Deforestation Trends in the Congo Basin

Reconciling Economic Growth and Forest Protection

WORKING PAPER 2 | Logging

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Africa Region
THE WORLD BANK

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CONTENTS

ACKNOWLEDGMENTS v
ACRONYMS vii
INTRODUCTION 1
CHAPTER 1. LOGGING ACTIVITIES IN THE CONGO BASIN 3
Export-oriented Industrial Logging Sector 4
Contribution to economic growth and employment 4
Significant progress on sustainable forest management 5
Industrial timber production 8
The booming informal sector 12
A long overlooked sector 12
An unregulated sector that does not capture its full socioeconomic potential 13
…and generates great pressures on natural forests 14
Unmet domestic demand 15
Illegal logging and forest governance 16
CHAPTER 2. IMPACTS ON FORESTS 17
"Limited" Impacts from Industrial Logging 17
Major threat likely to come from informal sector 21
CHAPTER 3. RECOMMENDATIONS 23
Pursue Progress on Sustainable Forest Management in Industrial Logging Concessions 23
Formalize the Informal Timber Sector 24
Modernize the Processing Capacities 25
Foster Involvement of Communities in Forest Management 26
Diversify Sources of Timber (Through Plantation, Agroforestry) 26
Strengthen Administrations, Particularly at the Decentralized Level 27
CONCLUSION AND OUTLOOK 29
REFERENCES 31

FIGURES

Figure 1.1: Forest Ecosystems in the Congo Basin 3
Figure 1.2: Total Land Area, Total Dense Forest Area, and Area under Industrial Logging Concessions in the Congo Basin 4

Figure 1.3: Total Industrial Logging from Congo Basin Countries, 1990–2009 (in m^3) 5
Figure 1.4: Industrial Timber Production per Congo Basin Country, 1990–2009 (in m^3) 9
Figure 2.1: Deforestation Dynamics along Roads 21

TABLES

Table 1.1: Area Estimates (ha) of Land-cover Types for the Six Congo Basin Countries 3
Table 1.2: Contribution of the Forestry Sector to GDP and Tax Earnings, 2008 6
Table 1.3: Direct Employment in the Commercial Forest Production and Processing, 2006 6
Table 1.4: Direct and Indirect Employment in the Forestry Sector 6
Table 1.5: Forest Management and Certification in the Congo Basin Countries, 2005–2010 ... 8
Table 1.6: Harvested Timber Volume and Primary Species Logged by Country in 2007 8
Table 1.7: Timber-processing Units in Central Africa, 1975 and 1995 10
Table 1.8: Main Constraints to Further Processing in Central Africa 10
Table 1.9: Estimated Production Volume of the Informal Sector 14
Table 2.1: Average Annual Degradation and Recovery Rates in Dense Forest Zones in the Congo Basin between 1990 and 2000 17

BOXES

Box 1.1: Principles of Sustainable Forest Management (SFM) and Challenges in the Congo Basin Forests 7
Box 1.2: Processing Requirements in the Different Congo Basin Countries 11
Box 1.3: On Timber Trade with China and Other Emerging Asian Markets 12
Box 1.4: European Union's Forest Law Enforcement, Governance and Trade Program 15
Box 2.1: Typical Impact of Commercial Logging Operations 18
Box 2.2: Reduced-impact Logging (RIL) 19
Box 2.3: Variations in Forest Carbon Stocks: Key Concepts 20

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ACRONYMS

ARM	Alliance for Responsible Mining
ASM	artisanal and small-scale mining
BBOP	Business and Biodiversity Offsets Programme
CEMAC	Economic and Monetary Community of Central Africa
CMEC	China National Machinery and Equipment Import and Export Corporation
CSM	chainsaw milling
ECCAS	Economic Community of Central African States
EIA	environmental impact assessment
EITI	Extractive Industries Transparency Initiative
FCFA	Central African CFA fran
FIFO	fly-in/fly-out
FLEGT	Forest Law Enforcement, Governance, and Trade
FSC	Forest Stewardship Council
GDP	gross domestic product
GHG	greenhouse gas
ICGLR	International Conference of the Great Lakes Region
IFC	International Finance Corporation
MEG	Metals Economics Group
MP	management plan
NGO	nongovernmental organization
PDAC	Prospectors and Developers Association of Canada
PGE	platinum group element
REDD(+)	Reducing greenhouse gases Emissions from Deforestation and forest Degradation
RIL	reduced-impact logging
RWE	round wood equivalent
SEC	U.S. Securities and Exchange Commission
SESA	strategic environmental and social assessment
SEZ	Special Economic Zone
SFM	sustainable forest management
SIA	social impact assessment
VPA	Voluntary Partnership Agreement

Introduction

The Congo Basin has the largest forest cover on the African continent. Of the 400 million hectares that the Basin comprises, about 200 million of them are covered by forest, with 90 percent being tropical dense forests. The vast majority of these forests are primary forests or naturally regenerated forests. Home to more than 30 million people, Congo Basin forests support the livelihoods of more than 75 million people, from more than 150 ethnic groups, who rely on the local natural resources for food, medicine, and other needs. Congo Basin forests also perform valuable ecological services at local and regional levels. Such services include maintaining the hydrological cycle (water quantity and quality) and controlling floods in high-rainfall regions.

The Congo Basin's logging sector has a dualistic configuration. It boasts a highly visible formal sector that is export oriented and dominated by large industrial groups with foreign capital and an informal sector that has long been underestimated and overlooked.

- Industrial logging is one of the most extensive uses of land in Central Africa, with almost 450,000 km^2 of forest currently under concession (about a quarter of the total lowland tropical forests). The formal logging sector in Central Africa produces an average of 8 million m^3 of timber each year, mostly for exports to Europe and Asia. The industrial logging sector is one of the major contributors to the GDP and a vital employer for most Congo Basin countries.
- The informal timber sector is as just as important as the formalized sector. In some countries, the economic importance of the informal sector is assumed to exceed that of the formal sector. However, the informal timber sector has long been overlooked by both the national entities as well as the international community, which, over the past decades, mostly focused attention on the industrial and export-oriented sectors. The informal sector is powered by booming domestic and regional markets. Demand for timber has been soaring on local markets to meet the growing needs of urban populations. Such demand comes from urban centers in the Basin but also extends way beyond the area. It was recently documented that well-established transnational timber supply networks from central Africa reach as far as North Africa—that is, Egypt, Libya, and Algeria.

When Congo Basin countries engaged in international discussions on REDD+, they mostly focused on forest degradation (second "D" of REDD+), highlighting the progress made over the past decade on the adoption of sustainable forest management practices to reduce adverse impacts of logging activities on natural forests. Over the past few years, stakeholders realized that within the Congo Basin, major pressures on forests may predominantly come from outside the logging activities (agriculture, energy, mining, and so forth).

This report is one of a series of reports prepared during a two-year attempt to analyze and better understand deforestation dynamics in the Basin. It presents findings related to the logging sector and its potential impact on forest cover, and it is based on an in-depth analysis of the sector. The paper's structure is as follows:

- **Chapter 1** gives an overview of the logging sector—both formal and informal—in the six countries and its importance in terms of employment and revenues.

- **Chapter 2** analyzes the impacts of logging activities on forest cover.[1]
- **Chapter 3** presents recommendations to foster sustainable logging activities—with a particular focus on the informal sector—and reduce potential adverse impact on natural forests.

1 The chapter mainly focuses on impacts in terms of carbon content (as per the REDD+ mechanism). However, it is important to note that while industrial logging may have limited impacts on carbon stock in the long run, impacts on biodiversity and ecosystem equilibrium may be critically affected by industrial logging.

CHAPTER 1

Logging Activities in the Congo Basin

The Congo Basin forest is the world's second largest tropical forest, covering almost 170 million hectares of dense forest in six countries—dense forests represent the largest portion of land cover. About half (46 percent) of the region's forest is dense humid forest, while woodlands represent about one-fifth of the land cover (see figure 1.1 and table 1.1).

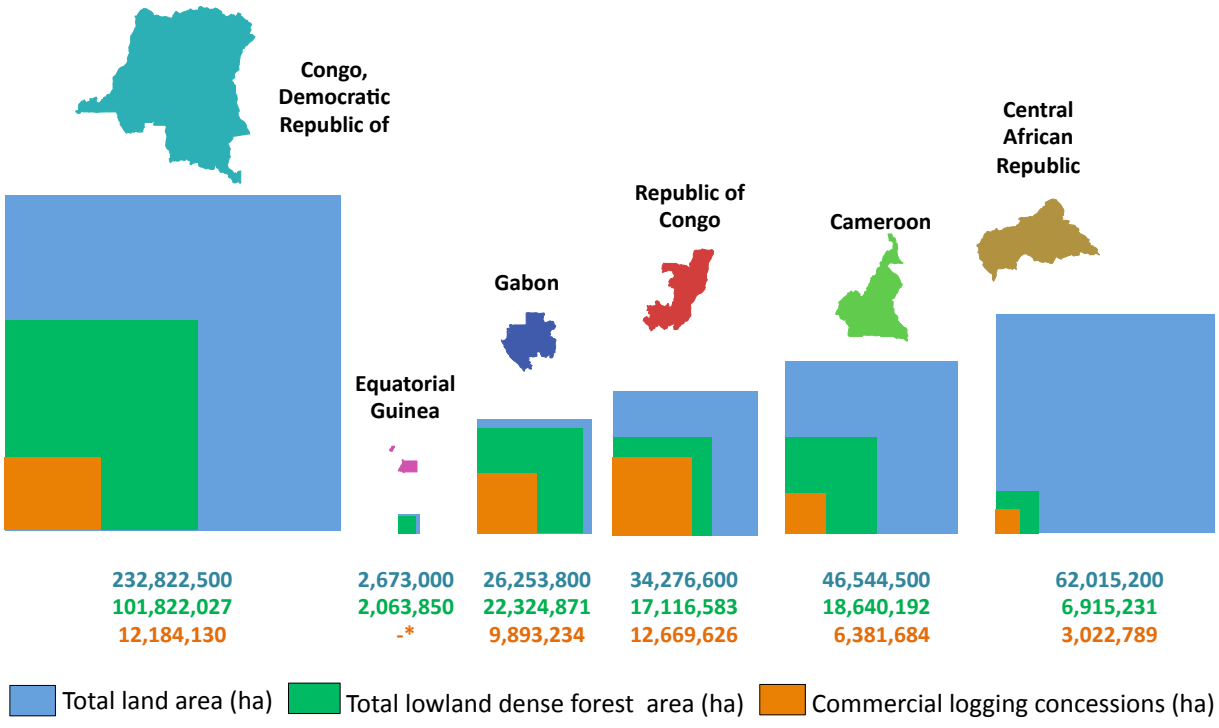
Industrial logging has become the most extensive use of land in Central Africa, with almost 450,000 km^2 of forest currently under concession (about a quarter of the total lowland tropical forests), whereas, by

