ivory, gold, sugarcane, drugs, timber etc.) in many parts of the world. Societies were stratified vertically so that a small group of elites had control over the majority of land and resources. Still today, rural areas are characterized by historically unfair power structures where changes in land use respond to urban and global interests rather than local needs and priorities (Pokorny et al., 2013). Political and economic elites, due to their position, resources and privileges, have the power to influence decisions about land and resources in accordance to their individual interests. They are often well connected with decision-makers across administrative tiers (Fischer et al., 2007) and use their power to pursue illegal and destructive resource use strategies to obtain the major share of the benefits from these activities (Ribot, 1998). The rural poor, on the other hand, are systematically deprived from many economic options (Sunderlin et al., 2005), and often find it difficult to have their voices heard (IFAD, 2010). The political, social and economic differences within different societal groups account for an uneven distribution of costs and benefits, which inevitably reinforces or reduces existing social and economic inequalities.

4.2.2 Rationality of Resource Users

Applying the above-presented theoretical considerations to illegal logging, one can posit that individual decisions on the use of resources mainly depend on the accessibility of economic opportunities to maximize individual utility in accordance to individual preferences prescribed to a lesser or larger degree by societal context. In these considerations, the accessibility to relevant economic alternatives largely depends on the availability of financial and human capital, as well as the level of information. The more capital an economic actor has, the better connected to relevant networks and logistics, and the better provided with knowledge and skills, therefore, the wider the choice of options. Accordingly, less capitalized, less connected, and less qualified actors are more limited in their choices and, in the case of land users, are less flexible and depend more on their labour and natural resources (Barbier, 2012). This dependency may combine with individual preferences resulting from specific trajectories embedded in a given societal context, which may further reduce their scope for action due to asymmetric power relations. While poorer land users often traditionally rely on specific land use practices, capitalized actors, instead, may more often follow specific investment avenues (Da Silva et al., 2009).

Although, in practice, economic actors might follow a wide range of interests and priorities, from an economic perspective, the above described differences translate into actor-specific profit expectations and varying degrees of environmental and social concerns. It is more likely that a more flexible resource user and one with more opportunities, will have higher profit expectations, and a lower dependency on the social and environmental conditions in a given place. Accordingly, one can imagine arranging different economic actors along those two variables: environmental and social concerns versus expected level of profit.

Generally speaking, capitalized land users such as for example agro-industrial companies have far higher profit expectations than less capitalized ones such as local timber companies, peasants or forest dwellers. Large,

international companies and entrepreneurs not only dispose of the capital, know-how and information needed for investments in highly productive technologies but are also flexible regarding the application of their capital. Decisions might consider social and environmental aspects when they do not significantly compromise profitability, or if third parties effectively enforce social or environmental standards (OECD, 2012). If profitability of a chosen land use becomes marginal, they tend to shift to other more attractive economic options.

In contrast, poor peasants, as well as poor forest dwellers, strongly depend on their ability to benefit from a relatively limited portfolio of assets (Ribot and Peluso, 2003). They fully rely on those few resources within their immediate surroundings (Banerjee and Duflo, 2007) and family labour, often including contribution of children (Berdegué and Fuentealba, 2011). They suffer from a notorious lack of liquid capital and have only very limited access to bank loans (D'Antona et al., 2006). In addition, they are much less connected to commercial networks (IFAD, 2013; Pfitzer et al., 2009). Due to their personal situation, their emotional ties to land and resources (Quinn and Halfacre, 2014), and their emphasis on social reproduction goals, risk avoidance and securing livelihood sustenance are at the centre of their decisions (Perz, 2005). The lack of capital and connectivity in combination with their socio-cultural preferences greatly restrain their economic choices, which partly explains why poor forest dwellers, if provided with legal access to larger forest areas, function as effective caretakers of the forests (Campos and Nepstad, 2006). At the same time, they are strongly interested in possibilities to generate immediate income, but are satisfied with relatively low profit margins. Accordingly, they show a preference for low-input, low-risk entrepreneurship that avoids costly inputs such as machines, fertilisers, pesticides and seeds. Despite an increasing importance of non-farm income and the chance for rural-urban migration (Wunder, 2001; Hecht, 2011), the possibility of producing food on their land for own consumption and markets still is essential to secure their livelihoods (IFAD, 2013). This, in combination with limited technical knowledge (IAASTD, 2009) and the marginality of their resources makes smallholders susceptible to degradative land uses including the destructive exploitation of marketable forest products (Barbier, 2012). Accordingly, poverty is an important driver of forest degradation (Kissinger et al., 2012).

Beyond the different land user groups, there are several other players that due to their capacities, assets and societal position can promote or hinder certain land user groups and shape their decisions. Actors such as intermediaries, processing industries, consumers, and investors are directly or indirectly engaged in value chains. Based on the abovementioned theories, one might expect them to be driven by profit-seeking behaviour, and thus, systematically explore opportunities to maximize profits. This is particularly relevant for large investors such as, for example, banks, stockbrokers and insurance companies, but also regarding consumers of agricultural and forest products, who generally highlight price and quality in their consumption decisions (TradeExtensions, 2014). In sum, these actors may

Daily life around Lake Sentarum, West Kalimantan, Indonesia. Photo © Tim Cronin for CIFOR

pressure the providers of the demanded goods and services to reduce costs, for example, by enhancing productivities, or by reducing environmental and social standards (Colen et al., 2008). In contrast, societal groups such as premium consumers, NGOs, policymakers and overseas aid, at least in their discourses, highlight the need for a less destructive use of resources, which, in the case of forests explicitly includes the legality aspect (see Chapter 7). However, some of these groups have conflicting interests. For example, policymakers may support environmental goals but may be even more interested in economic goals such as the creation of jobs, infrastructural development and access to consumption markets; overseas aid may engage in environmental and social initiatives but also cooperate in large infrastructure investments, the agro-industrial production of commodities and the exploitation of minerals in forest areas (Pokorny, 2015).

4.2.3 Land Use Options

From an economic perspective, land uses present opportunities for resource users to satisfy their demands and expectations outlined above. In this utilitarian sense, the decision for or against a specific land use option reflects individual rationalities and capacities as described above. Land uses happen, legally or illegally, sustainably or unsustainably, if motivation of at least one relevant user is sufficiently high, the opportunity is there, and the capacity for its implementation exists. Land uses comprise a wide range of activities including commercial and subsistence agriculture, infrastructure extension, urban expansion, mining, commercial logging, shifting cultivation, livestock grazing in forests, fuelwood collection and charcoal production (Geist and Lambin, 2001; Hosonuma et al., 2012; Kissinger et al., 2012; FAO, 2016a).

A comparison of level of risk and achievable profit margin for different land use options, suggests that in many cases several other land uses may be more attractive

Cattle farming is a major driver of deforestation in Brazil. Landscape near Rio Branco, Acre, Brazil.
Photo © Kate Evans for CIFOR

than sustainable forest management (Box 4.2.). This signifies the existence of a strong incentive for forest conversion, informal logging and other illegal forest activities. In fact, legality may reduce or increase the competitive disadvantage of legal forest uses or may even be a precondition for a specific land use option. In practice, there is at least one resource user group whose motivation for a subjectively attractive land use is stronger than the disincentive of eventually existing legal constraints; respectively, policymakers and major societal groups might be insufficiently interested in setting up and effectively enforcing legal constraints. In this context, the following paragraphs explain the most common non-forest and forest land uses, describe their geographic relevance, clarify why they are attractive to whom, and if and to what degree they might be related to illegality.

Agro-industrial production of agricultural commodities for global markets requires significant investments in land and technologies as well as a good integration into international value chains. In parallel, commercial agriculture promises large profits in short time periods. The production of soybeans, for example, can generate discount rates of 10 percent during a 10-year production period (Boerner et al., 2010). Similarly, other types of food production in many tropical contexts generate two-digit profit margins (Pokorny and Pacheco, 2014). In the case of cattle ranching, investments costs, management intensities but also profit margins are lower. Nevertheless, particularly if realized at a larger scale, it is attractive because profits are generated at a comparatively low risk. This attractiveness partly stems from public incentives including the provision of cheap land and credit programmes, as well as indirectly, through subsidies notably for energy and materials (e.g. fertilisers and pesticides). In sum, agro-industrial production fits perfectly with the interest and capacities of capitalized, often international and urban, investors. Large-scale agriculture including cattle ranching is most important in Latin America. In particular, in the Amazon region but also in Southeast Asia agribusinesses producing meat, soybean and palm oil for global markets play an increasing role (Rudel et al., 2009; DeFries et al., 2010). In some regions also the production of non-timber forest products (NTFPs) at a large scale plays a role, as for example in the case of rubber plantations in mainland Southeast Asia and Southwest China (Warren-Thomas et al., 2015). It is estimated that the expansion of agro-industrial land uses is responsible for up to 80 percent of deforestation worldwide (Geist and Lambin, 2001; Gibbs et al., 2010; FAO, 2016a). If fire is used for forest clearing, particularly in dry woodlands or on flammable peat soils, large forest areas can be affected (FAO, 2007). Many of these land uses are established on forest lands and violate customary rights (Larson et al., 2008; RRI, 2015) or forest laws; though, economically poorer countries in search for international investors offer favourable (legal) conditions to international investors increasingly interested in such opportunities described as "land grabbing" (De Schutter, 2011; Borras et al., 2012).

Small-scale agriculture concentrates on the cultivation of food and other materials for local consumption and local markets. It comprises extensive shifting-cultivation as well as intensively-managed agricultural fields mostly done on plots of less than 2 ha (Barbier, 2012). Cultivations might also include tree components. Due to the local utility of the products, the possibility for the application of family labour, the low level of investments and technical know-how needed, and simple logistics, this land use is attractive for small, often poor farmers. They might manage their land since generations, arrived during planned settlement programmes, or simply encroached public or private (forest) land (Kissinger et al., 2012). Often, these farmers lack formal land titles (RRI, 2015). While many small farms are effectively managed since a long time, others suffer from gradual degradation due to misuse and marginal size and properties (Barbier, 2012). Shifting cultivation although, in its original form, was well adapted to the conditions and needs of forest dwellers in the tropics (Denevan and Padoch, 1988), plays a larger role in deforestation especially in Africa and Asia (DeFries et al., 2010; Fisher, 2010; Silva et al., 2011). Particularly, the widespread practice of using fire to prepare agricultural fields, if insufficiently managed, signifies an enormous threat to forests (Cochrane, 2009) especially in years of dry conditions exacerbated by the El Nino effect.

In many forested regions worldwide, there are large investments in the exploitation of minerals, oil and gas as well the construction of dams for the generation of energy (Kissinger et al., 2012). While the industrial exploitation of gold and diamonds often happens at a smaller scale, the economically much more relevant surface mining of high bulk, low value commodities like coal and iron ore affect very large areas. This is also the case regarding dams built for the generation of hydro energy (Edwards et al., 2014). In expectation of positive impulses for economic development, international cooperation often collaborates in these initiatives with the business sector (Ledec and Quintero, 2003). Also, national governments

massively support these investments and provide the legal basis for land and resources (UNEP, 2016). Often, these deals include high-level corruption, violate existing customary rights to land and resources as well as national regulations for forest protection (Edwards et al., 2014; León Moreta, 2015). Due to the immense capital requirements, such land uses are only accessible to corporate actors, often multinational companies. Once established, their profitability can be very high.

The harvest of wood and non-wood products, including game from natural forests, plays an enormous role particularly for local dwellers (see Chapter 2). Most of this harvest lacks formal authorization; and in some countries even regulations for such uses are missing. The low technical and financial requirements for the harvest of NTFPs in combination with the absence of bureaucracy, and a low level of control make them accessible to poor dwellers (Wunder, 2001). While some NTFPs are used on the basis of well-defined traditional norms (Shanley et al., 2002), others, such as fuelwood and charcoal in semiarid regions, ignore social or environmental thresholds (e.g., Ahrends et al., 2010). Particularly in Africa, fuelwood collection and charcoal production, often in combination with livestock grazing in forests, contribute to forest degradation (Kissinger et al., 2012).

Timber has always been at the centre of the commercial interest in forests. In the tropics, commercial timber logging concentrates on a few valuable tree species, of which often only a few trees exist per hectare (Pokorny and Steinbrenner, 2005). Accordingly, in the tropics, timber harvest tends to be highly selective. In contrast, boreal forests dominated by only one or two species are mostly harvested with clear-cuts (Sizer et al., 2015). If forests are not reachable by rivers, significant investments in the construction of access roads are necessary so as to allow the use of heavy machinery and to enable the transport of the logs to the saw mills. The fact that natural forests are often located in somewhat remote regions makes the transport of logs the highest single cost factor. The harvest itself is technically not too demanding. This makes timber logging an interesting option for smaller timber companies that dispose of basic equipment and know-how. However, the organization of regional and international trade of timber requires elevated know-how and capital, and thus relies on capitalized, well-connected actors (see Chapter 5). The fact that timber from valuable species is a transferrable and transportable asset with an elevated value fairly easy to harvest, transport and sell, favours trafficking (Lawson and MacFaul, 2010). Selective logging (both legal and illegal) of high value trees is seen as a first step for the subsequent conversion of forests into other land uses (Asner et al., 2006), and thus has contributed to deforestation in many regions of Asia and Latin America, and is still growing in Africa (Fisher, 2010; Laporte et al., 2007). Timber may also originate from authorized land clearings (i.e. ClientEarth, 2015; Ardiansyah et al., 2015; Alarcon-Diaz, 2012). Nevertheless, in many cases forests are converted into agricultural land uses without using the timber (Pokorny and Pacheco, 2014), a fact that indicates the limited attractiveness of timber logging compared to other land uses. The legal use of timber is mostly related to forest concessions managed by timber companies on the basis of authorized management plans in accordance with the principles for sustainable forest management (see Box 4.2). In the tropics, concessions may cover areas of several 10,000 hectares. Concession rights are often provided on the basis of bidding processes, in many cases influenced by corruption (Pokorny, 2015). Concessionaires

Box 4.2

Limited attractiveness of Sustainable Forest Management in the Amazon (adapted from Pokorny and Pacheco 2014)

Sustainable Forest Management (SFM) is seen as the principal approach for the legal production of timber. SFM foresees the application of techniques to reduce the environmental impacts of harvesting, avoid damage to future crop trees, and to improve the production efficiency of operations. It requires planning, the application of specific felling techniques, intensive monitoring and post-harvest forest protection. Government agencies are responsible for authorising and monitoring SFM. In the Amazon region as in many other regions, timber companies adopting SFM tend to also seek Forest Stewardship Council (FSC) certification to facilitate the export of well-paid timber into industrialized countries. Yet, SFM is insufficiently attractive for most land and forest users because: (1) consumers are only interested in a few well-known noble species from which only three to six trees per hectare stock in highly diverse tropical forests; (2) harvest operations are costly due to great investments into the building or infrastructure, and the large transport distances; (3) regulations for the protection of water sources, rare species and seed trees may drastically reduce the harvestable timber stocks while the fulfilment of other legal requirements entails high administrative costs; (4) human resources for planning and administration results in significantly increasing a company's fixed costs thus reducing its flexibility. There are problems related with excessive bureaucracy, corruption and the glacial pace of public agencies. Due to their accessibility, FSC-certified enterprises additionally suffer from intensive scrutiny, auditing and bureaucratic challenges. For the eastern Brazilian Amazon, average total harvesting costs run between 30-100 USD per m³. Considering that technologically outdated saw mills need 3-4 m³ logs to produce one m³ sawn wood, raw material costs alone are around USD 80 to 200 to which another USD 100 has to be added for milling. This results in a cost of more than USD 200 per m³ for sawnwood not including shipping. In consequence, harvesting timber is only attractive to a few larger timber companies well connected to global markets. For the vast majority of land users, SFM cannot compete with nearly all alternative land use options, including illegal logging.

have to pay fees and royalties, and normally also bear the cost for infrastructure. This, in combination with the elevated bureaucratic and technical requirements to set up and implement management plans, requires capacities often only available within larger export-orientated timber companies. For forest communities to comply even with simplified standards for small-scale logging requires massive external support (Pokorny, 2013). Although concessions provide an internationally-recognized legal basis, in practice, most of them insufficiently consider or even ignore eventually existing customary rights (Pokorny, 2015; IASS, in press). Additionally, a larger proportion of concessionaires' forest operations do not comply with the technical standards outlined in regulations and fail to effectively protect forest areas in the long-term (Sabogal et al., 2007; Pokorny, 2015).

Nowadays, the production of forest goods is moving away from primary forests towards plantations, where they can be produced at much lower costs (FAO, 2010). While initial investment costs in plantations can be high, benefits are equally high and achievable in the short term. The forest plantation sector is dominated by a few very large, mostly international companies which, however, may cooperate with small and medium-sized producers in out-grower or contract farming schemes (Hoch et al., 2009). Plantations, even if established on already deforested land imply the removal of natural vegetation. Despite a reduction in the practice of replacing "unproductive" natural forests with plantations, in some regions, forest areas are still being converted as for example in the case of oil palm plantations in Indonesia (Vijay et al., 2016).

Trucks carrying logs in Gunung Lumut, East Kalimantan, Indonesia. Photo © Jan van der Ploeg for CIFOR

4.3 Contexts

The use of forest lands in rural regions is strongly influenced by complex interactions of social, economic, political, cultural and technological processes at the local, national and global levels (Kissinger et al., 2012; FAO, 2016a). They prescribe the accessibility and attractiveness of land use options for the different resource user groups. The specific local configurations of land tenure, regulatory and institutional frameworks, markets, finances and public services are in turn influenced by broader processes such as demographic and economic dynamics, conflicts and crises, as well as climate change (Geist and Lambin, 2001; Obersteiner et al., 2009; FAO, 2016a). This section describes relevant context conditions and trends to sketch their influences on decisions about illegal and destructive forest uses.

4.3.1 Current Situation

An estimated 3.4 billion people live in rural areas (World Bank, 2016) from which nearly a half is dependent upon forests to some extent. An estimated 300-350 million people, most of them indigenous, are classified as being highly dependent on forests (FPP, 2012). About 86 percent of the world's forests are publicly owned (Siry et al., 2010), however, in practice, the land tenure situation is often unclear and conflicting (Larson et al., 2008; RRI, 2015). Globally, around 60 percent of land and resources are managed on the basis of customary rules although less than a fifth is formally recognized (RRI, 2015). Recognition of local rights is often limited to some forest areas with protected area status, and properties in agricultural settlements. Poverty rates in and around remote forest areas are significantly higher compared to those of cultivated and urban areas (Chen and Ravallion, 2011). In many cases, these areas are characterized by power imbalances, patronage systems and social isolation including very restricted access to public services (Barbier, 2012; Green and Hulme, 2005). Often, local elites and authorities arbitrarily provide rights to resources on the basis of personal preferences (DFID, 2015). The combination of remoteness and poverty results in vicious circles that imply absence of attractive economic options (Barrett and Swallow, 2006).

Over the last few decades, newly constructed roads have made many forested landscapes more accessible. While road construction in rural regions is a key policy of most developing countries, a large share is constructed by logging companies, cattle ranchers and agro-industries, and even as a collective effort of smallholders (Walker et al., 2013). Roads have made markets and public services accessible for a larger part of rural populations, opening up new economic opportunities (Barber, 2014) and creating new urban-rural networks (Padoch et al., 2008). In parallel, roads act as entry points for non-local actor groups including small and large-scale farmers and cattle ranchers, forest companies, agro-industries, mining and other companies who use their resources, capacities and social connections to appropriate land and resources (Pokorny, 2013). Nearly 50 million hectares of foreign investments into large-scale land acquisitions in developing countries have been documented so far (Land Matrix, 2016). Concurrently, the delivery of timber concessions

is making large forest areas available to non-local actors (Pokorny, 2015). In this process, customary rights of local people are regularly violated which results in further marginalization and displacement of poor forest dwellers (RRI, 2015; De Schutter, 2011).

Several studies have shown that improved accessibility of remote forest areas promotes over-use and conversion of forests into agricultural land uses (e.g. Laurance et al., 2014) which are seldom sufficiently adapted to the specific local conditions. They often rely on the continuous application of fertilisers and pesticides or show gradually declining productivities. As a result, massive degradation of soils is frequent (MEA, 2005; Kissinger et al., 2012; Weigelt et al., 2014). Many smallholders continue residing in or migrate into such environmentally fragile landscapes in search for land (Barbier, 2012). This highly dynamic situation latently threatens the few successfully established long-term farm and forest management schemes, including well-managed forest concessions and forest conservation areas.

4.3.2 Future Trends

Land use dynamics are affected by a still growing population and improved levels of economic well-being among large parts of particularly urban populations, especially in the so-called BRIICS countries[1], as well as in most economically less developed countries including those in Africa (UNDP, 2015). Typically, population growth and improved well-being induce a significantly growing demand for food, mineral resources, energy for transport, electricity and heating (UNDP, 2015). Particularly, the anticipated two- to three-fold increase in demand for both food products and biofuels by 2050 (OECD/FAO, 2011) is expected to result in a further expansion and intensification of agro-industrial production (FAO, 2009), much of which through encroachment in forest areas. It is estimated that at least 25 million kilometres of new roads will be built by 2050, many of them to improve the access to rural production areas (Laurance et al., 2014). To satisfy a nearly 50 percent increase in worldwide energy demand by 2040 while achieving the reduction in fossil fuel consumption agreed in Paris, governments will likely invest in the construction of large-scale hydro-energy dams (IEO, 2016). Equally, many new mining areas will likely be established or enlarged in pristine forest areas, regardless of any pre-existing legal protection status (Rademaekers et al., 2010). In parallel, rising prices will stimulate small-scale, informal mining operations (Swenson et al., 2011; Schueler et al., 2011).

Globalization of value chains and trade will further intensify due to innovations in communication technologies and transport logistics, as well as the international processes for trade liberalization (Love and Lattimore, 2009). Improvements and standardization of technologies for the production of global commodities will allow for higher productivity (Rademaekers et al., 2010; Pacheco and Poccard-Chapuis, 2012) and profit margins (Boucher et al., 2011; Rudel et al., 2009). Pushed by cost-sensitive consumers in economically-developed regions and urban centres, capitalized actors will most likely use their increasing control over resources and markets to enforce highly productive technology packages for the production of a limited number of standardized goods (FAO, 2016a). This will further discriminate against small-scale producers of agricultural and forest products.

Also, the demand for forest products is expected to increase, primarily for pulp and timber (Rademaekers et al., 2010) while consumption of fuelwood may stabilize as a result of economic development and the related switch to other energy sources (Klenk et al., 2012). However, the demand for charcoal is likely to increase because of the growing number of urban inhabitants. Consequently, the pressure on shrinking natural forest areas is likely to increase in the near future (Lapola et al., 2010) even though an increasingly larger share of forest goods will be produced in intensively-managed tree plantations (FAO, 2016a).

Population growth and economic development fuelled by global commodities trade, accelerating infrastructure development and urbanization in combination with an ongoing degradation of resources and an increasing welfare gap between rural and urban areas, will further aggravate the problem of illegal and destructive uses of continuously shrinking forest areas. Climate change will exacerbate these problems by causing shifts in land uses in response to ecosystem change (HLPE, 2012). In combination with an increasing number of economic and political crises (IFAD, 2010), this is likely to mobilize millions of rural families who will leave their land in search of new economic opportunities (Burrows and Kinney, 2016). It will also create new spaces for actions falling outside the law. As evidenced in many regions such as the Central African Republic, Liberia and Myanmar, crises and conflict are potent drivers of illegal and destructive forest use, with timber proceeds being used to pay for weapons or to fund other illicit activity (see also Chapter 5).

4.4 Forest Governance

The above section demonstrated that resource users have a propensity to opt for destructive, often illegal, forest uses to satisfy their demands. At the same time however, humans have always invested in protecting their natural resources against overuse and destruction. Such attempts have been most successful where the users of the ecosystem goods and services had the possibility to negotiate and establish collective governance mechanisms within an area little affected by non-local actors (Coase, 1960; Ostrom, 1998). There are also manifold examples of effective nature protection organized hierarchically,

[1] BRIICS is a grouping acronym that refers to the countries of Brazil, Russia, India, Indonesia, China and South Africa, which are all deemed to be at a similar stage of newly advanced economic development.

however, often at high social costs (Cole and Grossmann, 2002). However, in an increasingly globalized and dynamic world, the challenge for effective forest governance is becoming more and more complex. In this situation, the international community, multilateral, regional and bilateral processes, national and local governments, as well as a wide range of civil society organizations have massively invested in forest governance to soften the above outlined scenario (see also Chapter 7). But, despite some impressive achievements (Elias, 2012; Hoare, 2015), the problem of illegal and destructive forest use still persists in many parts of the world, a fact attributed to a phenomenon commonly called "weak" governance. This section summarizes the reasons listed for this phenomenon, and highlights some more structural problems of contemporary forest governance efforts.

4.4.1 Forest Governance Initiatives

Conditions for effective forest governance have significantly improved in recent years thanks to the global connection of people and initiatives through rapidly improving technologies, in combination with national governments that are more and more integrated into binding political and economic international processes (Huwart and Verdier, 2013). Already in the late 1980s and early 1990s, with the support of the international community, progressive forest management regulations were enacted by the governments of many timber producing countries. Implementing organizations and mechanisms were established at all levels from environmental and forest ministries down to local governmental agencies that defined technical guidelines and bureaucracies to manage and control forest management and conservation activities (Lawson and MacFaul, 2010). There have been significant investments in equipment, technologies, and training and capacity building (Hoare, 2015). Decentralization was pushed forward to achieve more transparency and accountability as a basis for effective cooperation with forest users. At the same time, universities and international and national research organizations received funds for forest-related scientific research and teaching (Jagger et al., 2010; Lambin and Meyfroidt, 2011). International initiatives to fight illegal timber trade were set up (see Chapter 7). Efforts also included cross-sectoral commitments, most importantly regarding human rights, although, insufficiently taken up in many countries (León Moreta, 2015; IASS, in press). More recently in the context of actions to reduce and mitigate climate change, multi-stakeholder initiatives such as round tables on soy and palm oil emerged (Paoli et al., 2010), although again with mixed results in terms of indigenous peoples' rights and forests (Colchester, 2016). The lively discussion about environmental and social safeguards also relates to these processes (World Bank, 2010).