Figure 1.1: Forest Ecosystems in the Congo Basin

Table 1.1: Area Estimates (ha) of Land-cover Types for the Six Congo Basin Countries

	Cameroon	Congo	CAR	DRC	Gabon	Equatorial Guinea	% of total land
Lowland dense moist forest	18,640,192	17,116,583	6,915,231	101,822,027	22,324,871	2,063,850	41.83
Submontane forest	194,638	–	8,364	3,273,671	–	24,262	0.87
Montane forest	28,396	10	–	930,863	19	6,703	0.24
Edaphic forest	–	4,150,397	95	8,499,308	16,881	–	3.14
Mangrove forest	227,818	11,190	–	181	163,626	25,245	0.11
Total Dense Forest	**19,091,044**	**21,278,180**	**6,923,690**	**114,526,050**	**22,505,397**	**2,120,060**	**46.18**
Forest-savanna mosaic	2,537,713	517,068	11,180,042	6,960,040	51,092	–	5.26
Rural complex and young secondary forest	3,934,142	3,664,609	713,892	21,425,449	1,405,318	507,281	7.84
Tropical dry forest – miombo	1,292,106	297,824	3,430,842	23,749,066	31,337	172	7.13
Woodland	11,901,697	2,659,375	34,381,438	36,994,935	787,231	4,669	21.48
Shrubland	2,561,163	2,101,556	4,002,258	6,705,478	619,347	1,308	3.96
Grassland	177,385	1,191,956	62,015	4,372,677	341,688	86	1.52
Others	4,668,275	2,482,305	1,152,349	17,714,723	685,838	30,592	6.62
Total	**46,163,525**	**34,192,873**	**61,846,526**	**232,448,418**	**26,427,248**	**2,664,168**	**100.00**

Figure 1.2: Total Land Area, Total Dense Forest Area, and Area under Industrial Logging Concessions in the Congo Basin



Source: Prepared from data in de Wasseige et al. (2012); in Equatorial Guinea, all logging concessions were canceled in 2008.

comparison, 12 percent of the land area is protected. Industrial logging concessions will likely expand further. The portion of forest area designated for logging is particularly high in the Republic of Congo (74 percent) and the Central African Republic (44 percent).

The industrial logging sector in Central Africa produces an average of 8 million m^3 of timber every year. After a period of slow growth over the past 15 years, the timber production from Central Africa contracted by about 2.5 million m^3 in 2008 as a result of the international financial crisis that affected the market for tropical timber. This contraction was particularly significant in countries with large export volumes, such as Cameroon and Gabon (see figure 1.3). Production has recovered since then, in part due to the steep increase in roundwood production in Gabon toward the end of 2009.

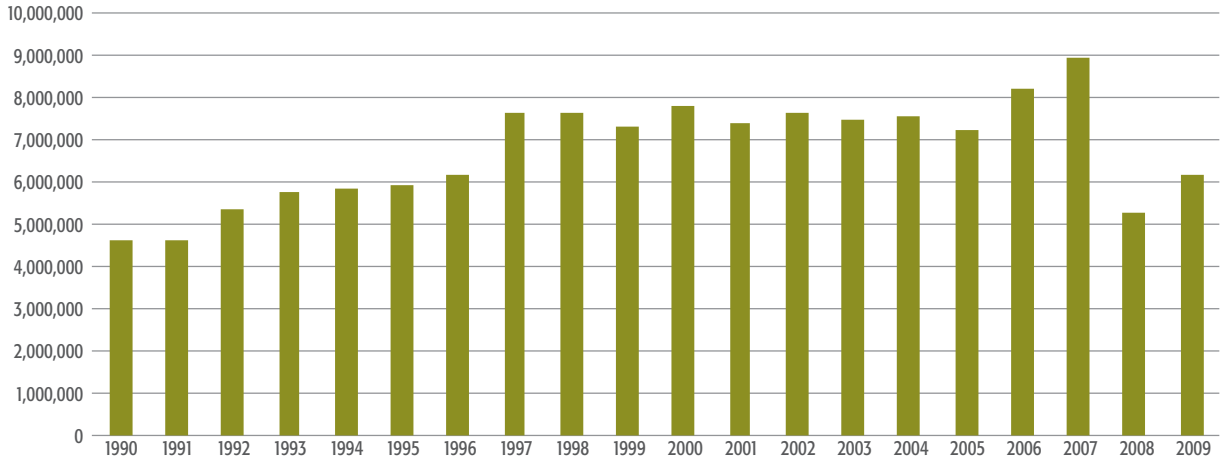
The informal timber sector has long been overlooked by both the national entities as well as the international community, which, over the past decades, mostly focused attention on the industrial and export-oriented sectors. In 1994, the devaluation of the regional currency (FCFA) boosted timber exportation at the expense of domestic markets, which, consequently, hugely contracted. With most of the formal production being exported, in Congo Basin countries, local timber demand is being met by the rapidly flourishing informal industry. The recovery and boom of the domestic market in recent years is a sharp turnaround, and the domestic and regional timber economy is now recognized as just as important as the formalized sector.

EXPORT-ORIENTED INDUSTRIAL LOGGING SECTOR

Contribution to economic growth and employment

The industrial logging sector is an important contributor to the gross domestic product (GDP) in almost all

Figure 1.3: Total Industrial Logging from Congo Basin Countries, 1990–2009 (in m^3)



Source: OFAC Monitoring Data as of 2011.

Congo Basin countries. Historically, the forest sector played an even more important role in the Congo Basin (see table 1.2). However, with the booming development of the oil sector in several Congo Basin countries over the past decade, the forest sector's relative contribution to overall GDP has decreased.[2] There is evidence, though, that projected declines in oil production in Gabon over the next decade may lead to renewed growth in logging for export. Tax revenue from the forest sector in absolute terms is currently highest in Cameroon and Gabon, which are both countries with well-developed commercial forestry sectors.

The industrial logging sector is also an important employer, particularly in rural forested areas (de Wasseige et al. 2009). The formal sector accounts for around 50,000 full-time jobs in the six countries. Employment created in the formal forestry sector by private sector operators is particularly important in Gabon, where timber is the largest employment sector after the government (see table 1.3). In Gabon, the sector further provides indirect employment for another 5,000 jobs and the public forest service itself employs about 600 officers and support staff. In Cameroon, the formal sector is estimated to provide some 20,000 full-time jobs (that is, 0.3 percent of the total labor force), but indirect employment from the sector has been estimated to be much higher, at more than 150,000 jobs or more than 2 percent of the population (MINEF, 2006; see table 1.4).

Significant progress on sustainable forest management

Sustainable forest management (SFM) in logging concessions has progressed over its ten years of implementation in Central Africa (Nasi, Cassagne, and Billand 2006). While there was an overall increase in the adoption of management plans in all three main tropical forest regions (that is, Latin America, Asia and Pacific, and Africa), the relative increase was particularly significant in Africa, predominantly in the Congo Basin. After the Earth Summit in Rio de Janeiro in 1992, all of the Congo Basin countries began a revision of their forest laws in order to make them compliant with SFM practices.

The past two decades saw revisions to most forestry laws and the emergence of forest management

2 The contribution of the forestry sector to GDP has decreased gradually and consistently, particularly for countries with a growing oil sector, notably Republic of Congo, Gabon, and Equatorial Guinea. For Equatorial Guinea in particular, the forest sector's contribution to GDP dropped from 17.9 percent in 1990 to 0.9 percent in 2006 (FAO, 2010).

Table 1.2: Contribution of the Forestry Sector to GDP and Tax Earnings, 2008

	Contribution to GDP		Gross value added (US$ million)			
	%	year	Roundwood production	Wood processing	Pulp and paper	Total for the forestry sector
Cameroon	6	2004	236	74	13	324
Central African Republic	6.3	2009	133	10	1	144
Republic of Congo	5.6	2006	45	27	–	75
Congo, Dem. Rep.	1	2003	185	2	–	185
Equatorial Guinea	0.2	2007	86	2	–	86
Gabon	4.3	2009	171	118	–	290
Total			**856**	**233**	**14**	**1,103**

Source: Atyi et al. 2009.