Many timber producing countries in the tropics invested in the clarification of land tenure to reduce land conflicts, to enhance interest of resource users in legal and more sustainable management schemes, and to facilitate the control of forest activities. Herein, security of tenure was often given more importance than the issuing of private property rights (Robinson et al., 2011). This process was accompanied by the elaboration of National Forest Plans with an active involvement of relevant stakeholder groups (FAO, 2016b). In the course of these initiatives, forest areas and their functions were defined, including the demarcation of forest concessions offered to companies with the interest and capacity to implement the principles of sustainable forest management. Other forest areas received protection status, in some cases accompanied by the delivery of collective rights to the indigenous and traditional communities living there, with legal use defined by authorized management plans (Pokorny et al., 2013; Pokorny, 2015; IASS, in press).

Finally, initiatives included a bundle of economic instruments to stimulate land users' interest in sustainable forest management as an alternative to illegal and destructive forest uses. Instruments included tax reductions and the payment of subsidies, in addition to the training and capacity building of timber companies as well as forest communities (i.e. FAO, 2016c). These classic governmental instruments were accompanied by global initiatives for certification (FAO, 2016d), the setting up of carbon markets (Engel et al., 2008) and performance-based payments for climate mitigation under the framework of REDD+ (Brockhaus et al., 2016).

4.4.2 Reasons for Limited Success

Corruption

Corruption is a complex, dynamic and multi-faceted phenomenon. There is no unique definition of corruption agreed in the literature because different disciplines bring different perspectives to the issue (Mungiu-Pippidi, 2015). It generally refers to the abuse of entrusted power and the misuse of resources or power for private gain (DFID, 2015), a definition that has been popularized by the work of Transparency International. Corruption is also categorised on the basis of the type, actors involved and the sums exchanged (e.g. political corruption involving politicians, bureaucratic corruption involving government administrators etc.). When large sums of money are involved, it is called "grand corruption" (and may involve corruption of the political process or of bureaucratic processes). In contrast, "petty corruption" involves the exchange of small amounts and normally takes place in the implementation and enforcement of laws and regulations by mid- to low-level government employees, for example, payments made to forestry personnel or the police to enable illegally-logged timber to be transported (Cerutti et al., 2013).

Corruption may occur if an authority is unable to effectively monitor the providers of a public service, but can also be understood as a collective problem particularly in contexts that show low levels of social and political trust, and deficient mechanisms for institutional and societal accountability (DFID, 2015). Paradoxically, corruption may also be fostered by an excess of complex, and possibly contradicting, formal and informal rules and regulations (Blundo and Olivier de Sardan, 2006)

Box used for reporting corruption notices and cases. Nairobi, Kenya. Photo © Andre Purret

typical for (neo-)patrimonial systems grounded in patron–client relationships or in kinship, ethnicity or religion (DFID, 2015).

Foreign corporations may reinforce corruption patterns through the bribing of officials for contracts, promoting tax avoidance and evasion (Kolstad et al., 2008). This happens especially in countries rich in natural resources where the state has the possibility to generate revenues by selling the rights on these resources to, often international, companies without consulting the affected stakeholders (DFID, 2015). Here politicians run vast patronage networks where the delivery of public services is perceived as a favour rather than a right (Unsworth, 2010).

Aid and specific donor practices may also have these effects (Schultz and Søreide, 2006). It is also debated that donor support to corrupt (and often authoritarian) states has helped sustain and recreate corruption and entrench their power even further (DFID, 2015). It is, however, not always easy to define the boundaries between corrupt practices and other behaviour or actions because corruption may result from non-corrupt interactive networks within a social landscape that relies on social ties and the moral imperative to help one's kin (Olivier de Sardan,1999). In this sense, investments in personal relationships with public officials can be an insurance strategy to provide for possible future needs (Blundo and Olivier de Sardan, 2006).

Deficient regulations and inefficient law enforcement

Literature on illegal logging points to inefficient detection, policing and enforcement of forest activity due to weaknesses of the instruments set up and ineffectiveness of forest agencies, notably because of corruption (Lawson and MacFaul, 2010). Furthermore, the technical regulations and methods guiding the implementation of the usually well-defined regulatory forest frameworks are often insufficiently elaborated, and the bureaucracies are complex and slow. In many countries, forest agencies suffer from a notorious lack of financial and human resources to comply with their complex tasks (Lawson and MacFaul, 2010; UNODC, 2015). Institutional as well as global information and communication systems about forests and timber markets are insufficiently developed. Deficient timber and chain of custody tracking instruments seriously affect the transparency of markets. Another issue is the low levels of prosecution, partly grounded in the problem of corruption. Poor forest owners often do not have a realistic chance to seek justice when their rights are violated. Even persons and companies caught for environmental crimes or illegal trade are rarely prosecuted. In many countries, it is common practice to only indict a small number of high profile cases, while a much larger number of smaller offences go unnoticed. Often, criminal justice systems fail to view illicit timber trade as an organised crime (UNODC, 2015). The low fines and minimal criminal sanctions for offenders make taking the risk to commit a crime more worthwhile (see Chapter 5). Independent from this, the effect of penalties and intensified law enforcement is generally overestimated because informal and illegal forest users systematically underestimate the probability of getting caught (see Section 4.4.1). Also at the government level, the lack of enforcement may provide additional incentives for officials to allow forest conversion (UNEP, 2016; U4, 2011; Downs, 2013).

The effectiveness of established forest governance instruments is further reduced due to incoherent and ambiguous legislation. Environmental laws may stand in sharp contrast to other sector regulations and practices and often play only a marginal role (Lawson and MacFaul, 2010). In fact, most countries emphasise economic and financial policies for the development of agriculture, industries and infrastructure (Chandra et al., 2009). This is true for economically poorer countries where the environmental sector is financed to a large degree by overseas aid (Pokorny, 2015) as well as for economically well-developed countries (OECD, 2016), although in the latter the application of environmental regulations is stricter, at least regarding the national forest areas.

Efforts to clarify land tenure, the demarcation of areas for the management and conservation of forests, and the subsequent attribution of rights and responsibilities, are making only slow progress due to the complexity of the problem, inadequate information systems, insufficient financial and human resources and the influence of strong lobbies trying to impose their particular interests (RRI, 2015). Often, too little attention is given to identify and respect customary rights to land and resources (see section on misguided foci).

Limited financial incentives for legal forest uses

Economic instruments such as certification, payments for climate mitigation, subsidies and tax reliefs, have resulted in some successes. Certification, as one of the most successful market-based examples globally, has managed to create a consolidated market niche for timber from

Box 4.3

Effects of increased forest regulations on the informal forest sector

The informal timber sector carried out by smallholders in small-scale operations with artisanal means and serving local or domestic timber markets (Bayol et al., 2013) has an enormous economic and social importance for many sub-Saharan tropical timber producing countries from Liberia in West Africa to the DRC in the Congo Basin (IIED et al., 2016; Cerutti et al., 2014). In fact, in most countries such local markets are much more important than the export markets (Wit et al., 2010; Putzel et al., 2015; Cerutti et al. 2014). Yet, a growing interest in the monitoring and verification of legality has put a lot of pressure on this informal network. New forest regulations primarily developed for the large-scale export-orientated forest sector are incompatible with the realities and capacities of traditional forest users. Hence, the new regulations leave little or no room for smallholders and artisanal loggers to justify any of their operations. Forest codes essentially contain only one or two legal options accessible to artisanal loggers, and since the 1990s, they have almost all been suspended or considered illegal (see Chapter 2 for details). Yet, local artisanal loggers have to keep harvesting timber to fill the growing local demand. This criminalization, as with many other informal value chains (Putzel et al., 2015), makes them vulnerable to corrupt state officials (Cerutti et al,. 2013), threatens their livelihoods and fosters conflicts in rural areas. Frequently, the same resources are attributed to larger-scale loggers with the political connections and financial means

well-managed sources. However, price incentives are insufficient for significant further expansion (Meijaard et al., 2011) notably because the parallel international effort to promote legal trade may negatively affect the interest in certification of producers and consumers. Furthermore, for smaller enterprises and, more so, for poor forest communities, transaction costs are too high (Medina and Pokorny, 2014).

This also holds true regarding the emerging massive voluntary carbon markets. Also here, the technical and bureaucratic requirements needed to document and report carbon values regularly exceed the capacity of local forest users. Additionally, the payments themselves may be too low to compensate for lost economic opportunities. For example, net present value of oil palm plantations ranges between USD 6,000 and USD 9,000 per hectare while carbon credits for standing forests range between only USD 614 and 994 per hectare (Pacheco et al.. 2012; Fisher et al., 2011). Attempts to scale up locally successful payment schemes for other forest services such as the provision of clean water and clean air, have been even less attractive, so far (Pearce et al., 2001).

Misguided Foci

Many of the efforts for improved forest governance also suffer from systemic problems caused by questionable assumptions and insufficient consideration of reality. Some governance measures instead of contributing to the legal and sustainable management and conservation of forests may even accelerate illegal and destructive forest uses.

Overregulation

Efforts to regulate the forest sector themselves may create perverse incentives. Technical guidelines, legal requirements and bureaucratic processes imply costs and uncertainties for forest managers. Thus, instead of generating the benefits needed to convince forest managers to switch from illegal and destructive to legal and sustainable forest regimes, in practice, regulations often have the opposite effect. For the vast majority of local forest managers, it is literally impossible to comply with the newly established regulations that are beyond their capacities and realities (Pokorny, 2013). De facto, forest regulations exclude most local forest managers from the possibility to legally use their forests without massive external support by NGOs, or, often unfavourable, arrangements with timber companies (Pokorny, 2013). Forest regulations further accentuate the appeal of the much less-regulated agricultural sector over the forestry sector. This problem is reflected by the fact that in many countries prices for deforested land are higher than those for forest lands (Pokorny and Pacheco, 2014). In other cases, people intentionally destroy their forests or hinder natural regeneration to avoid legal constraints to future land uses (Adler, 2007).

Ignorance of customary forest users' potential

One of the main shortcomings of contemporary efforts to improve forest governance is its, often implicit, preference for larger timber companies and export markets. The potential interest by customary forest users, local value chains or informal markets to use resources wisely is widely ignored or even opposed (Lawson and MacFaul, 2010) although recent research clearly indicates that the economic and social importance of the informal forest sector in most countries exceeds by far the magnitude of the formal sector (IIED et al., 2016; Cerutti et al., 2014). The informal sector may include customary forest uses for subsistence and the commercialization in local, regional and national markets, as well as the involvement of local forest managers as providers of logs for international value chains. Ignorance of this potential is not only visible in the incompatibility of forest regulations with the reality of local forest users, but also through the lack of willingness to recognize customary rights to land and resources (HLPE, 2011). In the extreme, countries may not even provide the possibility for local communities to legally use forests. In fact, newly set up forest regulations have shifted the vast majority of local forest managers from informality into illegality (see Box 4.3).

Notorious short-term focus on economic growth from an urban perspective

Despite serious efforts and a societal desire to protect forests and to fight illegal logging, many actor groups

in producer and consumer countries are motivated by other priorities. Many entrepreneurs, companies and consumers but also poor forest dwellers are more interested in profits, affordable prices, good quality, the generation of urgently required income and, in the case of people living in remotely located forest regions, better access to consumption markets and public services (IFAD, 2010). Moreover, policymakers tend to follow their individual interests and thus favour economic over environmental aspects in their calculations (Beniers and Dur, 2007); they frequently ignore the long-term economic costs of soil erosion, water quality and quantity impacts or greenhouse gas emissions when setting policies. Governmental decisions in favour of mining and energy installations and the construction of roads into protected forest areas, the establishment of settlements in inadequate forest settings, and the attraction of agro-industrial investors (Pokorny, 2015), often accelerated by corruption, reflect this lack of concern. Consequently, an existing collective interest in environmental protection is overruled by the cumulative sum of individual interests, or, in more general terms, by the wish for short term economic gain and development. A broad phalanx of actors interested in individual benefits creates an unfavourable context for good forest governance and may, at least partly, explain why contemporary measures are so hesitant to tackle the "real" reasons for illegal and destructive forest use, including road construction into forest areas, the expansion of commercial agriculture, an inequitable global economy, power imbalances, aspirations for consumption and unregulated financial markets (Kissinger et al., 2012). Current efforts for improved forest governance also suffer from unrealistic expectations regarding the possibility to control and repair the environmental damages caused by exploitation of nature. Discourses still uphold the idea that effective control, technical innovations and professional management can make the exploitation of forests and other natural resources compatible with the lifestyle and societal systems of modern mass consumption societies (Weizsäcker et al., 2009) despite evidence to the contrary (MEA, 2005). In parallel, there is an assumption that the internalization of environmental costs in the decisions of economic and political elites is possible, although research suggests not (Beder, 2011).

4.5 Conclusions

Illegal and destructive forest use is driven by several mutually reinforcing factors. People make decisions to maximize individual benefits and insufficiently consider externalities and the related costs sustained by all. Thus, capital-endowed actors as well as poor forest dwellers may drive illegal and destructive forest uses, albeit for different reasons. Poor resource users favour land uses that immediately generate urgently-needed income and tend to inadequately manage or overuse accessible resources due to a lack of assets and alternatives; capital-endowed actors enforce the most profitable land uses to satisfy excessive profit expectations at lowest risk; and consumers are especially interested in low prices and the quality of the product. Sustainable management of forests on a legal basis does not respond to the needs, interests and capacities of most resource users, be it due to low profit margins, major technical and bureaucratic requirements, or the risk related to long-term investments. From an economic perspective, only resource users strongly committed to the resource and with low profit expectations may feel sufficiently attracted by such an option. These may include some conservative indigenous and traditional communities, as well as corporate actors interested in improving their market position by capitalizing on a growing group of consumers demanding green products (Pokorny and Pacheco, 2014).

Decisions of resource users are embedded in a broader societal context characterized by a strongly unequal distribution of power and wealth that allows economic elites and better-off societies to enforce their interests at a global scale. Within this context, illegal and destructive forest uses are often more practicable and attractive than those that are legal and sustainable. This already problematic situation is expected to worsen due to a massive increase in demand combined with improved technologies for the agro-industrial production of commodities, and funded by profit-seeking banks, insurance companies, multinationals, entrepreneurs and private households. Particularly remote forest regions may be a target for these investments.

These contexts and trends that favour illegal and destructive forest uses are difficult to change. In an attempt to improve this scenario, the international community, multilateral, regional and bilateral processes, national and local governments, as well as civil society organizations have invested massively in forest governance. While impressive achievements are reported, a number of shortcomings place limits on the success of these initiatives, namely: the problem of corruption, deficiencies in the design and performance of regulations and enforcement institutions, as well as the existence of some strategic errors. The emphasis on larger timber companies and export markets given by governance measures, and the insufficient consideration of the potential and needs of customary forest dwellers active in informal market networks are particularly critical.

Despite the existence of many examples from both developed and developing countries of governance approaches that have succeeded in shifting old patterns of illegal and destructive logging to legal and sustainable forest use, it remains open to what degree such schemes can effectively influence the overwhelming adverse global momentum fuelled by economic and demographic development on the one hand, and economic, political and environmental crises on the other.

In such a situation, short term efforts may have to concentrate on controlling capitalized profit-seeking actors because of their high impact and the likelihood of influencing them. In parallel, it makes sense to support customary forest users and actors with interests that are realistically achievable through legal management of

forests. Research needs to invest in the identification and promotion of such opportunities.

To achieve broader success in the fight against illegal and destructive forest use, however, requires a better understanding of the carrying capacity of our world, the nature of economic actors, and responsibility in this complex setting. Honesty and awareness is a fundamental prerequisite for effective action (Kollmuss and Nagyeman, 2002). This would provide the basis for a profound transformation from a mass-consumption society towards one that prioritizes environmental and social goals over material well-being: a noble task for academia.

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Chapter 5
Organized Forest Crime: A Criminological Analysis with Suggestions from Timber Forensics

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5.1 Introduction: Illegal Timber as a Global Crime Question

It was only during the first decade of this century that illegal timber was recognised as a transnational crime problem by international law enforcement organizations and academic criminologists. In 2008 the World Bank asked INTERPOL to look at illegal logging from the perspective of international criminal justice. This led to INTERPOL's first project on illegal logging, the *Chainsaw Project*. The report states that:

"(…) due to a lack of resources, INTERPOL's potential to contribute to efforts combating illegal logging has not yet been fully exploited. Environmental crime and illegal logging specifically, has largely not been recognised by member countries and accordingly is not given high priority. Countries and international bodies must clearly express a will, and provide resources, before this situation is likely to change" (INTERPOL and World Bank 2010: 46).

Since 1992, INTERPOL has an "Environmental Crime Committee", a global network of experts advising and assisting it in the identification of environmental crime trends. In 2009, INTERPOL brought its activities on environmental crime together in the "Environmental Crime Programme". Initially, there were two people working in this programme, reflecting the low law enforcement priority of environmental crime within the only global law enforcement body.

In the context of growing attention to climate change, wildlife trafficking and environmental crime in general, INTERPOL received donations from countries and NGOs which allowed the expansion of its Environmental Crime Programme, such as through the International Consortium on Combating Wildlife Crime (ICCWC). In 2012, with funding from Norway, the Project LEAF (Law Enforcement Assistance for Forests) started with the aim to combat illegal logging and organized forest crime (Stewart, 2014). In September 2012, after months of investigation in Latin America, North America and Europe, Project LEAF led to INTERPOL's first international operation against illegal logging across twelve Latin American countries. It resulted in the seizure of more than 50,000 cubic metres of illegally logged timber (Humphreys, 2016).

In 2013, INTERPOL's Environmental Crime Programme was renamed "Environmental Security Sub-Directorate". It reflected INTERPOL's higher priority given to environmental crime, and showed that environmental crimes are also considered as a security issue. By 2015, INTERPOL's Environmental Crime Programme had grown to almost forty people.

More funding also allowed for more research and knowledge. In 2012, UNEP and INTERPOL published a "Rapid Response Assessment" on illegal logging, tax fraud and the laundering of the world's tropical forests: *Green Carbon, Black Trade*. It estimated the value of the worldwide, annual illegal timber business at between USD 30 and 100 billion, representing between 10 and 30 percent of global timber trade (Nellemann and INTERPOL Environmental Crime Programme, 2012). The range of the estimate reflects the poor state of knowledge.

Also in 2012, the World Bank published a well-documented study on illegal logging, including many suggestions for using the criminal justice system more effectively in order to prevent and combat illegal logging and forest crime. The authors correctly note that when the criminal justice system is discussed, the focus is generally on its failures, rather than its potential to help reduce and deter illegal logging (Goncalves et al., 2012). The study shows that the legal infrastructure already exists for taking a more punitive approach towards illegal logging and criminal timber networks.

In 2015, UNEP and INTERPOL published a second rapid response assessment on environmental crime: it signalled, that while in some tropical countries an estimated 50-90 percent of the timber is from illegal sources, "most illegally sourced and traded wood is either not considered or recognised as contraband by customs, or falsely declared as legally sourced and traded" (Nellemann et al., 2015: 61). In 2016, a third UNEP- INTERPOL Rapid Response Assessment was published, *The Rise of Environmental Crime* which identified environmental crime as the fourth largest criminal enterprise, after drugs smuggling, counterfeiting, and human trafficking (Nellemann et al., 2016). Of the eight identified categories of environmental crime, forestry crime was estimated to account for the largest illegal turnover, with the largest annual losses in revenues for governments estimated at between USD 9–26 billion per year (Nellemann et al., 2016).

All of the sources referred to so far, mention criminal involvements in logging and timber businesses. In the *Chainsaw Project* (INTERPOL and World Bank, 2010) it is suggested that illegal logging could be considered as a form of organised transnational crime, as defined by the UN Convention against Transnational Organized Crime (UNTOC). *Green Carbon, Black Trade* mentions that criminal elements, groups, gangs and cartels are involved in illegal timber extraction and trade (Nellemann and INTERPOL Environmental Crime Programme, 2012). UNEP- INTERPOL's 2015 report describes some of the recent (international) law enforcement successes against illegal timber in countries in different tropical regions: South and Central America, West, East and Southern Africa, and South East Asia (Nellemann et al., 2015; see also Humphreys, 2016). UNEP- INTERPOL's 2016 report, *The Rise of Environmental Crime,* refers to "large-scale corporate crimes concerning timber, paper and pulp involving large-scale deforestation" (Nellemann et al., 2016: 15).

Investigations from NGOs also identify criminal networks in the timber business. Particularly investigative NGOs such as the Environmental Investigation Agency (EIA), Global Witness and Greenpeace, published detailed reports about illegal logging and illegal timber. They revealed some of the timber traders and illegal timber networks and described the open or sometimes sophisticated ways in which illegal timber is traded (see e.g. EIA and Telapak, 2004; 2005; 2006; EIA, 2008; Global

Witness, 2002; 2012; Greenpeace, 2003; 2015; Khatchadourian, 2008).

Criminological publications on illegal timber only exist since a decade or so (Boekhout van Solinge, 2004; Green et al., 2007; Schloenhardt, 2008; Graycar and Felson, 2010) with work on illegal and otherwise harmful dimensions of illegal logging and deforestation in equatorial rainforests (Boekhout van Solinge, 2004; 2008a-c; 2010a-b) and on the existence of violence and corruption related to deforestation (Boekhout van Solinge, 2014b; 2016a-b). Evidence based on field research in Borneo and the Amazon, enabled a growing understanding of the networks involved in logging and deforestation as organized crime, or as criminogenic and violent business subcultures, such as when loggers and large landholders collude in orchestrating violence against people resisting illegal logging and deforestation (Boekhout van Solinge, 2014a-b). Other research explored the legal-illegal interfaces in tropical timber flows and described the social organization of timber flows as being on the edge between legality and illegality (Bisschop, 2012; 2013; 2015). Graycar and Felson (2010) applied the criminological concept of situational crime prevention to illegal timber.

This chapter addresses the question of illegal timber from the perspective of criminology, the academic science of crime. Criminology is a so-called 'domain science' rather than an academic discipline, with practitioners from a variety of disciplines, such as psychology, law and the social sciences. Criminology can be simply defined as the study of crime, but a more common definition among criminologists is that it considers crime as a social phenomenon. According to a much used definition by the famous criminologist Edwin Sutherland (1883-1950), it includes the process of making law, of breaking laws and the social reaction towards the breaking of laws (Sutherland et al., 1992).

As noted in earlier chapters, this report distinguishes three different types of illegal logging: (1) informal logging, (2) illegal logging resulting from forest conversion and (3) other illegal forest activities, in particular criminal logging: large-scale illegal extraction, often selectively of a few valuable timber species, and operated by criminal networks. This chapter focuses solely on criminal logging, logging that is related to other crimes, and in which (organized) crime networks are involved. The term "organized forest crime" therefore seems appropriate (see Stewart, 2014). As will be shown, organized forms of forest crime can be found in illegal logging resulting from both forest conversion and other illegal logging activities.

Presenting a criminological perspective on illegal timber means in the first place that the actors and networks that are involved in the criminal types of logging will be analysed and typified, using criminological concepts as well as some theory. A criminological analysis also means that some mechanisms of illegal (timber) business will be discussed, such as the role of legal and illegal crime facilitators. A final aim of this chapter is to bring some criminological knowledge to the forest sector by giving some suggestions from the fields of criminology and timber forensics for improving detection and prevention of illegal timber.

While illegal timber is the main focus, for completeness it is necessary to differentiate between illegal timber (which was logged or traded illegally) and conflict timber (where the timber proceeds are used for funding armed conflicts). Conflict timber is not necessarily illegal, as the example of Liberia showed in the late 1990s and first years of this century (see Box 5.1). A main difference between illegal timber and conflict timber is the motivation. While involvement in illegal timber is generally motivated by economic objectives, the involvement in conflict timber is usually, at least by some of the (central) actors, motivated by political, ideological or religious objectives, such as in the case of the Taliban (See Box 5.1 on conflict timber).

5.2 A Criminological Analysis of Criminal Timber Actors and Networks

This section considers some of the actors and criminal networks involved in illegal timber and how these actors and criminal networks can be characterised or typified in criminological terms.

In the *Oxford Handbook of Organized Crime*, Boekhout van Solinge (2014a) discussed case-studies of illegal exploitation of natural resources, notably timber, in a number of tropical countries, particularly the large and biodiverse equatorial rainforests of Brazil, the DRC and Indonesia. In all these cases, illegal timber exploitation was closely related to other illegal activities (Boekhout van Solinge, 2014a).