Table 1.3: Direct Employment in the Commercial Forest Production and Processing, 2006

	Employment (1,000 FTE*)				Total Forestry Sector (% to total labor force)
	Roundwood production	Wood processing	Pulp and paper	Total for the forestry sector	
Cameroon	12	8	1	20	0.3
Central African Republic	2	2	–	4	0.2
Republic of Congo	4	3	–	7	0.5
Congo, Dem. Rep.	6	–	–	6	–
Equatorial Guinea	1	–	–	1	0.5
Gabon	8	4	–	12	1.9
Total	**33**	**17**	**1**	**50**	

**FTE* (Full-time equivalent)
Source: FAO 2011.

Table 1.4: Direct and Indirect Employment in the Forestry Sector

	Employment			
	Direct	Indirect	Year	Source
Cameroon	13,000	150,000	2006	Audit Economique et financier du secteur forestier au Cameroun
Central African Republic	4,000	no data	2009	
Republic of Congo	7,424	14,848	2007	DAF/MEF (Informal sector not included)
Congo, Dem. Rep.	15,000	no data	2006	Federation de Industriels du Bois en RDC
Equatorial Guinea	490	no data	2009	Data from Forest Industries
Gabon	14,121	5,000	2009	Cellule Economique
Total	**41,035**			

Source: OFAC 2011 (last accessed November 2011, data as reported by countries during 2006–2009).

frameworks that promote SFM principles. The first country to define a new legal framework promoting such principles was Cameroon, which substantially revised forest laws in 1994 and 1996. Forest laws were revised in 2001 in Gabon, in 2002 in the Democratic Republic of Congo, and in 2008 in the Central African Republic. Cameroon is currently revising its forest laws again. Nevertheless, promoting SFM in Central Africa remains a challenge due to overlapping and contradictory policies and regulations, inadequate law enforcement, and governance constraints.

The area of natural forest under management plans increased dramatically—in particular, during the time period of 2005–2010. As of 2008, about 36.4 million hectares (ha) have been allocated in the form of 256 forest concessions in the subregion, 31 percent of which are already operating under approved management plans (de Wasseige 2008). The trend for the development of management plans has been momentous, from zero hectares managed in 2000; the subregion had more than 7.1 million ha of forest concessions managed in accordance with state-approved plans in 2005, 11.3 million ha in 2008, and 25.6 million ha in 2010 (see table 1.5). The most considerable progress has occurred in Cameroon, with 5.34 million ha of natural forest now covered by management plans (as of 2011) compared with 1.76 million ha in 2005. Management plans are now also in place for about 3.45 million ha of natural forest in Gabon.

The number of logging concessions with an approved management plan is expected to increase further in the next five years, as many of the remaining concessions are currently in the process of preparing their management plans. Similarly, the area of certified natural forest production in the permanent forest estate in Central Africa has increased from just 1.5 million ha certified in 2005 (in Gabon) to 4.5 million ha certified in 2010 (in Gabon, Cameroon, and the Republic of Congo).

A significant number of private logging companies operating in Central Africa have now engaged in forest certification (Nasi, Cassagne, and Billand 2006). Under such voluntary market-based schemes, forests are certified against a set of strict environmental and social standards, and timber from certified forests is tracked all the way to the consumer through the chain of custody certification system (Butler and Laurance 2008). Although there are several competing processes, the system of principles, criteria, and indicators from the Forest Stewardship Council (FSC) is considered the most demanding at the international level.[3] The FSC certification is the most commonly applied system, but other SFM certification certificates (for example, the Dutch Keurhout system or the ISO 14001 system) have been applied for several concessions in Gabon (de Wasseige et al. 2009; WIJMA 2010). It should be noted that several civil society organizations, such as FSC-Watch, have questioned the rigor by which these certification schemes are being monitored (FSC-Watch 2010).

Box 1.1: Principles of Sustainable Forest Management (SFM) and Challenges in the Congo Basin Forests

The objective of SFM is to manage the forest resources to meet the social, economic, ecological, cultural, and spiritual needs of present and future generations. The principle is that the SFM plan should provide presceptions that, if appropriately followed, forests can maintain their productive value over several rotations (Drouineau and Nasi 1999). The challenge with SFM in Central Africa is the nature of the biologically diverse old-growth forests. Unlogged forests in Central Africa contain valuable timber trees that are often more than 400 years old. Obviously, not even SFM principles can recommend 400-year harvesting cycles, and logging in the region follows a two-step process: (1) highly selective low-impact harvesting of old-growth trees; and (2) sustainable production of wood products within logged-over forests.

3 International institutions, most notably the FSC, established forest management principles, criteria, and a process for concession certification that are designed to ensure sustainable wood production and logging practices: (i) comply with national and international laws; (ii) do not infringe on indigenous people's rights; (iii) respect local community concerns and workers' rights; (iv) help maintain the forest's multiple values; (v) minimize environmental impacts; and (vi) set aside forest patches of high conservation value.

Table 1.5: Forest Management and Certification in the Congo Basin Countries, 2005–2010

	Total ('000 ha)		Available for harvesting ('000 ha)		With management plans ('000 ha)		Cetified ('000 ha)		Sustainably managed ('000 ha)	
	2005	2010	2005	2010	2005	2010	2005	2010	2005	2010
Cameroon	8,840	7,600	4,950	6,100	1,760	5,000	–	705	500	1,255
Central African Republic	3,500	5,200	2,920	3,100	650	2,320	–	–	186	–
Republic of Congo	18,400	15,200	8,440	11,980	1,300	8,270	–	1,908	1,300	2,494
Democratic Republic of Congo	20,500	22,500	15,500	9,100	1,080	6,590	–	–	284	–
Equatorial Guinea										
Gabon	10,600	10,600	6,923	10,300	2,310	3,450	1,480	1,870	1,480	2,420
Total	**61,840**	**61,100**	**38,733**	**40,580**	**7,100**	**25,630**	**1,480**	**4,483**	**3,750**	**6,169**

Source: ITTO, State of Tropical Forest Management, 2011.

In early 2005, there were no certified forests in Cameroon (ITTO 2006). The first concession to be certified in the subregion was a concession of 42,000 ha in Cameroon held by Wijma in 2005. Since then, forest area certified for sustainable management increased to a total of nearly 6.4 million ha in 2010 in Cameroon, Gabon, and the Republic of Congo (see table 1.5). In July 2010, five concessions (with a total area of 763,146 ha) held valid FSC forest management certificates (FSC 2010). An additional 1.2 million ha of FMUs are in the process of certification. In contrast, as of mid-2010, no forest had been certified as well managed in the Central African Republic (FCS 2010). Similarly, no forests have yet been certified in the Democratic Republic of Congo, but some foreign companies are undertaking baseline studies for future certification.

Industrial timber production

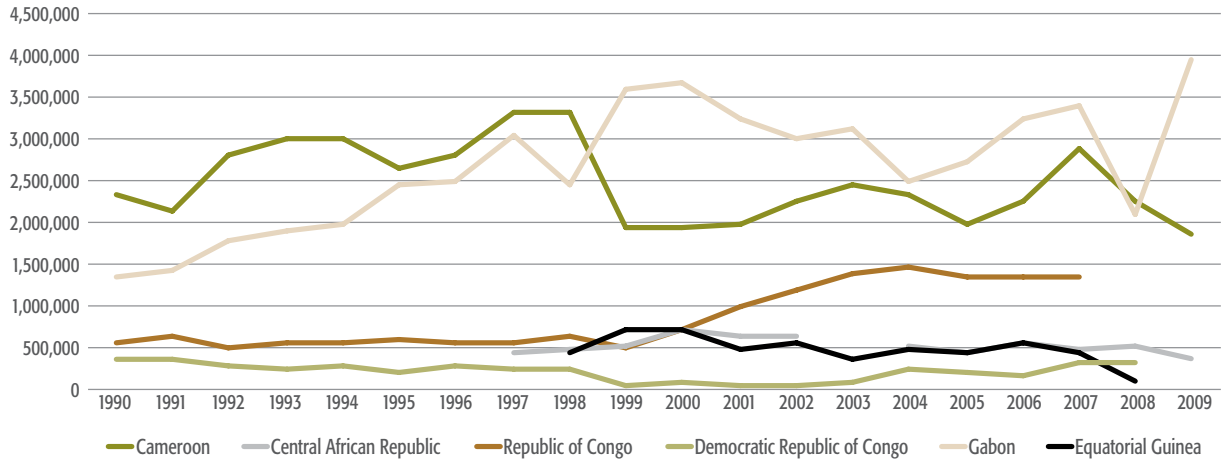
The industrial logging activities are highly selective in the Congo Basin. Unlike in other tropical regions, where logging activities are usually a way to transition

Table 1.6: Harvested Timber Volume and Primary Species Logged by Country in 2007

	Production (m^3)	Main species logged
Cameroon*	2,296,254	Ayous, sapelli, tali, azobé, iroko
Central African Republic	537,998	Ayous, sapelli, aniegré, iroko, sipo
Republic of Congo	310,000	Sapelli, wengué, sipo, afromosia, iroko
Congo, Dem. Rep.	1,330,980	Sapelli, sipo, bossé, iroko, wengué
Equatorial Guinea	524,799	Okoumé, tali, azobé, ilomba
Gabon	3,350,670	Okoumé, azobé, okan, movingui, ozigo
Total	**8,350,701**	

** 2006 data.*
Source: de Wasseige et al. 2009.

Figure 1.4: Industrial Timber Production per Congo Basin Country, 1990–2009 (in m^3)



Source: OFAC Monitoring Data as of 2011.

to another land use, logging in the Congo Basin is highly selective and extensive. Of the more than 100 species generally available in the tropical humid forest in Central Africa, fewer than 13 are usually harvested (see table 1.6). Further, the three most harvested species (*okoumé*, *sapelli*, and *ayous*) combined represent about 59 percent of log production in Central Africa (de Wasseige et al. 2009). Though the countries would like to see more secondary species logged in the Basin forests, the export markets have so far shown themselves to be conservative and slow in accepting unfamiliar secondary species, regardless of their otherwise perfectly suitable technological characteristics. In general, selectivity in logging is increased when harvesting costs are high because timber companies tend to concentrate only on the most economically rewarding species. For example, while Cameroon has more than 600 tree species, fewer than 30 of them are currently used in significant quantities for timber, and fewer than a dozen species make up the bulk (80 percent) of utilization and trade (ITTO 2006). The number of species logged is gradually diversifying—yet, thus far, only in forests near the ports of export and other areas with lower production costs (for example, Cameroon, coastal areas of Gabon, southern Congo, and the province of Bas-Congo in the Democratic Republic of Congo; de Wasseige et al. 2009).

Congo Basin countries remain a relatively small player in terms of timber production at the international level. With an average production of 8 million m^3 per year over the last few years, Central Africa countries produce about 80 percent of the total volume of African timber. However, its contribution to international timber production remains low: Central Africa trails far behind the other two major tropical forest regions in terms of tropical timber production, with only 3 percent of global production of tropical roundwood and just 0.4 percent global production of roundwood (OFAC 2011).

After a period of slow growth over the last 15 years, production drastically contracted by about 2.5 million m^3 in 2008 due to the international financial crisis that also affected the market for tropical timber. This trend particularly affected countries with large export volumes, such as Cameroon and Gabon. Since then, production has recovered, in part, due to the steep increase in roundwood production in Gabon toward the end of 2009.

The contribution of Congo Basin countries to processed timber production is very low. A global analysis of trade in further-processed timber shows that the value of exports for all ITTO producers countries combined was about US$5 billion in 2000, 83 percent

Table 1.7: Timber-processing Units in Central Africa, 1975 and 1995

	Year	Cameroon	Central African Rep.	Republic of Congo	Congo, Dem. Rep.	Gabon
Sawmills	1975	58	10	15	50	23
	1985	96	12	22	46	20
	1995	60	6	26	68	11
	2002	64			50	34
Peeling and slicing	1975	4	2	4	7	4
	1985	5	1	4	7	4
	1995	5	1	4	6	3
	2002	1	no data	no data	6	8
Plywood and boards	1975	3	1	no data	4	1
	1985	4	1	no data	4	1
	1995	4	2	2	4	3
	2002	5	no data	no data	no data	3

Source: ITTO 2006.

Table 1.8: Main Constraints to Further Processing in Central Africa

	Countries				
	Cameroon	Central African Rep.	Congo	Congo, Dem. Rep.	Gabon
Equipment in disrepair	X	X	X	X	
Inadequate transport infrastructure and poor services		X	X	X	X
Lack of concerted and coherent national strategy for forest industry development or non-implementation of existing strategies	X	X	X		X
Absence of adequate financing mechanisms for the further-processing industry		X	X	X	
Lack of qualified and experienced personnel in the future-processing planning, management, and products marketing	X	X	X	X	X
Limited domestic further-processed product market and foreign imports	X				X
Non-compliance with legal processing rates by operation			X		X

Source: ITTO 2004.

of which originated in countries in the Asia-Pacific, 16 percent in Latin America, and only 1 percent in Africa. Ghana and Côte d'Ivoire alone make almost 80 percent of the contribution of African countries to the further-processed timber trade, meaning that the contribution from Central Africa is very small.

Box 1.2: Processing Requirements in the Different Congo Basin Countries

The following list gives the current minimum conversion rates that states impose on each operator—that is, the volume of logs to be processed in the country:

- Republic of Congo: normally 85 percent, but exceptionally lowered to 70 percent during international economic crisis (a measure that was extended to 2011), with the possibility for operators to exchange quotas
- Gabon: 100 percent since the end of 2009. It is possible that export quotas could be granted for 2011
- Cameroon: the sale of some species in the form of unwrought logs is forbidden. The list of the concerned species appears under MINEF Decree No. 0872 of 16 October 2001
- Central African Republic: 70 percent since 2008
- Democratic Republic of Congo: at least 70 percent (quotas are fixed for each operator) for 10 years for processing unit holders and national users
- Equatorial Guinea: 100 percent since 2008

Source: FAO 2010 (The Forests of Basin - State of Forests).

Processing capacities in the Basin, when they exist, are essentially limited to primary processing: sawnwood, peeling and slicing for the production of plywood and veneer (that is, primary processing). Accordingly, more than 80 percent of timber processing units in Central Africa are sawmills[4] (see table 1.7). Together, Cameroon and Gabon represent 60 percent of the subregional processing capacity. In most Central African countries, secondary or tertiary timber processing—that is, the stages that generate the most added value and employment (such as the manufacture of molding, flooring, furniture, and joinery)—is in an embryonic stage, but the industry is more developed in West Africa (Ghana, Côte d'Ivoire, and Nigeria). Overall, Basin countries lag behind—except in the production of moldings, floorings, and other dry and profiled timber, which has expanded in Cameroon during the last decade. One of the paradoxes of Central Africa is that net trade in furniture is negative, with imports totaling US$16.5 million against US$9.5 million in exports. The development of further processing in Central Africa is currently constrained due to a number of factors, as shown by table 1.8.

Log export restrictions are currently being applied in the form of (partial) export bans or the setting of local log-processing quota (minimum processing quota) in order to ensure the further development of and the supply for the in-country processing industry. Governments are becoming more demanding vis-à-vis the operators to maximize the processing level and to increase in-country value added and employment (see box 1.2).

Asian markets absorb more and more timber exports from Congo Basin. Europe used to be the traditional market for timber-producing Basin countries. Although still important, it tends to contract, and Asian markets have become increasingly significant. In the late 2000s, while timber demand from the EU almost collapsed with the economic crisis, China's demand proved to be more resilient and helped to sustain Central African timber exports during recent years. Asia is now the main exportation hub, receiving about 60 percent of total exports during the 2005–2008 period. *It strengthened its position in 2009, at the height of the crisis, by exceeding 70 percent of total exports (see box 1.3).*

Asian markets also present different profiles and preferences for timber products, which could eventually change the way timber is produced in Central Africa. Asia, and particularly China, imports a broader selection and higher volume of lesser-known secondary species,

4 Note that data on sawmills vary widely across the literature and not all sawmills listed are actually operational and active. In particular, in the Democratic Republic of Congo, sawmills are abandoned and not operational after many years of neglect during the years of civil conflict.

Box 1.3: On Timber Trade with China and Other Emerging Asian Markets

To better understand the influence of China and other emerging Asian markets on timber management and exports in the Congo Basin, it is important to understand the market dynamics specific to the timber trade between the Central African countries and China. Following the 1997 Asian crisis, the timber demand of Asian countries, most notably China, grew rapidly. Between 1997 and 2006, China's total timber-product imports almost quadrupled in volume (roundwood equivalent) from approximately 12.5 million m^3 to more than 45 million m^3. China is now the number-one importer of timber products in the world.

With China's manufacturing sectors rapidly expanding, the demand for unprocessed timber is skyrocketing. This is also reflected in the changing composition of timber imports by China. Through the 1990s, China mainly imported large quantities of plywood, but the significant increase of timber imports over the last decade is almost exclusively based on increased log imports, while sawnwood imports stagnated and plywood imports actually decreased. Accordingly, China as has been the top destination of logs exported from the Basin for several years now, surpassing historical destinations such as Italy, Spain, or France. For more than 10 years, Gabon has been the largest Central African supplier of logs to China (for example, with exports worth US$400 million in 2008), followed by the Republic of Congo, Equatorial Guinea, and Cameroon.[a] In comparison to exports from other Congo Basin countries, the Democratic Republic of Congo's official timber exports to China remain at less than $20 million. However, the Democratic Republic of Congo's timber sales to China have been trending sharply upward and the volumes of timber illegally shipped through bordering countries have not been quantified, making the Democratic Republic of Congo's timber export sector worth closer investigation.

In line with the above export trends, several Western logging companies that have been operating in Africa for decades have recently been taken over by investors from China and other emerging Asian countries. For example, the formerly French, then Portuguese, firm Leroy-Gabon, was taken over by Chinese interests. The originally French, then German (from 1968), then Danish (from 2006), company CIB—which operates in the Republic of Congo—was sold to the Singapore-based firm Olam International (controlled by Indian investors) by the end of 2010.

[a] The effect of Gabon's 2010 log export ban on China's imports of Gabonese timber has yet to be fully examined.

which may become more important as the stock of primary export species degrades or becomes more costly to access in remote forest areas.

The logging operators are largely concentrated. The top 10 operators in Central Africa operate between 40 to 50 percent of the concessions in the subregion. The industry leader in recent years has been the French Groupe Rougier, which manages a concession area of nearly 2 million ha. In line with the increasing importance of Asian markets for Congo Basin timber exports, several Western logging companies that have been operating in Africa for decades have recently been taken over by investors from China and other emerging Asian countries. Apart from this mainly foreign-owned, highly commercial sector, there is a set of small industrial operators with limited capacity and resources that are working on smaller forest areas. The professionalization of this growing number of small operators—including improved forest management and more effective industrial processing of their products—will be one of the main challenges in the coming years.

The booming informal sector

A long overlooked sector

The informal timber sector has long been overlooked by both the national entities and the international community which, over the past decades, mostly focused attention on the industrial and export-oriented sectors. In 1994, the devaluation of the regional currency (FCFA) boosted the timber exportation at the expense of the domestic markets, which, consequently, hugely

contracted. The recovery and boom of the domestic market in recent years is a sharp turnaround; domestic and regional timber economy is now recognized as just as important as the formalized sector.

Informal sector is mostly geared by domestic markets. Demand for timber has been soaring on local markets to meet the growing needs of urban populations. However, while most focus has been put so far on export trends (to European markets as well as to Asian markets), very little information exists on the rapidly growing domestic markets in the subregion (both national and regional). Research shows that demand for construction timber rapidly increases from urbanizing cities. This growth generates intense timber flows (mainly informal) that expand at the regional level. It was only recently documented that well-established transnational timber supply networks from Central Africa to as far as Niger, Chad, Sudan, Egypt, Libya, and Algeria have driven the growing urban demand for construction material (Langbour, Roda, and Koff 2010).

Domestic demand for construction timber is booming. In some countries, the potential economic importance of the domestic forest economy appears to exceed the formal economy. For example, in Cameroon, domestic timber production already well surpasses formal timber production; in the Democratic Republic of Congo and the Republic of Congo, domestic timber production represents more than 30 percent of total timber production (see table 1.9). Only recently, research on the informal sector substantiated its importance both in terms of estimated timber volumes as well as in the number of jobs associated with informal activities (from production to marketing). Domestic operators are now recognized as engines that drive small and medium enterprise development.