In West and Central Africa, especially during the armed conflicts in the DRC, Liberia and Sierra Leone, proceeds from the sale of timber and several other natural resources such as gold, diamonds and coltan were used to buy weaponry. A large variety of players was involved: state actors, businessmen, illegal entrepreneurs, military and rebels. More than anywhere else, natural resource exploitation in Africa has been connected to armed conflicts. This is probably best exemplified in the DRC, where the war officially ended in 2003 but still continues in some eastern parts of the country. This ongoing conflict is largely driven by exploitation of natural resources, in which states and corporations are involved. During the war, illegally-logged timber from the DRC was exported to the US, and European and Asian countries via Burundi, Rwanda and Tanzania (UNSC, 2000). However, as compared to tropical America and tropical Asia, criminal networks with a primary focus on timber seem to be less common in Africa. This may be because Africa has other, more lucrative natural resources available (notably, gold, coltan and diamonds) which are also easier to exploit and transport than timber.

In Indonesia, investigations by EIA and Telapak (2004; 2005; 2006) revealed the involvement of economic, political and military elites, as well as corrupt officials from the forestry sector and judiciary, Malaysian businessmen, brokers and banks and international logging companies. Tsing (2005) analysed how economic liberalization

These illegal logs were seized, while in transit, and impounded at district police offices, Riau, Sumatra, Indonesia.
Photo © Sofi Mardiah for CIFOR

blurred the lines between public, private and criminal exploitation and noted that the "slippage back and forth between military and private enterprise" and the "fluidity between public and private," made it difficult to distinguish between domestic, foreign, and government ownership, while the military had the advantage of having "the muscle to make the best deals" (Tsing, 2005: 34-37). This created an "authoritarian lawlessness that made resources free for those who could take them" and "violence became key to ownership" (Tsing, 2005: 34-37, 67-68). Over the last years however, significant improvements have been made in Indonesia, which has clamped down on corruption and financial crime (Hoare, 2015; Dermawan and Sinaga, 2015). People from higher ranks have also been targeted, such as a timber smuggler who was convicted to eight years' imprisonment, with evidence showing that USD 127 million had passed through his account (Nellemann et al., 2105).

In the Brazilian Amazon, violent criminal timber networks – often described locally and in the media as "timber mafia"- have been active for years. Timber traders are involved and corruption is prevalent (Boekhout van Solinge, 2014b). Recent ethnographic and anecdotal evidence in Para state suggests that ipê (ironwood) is currently targeted by (corporate-)criminal loggers, because of high demand for it in Europe. While some of these networks solely focus on timber, collusion with large landholders is also common. Although most deforestation in the (Brazilian) Amazon has been caused by (illegal) expansions of cattle and later also soy farming, this land grabbing with false paper work (*grilagem*) is usually combined with, or preceded, by illegal logging. Both illegal logging and land grabbing in the Brazilian Amazon are particularly violent. It is not uncommon for loggers or large landholders - or acting in collusion - to use gunmen to threaten or kill opposition from local residents (Brooks, 2011; CPT, 2015; Boekhout van Solinge, 2010a; 2016a; Monbiot, 1991). Between 2002 and 2013, Global Witness identified that almost half of all the murders of environmental and land defenders around the world occurred in Brazil - particularly in the states with most deforestation: Para and Mato Grosso (Global Witness, 2014).

In terms of victimization, the regions with the highest prevalence and incidence of violence against forest residents and other environmental protectors (civilians or staff of NGOs or CSOs) have been identified in the Brazilian Amazon (Global Witness 2014; 2016), while the region that stands out as having the highest victims among law enforcers and rangers is the DRC, particularly where rangers protect forests and wildlife against illegal logging for charcoal (Jenkins, 2008; Boekhout van Solinge, 2008b; Nellemann and INTERPOL Environmental Crime Programme, 2012: 29; Nellemann et al., 2015).

This quick overview shows that very different types of actors are involved in illegal timber activities, with overlaps and collusions between legal and illegal entrepreneurs, corporations, traditional criminals such as gunmen, as well as state actors, governmental agencies and countries' elites (see e.g. Boekhout van Solinge, 2008a-c; 2014a; Straumann, 2014). Is it possible to typify, in criminological terms, some of these criminal networks, and is it justifiable to consider some of them as organized crime?

In some cases, such as in the DRC, where there was involvement of states, illegal timber exploitation and trade can be considered as "State crimes" as defined by Green and Ward (2004): state organizational deviance involving the violation of human rights. Practical examples can also be found of the broader concept of "governmental crimes": crimes committed in a governmental context by individuals or organizations for economic or political gain (Friedrichs 2004). Examples of "corporate crime" - which refers to illegal offences committed by employees or corporations to promote corporate interests (Clinard and Quinney 1973; Clinard and Yeager, 1980; Friedrichs, 2004) - can also be identified. Depending on the type of actors dominating timber schemes, criminological hybrid concepts also seem to apply to the timber business, such as "state-corporate crime" (Michalowski and Kramer, 2006; Zaitch et al., 2014) or "state-organized crime" (Chambliss, 1989).

Ruggiero (1996) stressed that the difference between corporate crime and organized crime is actually difficult to make. Criminologist Alan Block emphasized that "organized crime is a social system and a social world. The system is composed of relationships binding professional criminals, politicians, law enforcers, and various entrepreneurs" (Block, 1983: vii). Block's definition of organized crime is useful and applicable to some criminal timber networks as we understand them from the various studies and reports that were referred to in the Introduction of this chapter.

The United Nations Convention against Transnational Organized Crime (UNTOC) of 2000, the only international convention that deals with organized crime, does not contain a precise definition of "transnational organized crime." It does contain however a definition

Box 5.1

Conflict timber

Conflict timber refers to timber trade that is related to armed conflicts, the most direct way being that the proceeds of timber sales are used to buy weaponry. Conflict timber is not necessarily illegal. The term conflict timber was first coined in 2001 by a UN panel of experts investigating the illegal exploitation of natural resources in the Democratic Republic of the Congo (DRC). A 2002 Global Witness report, *The Logs of War*, which described cases in Cameroon, DRC, Liberia, Myanmar and Zimbabwe, was also instrumental in raising awareness. In more recent years, the eastern part of the DRC has remained under close observation for cross-border trade of natural resources, especially given the presence of the UN Stabilization Mission MONUSCO (United Nations Organization Stabilization Mission in the DRC) and various attempts made at pacifying and stabilising the area. While evidence of harvesting and production of timber and charcoal indeed exists, as well as of the cross-border trade with neighbouring countries such as Uganda or Rwanda (Lescuyer et al., 2014), only scattered evidence exists of the financial mechanisms behind such trade. Yet, according to informal discussions held with MONUSCO officials in the area, it is believed that organized crime and armed groups remain the major culprits managing (and deriving profits from) this trade (see also Nellemann et al., 2015).

In 2002, during the UN summit on Biological Diversity in The Hague, environmental activists chained themselves to a ship transporting timber from Liberia's largest logging company, owned by a Dutch multimillionaire timber entrepreneur. They claimed the timber was connected to arms' trafficking. The timber itself however was legal, as the then President of Liberia, Charles Taylor, had liberalised Liberia's logging laws. The timber proceeds allowed Taylor to stay in power. When the UN Security Council introduced timber sanctions against Liberia in July 2003, Taylor resigned a month later (Boekhout van Solinge, 2008b). In recent years, Liberia's forest sector has made much progress, with the country signing in 2011 a Voluntary Partnership Agreement within the Forest Law, Enforcement and Trade (FLEGT) Action Plan of the EU.

A more recent case of allegedly conflict timber, raised in 2015 by Global Witness, concerns the Seleka's coup d'état in the Central African Republic (CAR), which occurred in March 2013 (Global Witness, 2015). CAR has also recently signed a VPA with the EU, and timber remains one of the country's major exports and sources of income for the government in power. Financial flows (taxes to the central government during the coup as well as many informal payments along roads or around logging concessions to guarantee their protection from militias) did not stop during the coup. As a consequence, Global Witness argues that such timber should be considered as conflict timber, "given the substantial payments made by the industry to the Seleka, […] where the sale of timber funded the commission of serious violations of human rights, violations of international humanitarian law or violations amounting to crimes under international law." (Global Witness, 2015: 5).

Afghanistan and Pakistan, with Taliban involvement in the timber business, are less well known cases of conflict timber. In 2007 the Taliban took control of Pakistan's Swat Valley, near Afghanistan. Logging became a resource revenue for the Taliban and in 2007 alone, more deforestation occurred than in the previous twenty years. After two years, 15 percent of Swat forests had disappeared. In some parts, 70 percent of the forest was logged (Khan, 2010). In 2009, the Pakistani army drove the Taliban out of Swat, which stopped the large-scale illegal exploitation of Swat's natural resources. Pakistan's immense floods of 2010, which made millions homeless, were severely worsened by the deforestation in Swat.

of "organized criminal group": "a group of three or more persons that was not randomly formed; existing for a period of time; acting in concert with the aim of committing at least one crime punishable by at least four years' incarceration; in order to obtain, directly or indirectly, a financial or other material benefit" (United Nations General Assembly, 2000). Transnational crimes cover not only offences committed in more than one State, but also those that take place in one State but are planned or controlled in another. Also included are crimes in one State committed by groups that operate in more than one State, and crimes committed in one State that have substantial effects in another State.

Academic criminologists often find the UNTOC definition too general; indeed many of the cases studies around illegal timber that Boekhout van Solinge (2014a) analysed seem to fit into this definition. In the scientific organized crime literature two rival notions of organized crime can be distinguished: one that understands organized crime as a set of stable organizations illegal per se or whose members systematically engage in crime, and the other that considers organized crime as a set of serious criminal activities mostly carried out for monetary gain (Paolo and VanderBeken, 2014).

In the North American literature on organized crime there is general consensus that "organized crime functions as a continuing enterprise that rationally works to make a profit through illegal activities, and that it ensures its existence through the use of threats or force and through corruption of public officials to maintain a degree of immunity from law enforcement" (Albanese, 2005: 9). The private use of violence in public places is considered important or crucial by some authors for determining whether there is question of organized crime (e.g. Blok, 1974; 2008; Fijnaut et al., 1998). Interestingly, an earlier UN definition of 1990 included these violent aspects, stating that the criminal activities of tightly or loosely organized associations "often involve offences against the person, including threats, intimidation and physical violence" (United Nations, 1990: 5).

As the famous sociologist Max Weber formulated about a century ago, monopoly on the use of legitimate violence is a key characteristic of a functioning state. When this monopoly is not in the hands of the state, it

undermines its power and it can no longer play its role as enforcer of law and order (Acemoglu and Robinson, 2013). This power vacuum left by the state opens the door for other groups as networks to take control; it is under these circumstances that organized crime can flourish. "All things considered, it appears that organized crime tends to flourish in divided, conflict-riddled communities in which government is weak and/or corrupt almost as a matter of course, and therefore becomes part of the problem rather than part of the solution" (Fijnaut, 2014: 87).

As criminal or organized crime networks are involved in forest crimes - not only in illegal logging itself, but also in logging-related crimes such as violence and corruption - the term "organized forest crime", as employed by Davyth Stewart (2014), head of INTERPOL's Environmental Crime Programme, is indeed appropriate. In this chapter, organized forest crime is defined as the illegal exploitation of forest or forest products/resources by organized criminal groups or criminal networks that ensure their activities through the use of threat or force and through corruption of public officials in order to maintain a degree of immunity from law enforcement.

5.3 Facilitators of Organized Forest Crime

Immunity from law enforcement is thus basically what organized (forest) crime is about. For the professional law breaker, this allows for the upscaling of illegal business activities: more business hours (sometimes 24/7) and larger quantities.

Criminologists are often interested in the interplay between the illegal underworld and the legal upperworld, such as through so-called "facilitators of crime". Traditionally, these facilitators mostly have a legal background, such as lawyers (Levi et al., 2005; Nelen and Lankhorst, 2008). There are also however, other kinds of facilitators, providing crucial services for groups of offenders, for example money exchangers, money launderers, document forgers, and financial and legal advisers (Kleemans, 2014). For international trafficking, facilitators are ideally found among people who work at airports or large harbours, where they can ensure that illegal cargo or people are not controlled. People in high(er)-ranked, management or central positions of the law enforcement system are also ideal facilitators because they can influence which, and how many, staff members work when and where.

In the commodity chain of criminal timber entrepreneurs, two phases seem to be crucial: the illegal harvesting of trees and giving a legal appearance to the illegally-harvested timber. In both phases, both illegal and legal facilitators of crime are needed.

5.3.1 Illegal Facilitators

During and after the illegal tree felling (as well as during transport), criminal loggers might face serious obstacles, in the form of protest from local residents, or in the form of controls by inspectors or law enforcers. During this phase violence might be used by security guards of the logging operation. This violence is usually directed against leaders of forest or riparian communities. It is also often directed against environmental activists/defenders, or against law enforcers or environmental inspectors. In some countries these "security guards" are hired violent criminals or gunmen while in other countries or regions they are military, policemen, militia or rebels.

Other illegal facilitators that were found in the illegal timber business are for example forgers of logging permits and timber certification, and hackers who can facilitate "legalising" quantities of illegal timber (Lawson and MacFaul, 2010). Once a window of opportunity has been opened to legality, large quantities can be put through the system. This is true for illegal drugs that can go through some (air)ports when certain people are (not) working, and it applies to illegal timber with a legal appearance. The amount of illegal Amazonian timber that was given a legal appearance by hackers who had broken into the digital governmental timber control system, was estimated at 500,000 cubic metres. As was described in a newspaper in the Amazonian harbour city of Santarem - regionally known as an (export) hub for illegal timber- this quantity of "legalized" timber was so large that some 14,000 trucks would have been necessary for its transport. It also reported that the regional office of the Environmental Inspection agency IBAMA had been closed by the Federal Police and that the houses of IBAMA agents had been searched (Sousa, 2014; Boekhout van Solinge, 2014b).

5.3.2 Legal Facilitators

In order to understand illegal phenomena, it is always informative to consider during which phase of the illegal commodity chain most profit can be made as it is in this phase that most investments, such as through bribery, can also be made.

Applied to illegal timber, it is probably in the shift from illegal to "legal" where most profit can be made, especially if illegal timber can be made ready for "legal" export. A crucial phase therefore for organized crime groups involved in illegal timber is to give the timber a legal appearance. People who can arrange this are the necessary intermediaries between the illegal and the legal worlds. If legal facilitators – e.g. politicians or environmental inspectors - are aware of their crucial role as facilitators, some become pro-active and require payments from timber traders (Boekhout van Solinge, 2014b).

In illegal timber, as with many other illegal businesses, middlemen are the ones make most profits, as EIA (2008) showed for illegal merbau from Indonesian Papua and Nellemann et al. (2016) for illegal rosewood from West Africa. Boekhout van Solinge (2008c) described a large timber trafficking scheme in Borneo's interior, where meranti timber that was illegally logged in an Indonesian national park was smuggled to nearby Malaysia. Malaysian businessmen were paid between 10-20 euros for one cubic metre of meranti, while on the international market it could sell for 200 euros. (see picture(s) by Tim Boekhout van Solinge).

Large-scale timber trafficking from Indonesia to Malaysia in the interior of Borneo. Meranti timber that was illegally logged in Indonesia's Betung Kerihun National Park is waiting to be trafficked to nearby Malaysia (Sarawak).
Photo © Tim Boekhout van Solinge

In some countries, timber traders are also politicians, or they have family, friends or business relations who are politicians. When these patterns are observed, there is the risk of collusion, a secret alliance between for example timber businessmen and politicians. Collusion is often accompanied by corruption, illegal behaviour by people in positions of power or authority. In some countries timber traders have gained so much wealth that they are called timber barons or timber tycoons; the best known cases being found in Indonesia and Malaysia (EIA, 2008; Straumann, 2014). A culture of corruption can develop when people in high positions are involved in large-scale timber extraction that is facilitated by corruption or collusion as this encourages rule-breaking behaviour among business people and officials in lower positions.

5.3.3 Opportunity Structures

The well-known expression "resource curse" refers to the paradox whereby countries that are rich in natural resources experience less development on average than countries without those resources (Sachs and Warner, 2001). Kolstad and Søreide (2009) identify corruption as the main reason why resource-rich countries perform relatively badly in economic terms. Countries are more likely to suffer from a resource curse when they have poor institutions, notably those responsible for governing the private sector by the rule of law, and those that hold politicians accountable for using public resources (Kolstad and Søreide, 2009). The crucial role of functioning institutions for a country's economic prosperity was described comprehensively by Acemoglu and Robinson (2013) in their book *Why Nations Fail?*

Opportunity structures are not only present on the supply side in vast forests where institutional presence may be low, but they exist actually all along the commodity chain, including in transit and destination countries. Because forest crimes - and wildlife crimes - are currently not a priority for most countries, they often remain overlooked and poorly understood (UNODC, 2012).

Criminologist Lieselot Bisschop (2015) analysed the social organization of illegal timber trade focusing particularly on the legal-illegal interfaces, the role of trade hubs like important timber importing ports, and the facilitating role of transit countries like China and Singapore. Bisschop was told by policymakers that some

Box 5.2

Illegal logging in the Russian Federation

Russian forests cover 891 million hectares, approximately half of the country's territory (Federal Statistical Service, 2015). This enormous forest resource (over 83 billion m³) represents around a quarter of the world's timber reserves (Akim et al., 2014). A significant proportion of Russia's forest resources is located in the Far Eastern region of Russia, one of the Earth's most biologically valuable ecoregions (Olson and Dinerstein, 2002), and in Siberia.

Currently, illegal logging is one of the most acute problems facing Russia's forest sector although to date, no effective method has been adopted to assess the amount of illegal logging in the Russian Federation. This is due to a number of factors including: a lack of definition of illegal logging in Russian legislation; the use of different methods for the measurement and accounting of wood; a lack of transparency in forest use; and corruption within forest control bodies. As a consequence, estimates of losses from illegal harvesting differ considerably and are unreliable. They vary from 10 percent, the estimate of the Federal Forestry Agency (2013), to around 50 percent (Office of the Prosecutor General, 2014) and 30-60 percent by the EIA (2013).

Illegal logging and timber trade are the breeding ground for corruption and organized crime. The Chairman of the Constitutional Court V. Zor'kin (2010) warned against the possibility of transformation of Russia from a criminalized to a criminal state. He further cautioned that statistics portraying a drop in organized crime are misleading as they demonstrate a failure to detect and register them rather than an actual reduction in crime (Zor'kin, 2010).

China receives 96 percent of the precious wood exported from Russia's Far East. Estimates by the EIA (2013) suggest that at least 80 percent of these exports consist of illegally-logged old-growth timber, often from protected areas, stolen with the use of fake documents and official seals that have been received from bribed forest officials. Chinese organized crime groups are involved in harvesting and export of timber in the Russian Far East (Lelyukhin, 2012). Criminal groups manage big forest plots in Khabarovsk and Primorsky krais, Amur and Chita oblasts bordering with Northern China. According to estimates, Chinese triads are exporting around 1.5 million cubic metres of Russian timber worth at least USD 300 million (Lelyukhin, 2012).

major actors in the international timber business (notably in Asia) do not exercise necessary due diligence for their supplies. She also found that in a destination port such as Antwerp (the principal destination harbour in the EU for West and Central African timber) inspections were mostly paper inspections and illegal timber detection had a low priority. Her research took place before the EU Timber Regulation took effect.

Since March 2013, the EU Timber Regulation (EUTR) makes it an offence to place illegal timber on the market. In 2016, the European Commission (2016: 9) noted that EU member states "have not reported any closed investigation cases for violation of the prohibition obligation." Greenpeace (2014; 2015) on the other hand presented case studies claiming that it had traced illegal timber from Brazil and the DRC entering the EU which, in the case of Congolese timber unloaded in Antwerp, led to wood confiscations in Germany.

In March 2016, the first public actions were taken in EU countries: authorities in Sweden and the Netherlands notified companies that imported timber from Cameroon and Myanmar may be subject to sanctions (Saunders, 2016). The EUTR is likely to be increasingly enforced and improved (such as through the EUTR Guidance Document of February 2016), but the scale of the EU's timber imports from countries and regions that are known to have high levels of illegal logging suggests that ample opportunities still exist for exporting illegal timber to a destination market like the EU.

From the perspective of effective law enforcement, it would seem more logical for customs to be directly involved in the EUTR enforcement. Controls are more precise and effective when they happen when the freight and bill of lading are together and when (forensic) verification techniques can be employed to see whether they correspond, rather than afterwards, via documents or during an (announced) inspection at a timber company, as is still common EUTR practice.

In that respect, enforcement in the United States via the Lacey Act seems to have more power and uses more (forensic) investigation techniques. Large fines have been issued such as in the case of the Lumber Liquidators (several millions); and in the case of Gibson guitar a (monetary) penalty of USD 300,000. Despite the apparent stricter and more effective legislation and enforcement in the United States as compared to the EU, "large volumes of likely-illegally-sourced wood continue to be imported into the United States" (Lawson, 2015: 15).

The general low level of involvement of police, judiciary and customs in destination markets can also be identified as a crime opportunity structure. Timber crimes do not earn as much official scrutiny or media coverage, or spark the same degree of public alarm as more traditional or better known global crime issues like the trafficking in drugs, humans or arms (Naím, 2007). International policymakers have generally been reluctant to consider illegal timber as a crime issue. For years, illegal timber was primarily treated as an economic or trade issue, and secondly as an environmental issue. Only since a decade or so, it is also being perceived as an international crime problem.

Because illegal timber is primarily considered a trade issue - and only secondarily as an environmental issue, and more recently as a crime and law enforcement issue - ministries of economic affairs or agriculture, and possibly environmental ministries, are usually responsible for policy implementation rather than the ministry of justice. It is consequently no surprise that seeking agreements with timber trade organizations is generally preferred over mobilising law enforcement agencies and applying their technical (forensic) and criminal investigation techniques.

UNEP-INTERPOL's most recent report on environmental crime estimates that in 2016 the total financial resources currently available for environmental crimes at the primary global institutions (e.g. CITES, INTERPOL, World Customs Organization (WCO) and UNODC) responsible for reducing the global illegal trade probably amounts to around USD 20 million. In comparison with, for example, US domestic and international drug law enforcement –which is around USD 2 billion (Nellemann et al., 2015)– prevention and enforcement of illegal timber are still clearly given low priority.

Large profits can be made in the illegal timber business, as various cases show. This is combined with the observation that (organized) forest and timber crimes are still given relatively low priority in destination, transit and exporting countries (UNODC, 2012). If one adds to this the lack of real, verifiable (corporate) transparency in timber commodity chains (Dauvergne and Lister, 2011; Bisschop, 2013), one can only conclude that many opportunities still exist for logging and trading timber illegally. As such, the large levels of illegal timber on the international market, in both absolute and relative terms, are well explained by the criminological "Crime Opportunity Theory".

5.4 Criminological Tools

As defined in the introduction, the domain of criminology includes the process of making and breaking laws, and the social reaction towards the breaking of laws. This section explores what can be done to better detect, limit and prevent criminal and organized forms of timber exploitation and trade.

5.4.1 Clearly Defining the Crime Issue: Serious Crime or Organized Forest Crime

The more professional and criminal forms of illegal timber trade should be treated as what they are: serious crimes that are committed by members of (transnational) organized crime networks. Formal acknowledgement of this fact actually offers more law enforcement possibilities. When a crime phenomenon falls into the category of serious crimes or organized crime, the law enforcer's "tool box" can be opened because serious crimes allow the use of advanced investigation techniques such as phone tapping, financial investigations, controlled deliveries, etc. The overviews by Goncalves (et al. 2012) and

Box 5.3

Dismantling an organized timber network in Brazil: Operation Clean Timber (Madeira Limpa)

While there has been a strong reduction in deforestation in the Brazilian Amazon due to increased enforcement and the implementation of different policies (Nellemann et al., 2016), the situation is far from being under control. Criminal timber networks often use gunmen to intimidate, threaten or kill local or environmental protest by leaders of forest and riparian communities that resist illegal logging. Global Witness (2014) noted that 25 years after the murder of Chico Mendes, Brazil is the most dangerous place to be an environmental and land defender. Recent law enforcement and criminal investigation by Brazil's Federal Police and Federal Prosecutor in Santarem (Pará) reveal some of the ways in which criminal logging networks operate.

In August 2015, Brazil's Federal Police and Federal Prosecutor in Santarem started a criminal case against a large illegal timber network. Fraudulent timber credits and transport documents gave a legal appearance to illegally logged timber, particularly ipê, massaranduba and angelim vermelho. A large timber exporting company in Santarem that owned several sawmills, coordinated the illegal timber scheme. Over a dozen people were arrested and put in prison: timber traders, a document forger and several (high ranking) civil servants.

Corrupt officials were found at different government levels:

- Federal level: at the Environmental Inspection Agency (IBAMA), and at the Institute for Colonisation and Agrarian Reform (INCRA);
- State level: Para's state Finance Agency (SEFA) and Para's Environmental and Sustainability Secretariat (SEMAS);
- Municipal level: Municipal Environment Secretariat (SEMMA).

Among those arrested were a high-ranking super intendant of INCRA, a politician and a municipal secretary for the environment. For a detailed description see Greenpeace (2015) or see the Brazilian media coverage of "Madeira Limpa", for example by Brazil's commercial television network Globo.

In November 2015, the lead author of this chapter visited communities where the criminal loggers had been operating. One community leader had been threatened and later attacked after travelling several times to the prosecutor's office in Santarém (a whole day's trip by motorised transport) to report illegal logging activities. Contacts between affected communities and prosecutors had been established by a project on Conflict and Cooperation over Natural Resources, funded by the Dutch Organization of Scientific Research (NWO), which the lead author coordinated (Boekhout van Solinge, 2016a-b). At different hotspots of illegal logging he was told that the criminal and violent loggers selected valuable trees such as ipê, as these would fetch a good price in Europe. Several months after the initial enforcement operations, several (high ranking) civil servants who acted as crucial facilitators of the illegal timber scheme, were still in prison. In 2016, he heard that other criminal loggers had arrived in the area.