An unregulated sector that does not capture its full socioeconomic potential

The informal sector provides financial contributions to rural economies that are largely ignored in official statistics; recent research show that the informal sector provides for much higher direct and indirect local employment than does the formal sector, with benefits more equally redistributed at the local level than has been achieved through formal sector activities. Lescuyer et al. (2010) estimate the financial gain generated by the informal sector (that is, based on aggregated local wages, fees, and profits) at around US$60 million per year for Cameroon, $12.8 million for Congo, $5.4 million for Gabon (Libreville area only), and $1.3 million for the Central African Republic (Bangui area only). Generally, the socioeconomic benefits created by chainsaw milling are distributed more widely in communities than are benefits provided by conventional logging. Lescuyer et al. (2010) could demonstrate that the revenue from chainsaw milling that remains in rural economies in Cameroon is four times as high as the area fee, the latter being the tax paid by industrial logging companies and redistributed to local councils and communities. Further, the income generated by chainsaw milling activities also stimulates a secondary economy, thus providing further benefits as secondary service and trade activities develop.

Despite these important local socioeconomic benefits, current regulatory frameworks fail to properly oversee domestic timber production. Because of the quasi-exclusive focus on the industrial timber sector, forest-related laws and regulations prepared since the 1990s have been designed with a clear bias on industrial operations and with little attention to smaller operations. Consequently, legal/regulatory frameworks are not adapted to small forest enterprises which are thus constrained to illegality, with a greater adverse impact on natural forest resources (due overexploitation of timber resources by informal operators). As long as national and international policy makers continue to largely disregard local timber production and consumption—and as long as there is no clear framework that regulates domestic timber production and trade—there is little prospect that illegal timber trade can be reduced. There is an urgent need to focus the efforts on the formalization of the informal sector and to define new rules and regulations that can support the sustainable development of this vibrant sector while preserving the capital of natural forests.

Table 1.9: Estimated Production Volume of the Informal Sector

Country	Estimated lumber production for local market* (m^3/year)	Domestic timber production compared to industrial production	Policy	Estimated forest estate (ha and percent of total land area)	Population
Cameroon	662,000 m^3; more than 2 million m^3 RWE	Almost twice the industrial exports of sawn timber	Chain-saw milling (CSM) is mentioned in the forestry law, but permits are difficult to acquire.	19.4 million (42%)	19.1 million
Gabon	70,000 m^3	23% of the industrial export of sawnwood	The law allows for CSM operators to apply for legal logging authorization, but granting has been very slow.	22 million (85%)	1.5 million
Republic of Congo	78,000 m^3	35% of industrial sawnwood production	CSM is mentioned in the forestry law, but permits are difficult to acquire.	22.4 million (66%)	3.6 million
Congo, Dem. Rep.	1,500,000–2,400,000 m^3	35% of industrial sawnwood production	CSM activities are not adequately covered in legislation; the law allows for a special permit for small-scale loggers, but in practice it is difficult to acquire this permit.	154.1 million (68%)	64.3 million
Central African Rep.	67,000 m^3	150% of the officially exported industrial production (*Semi-commercial export to Chad not included)			

Source: Authors, from multiple sources.
Note: RWE = round wood equivalent

Left unregulated, the informal sector has been "captured" by vested interests, and its socioeconomic benefits have been compromised by corrupt practices. The informal sector involves a large number of operators, including sawyers, porters, retailers, firewood traders, mill owners, log transporters, etc. Despite operating outside of governance and legal schemes, they interact with national entities (forestry administration, customs, finance and so forth). A large share of the benefits is captured by community elites, individuals in the lower level of the supply chain (that is, traders), or corrupt government officials seeking informal fees. These "unofficial" payments to government officials and local elites could also be considered lost revenue to the State. Lescuyer et al. (2010) extrapolated estimates of these payments to the overall volume of estimated informal production and thus calculated revenue losses from the informal sector to amount to US$8.6 million in Cameroon, $2.2 million in Congo, $0.6 million in the Central African Republic, and $0.1 million in Gabon.

…and generates great pressures on natural forests

Informality of the sector also generates inefficiencies and huge pressures on natural forests. The current situation already generates major inefficiency in the provision of timber to domestic markets as well as huge pressures on natural forests. The techniques used by the informal operators are also largely inefficient (hand-free chainsaw milling), but the low-priced domestic market conditions tend to counter any attempt to improve processing methods. A study from Samuel,

Box 1.4: European Union's Forest Law Enforcement, Governance and Trade Program

The European Union (EU)'s Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan represents an attempt to use the power of timber-consuming countries to reduce the extent of illegal logging. The role of consumer countries in driving the demand for timber and wood products—and thereby contributing to illegal logging—has been a particular focus of debate in recent years. This has been especially true of the EU, which is a major global importer of timber and wood products; several countries from which EU member states import such products suffer from extensive illegal activities. Spurred by discussions at the East Asia FLEG conference in September 2001, the European Commission published its Action Plan on Forest Law Enforcement, Governance and Trade (FLEGT) in May 2003. Approved by the Council of the EU in October 2003, it included the following proposals:

- Support to timber-exporting countries, including action to promote equitable solutions to the illegal logging problem.
- Activities to promote trade in legal timber, including action to develop and implement VPAs between the EU and timber-exporting countries.
- Promoting public procurement policies, including action to guide contracting authorities on how to deal with legality when specifying timber in procurement procedures.
- Support for private-sector initiatives, including action to encourage private-sector initiatives for good practice in the forest sector, including the use of voluntary codes of conduct for private companies to source legal timber.
- Safeguards for financing and investment, including action to encourage banks and financial institutions investing in the forest sector to develop due-care procedures when granting credits.
- Use of existing legislative instruments or adaption of new legislation to support the Plan—for example, the EU Illegal Timber Regulation.
- Addressing the problem of conflict timber.

For more information, visit www.euflegt.efi.int/portal/home/flegt_intro/flegt_action_plan/

Pasiecznik, and Fehr (2007) compared the economic viability of producing timber with freehand chainsaw milling or with a frame mill in the Democratic Republic of Congo. They found that freehand was more viable for local chainsaw operators. While the timber from a frame mill was of higher quality, the study found that there was no local market for such timber and that the price premium that could be obtained in the non-local market was largely offset by the additional transport cost. Even though the frame mills have a higher rate of recovery, logs were abundant; thus, there was little motivation for using milling attachments in the Democratic Republic of Congo. Various other studies also show that small-scale forest operations tend to gain in profitability with a certain scale rather than with value addition. Unless the domestic timber supply becomes properly regulated, this situation will exacerbate and cause major adverse environmental impacts.

Unmet domestic demand

One of the paradoxes of Central Africa is that net trade in timber furniture is negative, with imports totaling US$16.5 million against US$9.5 million in exports. At first glance, the fact that countries like Cameroon are net importers of furniture may seem paradoxical. However, since the import volume and demand for high-end furniture is mainly driven by urban elites, hotels, restaurants, and administration, local producers find it difficult to tap into this sizable market due to quality and design constraints as well as lack of appropriate equipment and skills. As such, the lower quality of locally manufactured furniture prevents local manufacturers to compete with global furniture manufacturing to meet the domestic demand for high-end furniture.

Further developing the processing subsector for domestic market could expand marketing options to

lesser-known secondary species. While the value of sawnwood, veneer, plywood, and flooring products depends on the species used, manufactured timber products are not necessarily species-specific; instead, their sales value depends more on their appearance and quality. Secondary species represent an increasing percentage of authorized logging due to the great diversity of species in the Congo Basin forests and the degradation of residual primary forests. Developing the industry for manufactured wood products could thus add value to secondary species and further support larger-scale acceptance of these lesser-known species in future timber supplies. Many secondary species in Central Africa lend themselves well for further processing and are of interest due to the their excellent technical qualities as well as their broad availability.

Illegal logging and forest governance

Illegal logging is suspected to be widespread in the region, but little data exists to adequately quantify the scope. Annual losses in revenues and assets due to illegal logging on public lands are estimated at about US$10–18 billion worldwide, with losses mainly occurring in developing countries. In Cameroon, losses are estimated at $5.3 million; in Congo Brazzaville at $4.2 million; and in Gabon at $10.1 million per year. This revenue is being lost every year due to poor regulation of timber production, and figures do not include estimates for "informal" logging carried out by small-scale operators, who mainly operate illegally. Reliable figures on the volume of illegal logging are rarely available and differ largely. The actual forest area affected is further difficult to detect and delineate with current remote-sensing techniques, as illegal logging in the Congo Basin is usually associated with forest degradation rather than deforestation (European Commission 2010).

Congo Basin countries have adhered to the European Union's FLEGT process. FLEGT stands for "Forest Law Enforcement, Governance and Trade" and has been set up to strengthen forest governance and combat illegal logging. Cameroon (2010), the Republic of Congo (2010), and the Central African Republic (2011) have signed Voluntary Partnership Agreements (VPAs) negotiated under the European Union's FLEGT process. FLEGT seeks to ban illegal timber trading on the European market. One of the fundamental elements of FLEGT is to provide support to timber-producing countries in order to improve their forest governance and establish effective methods to counter illegal logging (see box 1.4). In April 2012, six countries are developing the systems agreed under a VPA—among them, Cameroon, the Republic of Congo, and the Central African Republic—and four countries that are negotiating with the European Union, among them the Democratic Republic of Congo and Gabon.

CHAPTER 2

Impacts on Forests

Unlike in other tropical regions, logging activities in the Congo Basin usually do not entail a transition to another land use. They generally lead to forest degradation rather than deforestation. This feature was the main reason for the Congo Basin countries to join forces during the Conference of Parties in Bali in 2007 and expand the concept of RED to forest degradation (thus adding the second "D" to the acronym REDD).

Limited cumulative figures are available on the specific degradation impacts of logging activities. Annual degradation rates for dense forest in the Congo Basin have been estimated at 0.09 percent based on gross degradation of 0.15 percent combined, with recovery of 0.06 percent. These rates are low, and although there is insufficient data available on the quantitative impact of logging operations on biomass and carbon stocks, the GHG emissions from industrial logging activities are considered to be low. The impact may, however, be more significant for informal logging activities that do not apply minimum standards to manage the resources and thus tend to be more damaging to the forests.

Forest degradation, though harder to quantify, also drives major change in Basin forests. An estimated 3.8 million ha of forest are degraded each year. This quantified measure of degradation is based solely on significant detected change in forest cover and not in qualitative terms (that is, change in species composition). Degradation is largely offset by recovery (transition from degraded forest to dense primary forest), when considered nationally (see table 2.1).

"LIMITED" IMPACTS FROM INDUSTRIAL LOGGING

Logging activities lead to forest degradation rather than deforestation. Logging in the Congo Basin is highly selective and extensive, and production forests remain permanently forested. In industrial concession,

Table 2.1: Average Annual Degradation and Recovery Rates in Dense Forest Zones in the Congo Basin between 1990 and 2000

Country	Gross degradation (%)	Gross recovery (%)	Net degradation (%)
Cameroon*	0.07	0.06	0.01
Central African Republic	0.06	0.04	0.02
Republic of Congo	0.04	0.04	0
Congo, Dem. Rep.	0.19	0.07	0.12
Equatorial Guinea*	0	0.32	
Gabon*	0.09	0.01	0.08
Congo Basin	**0.15**	**0.06**	**0.09**

Source: Adapted from Duveiller et al. 2008; Eba'a Atyi et al. 2008.

* These figures should be interpreted cautiously, given the low to very low sampling rate.

Box 2.1: Typical Impact of Commercial Logging Operations

- ***Logging base camp***: 0.03 to 0.1 percent of forest cover of the concession area is cleared for the purpose of the base camp(s), according to companies (Lumet et al. 1993). However, subsequent to the establishment of a base camp, the pressure on the surrounding forest increases rapidly due to agricultural activities, hunting pressure, etc. Little quantitative data is available on the extent of indirect impact from logging base camps.
- ***Logging access roads:*** Development of logging roads involves the clearing of a strip of forest and the compacting of the soil. Access roads are typically between 4m and 25m wide. Primary and secondary roads generally account for 1–2 percent of surface disturbance (including the road edges that are also cleared).
- ***Incidental damage***: The felling of trees also contributes to damage and uprooting of adjacent trees and vegetation in the logging plot. This includes total damage of trees as well as broken-off branches of nearby trees during the fall of the logged timber tree. As part of an operation with an extraction intensity of 0.5 trees per hectare, one generally estimates that per 1 m^2 of extracted timber, damage is caused to 4.3 m^2 of surrounding forest area. Vine cutting prior to felling significantly reduces the impact.
- ***Skidding trails***: Skidding trails create the least impact of the different factors, in particular in Africa, where extraction is highly selective. The track that is opened is usually rapidly overgrown; large trees are avoided during development of the track and skid trails are often not detectable from aerial photographs shortly after operation. As part of an operation with an extraction intensity of 0.5–1 tree per hectare (5–15m^3/ha), one generally estimates that about 3 percent of the forest floor is covered by skid trails, half of the area caused by the actual extraction.
- ***Log dock***: The log dock is an opening in the forest to accommodate temporary storage of extracted logs prior to further road transport. This usually accounts for 0.3 percent of the total surface used.

wood extraction is very low, with an average rate of less than 0.5 m^3 per hectare. As a matter of fact, the industrial logging sector in the Basin has two specific features that tend to drastically limit its impact on forest carbon:[5] adoption of sustainable forest managements (and, in some cases, subscription to forest certification schemes) as well as the high selectivity in valued species. In a conventional industrial concession, it is estimated that for the first round of logging in old-growth forests, the total disturbed area accounts for approximately 5.5 percent of total forest area (Garden 1995). Second- or third-rotation logging in logged-over forests increases the damage to more than 6.5 percent of the total surface. Although there is insufficient data available on the quantitative impact of logging operations on biomass and carbon stocks, the direct GHG emissions from industrial logging activities are considered to be relatively low. Box 2.1 describes the impacts of the different logging operations.

Recent field studies on the carbon impact of selective logging in the Republic of Congo quantifying the impact of selective logging on forest carbon stock (Brown et al. 2005) estimate that the carbon impact from the test logging site totals 10.2 t C per ha of concession area, or a total carbon impact of 12,174 t C for a total of 3,542 t C of extracted biomass carbon (that is, the commercial log). This represents a comparatively low total carbon impact, which breaks down roughly as follows: 29 percent extracted biomass carbon, 45 percent damaged biomass carbon in logging gap, 1 percent damaged biomass carbon in skid trails, 25 percent biomass carbon impact of logging roads.

The study also suggests that such selective logging activities have comparatively less impact on carbon stock than do reduced-impact logging (RIL) activities in the Amazon Basin. There are several explanations for the low impact of the case study of highly selective

5 In this section, we consider the impacts in terms of carbon content (as per the REDD+ mechanism). However, it is important to note that while logging may have limited impacts on carbon stock in the long run, impacts on biodiversity and ecosystem equilibrium may be much more affected by logging.

Box 2.2: Reduced-impact Logging (RIL)

RIL comprises the entire spectrum of forest-harvesting operations—from pre-harvest inventory and planning, selection of merchantable trees, and design of infrastructure to felling, extraction and hauling of logs, and finally post-harvest operations and assessments. Careful selection of trees is a first step toward ensuring that conservation principles and future harvesting cycles are appropriately considered.

Proper RIL is usually practiced every 25 to 50 years, depending on forest type, resulting in minimal disturbance. Timber harvest (sometimes combined with carbon credit sales or other ecosystem service credit sales) provides an economic benefit from the forest while retaining a large part of the values associated with an unharvested forest. The challenge is to produce enough economic benefit from the forest to also support the local people sustainably.

RIL must therefore be seen as only a component, albeit an important one, toward responsible or sustainable forest management. For example, the application of RIL does not comprehensively consider social issues, such as land and customary rights, although these issues are important in many situations. In other words, RIL defines how logging operations will be carried out, while bigger-picture aspects are covered under sustainable-yield planning; social and environmental considerations are considered as part of broader forest management planning and within the applicable policy and legislative frameworks.

Generally, the advantages of RIL include: (1) Soil disturbed in roads, landings, and skid trails reduced by almost 50 percent; (2) significantly less canopy opening; (3) better survival of residual trees and faster recovery; (4) wood waste reduced by more than 60 percent; (5) reduced machine hours; (6) reduced injury rate among workers; and (7) increased carbon retention.

In contrast, conventional logging tends to lead to: (1) many unnecessary roads and skid trails; (2) many unnecessary landings that are too large; (3) substantial canopy opening; (4) subsequent invasion by vines and pioneer plant species; (5) significant damage to residual vegetation, including future crop trees; (6) large number of lost logs; (7) higher machinery use and increased injury rates among workers; and (8) decreased carbon retention.

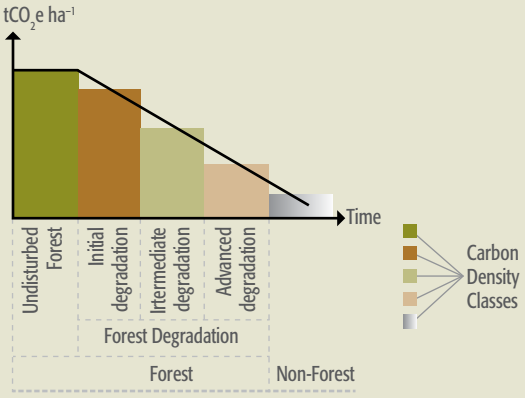
logging in the Congo Basin. In the test sites in the Amazon, the ubiquitous presence of lianas resulted in more damage in the areas surrounding the extracted trees, while there was no presence of lianas at the test site in Congo. Further, the overall biomass and thus carbon impact of highly selective logging in the Congo Basin is low due to the relative proportions of the extracted timber trees. For example, commercial log length at the test site in the Republic of Congo was 22 meters, while log length recorded in studies from the Amazon often range much below (for example, a comparable study from Bolivia reports mean log length just over 10 meters; see box 2.2)

In addition to the limited impact during logging activities, industrial concessions are generally managed under rotation cycles, meaning that the plots will not be logged again before a 20-to-30-year period, which leaves enough time for biomass to regenerate. As a result, it is expected that under proper implementation of SFM principles, a concession should globally maintain a carbon stock over the long run (see box 2.3).