UNODC (2012) can function as guides for criminal justice procedures such as, for example, bilateral and multilateral police and justice collaboration aimed at suppressing international timber networks.

Dollar banknotes, handcuffs and judge gavel
Photo © Fotolia: aruba2000

An important condition for being considered a serious crime is that the offence is penalized accordingly by legislation. The Convention on Transnational Organized Crime prescribes that "an offence does not qualify as 'organized crime' if the maximum prison penalty is lower than four years, which often applies to environmental crimes" (Spapens et al., 2016: 2).

When international (e.g. by INTERPOL (Stewart, 2014)) or regional investigative operations are done, they can yield significant results (see Box 5.3).

Although crime interventions in the field of environmental crime in general are complicated (Spapens and Huisman, 2016), the current (albeit limited) forest law enforcement capacity could be used most effectively. Technology can be of help, especially in vast forested areas. Moreover, law enforcement capacity can be used more effectively by focusing on identifying central actors of illegal timber networks, as well as, crucial facilitators, those who are difficult to replace and who can therefore be considered as the essential, but also weak, link in the criminal network.

Public policies and public-private initiatives can reduce some of the opportunity structures that currently still exist in favour of illegal timber trade. For example, preventive anti-corruption policies can be developed for certain vulnerable and criminogenic professions and

certain governmental agencies. Administrative law can be used for withdrawing certain permits.

Illegal facilitators, especially those that in some areas regularly or structurally use threats and violence against forest residents or others and thereby de facto control the monopoly on violence, should be prioritised because they challenge the authority and legitimacy of the state and rob the country and its people from natural resources.

5.4.2 Situational Crime Prevention

Since several years some Western, particularly European, countries are experiencing a reduction in crime, the so called "crime drop". One of the main criminological explanations for this decline is that it has generally become more difficult to commit certain crimes (Van Dijk et al., 2012). Based on the crime opportunity theory, various governments put policies in place such as situational crime prevention (Clarke, 1997). "Central to this enterprise is not the criminal justice system, but a host of public and private organizations and agencies" (Clarke, 1997:2). Situational crime prevention is mostly used in Western countries and urban settings, and commonly combined with social activities, such as surveillance and response to crime by people, including households and security personnel (Ekblom, 2006). Situational crime prevention is also employed in the field of wildlife, such as described by Lemieux (2014) for the prevention of poaching in Uganda.

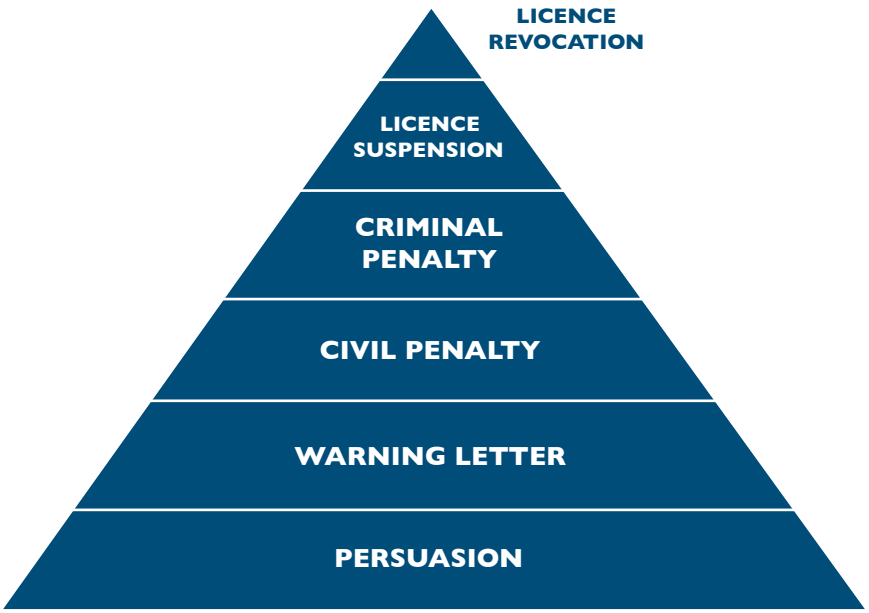
Situational crime prevention can also be applied to organized crime (Bullock et al., 2010), as well as to illegal logging and related corruption (Magrath et al., 2007; Graycar and Felson, 2010), particularly in areas that are vulnerable to illegal logging. This vulnerability can be caused by the abundance of certain valuable species, by certain geographical and logistical advantages for (illegal) timber, and it can be explained by the criminal opportunities: lack of control, low governmental presence, a culture of corruption, etc.

As (forest) crime can be concentrated in certain areas ('hotspots') or happens more at certain hours ('hot times', such as log transports during the night), specific situational prevention strategies can be developed and put in place. Situational crime prevention can be combined with crime mapping and "techno prevention" - crime prevention with the help of technology. In forests, the social dimension of situational crime prevention is most logically implemented by working with the people who are already present, such as forest residents, who generally (but not always) have a direct stake in keeping the forest intact.

5.4.3 Community Forest Watch Supported by (GPS) Technology

A major limitation of the surveillance of vast forests with many valuable trees is the low level of law enforcement presence. It can happen that a single public prosecutor is responsible for law enforcement and the rule of law in an area the size of France. This is for example the case of the state prosecutor in Brazil's West Para, responsible for (agricultural) land conflicts. As much illegal logging (as well as illegal mining and land grabbing) takes place

The enforcement pyramid Figure 5.1



Source: Ayres and Braithwaite (1992)

in this large area, it is simply impossible to effectively enforce the law.

Much of today's forest monitoring is done with the help of satellites. While satellites are extremely useful, forest crimes such as (selective) illegal logging, small-scale land grabbing and violence against community leaders are not detected by satellites. They stay under the radar because they happen under the tree or cloud cover, or because they occur on a small scale in remote places without mobile phone reach or internet connections. As is known from military operations, intelligence from the ground, collected by locals, is essential for knowing what is really going on, and who is going where. In Indonesia for example, civil society has been given a formal role in monitoring the forest legality system.

In different forests around the world, relatively different small projects are ongoing with forest communities making use of GPS technology. This technology is usually used for land demarcation, map making and land tenure claims. GPS and other technology however can also be used to collect evidence of illegal logging and timber trafficking routes. When there is trust between law enforcement actors and (leaders of) forest communities, GPS pictures and other intelligence from the ground can be communicated to law enforcement and criminal justice agencies (see also Stewart, 2014).

One such project of GPS-supported community forest watch has started around some hotspots of criminal logging in the Brazilian Amazon (Boekhout van Solinge, 2016b). Local residents use water proof GPS cameras to collect evidence of illegal logging, illegal timber transports, and also land grabbing. As several public prosecutors became part of an academic/NGO network that was formed during a previous scientific project, contacts were established between public prosecutors and leaders of communities where criminal logging is prevalent and violent. Communities that collect GPS-referenced pictures of illegal logging and deforestation now know that public prosecutors are receptive to using them to collect proof. A project like this can be considered as a forest version of the urban crime prevention programme "Neighbourhood Watch".

Forest watch networks can be ideally combined with crime mapping and situational crime prevention. People in forest areas know where the big centenarian trees sought by illegal loggers can be found. They also know which timber species the illegal loggers are after; such as today rosewood in Africa, meranti or merbau in Asia, and ipê in the Amazon. Locals often know where illegal timber transports are going or who is in control. While this may entail the risk of being controlled and exploited by local elites, there are also (always) communities and community leaders that clearly want to preserve the forest (Boekhout van Solinge, 2008c; 2016a-b).

5.4.4 Addressing Corporate Crime

Criminology distinguishes two main models in the case of rule- or law-breaking behaviour by private actors such as corporations: the "cooperation" model and the "sanctioning" (or "deterrence") model. The cooperation model is based on compliance, the sanctioning model on deterrence and criminalization.

Cooperation is generally preferred by private actors (the regulated) and governmental institutions (the regulators); both wish to keep the costs as low as possible, as well as maintain good relations between regulator and regulated (Van den Heuvel, 1993).

The influential criminologist John Braithwaite who wrote much about corporate crime, stated that selecting between cooperation or deterrence basically comes down to the type of actors and their attitude. "When there is a willingness to do the right thing in the business community, a punitive-adversarial regulatory style is simply not the best strategy for maximizing compliance. Punishment is the best strategy when good will is wanting" (Braithwaite, 1989: 130).

In some parts of the Amazon where logging and related corruption and violence are common, Boekhout van Solinge (2014b) identified the existence of a violent business subculture, a variation of John Braithwaite's (1989) description of business subcultures: businesses resisting law enforcement by forming oppositional and criminogenic business subcultures. When in certain timber exporting and processing regions or countries such a criminogenic timber sector seems to exist and where law-breaking behaviour is almost the norm (see also Goncalves et al., 2012), one can speak of a business subculture, and law enforcement measures seem inevitable.

In developing public and private policies for limiting illegal timber trade, countries and their law enforcement and inspection agencies might be inspired by the "Enforcement Pyramid" (see Figure 5.1) by criminologists Ayres and Braithwaite (1992), which is already employed in a number of countries. When necessary, there can be an escalation to more punitive sanctions. For further criminological suggestions, see also Bisschop (2015) and two recent books on transnational environmental crime and enforcement (Spapens et al., 2016; Elliot and Schaedla, 2016).

5.5 Forensic Tools for Better Governance and Criminal Timber Investigations

Methods based on intrinsic characteristics of the wood itself are a crucial addition to existing legislation aimed at combatting illegal logging and the associated trade.

5.5.1 Overview and Applicability of Forensic Tools

Two sets of forensic tools have been developed for this purpose. Dormontt et al. (2015) present a thorough overview of the field and the recent UNODC report provides practical guidelines (UNODC, 2016). The first set of methods aims to verify the claimed timber species; these are tools to identify species based on wood characteristics (Box 5.4). Some of these methods – e.g., wood anatomy - have a long history of development, are broadly applied in timber verification and have been used in law enforcement (Gasson, 2011).

Box 5.4

Four methods to verify species claims

1. **Wood anatomy.** Wood anatomical analysis is a fast and low cost method applied by many frontline officers when fraud is suspected (Dormontt et al., 2015). This method requires expertise, is based on visual characteristics of wood and generally adequate to distinguish timber at the genus level (Gasson, 2011), which can be sufficient to distinguish CITES- from non-CITES-listed species.
2. **Metabolic profiles.** The classification of timber based on metabolic profiles produced by advanced mass spectrometry is a relatively recent development (McClure et al., 2015). These profiles are like "chemical barcodes" of timber and can be compared to reference profiles from known taxonomical identity. The method is generally capable of distinguishing timbers at the species level (Lancaster and Espinoza, 2012).
3. **Near-infrared spectroscopy (NIRS).** NIRS is the measurement of the wavelength and intensity of the absorption of near-infrared light by a sample. This method is already widely applied in timber quality control, but could also be used to verify species claims (Braga et al., 2011).
4. **DNA barcoding.** DNA barcoding compares profiles of unknown samples to those with known taxonomical identity. DNA barcoding can also differentiate between closely-related species and is the standard for species identification (Lowe and Cross, 2011).

Across methods, important differences exist in accuracy, costs and experience required to perform verification.

The second set of methods is used to verify the claimed geographic origin of the timber (Box 5.5). In contrast to species identification methods, these recent methods have not been used extensively so far and have, to our knowledge, not yet been used in criminal prosecutions.

5.5.2 The Need for Reference Databases

Forensic tools that use chemical or genetic properties to verify the geographic origin of timber, require the existence of reference databases. These databases need to contain values of chemical or genetic properties of wood from a known geographic origin and, importantly, these values and their geographic origin need to be trustworthy.

For genetic characteristics such databases necessarily need to be species-specific, i.e. one database for each botanical species or timber variety. For chemical characteristics, such species-specific databases are the best option because isotope values may differ between tree species, even for the same patch of forest. Obviously, databases need to be based on representative samples for the timber variety: covering the entire geographic range of the tree species, representing all areas within that range and with a sufficiently large amount of samples (>100).

Building high-quality reference databases requires financial investments, time and patience, but if done well, it will certainly be rewarding. Forensic methods have for example already successfully been applied to reveal the international supply chain of ivory and to locate poaching hotspots (Wasser et al., 2015). In a similar way, forensic tools may be used to expose international timber trafficking and increase supply chain transparency of timber as a whole.

5.6 Conclusions

It is only since a decade that illegal logging and the consequent (international) trade have been recognised as a global crime problem by international law enforcement agencies and (academic) criminologists.

In this chapter we argued that organized crime and professional criminal networks are (also) involved in the illegal timber trade. These networks have connections to the legal upperworld and to the illegal underworld. Some forms of organized illegal logging and organized forest crime can be considered as (transnational) organized crime, considering the fact that some of these organizations are immune from law enforcement, by their use of threats and violence, combined with corruption or collusion. In some parts of the world, organized forest crime is particularly violent. Violence is used against forest residents, environmental defenders, and law enforcement personnel.

Focusing on the prevention and detection of opportunity structures –or illegal windows of opportunity– such as so-called facilitators of crime, some of whom are found at or near the interface of the legal and illegal, can help to improve effective law enforcement. Moreover, as resources for preventing and detecting forest crimes are

Box 5.5

Three methods to verify geographic origin

1. **Tree rings.** Time-series of ring width measurement of timber samples are compared to reference data from known geographic origin (Sass-Klaassen et al., 2008) or to climate data to verify the most probable origin. First tests for tropical timber suggest that this modified approach may work at a country to regional scale.
2. **Chemical properties.** The fraction of stable isotopes in timber is determined by the growing conditions of the tree. Analyses of stable isotopes have shown promising results for temperate (Horacek et al., 2009) and tropical timbers. This method provides a reliable and cost-effective means to verify the origin of timber at regional to country scale.
3. **DNA.** DNA microsatellites and SNPs (single nucleotide polymorphisms) are standard tools for differentiation of populations within species because genetic differences between trees increase with geographic distance. Degen et al. (2013) showed that microsatellites can be used to correctly trace back mahogany samples to their country of origin.

still limited, creativity combined with new collaborations may be required. For example, situational crime prevention can be applied to organized forest crime, especially when collaborations are sought with forest communities, particularly those that have shown to have a stake in forest preservation.

Prioritising serious or organized timber crime, particularly those groups or networks that have a certain degree of immunity from law enforcement, would help reduce opportunities for criminal timber trade. These types of networks should be dealt with accordingly, such as by using advanced investigative methods, which now are only occasionally employed.

More work could go into ensuring that sanctions for forest crimes are being executed, such as ensuring that fines are paid. And as Goncalves et al. (2012) noted, it is also time for the high-level law breakers, rather than the low-level ones, to be targeted by the criminal justice system. Moreover, logging permits should be withdrawn after serious or repeated offences.

This chapter also summarized the many methods, practices and tools from criminology and timber forensics that can be used to better prevent and detect organized timber crime by organized criminal timber networks. The suggestions from 5.4 (criminology) and 5.5 (timber forensics) can be used for improving both the detection and prevention of illegal timber appearing on the market. While a range of timber identification tools exist, they are as yet only used in a few countries or regions in crime prevention or criminal investigations.

In order to address some of the criminal timber networks and to limit their opportunities, international (bilateral) police and justice cooperation is needed. Criminal investigations are rare, but if they happen they clearly yield results as national and international cases show. This suggests that more national and international criminal investigations (bilateral and multilateral) are needed, just like is done in other serious and organized crime areas with international trafficking routes. A current condition for international police and justice cooperation under the umbrella of the UN Convention against Transnational Crime is that offences are punishable with a minimum of four year imprisonment. In order to increase international police and justice cooperation, some environmental and/or forest laws may need to be adapted for this purpose (see e.g. UNODC, 2012).

Knowledge Gaps

1. In-depth criminological studies on criminal timber networks are sparse. There have been no criminological analyses with research methods such as interviews and judicial dossier analysis. Interviews can be done with law enforcers but also with convicted timber traders (just like criminologists do with other illegal entrepreneurs) and corrupt officials.
2. Commodity chains are still not very transparent. Securing independent verification of legality and sustainability would be necessary.
3. Anecdotal evidence exists that loggers in the Amazon use satellite phones and use “hit and run” tactics, after valuable trees have been identified. Better understanding of the techniques of criminal loggers would be necessary and appropriate technology developed or applied to better detect and prevent them.
4. Methods are needed to better engage forest communities (in a safe fashion) in situational crime prevention and possibly also in detecting and reporting on forest crime.
5. There is anecdotal evidence of cocaine smuggling in logs, timber investments by drugs criminals, or criminal logging networks also being involved in other illegal activities. Research is needed to clarify and describe overlaps between illegal economies.
6. Improved understanding is required of the dynamics of the legal and illegal market with regard to certain crime prone timber species that are targeted by criminal timber networks, such as today rosewood in Africa, ipê in the Amazon, and (earlier?) meranti and merbau in South East Asia.
7. An assessment of the effects of timber sanctions, such as in the case of Liberia and Myanmar, is necessary.
8. Research is needed to extract high quality DNA from timber.

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Chapter 6
Multiple and Intertwined Impacts of Illegal Forest Activities

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6.1 Introduction

There have been numerous country-level studies and attempts to quantify illegal logging and related timber trade. A few reports have offered some global assessments about illegal logging but they are fragmented and fail to provide a detailed assessment of the impacts of illegal forest activities (see Lawson and MacFaul, 2010; Lawson, 2014; Hoare, 2015). In addition, because of their nature, some illegal forest activities as well as their impacts are hard to estimate (Tacconi, 2007).

Our understanding of the impacts from illegal forest activities suggests that they are multiple and strongly intertwined across different social, economic, political and environmental dimensions. Largely, these impacts are linked to the type of actor (e.g. large-scale loggers, smallholders, small-scale chainsaw millers) involved in illegal activities, as well as where and how these activities occur, which leads to different impact trajectories, and ultimate impacts on the ground.

The assessment of impacts resulting from illegal forest activities is complicated due to several factors: firstly, in many instances there is no clear-cut boundary between impacts associated with legal versus illegal activities since both may lead to similar impacts. Secondly, the impacts of illegal forest activities establish complex interactions among each other, resulting in diverse synergies and trade-offs. Thirdly, often it is assumed that all the impacts of illegal forest activities are negative; however, in some cases, they can be positive, depending on the stakeholders' perspectives.

This chapter embraces the challenge of identifying and characterizing the multiple impacts resulting from illegal forest activities drawing on existing literature on the topic. Given the fragmented nature of existing data, we propose a framework to understand these impacts and their causal relationships along different impact trajectories. This framework identifies three dominant situations (and associated actors) under which illegal logging is practised, i.e. large-scale illegal logging operations, informal small-scale and artisanal production, and illegal forest conversion. We relate each of these situations to different types of impacts (i.e. direct, indirect and cumulative) occurring across different dimensions (i.e. social, economic, political and environmental), which determine different impact trajectories. In addition, in order to illustrate these impacts, we examine cases of illegal logging activities in several countries in Latin America, Central Africa and Southeast Asia. These different cases enable us to draw conclusions about the characteristics, magnitude and nature of impacts across different impact trajectories.

6.2 A Conceptualization of Impacts

The impacts of illegal forest activities are multiple and interconnected, and unfold at different scales as shown in Figure 6.1 for the different realms of illegal forest-related activities.

The upper portion of the diagram identifies the most typical situations under which illegal logging occurs. These different situations tend to co-exist in practice, and likely can adopt different forms depending on the context (Casson and Obidzinski, 2007). Each of these situations leads to relatively differentiated impacts, since each tends to be associated with certain logging and land use practices. The first situation is associated with large-scale industrial logging, often practiced by actors who may have formal access to forests but who also break regulations by making use of different illegal practices in planning, harvesting, marketing and processing of timber. The second is informal small-scale and artisanal chainsaw milling practised by a diversity of local forest users including smallholders, indigenous people, landless people, and other local actors whose livelihoods depend on timber extraction. Finally, the third situation is associated with illegal clearing of forests to other land uses, mainly agricultural land uses, and it often occurs in logged-over forests whose economic value is comparatively lower than agriculture.

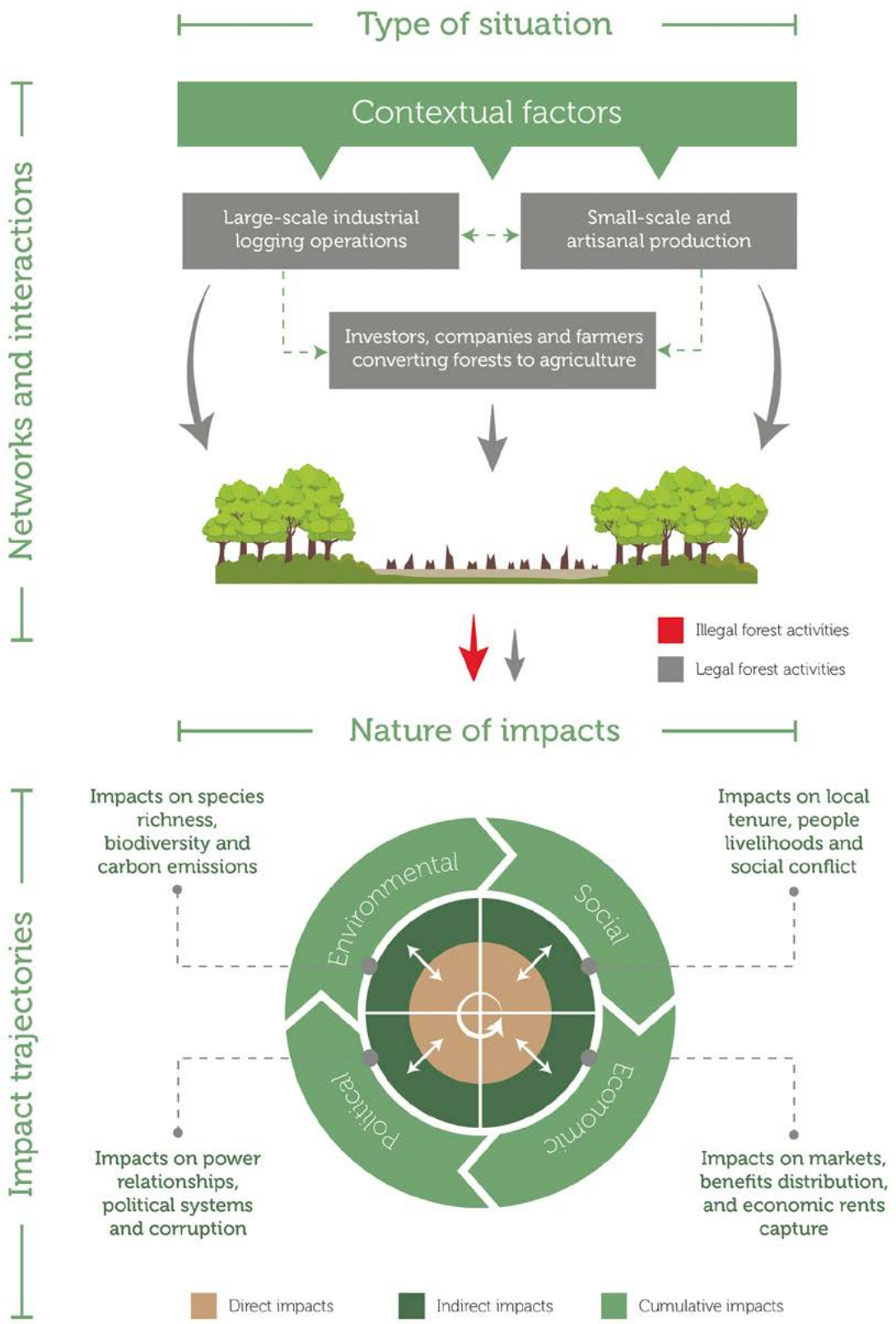
These different situations unfold in different contexts of market development and actor networks and interactions. Small-scale timber producers tend to be more strongly engaged with domestic markets and local intermediary networks (Molnar et al., 2007). In turn, large-scale logging tends to be connected strongly to networks supplying to regional and international niche markets, which tend to demand more valuable timber species (Cerutti and Lescuyer, 2011; Lescuyer et al., 2014). The type of interactions may differ as well since, in some cases, these market networks are relatively sporadic, while in others they are quite organized and stable over time (Kaimowitz et al., 2004; Pacheco, 2012). In addition, in many cases, the impacts from illegal versus legal forest activities are difficult to differentiate. We suggest that both legal and illegal practices may lead to similar types of impacts, although they may differ significantly in their magnitude depending on the intensity of human interventions in forests, and the quality of forests.

The lower part of the diagram examines the impacts of illegal forest activities. Key research on impacts of illegal logging (see: Tacconi, 2007; Contreras-Hermosilla, 2002; Contreras-Hermosilla, 2005) tends to cluster impacts across four main dimensions: social, economic, political and environmental, which are included in the above framework. This framework however, classifies the nature of impacts based on their causal relationships: direct, indirect and cumulative. It is noteworthy that the literature on illegal logging and related timber trade has largely neglected these different causal relationships. While the direct impacts are easier to observe and measure, the indirect impacts are less evident, although they can also be derived from direct. In turn, the cumulative effects are more difficult to determine due to time lags and more complex causal relationships between direct and indirect impacts, as well as other contextual factors.

Finally, the framework presented here, embraces the concept of impact trajectories. These impact trajectories are defined as the sequence of events resulting from

A framework to characterize the impacts of illegal forest activities

Figure 6.1



Source: Authors' elaboration

different human interventions on the forests, influenced by a set of contextual or mediating factors, that determine specific direct impacts across multiple dimensions (i.e. social, economic, political and environmental). These direct impacts have, in turn, indirect implications on these same dimensions. The sequence of events leads ultimately to other more complex interactions affecting the contextual factors shaping the decision-making process of actors. Each impact trajectory, therefore, is associated with specific illegal forest activities and social actors. These different trajectories interact with each other depending on specific contextual conditions.