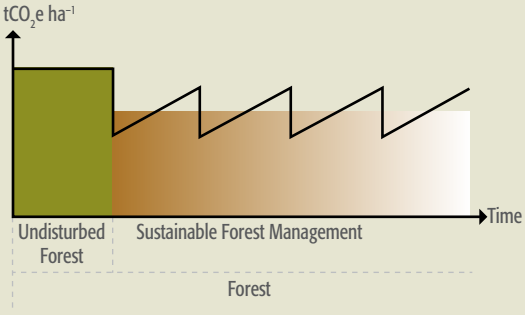
Indirect impacts can also result from logging activities, such as infrastructure (mainly road) expansion. According to estimates from Laporte et al. (2007), logging roads account for 38 percent of the length of all roads in Central Africa, ranging from 13 percent in the Democratic Republic of Congo to greater than 60 percent in Gabon and the Republic of Congo. Logging roads open access to forest frontiers, which are often colonized by the most vulnerable people in search for subsistence land. The frequency of deforestation rapidly decreases with the distance from

Box 2.3: Variations in Forest Carbon Stocks: Key Concepts

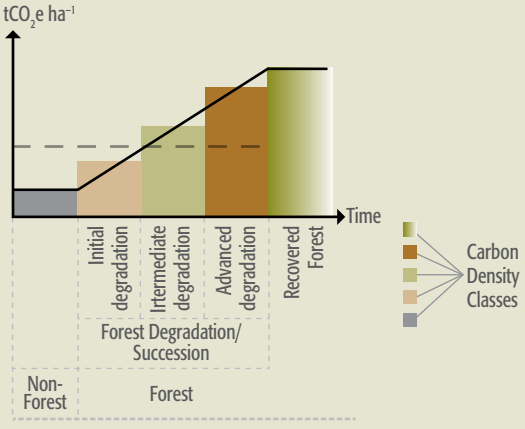
Deforestation is defined as the long-term or permanent conversion of forest land to other nonforest uses. The UNFCCC defines deforestation as "the direct, human-induced conversion of forested land to non-forested land".[a] It can be the result of an abrupt event (deforestation = forest → nonforest), in which case the change in land cover and land use occurs immediately and simultaneously, or of a process of progressive degradation (deforestation = forest → degraded forest → nonforest). Deforestation occurs when at least one of the parameter values used to define "forest land" is reduced from above the threshold for defining "forest" to below this threshold for a period of time that is longer than the period of time used to define "temporarily un-stocked."



Forest degradation is "forest land remaining forest land and continuing to meet the basic national criteria related of minimum forest area, forest height and tree crown cover remain" but gradually losing carbon stocks as a consequence of direct human intervention (for example, logging, fuel-wood collection, fire, grazing). "Degradation" is, thus, the conversion of a forest class with higher average carbon stock density to another one with lower average carbon stock density.



Consistently with the above definition, areas subject to sustainable forest management (with logging activities) represent a particular class of "degraded forest." An undisturbed natural forest that will be subject to sustainable forest management will lose part of its carbon, but the loss will partially recover over time. In the long-term, a sustainable harvesting and re-growth cycle could maintain a constant average carbon stock density in the forest. Since this average carbon stock density is lower than in the original forest, sustainably managed forests are considered a special case of "degraded forest."



Forest regeneration. A transition from a disturbed forest class to a forest class with higher carbon stock density is also possible. Degraded forests or young forests (planted or secondary) can increase their carbon stocks if properly managed, or when logging and other activities are permanently suspended or reduced.[b] The process can be seen as the reversal of forest degradation.

Reforestation/Afforestation is a specific case of forest regeneration when the initial status of the land is non-forest land. Depending whether the land was a forest before or after 1990, the mechanisms of forest regeneration is called respectively afforestation or reforestation.

[a] Forest area and carbon stock losses due to natural disturbances (landslides, consequences of volcanic eruptions, and see level rise, among others) are not considered "deforestation."

[b] Units of forest land subject to this "regeneration" process are successively allocated to forest classes with a higher average carbon stock density. As in the degradation case, the difference in average carbon stock density between two contiguous classes should be at least 10 percent.

roads. In Brazilian Amazon, a 30 percent of forest loss was found within 10 km of roads, a 20 percent loss between 11 and 25 km, and a 15 percent loss from 26 to 50 km (Mertens et al. 1997). Less research has been done on this issue in the Congo Basin, but work conducted in southern Cameroon (Mertens and Lambin 1997) shows that 80 percent of total deforestation occurs within a distance of less than 2 km of roads; beyond a distance of 7.5 km, deforestation ceases (see figure 2.1). As shown in the below map of the transition zone around Kananga city in southern Democratic Republic of Congo, the deforestation patterns are different in areas where higher population density puts more pressure on natural forests.

Major threat likely to come from informal sector

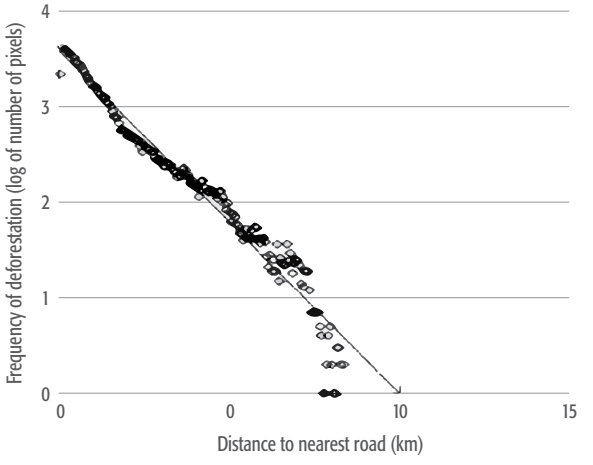
The major threat from logging activities is expected to come from the informal sector that supplies the boiling domestic market. Although the ecological impacts and sustainability of the informal timber sector has not been scientifically established, experts suggest that the informal chainsaw milling industry tends to lead to depletion of forest resources, due to the combination of several factors:

- The informal sector supply markets are less selective than the export markets; as such, the extraction rate from logging activities is considered to be higher. Reducing selectivity and increasing the number of secondary species in the market generally increase the ecological impact per logged area.
- The processing rate of the chainsaw industry is very low, requiring many more resources for the same volume of processed products.
- The informal activities are not governed by logging cycles and tend to over-log the most accessible areas (closed to markets or transportation access). This leads to a progressive erosion of the resources, as the regeneration rate cannot cope with extraction rates.

As long the informal sector is left unregulated, its impacts on natural forests are expected to increase and progressively degrade forests in most highly populated areas.

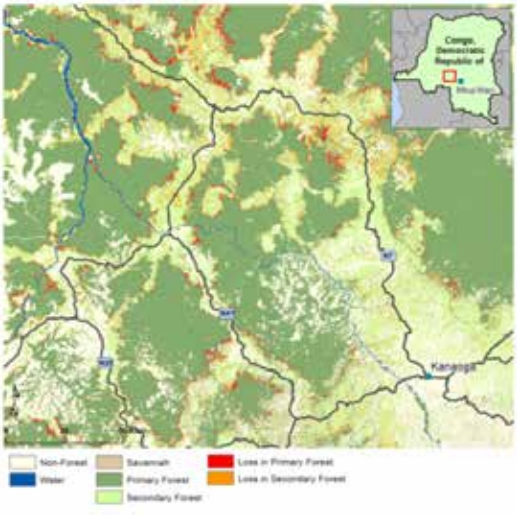
Figure 2.1: Deforestation Dynamics along Roads

Spatial modeling of deforestation in southern Cameroon.



Source: Mertens et al. 1997.

Forest loss near highways outside of Mbuji-Mayi/ Kanaga area between 2000 and 2010.



Source: Authors.

CHAPTER 3

Recommendations

Logging activities are usually not direct causes of deforestation in the Congo Basin. They rather lead to forest degradation. This is why the Basin countries strongly argued in Bali that the RED mechanism should also include the forest degradation and should, therefore, become REDD so that progress made on sustainable logging activities in the Congo Basin could receive some financial compensation under the climate financing mechanism.

The major threat comes for the boiling domestic market. While progress has been made in the industrial logging concessions, there is still room for improvement, and efforts should be pursued. But it is clear that the major threat from logging activities now comes from the informal sector that is not ruled by any governance framework and that tends to adversely impact the forest resources. Although the ecological impact and sustainability of the informal timber sector has not been scientifically established, experts suggest that the informal chainsaw milling industry tends to lead to depletion of forest resources.

This section provides some recommendations and guidance on how the future REDD+ mechanism could be used to support a more sustainable logging sector (both industrial and artisanal) that would reconcile the growing demand for timber products (mainly domestically) with forest preservation. The below section provides a list of policy recommendations that could help Congo Basin countries design a strategy to dismantle the dualistic profile (formal/informal) of the logging sector and help define a performing and differentiated logging sector that ensures the sustainability of the forest resources.

PURSUE PROGRESS ON SUSTAINABLE FOREST MANAGEMENT IN INDUSTRIAL LOGGING CONCESSIONS

Congo Basin countries have made major progress on sustainable forest management (SFM) in logging concessions in Central Africa over the last decades. The region is one of the most advanced in terms of areas with an approved (or under preparation) management plan (MP). However, studies indicate that despite this progress, SFM principles still need to fully materialize at the level of the industrial logging concessions. The below elements give some guidance on key aspects that should be reinforced:

- *Ensure adequate implementation of management plans at the concession level.* While a lot of technical expertise is usually put in the preparation/approval process of the MP for a logging concession, it seems that in many countries much less attention is given to implementation of the plan. The decentralized level of the forestry administration are usually not adequately equipped (in terms of human resources as well as vehicles and other equipment) to perform monitoring and control activities in the concessions (see below on "Strengthen Forestry Administration").
- *Revise technical SFM standards.* Standards on SFM defined in national regulations were based on the knowledge on forest dynamics at the time of the elaboration of the regulations. Based on the practical knowledge accumulated at the level of the concessions over the past decade, there is an opportunity to adjust the SFM parameters and

criteria that would take into account new elements. One such element should definitely be climate change, as it is already affecting forest dynamics in the Congo Basin (growth/mortality/regeneration rates). In addition, improved logging techniques, such as RIL, could be given a more prominent place in SFM practices, given their proven and demonstrated benefits related to reduced carbon impact, positive effects on ecosystem functions, and increased profitability.