6.3 Main Impacts across Four Dimensions

Natural forests have usually been logged using destructive conventional techniques, and remnant forests are likely to be further degraded due to fire, as well as edge and isolation effects (Finegan, 2015), which makes it more likely that they will be converted to agriculture (Chomitz, 2007). It is assumed that legal logging conducted under regulations that promote sustainable forest management (SFM) has a less destructive effect on forests than illegal logging, but in many situations SFM refers only to selective low impact logging (Sist et al., 2014). The differential effects between illegally and legally-harvested timber, are largely unknown since legal logging also affects forest ecosystems, although their impacts will largely depend on the management system under which harvesting takes place (Sist et al., 2012). Increasing demand for timber may continue to stimulate additional destructive logging and increase vulnerability to forest conversion, stimulated by a perceived lack of value of the degraded ecosystem (Putz and Romero, 2015).

Table 6.1 presents a synthesis of impacts from illegal forest activities following the different dimensions and categories of impact that were introduced in our analytical framework. This synthesis draws on key literature that directly or indirectly assesses these impacts (Contreras-Hermosilla, 2002; Contreras-Hermosilla, 2005; Putz et al., 2008; Edwards et al., 2014). The direct impacts of illegal logging and related timber trade are the most evident, yet they trigger several indirect impacts, which do not always follow linear causal relationships. Moreover, causal linkages are affected by complex interactions within and across the different dimensions. Furthermore, these impacts affect and are influenced by others factors, outside of the forest sector, resulting in broader cumulative societal and environmental impacts.

Social impacts

The social impacts of illegal forest activities tend to be contradictory. One main factor that makes many instances of small-scale logging illegal is that many forestry laws still do not recognize customary use rights (Colchester, 2016). Smallholders, indigenous people and other traditional communities often tend to benefit from conducting their timber extraction operations outside of the law,

Private property sign. Photo © Fotolia: jkrajsek

in order to avoid the costs of complying with otherwise cumbersome regulations. This also indirectly contributes to enhancing their local decision- making processes, maintaining institutions to manage the forest under their control, and capturing economic benefits that otherwise would be appropriated by other actors. Nonetheless, the same environment that allows this to happen also generates several other long-term effects that eventually hurt local forest users, affecting the more vulnerable groups, e.g. women and indigenous peoples. Illegal logging tends to put pressure on timber from smallholders and community lands, resulting in a loss of high-value species and local income, which are crucial for supporting local livelihoods. In some cases, threats on forests controlled by local people may fuel situations of land conflict, which can even result in violence.

Economic impacts

The economic impacts of illegal forest activities are manifold. Illegal logging tends to distort timber markets since it provides cheap wood to growing urban markets. This has negative effects on benefit distribution along the supply chain since it tends to undervalue the available timber stocks and pays relatively lower remuneration to local people, thus prompting an unequal distribution of the monetary benefits obtained from logging. It also leads to significant losses for the state due to the evasion of forest fees. Increasing depletion of timber stocks leads to a progressive reduction in the economic value of the remaining forests vis-à-vis other land uses, which acts as an incentive for forest conversion to agriculture. Furthermore, illegal logging constitutes a high risk to investors, thus ultimately reducing local access to affordable long-term sources of finance, and making forest-based activities unattractive financially. Illegal logging contributes to reduce the volume of public investment, and reproduces asymmetric, distorted and untransparent timber markets. Some positive impacts are that illegal logging enables local people to capture the economic rents from forests, and allows them to respond in flexible

A summary of the different types of impacts across four dimensions Table 6.1

Impacts	Dimensions			
	Social	Economic	Political	Environmental
DIRECT	Loss of high-valuable tree species and local income key to local livelihoods	Low remuneration to labour and under-priced forest stocks	Behaviours opposing to the implementation of clear procedures	Stimulates forest clearing to agriculture (and other) land uses
	Lack of social control on forest assets eroding local institutions functioning	Unequal capture of monetary-benefits among social groups	Judiciary allows for law transgressions, and lack of authority	Forest degradation in terms of decrease of stocks, species erosion and loss of structure
	Logging and forest clearing facilitates the justification of property rights to land (access and management rights)	Local people, including poor and unemployed, derive incomes, and can respond in flexible ways to market demand	Resources that otherwise would be captured by corrupted officials are retained by local users	Depletion of the species with greater commercial value, with impacts on ecological integrity
INDIRECT	Increased pressures on customary and smallholder lands, mainly in those with higher-value timber stocks	Reduction in the economic value of remaining forests vis-à-vis other agricultural land uses	Resources from illegal logging feed into political patronage systems that reinforce asymmetric powers	Reduction of forest-interior specialist species richness and changes in forest composition with prevalence of less valuable species
	Land and resource conflicts that results in loss of resources and violence, often linked to other illicit activities	High investment risks constrain finance, perpetuating low yields and high percentage of residues	Increased lack of transparency, and erosion of command-and-control systems, and law enforcement	Water pollution, soil degradation, fires and carbon emissions
	Developed local mechanisms to control local forests use, built by smallholders, indigenous and other communities	A portion of investments from revenues originated from illegal activities are retained upstream the value chain	Extended social networks based on illegal/informal transactions providing social/market services	Some locally-controlled forests contribute to maintain the provision of forest goods and services
CUMULATIVE	Livelihood loss and displacement of forest-based sources of income	Loss of state revenues, reducing the volume of public resources	Weak institutions with a higher prevalence of corrupt behaviours	Biodiversity loss associated with habitat erosion and destruction
	Diminished resilience capacity to adapt to economic change and climate change	Persistence of market imperfection, and unfair competition in the timber markets	Stimulate links with other illicit activities (e.g. drug trafficking, smuggling, mining)	Changes in climate variability and extremes of weather and climate-related events
	Local actors fulfil their consumption needs from forest-based rents, which pay for a wide range of local social services	Appropriation of forest-based economic rents, a portion of which is retained in the producing zones	Political power from local actors tend to counterbalance decision-making from the national level	Reduced resilience of the forest ecosystems to adapt to climate variability over time

Source: Author's elaboration with inputs from Contreras-Hermosilla (2002; 2005), Edwards et al. (2014), Nellemann and INTERPOL Environmental Crime Programme (2012), Putz et al. (2012), Tacconi et al. (2003) and Tacconi (2007).

ways to shifting market demands. Furthermore, it provides additional sources of capital to local actors that may translate into productive investments and social services.

Political impacts

Illegal forest activities contribute to weaken the political systems governing forests by perpetuating corrupt behaviours and practices in the different processes regulating forest use and conversion. Illegal logging fosters a vicious cycle of poor governance (corrupt individuals gain power through illegal revenues and then may support poor governance to maintain revenues and acquire more power). It fosters interests that work against the implementation of regulations and procedures to sanction

Aerial view of the Amazon rainforest, near Manaus the capital of the Brazilian state of Amazonas. Brazil.
Photo © Neil Palmer/CIAT for CIFOR

more efficiently law transgressions. The economic gains generated through illegal logging also contribute to reproduce relatively extended political patronage systems to continue profiting from illegal logging and forest conversion. Illegal logging contributes to increase misappropriation of public resources, and interestingly efforts to combat corruption have contributed to reduce the power of corrupt networks, embedded in the political systems.

Environmental impacts

The environmental impacts from illegal forest activities are more evident. Forests provide a number of goods and services, such as timber, carbon stocking, biodiversity, and soil and water protection that are lost when illegal logging and unsustainable cutting take place, or when forests are converted to agriculture. Illegal logging is naturally associated with predatory logging techniques (Blaser et al., 2011). Some studies show that predatory logging, also known as conventional logging can involve twice higher damage than planned logging also known as Reduced Impact Logging (RIL) (see Putz et al., 2008 for a literature review).

Carbon stocks are reduced on average to 76 percent of primary forest levels (range 47-97 percent) in selectively logged tropical forests (Putz et al., 2012). In addition, the composition of species changes as disturbance-tolerant edge species invade and interior specialist species decline (although species richness often remains at similar levels to those in unlogged primary forest), and there is increased water run-off and severe soil erosion, particularly along skid trails and roads (Edwards et al., 2014). Some of these goods and services will return to levels found in unlogged primary levels within a few decades if illegally-logged forests are left to regenerate (e.g. soil run-off); but others will remain in a reduced state over much longer time-scales, especially recovery of over-exploited key timber species (Edwards et al., 2014).

If illegally-logged forests are subsequently burned or converted to agriculture, the goods and services provided by even heavily logged forest are eroded far more extensively (Edwards et al., 2014). For a few years after tropical logging, there is an elevated risk of fire as canopy gaps allow sunlight to reach the forest floor (Siegert et al., 2001). Fire reduces carbon stocks, degrades biodiversity value, and causes further tree mortality (e.g. Barlow et al., 2003). Fire also makes further fire events more likely, with increasingly severe consequences for carbon stocking and biodiversity of repeat fires, potentially driving a transition from tropical wet forest to fire-dominated woodland. The conversion of logged forest to farmland results in a rapid loss of carbon, biodiversity and increase in water runoff and soil erosion.

Cumulative impacts

There are several cumulative impacts from illegal forest activities, yet these are more difficult to determine and can be contradictory. For example, pressures on local customary lands, along with other social factors affecting local rural economies, can exacerbate the loss of local livelihoods and erode the local resilience capacity to adapt to both economic shifts and climate change (German et al., 2010). It can also have the opposite effect, of facilitating access to economic rents by local populations when they are able to exclude third parties and use the timber commercially (Cronkleton et al., 2009). Illegal logging also fosters corruption and patronage systems that weaken the state regulatory and judiciary institutions to sanction criminal behaviours (Varkkey, 2012), and tends to reinforce the influence of local elites. It may also be linked to other criminal networks (e.g. drug trafficking, smuggling, mining) that contribute to funding national and regional conflicts, thereby exacerbating them (Nellemann et al., 2016). Moreover, threats such as climate change, species' introductions, landscape fragmentation and fire, as well as shifts in economic and governance systems, also impact the future of forests that will vary along gradients of biodiversity, novelty of composition, structure, and permanence (Putz and Romero, 2014).

There are different trade-offs between the impacts described. Most important are that while illegal logging activities lead to destructive practices that degrade forest resources over time, they also tend to generate economic benefits in the production zones, although only a portion of these benefits are captured locally, and a major portion benefit actors downstream of the value chain, and corrupt public officials. This also applies to local extraction of forest resources (mainly timber) through operations conducted often outside of the law, which may increase the pressures on forests, thus contributing to forest degradation. Local control of forest resources may also complement local income streams. Often, logged-over forests tend to be converted to agriculture; while this amplifies the negative environmental impacts due to complete forest removal, this can also have positive economic multiplier effects.

6.4 Impact Trajectories across Different Situations

Distinguishing the effects of legal versus illegal logging is complicated. In spite of this, this section examines the impacts of different types of illegal forest activities, noting limitations concerning empirical evidence, validity and comparability. Key evidence available from some select countries in Latin America, Central Africa and Southeast Asia is also presented.

6.4.1 Large-scale Industrial Logging Operations

Large-scale industrial logging operations have been shrinking recently in the Amazon and Southeast Asia, but continue to expand in Central Africa. Forest concessions are the most common way for logging companies, with capital and operational and logistical capacity, to undertake large-scale operations and to access forest resources legally. However, even logging companies with legal access to forests may break forestry regulations. In the absence of public forestlands, logging companies and associated actors also access timber illegally through unofficial joint ventures with medium and small enterprises that they support technically or financially, through agreements with smallholders and communities, or buying timber from informal sawyers. It is not uncommon for timber companies to place pressure on public forests or protected areas, and in some cases on smallholders and community lands.

Direct impacts

Large scale logging operations directly impact on the forest condition by removing timber species with a higher commercial value (e.g. Meranti in Kalimantan, Merbau in Indonesian Papua, and Mahogany and Ipê in the Brazilian Amazon) (Grogan et al., 2014; Verissimo et al., 1995). They also erode forest structure via direct felling and residual damage to unharvested trees, such that logged-over forests tend to be shorter in stature, lacking the largest emergent trees, and in the shorter-term, with a fragmented canopy that allows sunlight to penetrate changing the forest microclimate to a hotter and drier environment. The introduction of RIL in large-scale logging has often reduced the intensity of timber harvesting thus it may have reduced residual tree damage when compared to conventional methods. However, at higher logging intensities, this effect is lost (Putz et al., 2008).

Forests under forest management plans are twice as efficient as those without plans, but these operations have little trickle-down effect on surrounding smallholders and generate local employment only for a limited number of people (Lescuyer et al., 2012). Large-scale industrial operations that use illegal practices tend to generate more spillover effects on local economies through jobs and sourcing of timber from small-scale and informal timber operations, but only some sporadic cash income for local loggers and chainsaw millers selling to those companies. Furthermore, workers employed in large-scale operations are often employed only sporadically and companies tend not to fully comply with social obligations (Lescuyer et al., 2012). In addition, employment generated by timber companies tends to be poorly remunerated, but those incomes may still be important in view of limited alternative employment opportunities and the depressed state of small-scale farming (Richards et al., 2003).

Furthermore, rapid depletion of commercial timber species reduces the long-term economic potential of forestry, making alternative economic activities attractive, especially conversion to farmland, either through legal or illegal means. Moreover, the development of roads, and other infrastructure, tends to stimulate local land markets, also prompted by the arrival of immigrant farmers willing to expand cash-crop agriculture (Gardner, 2014). Since production of agricultural crops tends to lead to

Box 6.1

Large-scale operations in forest concessions in the Peruvian Amazon

In accordance with the 2000 Forestry Law, about 581 concessions were granted in the Peruvian Amazon over a total area of 7.3 million hectares, 12.4 percent of the country's forests, with sizes ranging from 5,000 to 50,000 hectares. Forest concessions should follow sustainable management operations through the adoption of a forest management plan, which identifies the trees to be removed, specifying the area in a period of five years. Once the Forest Management Plan (FMP) is approved, the concessionaire develops an annual operational plan for each year of operation (or harvest), which specifies the location of each tree to be extracted. The main loopholes in the concession system are: 1) issuance of fake timber transport permits (TTP) to launder timber from other unauthorized cutting areas of other concessions and 2) substituting species to inflate the volumes of some species to be allowed to process permits of species with higher economic value. The concession system, therefore, has largely served to generate legal documents that are sold on the black market, fostering illegality.

Besides the production of fake TTPs, an institutionalized system of bribes also allows for the legalization of illegal timber. According to anecdotal evidence, when logs from concessions arrive at the ports, each loaded boat pays USD 180 in bribes to the local police. Once timber is loaded onto trucks, the TTPs are handed out to the local authority at the technical offices where technicians verify the species, and bribes of USD 20 per truck are paid to avoid setbacks. If the timber is transported as logs, no further procedure is needed, but the TTPs need to be exchanged at the technical office if the timber has been processed, which represents an extra payment. If the TTP passes the technical revision, trucks are allowed to travel to Lima. Usually, wood passes through eight checkpoints. In each of these checkpoints, USD 100 are paid as bribes to avoid extensive control. Each truck pays up to an estimated USD 1,000 on its way to the end- market.

Source: Author's elaboration based on Cossio et al (2011), EIA (2012), Finer et al., (2014), Mejía et al. (2015) and Muñoz (2014).

higher profits and is associated with lower operational risks when compared with logging, even when the latter is conducted illegally, it becomes more attractive for investors to develop agriculture rather than to invest in forest management (Lawson 2014). Formerly logged forest is thus much more likely to be cleared than is unlogged primary forest, according to research both in the Amazon and Southeast Asia (Edwards et al., 2014).

Indirect impacts

Large-scale operations tend to have several indirect impacts. The main social impacts are the pressures that they generate on local communities since they often operate on lands where customary rights tend to prevail. Because of the forest operations, local populations are constrained in their rights to access those forests, which in some cases can result in social conflict and violence (Molnar et al., 2011). The granting of legal access rights to large-scale operations through forest concessions has not necessarily reduced contested rights existing over lands occupied by logging companies. The persistence of large-scale logging tends to degrade and improve access to relatively large areas of forest, which in turn increases illegal hunting for bushmeat and international wildlife trade, especially of large-bodied vertebrate seed dispersers, and other habitat disturbances (including fire), thus reducing the capacity of the forest ecosystem to regenerate (Rayden and Essono, 2010; Vermeulen et al., 2009). In addition, large-scale illegal logging tends to lead to important losses of state revenue through tax evasion and underreporting of timber stocks and production which are widespread illegal practices (KPK, 2015; Finer et al., 2014).

Many forests have undergone significant degradation associated with large-scale logging, and in some cases those forests are degraded beyond recovery. Two meta-analyses each considering over 100 scientific studies (Gibson et al., 2011; Putz et al., 2011) demonstrate the complex relationships between the loss and degradation of forests and resultant biodiversity impacts. As a general rule, Gibson's analysis (2011) demonstrated that human disturbances reduce biodiversity in tropical forests, with all taxonomic groups being negatively affected, although some – such as mammals – less so than others. The type of disturbance is also determining, with birds being more affected by conversion to agriculture, while plants, by burning of forests. Unsurprisingly, generalist species fare better than specialists, with subsequent changes in species composition (but maybe less changes in terms of species richness) (Putz et al., 2011). Of all disturbance types, selective logging appears to be associated with the lowest level of adverse biodiversity impacts (Gibson et al., 2011).

Important environmental services are also degraded by intensive logging. Carbon storage is reduced, and may take several decades to recover to unlogged forest levels (Bonnell et al., 2011; Huang and Asner, 2010). Nevertheless, rates of carbon sequestration in heavily logged forests are much higher than those in unlogged forest essentially due to natural regeneration (e.g. Berry et al., 2010; Gourlet-Fleury et al. 2013). Furthermore, Southern Amazonian forest logged with RIL recovered 100 percent of original above-ground biomass in only 16 years (versus 77 percent for conventional logging) (West et al., 2014). In Indonesian Borneo, there was a 10-fold increase in water runoff from skid trails and roads, resulting in a 100- to 3,000-fold increase in soil loss compared to forested control plots (Hartanto et al., 2003). Despite the initial pulse of erosion and sediment runoff, several years after logging total soil runoff (including skid trails) was similar to that of primary forest (Douglas, 1999).

Cumulative impacts

Large-scale illegal logging, in its different illegal facets, leads to cumulative impacts. It does so by affecting livelihoods not only by excluding local people from forest areas, but also due to limited distributive effects at the local level. It also contributes to the loss of state revenue, which along with inefficient fiscal systems of state revenue capture, results in less income for producing zones, thus diminishing their capacity to use economic rents from forests for social and productive investments. Large-scale illegal logging, in the context of weak accountability, also fosters corrupt behaviours and networks, which in some cases link with other illicit activities. Forest degradation, along with destruction of habitats, also leads to biodiversity loss, and has impacts on climate change. Finally, carbon emissions from large-scale logging have an important role in driving global climate change, while it is plausible that degradation via intensive illegal logging will reduce the resilience of logged-over forests to adapt to climate change, especially under more frequent drought events that may increase fire risk.

A logging area in Gunung Lumut, East Kalimantan, Indonesia. Photo © Jan van der Ploeg for CIFOR

6.4.2 Informal Small-scale and Artisanal Production

The involvement of multiple local forest users conducting small-scale and artisanal logging is growing over time, and in many cases has surpassed the contribution of large-scale

logging timber operations. Local forest users are a large and heterogeneous group, with different types of tenure rights, including indigenous people, smallholders and other traditional people. These groups undertake different types of forest management, while increasingly engaging in commercial timber operations. A minor portion conducts its operations collectively, while a majority undertakes small-scale logging individually; some also carry out individual chainsaw milling. Most of these operations occur outside of the law or informally.

There are many situations, like in Latin America, of flawed forest legislation that does not give procedural rights to farmers without land titles, including indigenous communities (Pacheco et al., 2011). While formal property rights were recognized in favour of smallholders and communities, they have to follow relatively cumbersome regulations, often inspired by large-scale industrial logging operations, which make it difficult for them to access harvesting and transport licences. As a result, they tend to use their forests without permits or outside of the formal system (Pacheco et al., 2008).

In the Congo Basin countries, informal small-scale chainsaw milling supplies important domestic and regional markets, and provides jobs and income. This sector has undergone rapid development to meet the demand for cheap timber in Central African countries and other nearby countries (Chad, Nigeria, Uganda, Rwanda and Angola), as well as the interests of stakeholders all along the chain of custody (Lescuyer and Cerutti, 2013). This situation nevertheless differs from country to country (see Box 6.2). It is noteworthy that community forestry was also promoted in some of these countries (e.g. Cameroon, Gabon, Democratic Republic of the Congo, Central African Republic (CAR)) although it has not yielded the expected results since it faces multiple regulatory constraints (Julve et al., 2013), and does not seem to substantially conserve forest resources (Bruggeman et al., 2015).

Informal, small-scale or artisanal logging in Indonesia is linked to furniture-making industries and local infrastructure development, which involve a significant number of smallholders and small- and medium-scale enterprises (SMEs). Most do not have a fixed location and move frequently, depending on the availability of raw material and business opportunities (Obidzinski and Kusters, 2015). While these small-scale timber businesses are thought to be associated with furniture and souvenir making in Java, Bali and Sulawesi, small-scale logging also plays a vital part in generating the raw material for infrastructure development (roads, bridges etc.). It is clear that virtually all local timber demand for infrastructure development and civil construction (offices, housing etc.) comes from undocumented sources. Invariably, these sources are small-scale loggers.

Box 6.2

The contribution of chainsaw milling in Central African countries

In Cameroon and the DRC, informal chainsaw milling accounts for 57 percent and 87 percent respectively of total timber production, and supplies rapidly growing domestic markets. In Gabon, small-scale chainsaw milling covers 23 percent of needs, due to lower domestic demand. In CAR, this proportion reaches 34 percent, due again to limited demand and to the lower quality products supplied to markets by formal companies. In addition to the volume of timber it produces, the informal timber sector also provides thousands of jobs in Central African countries. In Cameroon, around 45,000 people find their main employment in this sector, which is more than three times the number of direct jobs provided by the industrial timber sector (13,000). These jobs include operators, transporters and prospectors in rural areas, as well as traders and handlers in cities (around 4,000). In the cities of Congo, the CAR and Gabon, more than 1,000 people have jobs directly linked to the sale of small-scale timber production. It is noteworthy that the success of the small-scale chainsaw milling sector is due to its acceptance both by urban consumers, who gain access to low cost materials (prices are three to four times lower than those of industrial timber), and by rural stakeholders, who see it as a significant source of income. Indeed, despite its informality and the illegal levies made on operators, small-scale chainsaw milling is a profitable activity. The profit margin stands at almost 12 percent in Cameroon, the CAR and the DRC, and reaches 18 percent in Congo, and even 30 percent in Gabon.

Sources: Authors' elaboration based on Lescuyer et al. (2014) and Eba'a Atyi et al.(2016)

Direct impacts

The small-scale logging sector is important for employment and rural livelihoods. It employs vast numbers of people on a part-time and a full-time basis thus making significant contributions to rural incomes and livelihood security (Mejía and Pacheco, 2014). The sector often constitutes only a complementary source of income for smallholders and indigenous communities and is also a source of income for urban elites. Some government officials also benefit by demanding informal payments from small-scale chainsaw millers and transporters before authorizing them to continue their activity (Lescuyer et al., 2012). Smallholders and indigenous people may also benefit from carrying out informal timber operations as it may enhance their control of forests and secure their tenure rights. In turn, this helps them to capture economic benefits that otherwise would be captured by external actors, including local elites (Lescuyer et al., 2013).

The effects of small-scale timber operations on forest condition are uncertain. Some argue that community-managed forests have lower and less variable annual deforestation rates than protected forests (Porter-Bolland et al., 2012), and that the volumes harvested through illegal logging tend to be lower when compared to legal timber operations (Mejia et al., 2015). Thus, given the small-sized plots and relatively low-intensity harvest of smallholders, forest extraction tends to erode forest resources slowly over time. Nonetheless, impacts on long-term timber revenues could be similar to those of large-scale

timber operations if smallholders, indigenous people and chainsaw millers opt to log selectively a few highly valuable timber species. This often happens in contexts of growing market pressure (Cano et al., 2015; Mejía et al., 2015). Nonetheless, much of the milling of these groups is carried out using chainsaws in situ and carts, small tractors and river rafts for transport. If no (or few) roads are opened, this will likely threaten the few targeted tree species, but overall have a low impact on forest structure, a short-term impact on wildlife hunting (i.e. during but not after harvest), and thus limited impact on the successional trajectory of the remaining forests.

Indirect impacts

The states are the main losers in the persistence of small-scale informal logging as well as with the development of small-scale chainsaw milling, which goes against their strategy of formally managing and taxing forest resources. In addition to foregone tax revenue, small-scale chainsaw milling could compromise their efforts to sustainably manage forests. While benefits are appropriated locally, they are rarely invested in the local forest sector, or in enriching the forests, or in modernizing the SMEs. In addition, the persistence of these informal systems also occurs via illegal payments to public officials and to control systems, which allow relatively well developed intermediary networks to transport the timber to markets (Mejia et al., 2015). These payments fuel local corrupt systems that work against smallholders and chainsaw millers who do not have the resources to process their permits, and are vulnerable to asymmetric interactions with intermediaries (who also provide the capital to finance the timber extraction).

Transporting logs along the river Indonesia.
Photo © Sophie Furnival/CIFOR

Furthermore, once valuable timber species are exhausted, small-scale timber extraction and chainsaw milling tend to put pressure not only on indigenous and smallholder lands but also on surrounding lands, which can include public forests, agroforestry zones and, in some cases, protected areas. This is also influenced by the process of social expansion of frontiers dominated by smallholders, whereby immigrants looking for new lands to occupy move into these areas. Ultimately, this leads to negative effects on forests and a lack of incentives for conservation (Chomitz, 2007). It also accelerates the expansion of agricultural frontiers with a growth of subsistence, cash crops or mixed production systems to the detriment of forests. While some smallholders are able

Box 6.3

Forest conversion to pulp and paper, and oil palm plantations in Indonesia

In Indonesia, by far the most widespread illegal practice associated with forest conversion is under-reporting of commercial timber stocks (KPK, 2015). This helps the companies, on the one hand, to minimize forestry taxes due to the government, and on the other hand, to maximize returns on the sale of timber. As the government is progressively addressing this problem, there is an increasing tendency among oil palm companies to forgo timber profits and focus exclusively on oil palm. If the concession contains commercial timber stocks, the company is required to obtain a timber utilization permit (IPK), a forest clearing permit and pay appropriate taxes. Many companies resort to bulldozing over the timber and burying it in the ground in order to avoid the necessity of dealing with the forestry authorities, an illegal practice. The underreporting problem has had a hard impact on the government's ability to collect forestry revenues. According to KPK (2015), between 2003 and 2014, the government recorded only 23 percent of timber volumes that were actually extracted and lost between USD 6.5 to 9 billion as a result.

A large proportion of forest allocated to forest concessions in the past has been reclassified for plantation development. With 35 million hectares of forest land allocated to industrial timber plantations (HTI) and oil palm estates, these two commodities have been the leading drivers of deforestation in Indonesia and a major source of timber (Casson et al., 2014). While large-scale oil palm plantations drive most of the forest conversion, increasingly smallholders are expanding their plantations, currently contributing to 42 percent of total palm oil supply (Directorate General of Estates, 2014). Oil palm expansion has led to significant impacts on CO2 emissions (Carlson and Curran, 2013), mainly due to expansion into peatlands. Between 1990 and 2009/2010 net CO2 emissions, from land use change due to oil palm plantations, peat fires and peat oxidation, increased from 92 to 184 Tg CO2 yr-1 in Indonesia, Malaysia and Papua New Guinea (Agus et al., 2013). Between 2007 and 2010, the total area of industrial scale oil palm agriculture on peatlands increased by over half a million hectares, from 1.6 to 2.15 million hectares. Some 0.2 million hectares of this expansion was in Malaysia—nearly all of it in Sarawak—and the rest was divided more or less evenly between Sumatra and Kalimantan (Miettinen et al., 2013).

to expand their assets, and become capitalized farmers, the vast majority is not able to exit the poverty trap due to a limited access to land (Coomes et al., 2011). Logging by smallholders presumably has far lower impacts on biodiversity, carbon emissions, runoff and soil erosion than does intensive, large-scale logging, especially if road networks are not created (Edwards et al., 2014).

Cumulative impacts

The cumulative impacts of informal small-scale and artisanal timber production are contradictory. On the one hand, this type of timber operation contributes to supporting the livelihoods of smallholder-dominated landscapes under relatively diverse livelihood strategies, which occasionally rely on timber extraction. On the other hand, while most of the benefits remain in the production zones, they are not necessarily invested in agriculture or forestry, and a portion of those benefits still finance corrupt networks that reproduce themselves at the expense of informal timber extraction, thus inhibiting the upgrade of the timber value chain and SMEs. While informal small-scale and artisanal timber production produce a lower impact on biodiversity and carbon emissions in comparison to large-scale logging, much of it depends on the spatial scale and intensity of the timber operations.

6.4.3 Illegal Forest Conversion to Agriculture

A portion of logged-over forests tends to be converted to other land uses, mainly agriculture, and to a lesser extent, mining and urban expansion. This conversion takes place in three ways: the first is large-scale mechanized clearing driven by agri-business for the expansion of large-scale intensive plantations (e.g. soybean, oil palm) that primarily supply export markets. The second is land clearing in smallholder farmer plots, who convert forests as part of their traditional agricultural systems for meeting subsistence needs, supplying domestic markets with staple crops (e.g. manioc, rice) or international markets with high-value tree crops (e.g. cacao, coffee). The third is medium-scale landholders, with traditional systems (e.g. traditional ranching) that embrace extensive production systems.

A portion of timber supplied to domestic and international markets originates from forests converted to agriculture. This proportion varies greatly over time and across countries. For example, this situation has changed recently due to the drastic reduction of illegal land clearing in Brazil, which is currently mainly associated with smallholders (Godar et al., 2014). Conversely, land clearing continues in Indonesia due to the development of plantations (Margono et al., 2014). The situation is less clear in other tropical countries since deforestation has tended to grow in the Andes-Amazon countries (Coca-Castro et al., 2013), and pressures on land have been expanding in Western and Central Africa (Feintrenie, 2014). In the latter regions, while most past deforestation was driven by smallholders, increasing pressure has been placed by large-scale investments

Aerial view of growing oil palm plantation near Douala, Cameroon. Photo © M. Edliadi for CIFOR

involving foreign investors and new multi-national holdings in the region (Gerber and Veuthey, 2011; Feintrenie, 2014). An important but unknown portion of these forest clearings is likely undertaken outside of the law, thus can be considered as illegal forest conversion.

There is still debate on the extent to which agricultural development in the tropics is a direct driver of deforestation and to what extent it merely takes over areas previously degraded by commercial logging or small-scale encroachment, or lands already opened for other agricultural land uses. Moreover, other difficulties arise when assessing the legal technicalities of forest conversion. For example, in Indonesia, the forestry law does not consider clearing of natural forest cover in industrial forest concessions (HTI) as deforestation. Such tree cover is considered temporary "destocking", there is no need for timber utilization permits, and timber that is from natural forest clearance is not differentiated from harvested pulpwood (Obidzinski and Kusters, 2015). Also, concessions for oil palm are granted for the conversion of all forestland granted for oil palm development - with the exception of riparian forests and areas deemed inappropriate for planting - thus areas not converted can be claimed back by the state (Daemeter, 2015). In the Brazilian Amazon, 75 percent of the landholding has to be maintained as legal forest reserve (Soares-Filho et al., 2014).

Direct impacts

Illegal forest conversion leads to a complete removal of forests, replacing them with agricultural crops, high-value tree crops, or agroforestry systems, depending on whether agricultural expansion is driven by agribusiness or smallholder farmers. There are several direct impacts of forest conversion. Main environmental impacts are negative, due to forest degradation which leads to net carbon emissions, destruction of habitat for wildlife, and impacts on water provision and soil erosion, depending

on which agricultural practices are utilized (Lambin and Geist, 2006). Carbon stocks are dramatically reduced via conversion, resulting in net carbon emissions (Asner, 2009; Galford et al., 2011). The effects on carbon emissions are largest when converting peatlands to oil palm, and pulp and paper plantations, as in Indonesia (see Box 6.3). In addition, if clearance drives the fragmentation of remaining forests, then edge and isolation effects can reduce carbon stocks and biodiversity value over time in persisting forest patches (Laurance et al., 2002; Magnago et al., 2016).

Logging-facilitated conversion of forest to agriculture leads to severe biodiversity loss: there is a substantial loss of species richness (Gibson et al., 2011), underpinned by a large change in community composition from forest dwellers to edge and non-forest species. There is also a substantial decay of ecosystem functions when logged forest is converted. For example, large production forests retain more insectivorous and seed-dispersing birds, and nocturnal and dung-rolling beetles than do oil plantations (Edwards et al., 2013; Edwards et al., 2014). This will influence ecosystem processes, with implications for plant growth and biogeochemical cycling. Furthermore, forest conversion drives increased runoff, especially during tropical rainstorms, with greatly reduced evapotranspiration, 100–800 percent increases in annual water flow (Bruijnzeel, 2004), peak flows 185 percent higher and water levels rising nearly twice as quickly than under forest cover (Douglas, 1999). In cases where small-scale timber production does facilitate forest conversion, then the resulting impacts on biodiversity and ecosystem services will depend on the area cleared and the permanency of clearance (e.g., permanent monoculture versus slash-and-burn shifting agriculture).

Agribusiness and smallholder farmers benefit from forest conversion: the former since expanding agriculture contributes to expand their profits; the latter since that enables them to develop income streams that have positive impacts on their livelihoods (Angelsen and Wunder, 2003). Smallholder farmers depend on farming systems and cash crops to generate income. Agribusiness tend to embrace large-scale crop plantations (e.g. soybeans, oil palm), which are capital-intensive since they require higher levels of inputs, while smallholders tend to opt for high-value tree crops (e.g. cocoa, coffee), even though they only capture a small portion of the value that is created in these value chains (Arias et al., 2013).

It is noteworthy, that agricultural development in forest frontiers contributes to increase the value of land. Frequently, land is the main asset of farmers and it is used as collateral. Forest conversion to agriculture also contributes to generate local employment; this is much lower when the emerging land use is large-scale capital-intensive agriculture (e.g. soybean) or extensive ranching, and can be higher in the case of oil palm plantations that require labour for cleaning, applying fertilisers and harvesting, among others. In addition, forest clearing driven by smallholders expands labour-intensive farming systems. Another direct impact of agricultural expansion is production of crops that supply the domestic food markets or meet the supply of global food and feed industry. Some agricultural crops (e.g. palm oil) also provide raw material for multiple industrial uses.

Indirect impacts

Forest clearing associated with the development of large-scale plantations tends to lead to negative social impacts but also has positive economic multiplier effects. On the one hand, agricultural expansion may lead to social conflict, when concessions for agri-business development are granted in opaque or irregular circumstances, as in several countries in Central Africa (Assembe-Mvondo et al., 2015), or when legislative and customary land rights are ignored when the concessions are granted. This in turn affects customary tenure rights (Schoneveld, 2013) and negatively impacts on the livelihoods of minorities, particularly if mechanisms are not put in place to compensate or rebuild those livelihoods (German et al., 2010). On the other hand, plantations have important multiplier effects in other sectors (e.g. services) and trigger significant economic growth in frontier areas, leading to infrastructure development and expansion of market networks, and logistics and processing facilities.

However, this can be problematic when new roads are built, opening up new forest areas and resulting in an influx of immigrants trying to obtain a piece of land and establish themselves in these frontier areas. Smallholders seize the opportunity of existing infrastructure and logistics to get involved in value chains as has been the case with beef cattle in the Brazilian Amazon (Pacheco and Poccard-Chapuis, 2012) and oil palm in Indonesia (Cramb and McCarthy, 2016). There are also processes of land re-concentration. For example, as large areas of land for oil palm plantations are increasingly difficult to come by, plantation developers often resort to crowd-sourcing of land from village communities and individual families. In this way, they purchase hundreds of small land parcels that add up to thousands of hectares (Budidarsono et al., 2012). There have also been land re-concentration in the Brazilian Amazon, particularly in already established agricultural frontiers (Pacheco, 2009).

Cumulative impacts

The most important cumulative impacts of illegal forest clearing are related to people's livelihoods and climate change as a result of large-scale plantations. The development of crop plantations contributes to the accumulation strategies of agribusiness, but it also has contradictory impacts on livelihoods. On the one hand, large-scale plantations displace local people, thus contributing to increase the vulnerability of some local social groups, generally indigenous populations. On the other hand, agribusiness development tends to integrate some more capitalized farmers in the supply chain, thus improving their wellbeing over time. This also leads to contradictory impacts in the economy with illegal clearing leading to tax evasion, but also agricultural expansion creating important spillover effects in the rest of the economy.

Environmental impacts of clearance tend to concern climate change and biodiversity, with clear cumulative effects on global carbon emissions and biodiversity loss as a result of agricultural expansion by both agribusiness and smallholder farmers. Additionally, the conversion of large tracts of logged forest will likely exacerbate climate change impacts via altering local temperature and rainfall patterns (Makarieva et al., 2014). Local and regional climates are largely driven by cycles of rainfall, evaporation, and cloud formation within tropical forest biomes. The loss of forest cover can disrupt this cycle, reducing the number of rainy days and increasing interannual variability in rainfall (Webb et al., 2005). In the Amazon, for instance, large-scale areas without tree cover have higher temperatures and lower rates of evapotranspiration, resulting in less rainfall (Spracklen et al., 2012).

6.5 Conclusions

This chapter sought to assess the impacts from illegal forest activities by drawing on existing literature. Fragmented data is a challenge and there is still no comprehensive global assessment spanning different geographies that structures, condenses and evaluates the impacts of illegal logging. Nonetheless, the framework that we offer here advances this discussion by: 1. linking explicitly the impacts of illegal logging to the specific situations under which it takes place; 2. distinguishing different causal relationships and interactions among impacts from illegal logging, and 3. identifying both negative and positive impacts from illegal logging (see Table 6.2). These three aspects were neglected in the analyses of illegal logging to date. In addition, we argue that the impacts from illegal versus legal logging are hard to separate, since the two tend to co-exist, and legal logging also leads to significant impacts. Furthermore, in some cases legal regulations may increase the pressure on forests, particularly when compared with timber extraction undertaken informally.

The main conclusions of this review are that, while impacts are inextricable linked, they differ depending on the type of situation driving them, and the scale of the associated operations. Large-scale industrial logging tends to be more regulated when accessing public forests, mainly through concession systems, but logging companies also contravene regulations in multiple ways, which leads to diverse positive and negative impacts, depending on the standpoint. In addition, it is difficult to generalize the widespread impacts of small-scale and artisanal timber extraction and milling that have developed widely across the tropics as they constitute a very heterogeneous group of actors having in common the fact that most of their timber operations are conducted outside of the laws or informally. The main impacts of informal small-scale logging depend on the type of forest management practised and the number of smallholders involved, as well as the intensity of timber harvesting. Finally, the impacts of illegal forest conversion are highly variable depending on whether conversion is to develop large-scale plantations or more traditional small-scale farming systems.

While direct impacts of illegal logging are easier to discern and quantify, the indirect impacts are less evident. Illegal forest activities impact directly on tenure rights, local jobs and income, timber markets, and rents capture, as well as leading to timber depletion and forest loss. Several negative impacts (e.g. forest encroachment, species loss, precarious jobs, illicit appropriation of public resources) can be highlighted but some positive ones such as local generation of employment and income for the rural poor also need to be considered, as illegal logging can enable local people to capture benefits that otherwise would be appropriated by others. There are several indirect impacts, transmitted through the market structures or political systems that tend to amplify the indirect impacts of logging, mainly increasing pressures on customary lands and conflicts, reduction in the economic value of forests and high-risks to investors, patronage systems and corruption that erode the effectiveness of law enforcement. Interestingly, many other factors – outside of the forest sector – generate cumulative effects that lead to the loss of people's livelihoods and erosion in the resilience of local actors, along with state revenue loss, and long-term impacts of biodiversity loss and climate change.

Undoubtedly, there are several synergies and trade-offs among the different types of social, economic, political and environmental impacts, but their analysis is outside the scope of this chapter. A more refined analysis of trade-offs, and winners and losers, is necessary across the different geographies in which there is still significant illegal logging, as well as the differential impacts of illegal versus legal logging and forest conversion.

Some main outstanding gaps with regards to impacts of illegal forest activity are:

- More knowledge is needed on the modus operandi of illegal timber networks, primarily about the evolving nature of illegal timber extraction and trade, which tend to adopt different strategies to circumvent the law and reproduce their operations.
- There is a continued need to refine information on commercial standing stocks and actual production, and land use trajectories exploring the link between forest intervention and forest conversion. Better use of emergent remote sensing for real-time monitoring and verification is particularly important.
- Information gaps remain on the dynamics of the small-scale logging sector, which is expanding. The size of the small scale sector, as well as its market and financial connections with actors upstream in the value chains are still unknown.
- There is a very limited quantification of the environmental impacts of large- and small-scale illegal logging versus those of legal logging systems, which is vital for understanding the conservation values of illegally-logged lands.
- There are major gaps of fairly fundamental information on the impacts of forest conversion, especially related to the impacts from conversion on primary versus degraded forests, and actual social and biodiversity impacts.

- More understanding is required of the indirect and cumulative impacts from illegal logging and related timber trade, in order to develop policy mechanisms to address them and to mitigate their negative impacts in the longer term.

Understanding better the social and political interactions among actors involved in illegal logging can contribute to better identify leakage and laundering effects, so that more effective monitoring of these processes can be put in place.

Table 6.2

A synthesis of some key effects across three different type of situations of illegal forest activities

Impacts			Large-scale industrial logging operations	Informal small-scale and artisanal production	Illegal forest conversion to agriculture
Nature	**Dimensions**	**Types**			
DIRECT	Social	Enhance social control	Low (−)	High (+)	Low to high (−/+)
		Securing tenure rights	Low (−)	High (+)	High (+)
	Economic	Remuneration to local labour	Low (−)	High (+)	Low to high (+)
		Local capture of benefits	Low (−)	High (+)	Low to high (−/+)
	Political	Local elite capture	High (−)	Low (−)	Low to high (−/+)
		Misappropriation of resources	High (−)	Low to high (−)	High (−)
	Environmental	Forest clearing to agriculture	High (−/+)	Low (−/+)	High (−)
		Loss of key timber species	High (−)	Low to high (−)	High (−)
INDIRECT	Social	Pressure on local lands	High (−)	Low (−/+)	High (−)
		Land conflict and violence	High (−)	Low (−)	High (−)
		Local mechanisms of forest control	Low (−)	High (+)	Low (−/+)
	Economic	Reduction in forest value	High (−)	High (−)	High (−)
		Risks for secure investments	High (−)	High (−)	Low (+)
		Benefits retained locally	Low (−/+)	High (+)	Low (−/+)
	Political	Fuel patronage systems	High (−)	Low to high (−)	Low to high (−)
		Loss of command and control authority	High (−)	High (−)	High (−)
	Environmental	Reduction in species richness	High (−)	Low to high (−)	High (−)
		Habitat destruction	High (−)	Low to high (−)	High (−)
CUMULATIVE	Social	Livelihood loss	High (−)	Low (−)	Low to high (−)
		Diminished resilience capacity	Low to high (−)	Low to high (−)	Low to high (−)
	Economic	Loss of state revenue	High (−)	Low to high (−/+)	Low to high (−/+)
		Unequal appropriation of forest rents	High (−)	Low (−)	Low to high (−)
	Political	Prevalence of corrupt behaviours	High (−)	Low to high (−)	Low to high (−)
		Links with other illicit activities	Low to high (−)	Low to high (−)	Low (−)
	Environmental	Biodiversity loss	High (−)	Low to high (−)	High (−)
		Climate change	Uncertain	Uncertain	High (−)

Source: Authors' elaboration. Low and High propensity of impact. Impact can be (+) positive, (−) negative and (−/+) contradictory.

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Chapter 7
Global Governance Approaches to Addressing Illegal Logging: Uptake and Lessons Learnt

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7.1 Introduction

One of the most challenging tasks facing development agencies, trade ministries, environmental groups, social activists and forest-focused business interests seeking to ameliorate illegal logging and related timber trade is to identify and nurture promising global governance interventions capable of helping improve compliance to governmental policies and laws at national, subnational and local levels. This question is especially acute for developing countries constrained by capacity challenges and "weak states" (Risse, 2011). This chapter seeks to shed light on this task by asking four related questions: How do we understand the emergence of illegal logging as a matter of global interest? What are the types of global interventions designed to improve domestic legal compliance? How have individual states responded to these global efforts? What are the prospects for future impacts and evolution?

We proceed in the following steps. Following this introduction, step two reviews how the problem of "illegal logging" emerged on the international agenda. Step three reviews leading policy interventions that resulted from this policy framing. Step four reviews developments in selected countries/regions around the world according to their place on the global forest products supply chain: consumers (United States, Europe and Australia); middle of supply chain manufacturers (China and South Korea) and producers (Russia; Indonesia; Brazil and Peru; Ghana, Cameroon and the Republic of Congo). We conclude by reflecting on key trends that emerge from this review relevant for understanding the conditions through which legality might make a difference in addressing critical challenges.

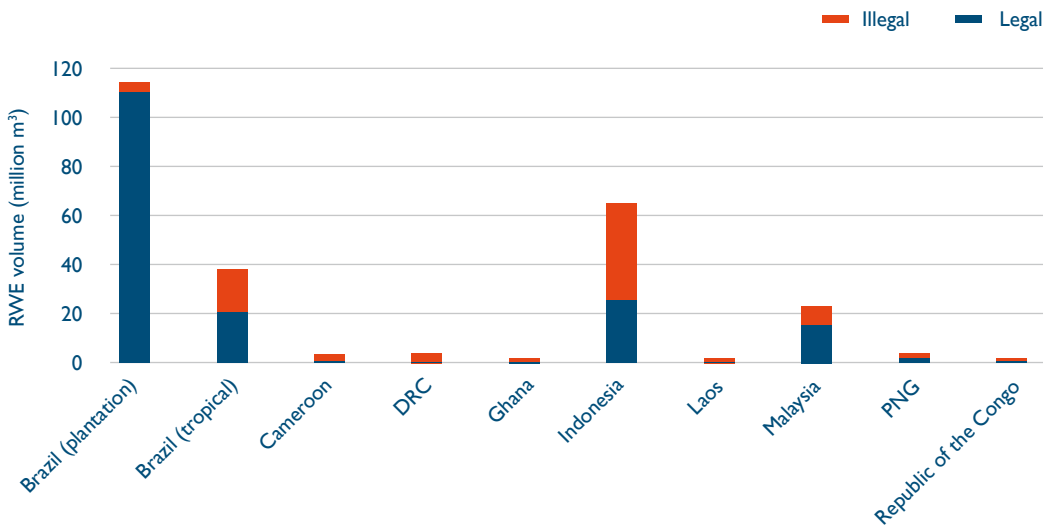
Mahogany wood. Trading mahogany species is restricted by the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES). Photo © iStock: SafakOguz

7.2 The Emergence of "Illegal logging" on the Global Agenda

While illegal logging has long been a domestic issue in many forested countries, the first glimpse of international attention towards illegal logging followed the 1992 United Nations Conference on the Environment and Development (UNCED) (Gulbrandsen and Humphreys, 2006) in which the world's governments could not agree on a binding international legal instrument on forests. Instead, UNCED fostered attention on a non-legally binding statement of "Forest Principles" and Agenda 21 that emphasized national sovereignty and regional cooperation, such as promoting "National Forest Plans" (Humphreys, 2006) and criteria and indicator processes that focused on defining

Estimated production of legal and illegal timber in the nine producer countries, 2013.

Figure 7.1



Source: Hoare (2015)

responsible forest management. The promotion of responsible forest management through market based eco-labelling/forest certification programmes - exemplified by the Forest Stewardship Council (FSC) created in 1993 and the Programme for the Endorsement of Forest Certification (PEFC) - are important for an analysis of illegal logging for two reasons. First, they reinforced the importance of global forest products markets as not only causing pressure on forests, but also as a possible arena in which to promote responsible stewardship. Second, both the FSC and PEFC promote legal compliance as a first step towards achieving broader sustainability in global forest management (Leipold et al., 2016). All these efforts place in context global efforts to target illegal logging and trade which, by the late 1990s and early 2000s, became an increasing concern to the competitiveness of timber interests in North America and Europe following increased flows of tropical forest products to consumers in developed countries (Leipold et al., 2016). This concern was reinforced by environmental groups, highlighted by the Environmental Investigation Agency (EIA), which drew on data from think tanks such as Chatham House to raise the issue of illegal timber in tropical developing countries (Leipold and Winkel, 2016). Figure 7.1 and Chapter 3 of this report provide recent estimates on the extent of illegal logging.

7.3 Global Approaches to Addressing Illegal Logging

As detailed in Chapter 2, following recognition from domestic and international agencies, including the US State Department and the World Bank, that addressing illegal logging required international political action, the 1997

Pivotal events in global efforts to address illegal logging — Table 7.1

Year	Event
1995–1997	Intergovernmental Panel and Forum on Forests refers to illegal logging in its proposals for action
1997	G8 summit agrees to an Action Plan on Forests which includes a commitment to eliminate illegal logging
1998–2000	G8 summits in Birmingham and Okinawa issues statements committing members to address illegal logging
September 2001	Bali Ministerial Meeting: a Forest Law Enforcement and Governance (FLEG) initiative in Asia is launched
2002	Indonesia signs joint statements or memoranda of understanding with the UK, Norway, Japan, Republic of Korea and China
July 2003	The President's Initiative Against Illegal Logging is launched, committing the US to assist countries in the Congo and Amazon Basins, Central America and South-East Asia to combat illegal logging
October 2003	Yaoundé, Cameroon: 39 countries committed to a Ministerial Declaration and Actions targeted at combatting illegal logging, associated illegal trade, and corruption in the forest sector at the Africa Forest Law Enforcement and Governance (AFLEG) conference
July 2003	The EU's Action Plan is officially released emphasizing increased support for governance and enforcement in wood-producing countries, as well as mechanisms for voluntary actions to control trade in illegal wood products. Trading activities are added to the EU's FLEG programme, renamed FLEGT
November 2005	Europe and North Asia Ministerial Conference on FLEG in St. Petersburg
2008	US Lacey Act is amended to include plants and plant products such as timber
2009	Ghana is the first country to sign a Voluntary Partnership Agreement (VPA) with the EU (later followed by the Republic of Congo, Cameroon, Central African Republic, Indonesia and Liberia)
2010	The European Union's Timber Regulation is passed
2012	Australian Illegal Logging Prohibition Act passed
March 2013	The EU Timber Regulation enters into force
November 2016	Indonesia becomes first country in the world to issue FLEGT licences verifying legal timber products

and 1998 G8 "Action Plan on Forests" included formal commitments from the world's largest global economic powers to promote the rule of law in the forest sector (Humphreys, 2006). For example, illegally-sourced timber was estimated to cost, on average, 16 percent less than legal wood, and thus was distorting international timber markets and undercutting the competitiveness of legally-operating forest industries (World Bank, 2005).[2]

These plans paved the way for the first of three ministerial meetings on Forest Law Enforcement and Governance (FLEG): Bali, 2001 (focused on Southeast Asia); Yaoundé in 2003 (focused on Africa) and St. Petersburg in 2005 (focused on Europe and North Asia). Each of these three meetings, which involved a broad range of stakeholders including government ministries, aid agencies, business, NGOs and social groups, produced a comprehensive set of plans and commitments to remove illegal timber from global supply chains.

Arguably the most comprehensive approach following the Bali Action Plan was the emergence of the EU's Forest Law Enforcement, Governance and Trade programme (FLEGT), which focused on reducing illegal timber through bilateral Voluntary Partnership Agreements (VPAs) between the EU and tropical timber exporting countries. Through VPAs, partner states assume responsibility for enforcement by assuring the legal source and production of wood and by granting a licence to each consignment verified as legal before it is exported to the EU. The EU assists the partner in developing their timber tracking and licensing systems, and in strengthening their governance capacity. In return, producers and traders can place timber on the European market without any further proof of legality (European Timber Regulation, 2010). The VPAs are specifically constructed to be consistent with WTO rules, which allow for non-tariff barriers when both consuming and producing countries agree to such restrictions (Brown et al., 2008). In addition to EU VPA efforts, a second key catalyst, originating first in the United States, but then spreading to the EU, Japan and Australia, focuses more specifically on amending domestic legislation to "weed out" illegal timber imports (Cashore and Stone, 2014). A third demand-side measure is the role of national governments in adopting "legally-sourced" public procurement policies. These efforts have been led by many European countries, but also have expanded to China, Japan, Mexico and New Zealand (Brack, 2014).

7.4 Country/Regional Cases

The story of domestic responses over the last 15 years has been highly dynamic. Policies in key consuming countries/regions encouraging legality compliance of timber imports – especially the United States and the EU - have significantly shifted from minimal or non-existent efforts to accelerating support. There has also been more cautious, but incremental, support from "middle of the supply chain" countries, such as China and South Korea. Though highly divergent, targeted producer countries have also shown increasing interest in drawing on incentives of "legality verification" of wood products to help foster "bottom up" incentives to improve domestic governance challenges. We now turn to discuss select examples of these changes over time, which we draw on to discuss lessons learnt and potential for future uptake.

7.4.1 Consumer Countries/Regions: the US and EU

Initially, the US approach emphasized responsibilities of consumers to help tropical producers by providing capacity to assist developing country governments in enforcing their own laws and policies (Cashore and Stone, 2014). However, the US broadened its framing towards "demand side" policies following the American Forest & Paper Association's findings that illegal wood was causing billions of dollars of losses to the US forest products sector (Seneca Creek Associates and Wood Resources International, 2004), and recognition by some environmental groups that a focus on reducing illegal imports, rather than simply higher standard certification programmes, might have more immediate impacts on the ground in tropical countries. A subsequent coalition of environmental and US timber producer interests successfully lobbied for the US Congress to amend, and expand, the US Lacey Act in 2008 to forbid the importation not only of illegal animal products, but also of plants (i.e. illegal timber). While the statutes leave discretion to suppliers and purchasers about just how to ensure they are not importing illegal timber, a consensus is emerging that one beneficial way to meet these requirements is to track legally-harvested products along global supply chains (Cashore and Stone, 2012).

In contrast to the United States, the EU approach to addressing illegal logging, as detailed above, emphasized the development of formalized negotiations between producer countries and the EU through VPA agreements. This "negotiated agreement" approach is important as it accounts for much of the responses on the part of developing countries reviewed below. At the same time, it is important to note that following the US Lacey Act modifications that targeted all imports entering the country, similar trade restrictions were taken up by the EU through the "European Union Timber Regulation" (EUTR). Domestic implementation and enforcement of

[2] In the very early days, the World Bank promoted legality verification through traditional direct financing incentive programmes. For instance, in Cambodia in 1999 pressure from the World Bank resulted in Global Witness acting as independent forest monitor overseeing Royal Government of Cambodia's forests. This relationship deteriorated following a 2001 Global Witness report that pointed to Cambodian public officials as engaging in illegal logging activities. In 2004, the contract ended, and in 2005 Global Witness staff were prevented from entering into the country (Luttrell and Brown, 2006)

the Regulation however, remain the responsibility of each Member State (Schwer and Sotirov, 2014).

In a similar vein, in 2012, the Australian Senate passed the "Illegal Logging Prohibition Act" (ILPA). The legislation aligns with EU and US legislation in prohibiting the placing of illegally-logged timber, or products made from such timber, onto the market. This covers both imported and local Australian timber. Like the EU Timber Regulation, the Act imposes due diligence obligations on importers and traders, which were defined in the 2014 Illegal Logging Prohibition Regulation. The Act is similar to the Lacey Act, and different from the EU Timber Regulation, in not accepting a CITES permit as proof of legality, although such permits may be used to support a due diligence case.

There were, however, notable differences in the types of domestic coalitions that emerged to support these policies. In the EU initially, environmental groups targeted domestic economic operators, traders and retailers by asserting that many of their imported wood products originated from illegal logging crimes in foreign countries. In response, traders and retailers eventually united with environmental groups to support the EUTR as a way to weed out illegal timber (Sotirov, 2014; Sotirov et al., 2015). This coalition also argued that by reducing international imports, the EUTR could also be seen as an important industrial development policy within the EU (Sotirov et al., 2015).

In contrast to the United States, European domestic timber producers, along with exporters from forest-rich EU Member States including Austria, Germany, Finland and Sweden were generally opposed to the EUTR. They feared, just as US producers had feared a decade before, that regulatory changes might result in their own domestic practices becoming a target (Sotirov, 2014). Unlike the US – where producers and NGOs worked out a collective effort to emphasize illegal logging as an external problem that originated abroad – EU producers had yet to be assuaged. In part for these reasons, producers identified technical and practical implementation, as well as WTO rules, in their unsuccessful efforts to reverse the EUTR decision (Leipold et al., 2016; Sotirov, 2014; Sotirov et al., 2015).

Given that individual countries decided whether, and how, to implement the EUTR, it is also important to note divergent uptake/implementation within Member countries (Sotirov et al., 2015). In general, scholars have found weak implementation within poorer Eastern European countries such as Bulgaria and Romania (Gavrilut et al., 2015) as well as in Southern Europe, particularly in Greece, Italy and Spain (Sotirov et al., 2015). Other scholars have found increasing coordination between EUTR implementation and FLEGT VPA processes, owing for example to the creation of the European Commission's EUTR/FLEGT Expert Group, an informal enforcement network convened by EU Member State Competent Authorities, and the Timber Regulation Enforcement Exchange (TREE) network organized by Forest Trends, which brings together environmental NGOs and law enforcement authorities from the EU, US, Australia and INTERPOL concerned with illegal logging (Overdevest and Zeitlin, 2016).

Office furniture made from rosewood (China)
Photo © Jianbang Gan

7.4.2 Middle of Supply Chain Countries[3]

The first formal approach from China to address legality verification occurred following the G8 Forestry Action Programme, which ended in 2002, (Toyne et al., 2002) and the "Bali Action Plan" on illegal logging. The Chinese State Forestry Administration (SFA), which has responsibility for developing domestic and international forest policy commitments, recognized the need for some type of policy response. First, the SFA declared that illegal logging was not a problem within China, but rather concerned challenges in other countries such as Indonesia. Second, to assuage concerns, the SFA signed a 2002 memorandum of understanding (MoU) with Indonesia designed to reduce illegal exports through information exchanges (Hurd and Simorangklr, 2011). Third, despite evidence to the contrary (Chrystanto, 2004), the SFA also provided assurances that its current systems ensured that tropical imports coming into China were legal. However, the MoU was generally viewed as a "paper exercise" with few observable effects in either country (Tacconi et al., 2004). No formal efforts were made to change internal policies governing legality verification.

Beginning in 2008, China changed course by formalizing a nation-wide approach to legality verification. The hallmark of this effort was the development of the Chinese Timber Legality Verification System, formally launched in December 2009. This system, implementation of which would continue throughout 2010, draws on China's extensive permitting systems to establish chain of custody for all legally verified forest products within the Chinese forestry sector (Sun and

[3] The section draws on Cashore and Stone (2014).

Canby, 2010). China also moved to strengthen the original Sino-Indonesian agreement by initiating more MoUs/agreements with other forestry product consuming markets including the US, EU, Australia and Japan with more formalized commitments and actionable items, such as enhancing communication around legal compliance challenges (Hurd, 2011). They also created mechanisms to follow up on MoU implementation, such as the US-China annual bilateral forum on combatting illegal logging and associated trade, and the EU-China annual Bilateral Coordination Mechanism on Forest law enforcement and governance (Chen et al., 2013).The SFA also undertook proactive efforts to assist Chinese operators, including issuing guidelines for domestic forest operations about how to meet legal requirements in foreign countries where they manage and utilize the forest; and providing training to Chinese forestry business to better understand, and comply with, the US Lacey Act and the EUTR (Chen, 2016).

International organizations like the World Wide Fund for Nature (WWF) and Greenpeace's China office also assisted by developing voluntary guidance tools focusing on how export-orientated companies might meet international legality verification demands by improving Chain of Custody (CoC) management. Currently the government has drafted a full-fledged Chinese Timber Legality Verification programme (CTLV), which was followed by an industry association pilot study. The development of CTLV is continuing. Cashore and Stone (2014) argue that China's more proactive approach is owing, in part, to the Lacey Act and EUTR amendments, which created stronger market signals, as well as assurances that China's existing approach to the sustainable management of forests would be reinforced, rather than challenged.

Other "middle of the supply chain" countries have also followed suit. For example, South Korea has, through its 2013 Act on the Sustainable Use of Timber, focused on reducing both domestic and foreign sources of illegal timber (although the legislation has yet to come into force). The Korean government has also announced that it will introduce voluntary "due diligence" among timber traders and manufacturers by 2017.

7.4.3 Producer Countries

Uptake in producer countries can be distinguished in two ways: those involved in VPA processes with the EU; and those who have responded to other global influences reviewed above (and in Chapter 2), as well as to their own domestic market pressures. We turn to review select cases of each.

VPA-supported countries

As of September 2016, Ghana, Cameroon, Republic of the Congo, Central African Republic, Liberia and Indonesia have all signed VPAs and are in the process of developing or implementing internal systems. Several other countries are in the negotiation or pre-negotiation (informing) phase, including Myanmar/Burma and Bolivia (EU FLEGT Facility, 2016).

Cameroon

Cameroon signed and ratified its VPA with the EU in 2010 that included a number of goals including: ensuring that all timber is legally sourced, transported and exported; promoting good forest governance, and improving capacity of stakeholders to engage in forest policy and practice through resource and technology transfers. The government and its technical and financial partners are now placing efforts on developing a "timber legality assurance system" (TLAS).

Some scholars argue that aside from stakeholder negotiations, there is thus far little discernible influence of the VPA process on the ground in the Cameroonian forest sector, largely owing to limited national commitment (Dkamela et al., 2014). Dkamela et al. (2014) explain that "internationally driven national forest policy processes tend to encounter massive implementation challenges" simply due to the fact that they stem from global priorities that may not reflect national policy agendas. For example, Cameroon's overarching policy objective is economic development given that it is a low-income country with high poverty rates. The national development strategy (Vision 2035) pays little attention to environmental sustainability, focusing rather on agro-industrial expansion, investments in infrastructure and manufacturing. Nonetheless, scholars have reported that the impacts of the VPA process on other policy domains (e.g. REDD+, mining and land tenure) appear to be more significant than its direct impact on illegal forest practices in Cameroon (Tegegne et al., 2014). For example, there is evidence that the VPA advanced collaboration between Cameroon's lead forest agency, MINFOF (Ministère des Forêts et de la Faune) and local NGOs to reduce corruption within the forest administration, and helped foster national implementation of the international climate financing mechanism, REDD+, as well as domestic land use planning processes (Wodschow et al., 2016). There is also evidence that the VPA-initiated deliberations are helping Cameroonian deliberations about how to address key United Nations Sustainable Development Goals including reducing poverty and ameliorating global climate change (Wodschow et al., 2016).

Indonesia[4]

Following international pressures noted above, Indonesia first formally addressed illegal logging in 2002 when it initiated the *Badan Revitalisasi Industri Kayu* (BRIK, Indonesian Institute for the Revitalization of the Timber Industry), which was charged with monitoring and verifying of legal timber and issuing certificates of legality (*Ekspor Terdaftar Produk Industri Kehutanan* or ETPIK) to export-orientated forest companies. However, this approach was criticized as being unable to initiate meaningful changes (Tacconi et al., 2008) owing to uneven standards (Brown and Stolle, 2009) and the relative ease through which black market certificates could be produced (Colchester, 2006).

[4] The following two paragraphs are from Cashore and Stone 2012. Our thanks to Tim Dawson for helpful comments on this section.

Log loader in Indonesia. Photo © Agung Prasetyo for CIFOR

In 2003, the Indonesian government appeared, on paper, to step up its efforts by completing a draft TLAS, formally known by its Indonesian name, *Sistem Verifikasi Legalitas Kayu* (SVLK). However, four years later, drafting was still not complete, leading many non-governmental organizations and international agencies to question Indonesia's resolve to follow through on its commitments. Yet by late 2007, draft legislation was submitted by the Indonesian negotiators to the Ministry of Forests for approval, and, in 2009 the SVLK was signed into law. In a departure from previous efforts that were criticized as limited, independent third parties were charged with auditing compliance with Indonesian law (Luttrell et al., 2011). In addition, civil society is empowered to provide independent monitoring and to submit objections. In sum, the case of Indonesia displays a progression from no support in 1999, to weak support in 2001, to formal and legislated commitments in 2009, followed by increasing support since this time. This ongoing support was matched by increasing roles for stakeholder groups to participate in standard development processes. Civil society representatives were successful in championing good forest governance, transparency and accountability, as well as supporting third party auditing and independent monitoring.

The EU-Indonesian VPA was formally agreed in 2011, signed in 2013 and ratified by the EU parliament in April 2014 (Yulisman, 2014), coming into force in May, 2014. Timber exports to the EU rose by 11.8 percent in the first quarter immediately following ratification (Suherjoko, 2014).

At the same time, given that much of Indonesia's timber harvest is for domestic consumption, which is harvested by local chainsaw operators who contribute directly to the local economy, there has been growing recognition that much attention must be placed on domestic uptake if SVLK is to play a meaningful role in reducing illegal logging. Currently, legal timber is exported to more economically advantageous markets, such as processors in Java or provincial capitals, which means that little timber is left for local consumption. Hence Obidzinski et al. (2014) argue that additional supporting mechanisms such as certification subsidies or incentives, capacity building and anti-corruption measures will be needed if SVLK is to be effectively implemented.

In part for these reasons, extensive revisions and improvements to the SVLK and its governance arrangements were undertaken following the joint Indonesia-EU Action Plan for the implementation of the VPA, which preceded the decision to start issuing formal licences by end of 2016. These revisions included subsidized group certification for small producers, extensive capacity building and training (for public officials, third-party auditors and private businesses), more rigorous accreditation procedures for auditors, stronger complaints and enforcement procedures, enhanced support for independent monitoring, and increased requirements for public information disclosure about the SVLK verification process (Overdevest and Zeitlin, 2016).

Republic of Congo

In May 2010, the Republic of Congo became the first Central African country to sign a VPA with the EU following two years of negotiations. However, six years later, efforts are still focused on developing a Timber Legality Assurance System (TLAS) with which to label exports for the EU market. Several explanations for this slow rate of change have been posited including: conflicts over forest use - especially concerning forest conversion and conservation; elite capture/corruption; decreasing importance of the EU timber market; and government emphasis on promoting commercial agriculture and mining over forestry (Tegegne et al., 2014; Tegegne et al., 2016).

Despite these bottlenecks, practitioners and scholars such as Tegegne et al (2014) argue that the VPA process in Congo has had important indirect effects, including the increasing involvement of the private sector and civil society in national working groups charged with forest governance related issues in general, and revision of forest, land tenure and mining laws in particular. As a result, local communities and indigenous peoples' participation in management plans is now an official right. In addition, independent civil society observation – first established under the VPA process - has now become an important catalyst to enhance transparency in forestry policy circles. Likewise, and following these efforts, the Congo government now makes public a range of previously private documents including management plans and allocations of timber concessions (available through an online website since 2015).

Similarly, as in Cameroon and the Central African Republic, the Congo VPA process has influenced other policy domains, such as REDD+ initiatives. For example, independent monitoring of REDD+, which is under development by national stakeholders, draws on work of the Independent Monitoring of Forest Law Enforcement and Governance Trade (IM FLEGT).

Ghana

Ghana experiences high levels of illegal logging; conservatively estimated at three to four times the legally permitted annual allowable cut (Hansen et al., 2012). The market is divided into a formal sector with harvesting rights issued by the government and an informal sector (chainsaw operators) without such rights. The formal sector produces primarily for overseas export markets while the chainsaw operators produce for the domestic market and for neighbouring countries (Marfo, 2010). In volume terms, approximately 70 percent of the total timber harvest can be attributed to chainsaw operators (Hansen et al., 2012). Ghana, was the first country to sign a VPA with the EU in November 2009, with the aim to secure access to the EU market (Overdevest and Zeitlin, 2016). The VPA, negotiated with broad stakeholder participation (Beeko and Arts, 2010), consists of a legality definition, a TLAS and a commitment for a comprehensive legal and policy reform programme to address more fundamental forest governance challenges.

Implementation of the VPA has proven more difficult than envisaged, and FLEGT export licensing, initially envisaged after two years, is now expected to be initiated in 2017. However, the VPA implementation has provided an effective platform for NGOs, civil society groups and private businesses to bring forward challenges in relation to illegal logging and forest governance issues through the VPA joint implementation committee known as the "Joint Monitoring and Review Mechanism". It has also played an important role in enhancing accountability, learning and problem solving (Overdevest and Zeitlin, 2016). Examples of important steps forward include operationalization of the TLAS, streamlining the implementation of Social Responsibility Agreements that entitles local communities to benefits and services from the timber concession holders equal to five percent of the stumpage fee payment, a public procurement policy for timber, attempts to provide chainsaw operators with legal means (permits) for production, and new procedures to reduce the administrative allocation of timber rights (Overdevest and Zeitlin, 2016). The long-term success of the VPA, some scholars argue, will hinge on its ability to address and find workable solutions for these root causes of illegality in the domestic market, including by enhancing the financial incentives for rural dwellers to engage actively in tree management (Hansen et al., 2015; Lesniewska and McDermott, 2014; Oduro et al., 2014).

Non-VPA countries

A second category of countries are those that have yet to engage in any VPA process but, owing to either previous international influences and/or domestic events, are starting to initiate some type of legality compliance system, often with the support of civil society and business organizations. We focus on three illustrations: Brazil, Peru and Russia, each of which reveals the ways in which global pressures and incentives play mediating roles in shaping domestic deliberations over legality verification.

Brazil

Illegal logging in Brazil is now recognized as a serious and persisting issue. Some estimates indicate that during the period 2000-2012, between 68 and 90 percent of forest clearing in Brazil was illegal (Lawson et al., 2014). However, the case of Brazil is distinct from the other cases in this review because the vast majority of Brazil's forest products are destined for domestic markets, rendering direct market incentives from the Lacey Act and EUTR less important.[5]

Still, international influences are certainly felt in a number of ways. International norms, including "biodiversity loss", "deforestation" and now "illegality", have been influential in shaping domestic discourses and problem definitions. Certainly as an important producer, processor and consumer of wood-based products, Brazil's efforts to slow down deforestation in the Amazon during the last decade, have been the subject of strong international scrutiny. In addition, and as a result, international aid agencies and non-governmental organizations have worked with, and provided resources to, the government, NGOs and business organizations in an effort to help improve uptake of, and influence, domestic efforts designed to reduce illegal activity affecting forests.

Several laws are relevant for those seeking to curb illegal logging. The Forest Code establishes the minimum parameters for conservation of forests within private landholdings, including Areas of Permanent Protection (APP) and Legal Reserves (RL). An Environmental Crimes Law sets criminal and administrative sanctions for behaviour and activities that harm the environment, including crimes against the flora – such as the destruction or damage of APP or RL. The legal framework is also composed of the National Conservation Area System (SNUC) – which establishes protected areas with specific restrictions and conditions on land use – and the Public Forest Management Law, which regulates the exploitation of public forests. Applicable legislation includes timber tracking and control systems at national and state levels, requiring timber transportation to be accompanied by documents of origin and corresponding cargo invoices. Logging must be carried out in accordance with a government-approved forest management plans or through an authorization by the environmental authority to eliminate native vegetation or to convert the forest to other land uses, while observing the limits and conditions established by law.

Therefore, illegal logging takes place in Brazil when there is violation of laws on forest use and conservation, breaches of requirements related to the production, processing, transportation and commercialization of timber, and/or lack of proper approval, or when logging is not in accordance with the obtained permit. Cases of illegal logging may also be linked with unclear tenure rights and land access. Timber may be illegal when sourced from public areas or protected areas, often posing threats to wildlife, indigenous peoples and traditional communities.

[5] Brazil's planted forests account for 95 percent of Brazil's timber products' exports (Oliver, 2013).

More broadly, illegal logging can be associated with fraudulent land titles, counterfeit permits, tax evasion and corruption. Illegal timber exploitation and deforestation can be closely interconnected, with timber often being a by-product of forest clearing for other land uses such as agriculture and ranching. Fearnside has found that illegal logging also increases the risk of forest fires in the Amazon (Fearnside, 2005).

In order to promote legal compliance, Brazil has pledged internationally to eliminate illegal deforestation by 2030. Brazil's domestic law enforcement efforts have sought to curb illegal deforestation and improve legal forest management, including the 2003 "Action Plan for the Prevention and Control of Deforestation in the Legal Amazon", the creation of forest concessions for timber production in federal forests in 2006, satellite forest monitoring and real time detection of deforestation in the Amazon, established as part of the revisions to the Forest Code, and new regulations that simplify environmental licensing in settlements to facilitate legal logging in 2013 (Romero et al., 2015; Wellesley, 2014). However, the myriad of strict regulations and complex bureaucracy have also made legality difficult to achieve for many local and small-scale producers (McDermott et al.,2015).

In order to curb illegal logging specifically, the Brazilian government has taken a number of measures, ranging from command-and-control instruments to enforcement mechanisms to ensure compliance, such as the "Document of Forest Origin" (*Documento de Origem Florestal*, or DOF), a timber-tracking system created in 2006. The DOF is a federal, mandatory permit that controls the transport and storage of native forest products. It follows the product from origin to destination, and contains information about the product's source. Although some states have devised their own tracking systems, they will eventually be linked to the federal DOF system. One of the benefits of this instrument is that environmental agencies will be able to concentrate enforcement efforts on states and cities where timber trade is highest.

Federal and state legislation have been initiated to help create conditions through which legality verification might be promoted, while procurement policies for construction and public services are now requiring evidence of "proof of origin". However, there is no fully functioning state or national policy requirement to verify legality along supply chains, and there is little communication with the US and EU about their import requirements. Some environmental groups point to changes in the Forest Law in 2012 that seemed to make legality compliance easier by reducing the rigour of legal requirements.

Peru[6]

In Peru, the problem of illegal logging was formally addressed as far back as 2002, when the national government established the "Multi-sectoral Commission to Combat Illegal Logging" as a way to help enforce adherence to forestry laws and policies (Cornejo-Arana, 2007). In addition, the US Lacey Act amendments to weed out imports of illegal timber took on additional importance in Peru given the 2006 United States-Peru Trade Promotion Agreement (PTPA), which entered into force in February 2009 (de Jong and Humphreys, 2016). In particular, the PTPA includes an Annex on forest sector governance that was developed in response to concerns in the US that trade liberalization between the two countries would result in illegal exploitation of people and natural resources in the Peruvian Amazon. The Annex requires Peru to verify that all wood being exported to the US comes from legal origins (del Gatto et al., 2009) and, importantly, contains actual on-the-ground commitments towards improving environmental and social resources stewardship. Proponents heralded the agreement as a new way to foster a "ratcheting up" of domestic practices in the global era (Jinnah, 2011), while maintaining a pro-growth development agenda. While the mechanisms set up for this verification give the US the option to participate in audits, the burden of auditing is largely placed on Peru (del Gatto et al., 2009). For these reasons, and following changes to the 2011 Forest Law, the Ministry of Natural Resources has committed additional resources to combatting illegal timber trade (El Comercio, 2015a).

Initially, some of the provisions within the trade agreement appeared to backfire, as it was used by elements of the Peruvian government to accelerate its development agenda, for example through the granting of concessions to industrial users, especially in the mining sector. Resistance from many private actors in the forest sector ensued, including public protests and even temporary occupations of government offices (El Comercio, 2015b). There are also ongoing concerns that the emphasis on legality may undermine rather than support local communities because, while many Amazonian forest communities engage in timber extraction, the legal hurdles for doing so (including bureaucratic planning processes and unclear land rights) are so difficult that their practices could be deemed outside of existing legal procedures (Pacheco et al., 2016). Meanwhile illegal logging in Peru has not declined significantly. Between 2009 and 2012, a total of 66 percent of the timber was extracted without following planning regulations (Mejia et al., 2015).

Russia

In the last twenty five years Russia's forest policy has undergone a number of reforms, including significant support for non-state market-driven forest certification (Sotirov and Mashkina, 2010).The global emphasis on illegal logging has coincided with significant domestic interest in Russia to address specific non-compliance challenges, especially loss of revenue from taxes and customs duties. Failure to capture these revenues explains, in part, a

[6] For a detailed review see Cashore et al. (2016).

Truck loaded with logs going over the bridge (Russian Federation) Photo © Fotolia: Stanislav Komogorov.

five-fold increase in losses from the forest sector over 10 years culminating to more than half a billion USD in 2014 (Federal State Statistics Service, 2015).

Researchers have found that a range of factors explain persistent illegality in the forest sector including high levels of corruption, lack of environmental concerns and frequent changes in the legislation, which make it difficult to support meaningful legal compliance. Proactive cooperation among the federal and regional authorities to address these issues is also hampered by federal legislation that protects businesses from being controlled by regional authorities (Vershinina, 2014). As a result, regional legislation only affects small-scale local enterprises, leaving the larger holdings essentially unregulated. There is also a growing recognition that better enforcement of existing laws and policies is needed if meaningful management reforms are to be realized (Sotirov and Mashkina, 2010; Vershinina, 2014).

Further to international attention and EU efforts in particular, Russia has initiated several changes with respect to policies and laws surrounding illegal logging. In 2013, the Russian Government approved an 8-year plan "The Development of Forestry, 2013-2020", with the goal of reducing losses from illegal logging and increasing profits from the forest sector (Government of the Russian Federation, 2013). This followed the two plans on "Prevention of illegal logging and timber trade in the Russian Federation, 2011-2014" and "Decriminalization of key industries of the Far Eastern Federal District, 2011-2013" (Federal Forestry Agency, 2013)

In 2012, the Russian Government included timber in the list of strategic goods to be accounted for at the border (Government of the Russian Federation, 2012a; Molodtsova, 2014). In 2013, the Federal Law on "Amendments to the Forest Code of the Russian Federation" and the Russian Federation Code of "Administrative Offences" improved the legal framework for harvested timber by introducing labelling, which coincided with the upgrading of remote monitoring systems (Vershinina, 2014). In 2014 the Criminal Code was amended to include stricter penalties for large-scale acquisition, storage, transportation and processing of illegal timber to be marketed or sold, including imprisonment for a maximum of seven years and fines exceeding the equivalent of USD 10,000 for serious offences.

In 2015 the efforts to control timber harvesting and trade culminated in the introduction of the "Uniform State Automated Information System" (EGAIS), requiring all legal entities and entrepreneurs, dealing in timber, to submit all information on the volume of harvested timber, labelling and timber transactions into the state electronic database. From 2016, failure to comply with EGAIS entails an administrative fine. The question for practitioners and scholars is to understand better how to draw on these recent policy developments in ways that foster durable and meaningful influence on the ground.

7.5 Conclusions

What lessons can we draw from this overview of global efforts to address illegal logging and domestic responses? First, this is a highly dynamic world, rendering static answers about impacts almost immediately out of date and of little utility to forward-looking policymaking. Second, impacts are quite variable, depending on local, regional and historical contexts, rendering sweeping generalizations difficult. Third, and notwithstanding, we can identify a myriad of international influences that appear to work to tip the scales within domestic settings, rather than determining "on the ground" outcomes (Bernstein and Cashore, 2012). Clear economic signals from US and EU trade import policies do appear to have been catalysts within "middle of the supply chain" countries such as China in developing more formalized responses. At the same time, European Union partnership agreements with developing countries through VPAs expanded beyond market incentives by emphasizing capacity building and empowerment of local communities – a phenomenon consistent with Bernstein and Cashore's (2012) "direct access" pathway. Likewise, even in countries in which domestic markets dominate, international norms surrounding the problem definition of "illegal logging" as well as international organizational influence through building of tracking systems and capacity, illustrate the important role that global efforts to weed out illegal logging can, and do play, in domestic settings. Similarly, efforts to "bandwagon" legal compliance through trade agreements, such as in the US-Peru Free Trade agreement, identify the ways in which international rules can reinforce market incentives.

The Russian case illustrates caution in being overly sanguine: there are simply too many domestic hurdles and incentives that contribute to illegal logging, to assume that global efforts to foster legal logging will be sufficient. Similarly, a key theme from many of the cases from Africa and Indonesia is that while domestic processes have expanded to include local and civil society groups, there remains a concern that owing to domestic approaches to legality and

costs of compliance, large scale firms may be better positioned to promote legality, while undermining local communities – including fears that informal rights might be determined illegal. A range of global actors and negotiators are working to address these concerns as they modify and adapt, agreements and approaches (Nathan et al., 2014).

What we do know is that the extent to which these global efforts to address domestic illegal logging will end up being short lived, or trigger more durable reforms, is in part dependent on how international actors and domestic partners travel two or more synergistic pathways over time. And this effort requires distinguishing the process of building legal compliance along global supply chains – what Cashore and Stone (2014) refer to as the "emergence phase", from the ability to have increased influence at a later time as legal compliance becomes increasingly entrenched in global markets. Certainly it seems likely that as combatting illegal logging is increasingly perceived as a factor of international market competiveness, further policy responses on the national level will emerge.

It seems essential to focus on reducing the costs of compliance through application of organizational and political capacity building among governments and the private sector and to building efficient technologies capable of tracking complex timber markets, in ways that maintain, and reward, domestic coalitions among businesses, NGOs and governmental agencies. This requires a careful dance in which legal compliance identifies important but achievable standards "on the ground" so as to not "knee cap" forest manager support. Once fully embedded to the point that shirking or free riding are not likely, Cashore and Stone theorize that legality verification efforts could be given increasing responsibilities since, any costs would be borne by consumers rather than individual firms.

Research gaps/next steps

Despite the achievements of the transnational campaign against illegal logging, a number of major challenges remain, to date, incompletely addressed. One major research challenge is to assess the effectiveness of various efforts aimed at ensuring that smallholders engaged in the informal economy are not excluded by legality assurance systems aimed at international markets, but are instead supported to move into legal production while enhancing recognition of the rights of indigenous peoples. Another major research gap is to assess whether, and how, transnational policy efforts from combatting illegal logging have helped controlling agricultural conversion, whether formally legal or illegal. Such research will also carry practical lessons, especially since conversion has become the most important source of deforestation in much of the Global South. At the same time a key lesson from this review is that policymakers must be careful not to take research from past impacts as static, but rather extrapolate implications from them for moving forward.

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Chapter 8
Conclusions

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In this report we have assessed the literature on illegal logging and related timber trade and attempted to provide a scientific analysis of the current state of knowledge. **Illegal logging and related timber trade are complex and multi-faceted phenomena.** The term "illegal logging" is very broadly used to include not one but rather a multitude of activities, which could also be termed "illegal forest activities". These activities include violations of public trust (i.e. paying bribes or using violence for personal gain), violations of property rights (public, communal or private) and violations of regulations (notably, related to forest management, timber processing or finances/taxes).

Definitions of illegal logging are manifold and methods to measure it vary. **For the purpose of this report, we define illegal logging and related timber trade as "all practices related to the harvesting, processing and trading of timber inconsistent with national and sub-national law".** This broad definition includes three dimensions of illegal forest activities: 1. "illegal forest conversion" as the act of clearing forest land that is in violation of land use laws and regulations, and/or without required licences; 2. "informal logging" which captures forest harvesting that is carried out often by small, unincorporated enterprises. This type of logging may, by definition, result in illegal activity when laws require incorporation, registration and/or licences for timber extraction. And 3. all other forms of illegal forest activities, including illegal timber trade.

Illegal logging has recently been recognized as a form of transnational organized crime which has triggered increased support for internationally-concerted interventions. Evidence suggests that very different types of actors are involved, with overlaps and collusions between legal and illegal entrepreneurs, corporations, "traditional" criminals, as well as state actors and agencies. In some parts of the world, organized forest crime may be extremely violent and has also been associated with the financing of wars and conflicts.

By its very nature, illegal logging is difficult to quantify and monitor over time. While different studies present alarming figures, with current information and knowledge, a direct comparison across geographies and time is difficult because of divergent definitions, assumptions and methodologies. It is not always clear which method has been used by existing studies to quantify illegal logging and related timber trade, and different illegal forest activities may be measured by different assessments further leading to difficulties in quantifying and comparing assessments over any given period of time. As a result, quantification is necessarily approximate, but current estimates place the extent of the annual global market value of illegal logging and related timber trade at anywhere between USD 10 billion and USD 100 billion.

Quantification is further complicated when domestic timber markets are included in the equation, because historically these markets have not been as regularly and extensively monitored as international ones. **Existing data however, underscore that domestic markets account for the largest share of consumption of illegally- and informally-produced wood and wood products;** in fact, estimates suggest that only a small percentage reaches international markets. Generally, hardwood is more likely to be illegally harvested and traded than softwood. Illegally-produced wood products (except for lumber) are more likely to be illegally traded than legal wood products. Plywood has the highest percentage of illegal production and trade, and almost all illegal hardwood plywood is exported. Global markets involve producer, pass-through, processing and consumer countries. Domestic, regional and global markets of legal and illegal wood products are interlinked, creating additional difficulty in monitoring and resolving illegal logging and related timber trade.

A handful of countries are dominant in illegal logging and related timber trade. China has become the world's largest importer and exporter of wood products and, both China and India have recently overtaken the EU, the USA and Japan as main importing countries. As of 2014, the dominant producing countries of both legal and illegal tropical timber were Brazil, Indonesia and Malaysia. Japan remains the largest importer of plywood from tropical hardwood. In terms of exports, Southeast Asia

Large-scale timber trafficking from Indonesia to Malaysia in the interior of Borneo. Meranti timber that was illegally logged in Indonesia's Betung Kerihun National Park is waiting to be trafficked to nearby Malaysia (Sarawak).
Photo © Tim Boekhout van Solinge (2005)

accounts for over half of illegal roundwood and sawnwood exports (with Myanmar and Laos playing a major role). In South America, Brazil accounts for the vast majority of illegally-sourced and exported roundwood and sawnwood, with the USA, the EU and China being the main destinations. Exports of roundwood and sawnwood from Cameroon, the Democratic Republic of the Congo and the Republic of Congo have grown, with China surpassing the EU since 2012 as the largest importer from the Congo Basin. In Oceania, Papua New Guinea has become a major player. **However, illegal logging is not limited to tropical forest regions: it appears as well in temperate or boreal forest regions, with Russia for example, having emerged as the main source of illegal timber from temperate and boreal forests.**

Understanding the drivers of illegal forest activities is necessary to identify effective governance responses. Often, the drivers for illegal logging, forest degradation and deforestation overlap. Forest lands in rural regions are modified by complex interactions of social, economic, political, cultural and technological processes at the local, national and global levels. At the core lie land users influenced by the economic and cultural contexts in which they live, fostered by poor governance. Power imbalances among economic actors lie behind many decisions for illegal land uses, and frequently it is economic and political elites that reap the most benefits.

Contested and conflicting land tenure are profound drivers of illegal logging, forest degradation and loss. Although 86 percent of the world's forests are publicly owned, in practice, globally, around 60 percent of land and resources are managed on the basis of customary rules, of which less than a fifth is formally recognized. Many timber producing countries in the tropics have started investing in the clarification of land tenure to minimize land conflicts, enhance the interest of land users in more sustainably managing their resources, and to facilitate the control of forest activities. **Another significant driver of illegal logging is road construction**, **which is central to most countries' model of economic development.** In forest regions, such roads are frequently built to service large agri-businesses resulting from forest conversion.

Corruption, deficient regulations and inadequate law enforcement, limited financial incentives, overregulation, ignorance of customary forest users' potential and a short-term focus on economic growth from an urban perspective have all signified that efforts to date to curb illegal logging have been met with limited success. While this may yield profits in the short term (for select groups), these illegal forest activities often occur in countries that are rich in forest resources but with weak institutions, depriving them from long term economic prosperity and frequently infringing on human rights.

Social, economic, political and environmental impacts of illegal logging are multifaceted, intertwined and dependent on diverse pathways. Attributing specific impacts to illegal logging is challenging, in part because of the similarity of impacts between legal and illegal logging. Illegal logging and related timber trade are perceived to have particularly negative impacts for the environment and lead to significant state revenue losses. However, not *all* impacts may be negative**,** at least from the perspective of specific stakeholders or when considering only a short-term timeframe. For example, illegal logging may allow local people to generate some urgently needed income from the local forests. In other cases, it may provide capital that may translate into productive investments and social services, as might be the case for illegal forest conversion into more profitable land uses.

The impacts of illegal logging can be direct, indirect and cumulative, and often establish causal relationships among each other which are difficult to disentangle. Furthermore, these impacts often interact with factors **outside the forestry sector such as agribusiness and farming that may amplify their effects.** While direct impacts are easier to observe and measure, indirect impacts are less evident. Cumulative effects are more difficult to determine due to time lags and more complex causal relationships between direct and indirect impacts, as well as other contextual factors.

Social impacts from illegal logging are mixed. Smallholders, indigenous people, landless and traditional communities may benefit from conducting timber extraction against given national regulations as it provides them with an additional source of much-needed income and resources. At the same time, illegal forest activities practised by others (e.g. by timber companies or criminal networks) tend to put pressure on local actors to operate in unequal markets.

Economic impacts of illegal forest activities include distortions in timber markets with subsequent negative effects on price definition and benefit distribution, and undervaluation of the available timber stocks. While illegal logging contributes to generating jobs and income - a portion of which is spent locally - illegal logging operations tend to offer lower remunerations to workers. Illegal

forest activities also lead to significant revenue losses for the state and result in the depletion of timber stocks, further reducing the economic attractiveness of managing the remaining forests vis-à-vis other land uses. In addition, illegal logging constitutes a high risk to investors.

Political impacts include weakened political systems governing forests by perpetuating corrupt behaviours and practices, fostering a vicious cycle of poor governance (corrupt individuals gain power through illegal revenues and then may support poor governance to maintain revenues and acquire more power). In addition, illegal logging contributes to an increased misappropriation of public resources.

Environmental impacts of illegal logging can be significant, but are difficult to separate from those of legal logging, even more so because illegal logging cannot be equated with unsustainable forest management per se. However, environmental impacts that can be attributed to illegal logging - in particular to illegal forest conversion – include a rapid loss of carbon, biodiversity loss and an increase in water runoff and soil erosion.

Different impact trajectories and pathways shaping specific impacts can be differentiated: 1. **Large-scale illegal logging** - practised by companies with legal access to forests but that contravene regulations in multiple ways - leads to larger interventions in forests with important short-term revenues, but also high state losses and forest degradation. 2**. Small-scale and artisanal production,** produce impacts that are difficult to generalize since these are a very heterogeneous group of actors (with different management practices, operating at different scales and levels of intensity), generating short-term economic benefits and a slow process of forest degradation. 3**. Illegal forest conversion to agriculture** produces highly variable impacts depending on whether conversion is to develop large-scale plantations or more traditional small-scale farming systems. Ultimately, illegal forest conversion is likely to produce significant negative impacts on forest goods and services, while having both negative and positive impacts on local people's livelihoods and food security.

Rainforest destruction in Thailand from aerial view.
Photo © Fotolia: khlongwangchao

Several international, regional and national policy responses such as FLEG - "Forest Law Enforcement and Governance" - FLEGT - "Forest Law Enforcement, Governance and Trade" - or domestic legislation in consumer countries forbidding the importation of illegal timber in key markets (including the USA, the EU and Australia) **have been designed to tackle illegal logging and related timber trade.** They include legal arrangements in consumer countries, between producer and consumer countries, land tenure improvements and tax reductions. Training and capacity building, including in the use of forest information systems based on remote sensing, are also important tools to tackle illegal logging. Global certification initiatives and carbon markets have been promoted as means of encouraging legal exploitation. **While the economic implications of these policies have triggered responses in some producer countries, their effects are often muted as the majority of illegal timber is traded domestically. Furthermore, legality verification with limited geographical scope, where effective, might reroute illegal timber to less regulated markets.**

The enforcement of policies aiming to combat illegal logging and related timber trade creates diverse problems. In some cases the complexity of compliance and verification procedures of legality verification procedures impacts negatively on small scale loggers, and/or undermines rights of indigenous communities and other less powerful members of society due to their limited capacities to understand and follow these procedures. In addition, poor enforcement is frequently an issue, in part because of capacity, technical, logistical or other reasons. Timber commodity chains still lack transparency and traceability for guaranteeing timber legality. Technological tools, such as from timber forensics, can contribute to timber verification and the detection of illegal timber. In addition, the **role of criminal timber networks is often underestimated**. Ultimately, to tackle criminal timber networks and to limit their crime opportunities, international (and bilateral) police and justice cooperation is needed. While to date, criminal investigations have been rare, when they have happened they have yielded positive results, thereby, suggesting that more (bilateral) criminal investigations are needed, as in other areas of serious and organized crime.

Understanding the complexity of illegal logging and related timber trade certainly seems key for developing effective governance responses. The causes and consequences of the different dimensions of illegal forest activities, namely "illegal forest conversion", "informal logging" and "other illegal forest activities", vary a great deal. Additionally, it is necessary to understand whether organized crime is involved in illegal forest activities, particularly in illegal forest conversion and other illegal activities. In contrast, informal logging might result from undermining rights of indigenous communities, unclear tenure rights, and complex compliance and verification systems. In fact, illegal forest activities might be the only

Word cloud based on Chapter 8 - Conclusions

way for local people to access economic rents. As a consequence, existing international as well as bilateral governance responses have yielded divergent results when addressing different illegal forest activities. **Political recognition of the different dimensions of illegal forest activities, and that illegal logging is not merely a forest-related problem to be resolved by the ministries dealing with the forest and environment sectors alone, is an important first step towards effective policy responses in the future.**

Research Gaps

This assessment has revealed the fact that many gaps remain in our understanding and knowledge of the various illegal forest activities. Each chapter provides suggestions for future work. Urgent priorities that have been particularly highlighted concern ***definitions*** and the inability to accurately determine trends and comparisons across different data sets that may not use the same definitions or methods. In general, a lack of ***data*** hampers efforts to tackle effectively illegal logging and related timber trade. More specific data about illegal forest activities is needed, and where data has been collected by countries or intelligence agencies it should be made available for research purposes.

This assessment benefitted from the analysis of illegal logging through a ***criminological*** lens. In this respect, there is a major outstanding gap in techniques and technologies both to understand approaches used by criminal actors and to apply improved technologies and best practices to investigate them.

A more targeted approach based on an understanding of the motivations and limitations of different actors is needed to better tackle ***drivers*** of illegal forest activities, using the three dimensions of illegal forest activities proposed in this assessment. Similarly, future work on ***policy responses and governance*** should focus on these dimensions with an emphasis on assessing what has worked to date in terms of international efforts to limit illegal forest conversion and to engage smallholders.

Appendix 1
Glossary of Terms and Definitions

Biodiversity: The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems (CBD, 1992).

Corporate crime: Offences committed by officers and employees of corporations to promote corporate (and personal) interests (Clinard and Quinney 1973; Clinard and Yeager, 1980; Friedrichs 2004).

Criminology: The scientific study of crime, which includes the process of making law, of breaking laws, and the social reaction towards the breaking of laws (Sutherland et al., 1992).

Deforestation: The conversion of forest to another land use or the long-term reduction of the tree canopy cover below the minimum 10 percent threshold (FAO, 2010). Deforestation implies the long-term or permanent loss of forest cover and implies transformation into another land use. Such a loss can only be caused and maintained by a continued human-induced or natural perturbation. Deforestation includes areas of forest converted to agriculture, pasture, water reservoirs and urban areas. The term specifically excludes areas where the trees have been removed as a result of harvesting or logging, and where the forest is expected to regenerate naturally or with the aid of silvicultural measures. Deforestation also includes areas where, for example, the impact of disturbance, over-utilisation or changing environmental conditions affects the forest to an extent that it cannot sustain a tree cover above the 10 percent threshold (FAO, 2001).

Degradation*:* see *Forest degradation.*

Forest: Land spanning more than 0.5 hectares with trees higher than 5 metres and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use (FAO, 2010). It includes areas with young trees that have not yet reached but which are expected to reach a canopy cover of 10 percent and tree height of 5 metres. It also includes areas that are temporarily unstocked due to clear-cutting as part of a forest management practice or natural disasters, and which are expected to be regenerated within 5 years. Local conditions may, in exceptional cases, justify that a longer time frame is used (FAO, 2010).

Forest conversion: For the **purposes of this report** defined as "Clearance of natural forests for other land uses, such as plantations, agriculture, pasture for cattle settlements, mining and infrastructure/urban development. This process is usually irreversible."

Forest crime: The taking, trading (supplying, selling or trafficking), importing, exporting, processing, possessing, obtaining and consumption of wild flora, including timber and other forest products, in contravention of national or international law. Broadly speaking, forest crime is the illegal exploitation of the world's wild flora (UNODC, 2012).

Forest degradation: The reduction of the capacity of a forest to provide goods and services (FAO, 2010).

Forest fragmentation: For the **purposes of this report** defined as "Any process that results in the conversion of formerly continuous forest into patches of forest separated by non-forested lands."

Forest management: The processes of planning and implementing practices for the stewardship and use of forests and other wooded land aimed at achieving specific environmental, economic, social and/or cultural objectives. It includes management at all scales such as normative, strategic, tactical and operational level management (FAO, 2004).

Governance: Refers to the way in which state and non-state institutions operating at international, national local and/or transnational levels mediate input from citizens, private businesses and civil society organizations as a means to develop policies and laws (modified from IUFRO 2005).

Illegal forest activities: All illegal acts that relate to forest ecosystems, and the extraction, production and trade of timber-based and non-timber forest products (Tacconi et al., 2003)

Illegal logging and related timber trade: For the **purposes of this report** defined as "All practices related to the harvesting, processing and trading of timber inconsistent with national and sub-national law" (based on Hoare, 2015 and Smith, 2015).

Illegal forest conversion: For the **purposes of this report** this term refers to the illegal clearance of natural forests not primarily targeting the use of timber or other forest products but aiming to create other land uses like plantations, commercial agriculture or mining. Illegal forest conversion is often aided by weak or unclear governance**.**

Illegal logging: For the **purposes of this report** defined as "Practices of harvesting trees inconsistent with the national and subnational law."

Illegal timber: For the **purposes of this report** defined as "Timber resulting from any practice related to its harvesting, processing and trading inconsistent with national and sub-national law."

Informal logging: For the **purposes of this report** this term refers to logging activities by small-scale producers (including unincorporated enterprises that may also be unregistered and small) that may operate illegally due to unclear legislation (e.g. tenure rights) or unreasonable and disproportionate costs of compliance (e.g. excessive charges or bureaucratic procedures).

Informal sector: Unincorporated enterprises that may also be unregistered and/or small (Hussmanns, 2003).

Organized crime: A continuing enterprise that rationally works to make a profit through illicit activities and that insures its existence through the use of threats or force and through corruption of public officials to maintain a degree of immunity from law enforcement (Albanese, 2005).

Organized criminal group: see also *Transnational organized crime***.** A structured group of three or more persons, existing for a period of time and acting in concert with the aim of committing one or more serious crimes or offences established in accordance with the UN Convention against Transnational Organized Crime, in order to obtain, directly or indirectly, a financial or other material benefit (United Nations General Assembly, 2000).

Organized forest crime: The illegal exploitation of forest or forest products/resources by organized criminal groups or criminal networks which ensure their activities through the use of threat or force and through corruption of public officials in order to maintain a degree of immunity from law enforcement (see *Chapter 5*).

Policy instruments: Also referred to as *policy tools*. Tools designed to regulate citizens' behaviour and define their legal rights. Substantive policy instruments direct government intervention that require or motivate a certain course of behavioural change. They comprise regulatory (e.g. laws, regulations), financial (e.g. subsidy, taxation) and informational (e.g. education, planning) policy means, which act directly on the addressees. Procedural policy instruments act on the process indirectly through institutional or organizational means by which policy is created (adapted from IUFRO 2005).

Situational crime prevention: Refers to a wide range of measures which commonly involve the design of products, services, environments or systems to make them crime-resistant, a strategy that is often combined with social activities such as surveillance and the response to crimes by other actors than law enforcement personnel (Ekblom, 2006).

State-organized crime: Refers to crimes carried out by (state) officials as a matter of policy. This does not include criminal acts that benefit only individual officeholders (Chambliss, 1989).

Sustainable forest management: Sustainable forest management, as a dynamic and evolving concept, aims to maintain and enhance the economic, social and environmental values of all types of forests, for the benefit of present and future generations. The seven thematic elements of sustainable forest management are: (a) extent of forest resources; (b) forest biological diversity; (c) forest health and vitality; (d) productive functions of forest resources; (e) protective functions of forest resources; (f) socio-economic functions of forests; and (g) legal, policy and institutional framework. The thematic elements are drawn from the criteria identified by existing criteria and indicator processes, as a reference framework for sustainable forest management (UN, 2007).

Transnational organized crime: see also *Organized criminal group***.** Refers to the United Nations Convention against Transnational Organized Crime (UNTOC), the international convention that deals with organized crime. It does not contain a definition of "transnational organized crime" but contains a definition of "organized criminal group" (see above) (United Nations General Assembly, 2000).

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