- *Move away from single-use, timber-oriented management models.* In line with the need for technical adjustments of SFM standards, one could also consider non-timber products, biodiversity conservation, and environmental services as part of forest MPs. Such multi-use forest management would better respond to the needs of the multiple stakeholders dependent on the forest resources and also add more value to the forest. SFM could serve as a tool toward a multi-use management approach, while planning for multiple uses would be elevated to the landscape level.
- *Encourage forest certification schemes.* Many studies have shown that other forest management requirements—for example, mandatory MPs—are not sufficient to motivate logging companies to adopt socially and environmentally sustainable practices. In many places, communities perceive improved social benefits from certified concessions compared to non-certified ones. A recent (Nasi et al. 2011) study indicates that only certification seems to provide incentive and sense of need for companies to invest significantly in operational procedures for biodiversity conservation (including improved planning of forest camps and road networks, protection of ecologically sensitive sites, pro-active control of hunting activities, and so on). While adoption of certification schemes is a voluntary and decided upon by an operator based on its business plan and the responses to its market's signals, incentives could be set up in the Congo Basin to encourage private operators to make the choice of certifying their concessions.
- *Support the FLEGT process.* FLEGT is the most comprehensive initiative to support tropical timber-producing countries as they improve governance in their forestry sector and promote production and trade of legal timber products. The process is already quite advanced in all Congo Basin countries (except Equatorial Guinea), and it is expected that wood products exported from these countries to the European Union will be FLEGT-licensed starting in 2013, ensuring that they do not contain any illegally harvested timber and are derived from SFM. The FLEGT process is critical to support better governance in the forest sector, and all governance-related activities in a specific country should strengthen and be aligned with the FLEGT VPA signed by that country.

FORMALIZE THE INFORMAL TIMBER SECTOR

The informal timber sector has long been overlooked by both the national entities and the international community which, over the past decades, mostly focused attention on the industrial and export-oriented sectors. As long as national and international policy makers continue to largely disregard local timber production and consumption—and as long as there is no clear framework that regulates domestic timber production and trade—there is little prospect that illegal timber trade can be reduced. There is an urgent need to focus the efforts on the formalization of the informal sector and to define new rules and regulations that can support the sustainable development of this vibrant sector while preserving the capital of natural forests.

- *Understand the "political economy" of the informal timber value chain.* A political economy analysis of the informal timber sector should be a prerequisite to the revision/adjustment of the legal and regulatory framework, as proposed below. In fact, the informal sector involves a large number of operators, including sawyers, porters, retailers, firewood traders, mill owners, log transporters, and so forth. Despite operating outside of governance and legal schemes, they significantly interact with national entities (forestry administration, customs, finance, and so forth). Robust understanding of interactions among

the various stakeholders as well as their roles in the informal timber value chain will help inform the preparation of a legal/regulatory framework.

- *Adapt the legal and regulatory framework to move the informal sector into formality.* There is a need to adapt the framework of legality standards to the reality of low-income and small-scale domestic producers so that they can move out of illegality and maximize their contribution to economic growth and job creation while sustainably managing forest resources. More concretely, governments of Congo Basin countries would need to put in place simple regulations and procedures to obtain small-scale logging permits, which would move into the formal economy.

  As the governments prepare a new framework on domestic timber production and trade, it is essential for them to engage an open and transparent dialogue with all key stakeholders and particularly the local people benefitting from the informal activities. Lessons further emphasize the importance of building broad consensus among the different stakeholders to address informal sectors. A multi-stakeholder dialogue will be a critical process for identifying solutions to overcome the difficult tradeoffs between sustaining rural livelihoods dependent on the informal domestic markets and enforcing production standards and trade restrictions as required by the principles of timber legality. A multi-stakeholder dialogue can further be seen as a first step for understanding and addressing the underlying problems that lead to the informality/illegality and inefficiencies of the domestic sector and for capacity building toward improving local governance, aside from strict enforcement. Failure to understand and take into account the underlying factors could run the risk that small-scale operators would only be driven even deeper into illegality.

- *Better understand the market trends and related opportunities.* So far, most focus has been put on the analysis of the export trends (to European markets as well as Asian market), but very little information exists on the rapidly growing domestic markets in the subregion (both national and regional).

  Research shows that demand for construction timber rapidly increases from urbanizing cities. This growth generates intense timber flows (mainly informal) that expand at the regional level (some studies highlight timber flows from Cameroon to Libya and Egypt). However, very little is known about these new markets (type of products, volumes, prices, flows, and so forth). As they are becoming a more and more prominent consumer of Congo Basin timber, there is a need for a more robust understanding of these markets and their dynamics so that the decision makers (public and private) can make more informed decisions on how to sustain this value chain without jeopardizing the natural forest capital. This analysis should be conducted at the regional level, as there are clear signals that the timber flows tend to be transnational.

MODERNIZE THE PROCESSING CAPACITIES

Having a better-performing and modern timber-processing industry has always been a high priority for the Congo Basin governments. Progress on that front has been minimal so far, but there are signals that this is likely to change in the coming years. Ambitious steps are being taken by the government of Gabon, for example, to develop a free-zone area "Special Economic Zone—SEZ" in Nkok, about 30 km from Libreville, on a 1,125-hectare area in partnership with the private operator Olam.[6]

While the modernization of the processing sector is critical to set up an efficient timber value chain in the Congo Basin, the following dimensions should be taken into account:

- *Adjust the processing capacities to the forest resources.* The timber-processing capacity is globally oversized and creates a huge pressure on the

6 This SEZ will be dedicated to the advanced processing of tropical timber, with a global capacity of 1 million m^3 per year and direct employment estimated between 6,000 and 7,000. As of November 2011, US$200 million has already been invested in this joint-venture SEZ. The SEZ is expected to be operational in mid-2012.

resource. While progress has been made in the industrial subsector, there is a lot to be done in the informal subsector. This is even more pressing as the domestic demand is massively growing. The Congo Basin governments have to make sure, as they formalize the informal sector, that the processing capacities will equate the capacity of the forest.

- *Promote more efficient processing techniques.* Industrial processing capacity is widely limited to primary processing (sawnwood, peeling and slicing) with low valorization rates (between 30 and 45 percent). The exported products are then reprocessed in the consuming countries. Governments of Congo Basin countries should have a comprehensive assessment of the barriers that need to be lifted to promote more efficient in-country processing.

  On the artisanal sector, and as the modalities of the formalization of this sector are defined, a specific attention should also be on the enhancement of the processing, as the situation now leads to a wide waste of resources ("tragedy of commons"). Artisanal operators should be empowered to innovate and improve technologies, and to more efficiently respond to domestic markets.
- *Diversify valorized species.* The timber sector in the Congo Basin is highly selective, valorizing only a very limited number of species. This trend has been mainly driven by the requirements from the consuming markets (Europe and Asia). There are, however, many opportunities to add value to secondary species, which could, for example, be incorporated into plywood production and other secondary processing. Further development of the secondary and tertiary processing industry would also allow increased value addition to secondary species.[7] Opportunities are also very important in the artisanal sector and the domestic markets, where secondary species could get more traction. In addition, valorization of the timber wastes (from production to processing) could also be of great impact.

FOSTER INVOLVEMENT OF COMMUNITIES IN FOREST MANAGEMENT

The concept of "community forestry" has been embraced by most of the Congo Basin countries and is now reflected in their legal framework. However, challenges remain in terms of operationalization of this concept. Community-forest status usually does not carry permanent property rights and is de facto similar to a concession—simply smaller and under a different regulatory framework. These time-bound management contracts leave communities exposed to tenure rights issues over the long term, and the various other shortfalls of the law significantly constrain the opportunities for effective and sustainable community forest management of the state-owned forest resources. More recently, the emerging REDD+ agenda has placed more emphasis on participatory forestry management and the importance to clarify the rights of the community over the forests (access/property rights).

DIVERSIFY SOURCES OF TIMBER (THROUGH PLANTATION, AGROFORESTRY)

The timber demand increases at the international level as well as at the local level in the Congo Basin, so it seems unlikely that the pressure on natural forest resources will decrease in the coming years and decades. The only way to alleviate this pressure is to create some other sources of timber. This can be done by the expansion of plantations (small-scale and industrial[8]) as well as the inclusion of valuable trees in farming land. This would diversify the timber supply and could create an alternative to natural forests as the unique timber provider in the region.

7 While the export of unprocessed wood and sawnwood is highly species-dependent, timber species have much less importance in secondary and (more so) tertiary wood products, in particular furniture, where price and marketability is dependent on design and aesthetic values rather than particular species specifications.

8 This should be done with respect to social and environmental best practices.

STRENGTHEN ADMINISTRATIONS, PARTICULARLY AT THE DECENTRALIZED LEVEL

Forestry administrations are weak in all Congo Basin countries: there are often under-staffed, with older employees. Staff is generally highly concentrated in headquarters and central entities, with very people at the decentralized level. The staff has usually not been trained on new techniques, technologies, and dimensions of forest management. Beyond human resources, forestry administrations are also poorly equipped, particularly in decentralized offices.

- *Rejuvenate forestry staff.* Staffing strategies (recruitment and capacity building) for the forestry administration should be redefined, based on the new needs, in terms of knowledge and skills.
- *Foster technology transfer.* Administration usually relies on inadequate equipment and buildings. New technologies (log tracking system, GIS, etc.) should be transferred to forestry administrations so that they can perform more efficiently their core tasks in terms of planning, monitoring, and control.

Conclusion and Outlook

With an average production of 8 million m^3 per year, Central African countries produce about 80 percent of the total volume of African timber. However, Congo Basin countries are a relatively small player in terms of timber production at the global level, with a relatively low contribution to international timber production. Asian markets absorb more and more timber exports from the Congo Basin. Asia is now the main exportation hub, receiving about 60 percent of total exports during the period 2005 to 2008. It strengthened its position in 2009, at the height of the crisis, by exceeding 70 percent of total exports. Asian markets also present different profiles and preferences, which could eventually change the way timber is industrially produced in Central Africa.

Besides industrial, export-oriented logging operations, Congo Basin countries witness the proliferation of artisanal loggers, who operate informally to supply a growing local and regional timber demand. This trend is unlikely to fade as most Congo Basin countries urbanize. In addition, demand for informal timber comes from other African countries (such as Niger, Chad, Sudan, Egypt, Libya, and Algeria), where demographic growth and urbanization are considerable.

While logging activities may no longer rank highest on the list of drivers of deforestation and forest degradation in the Congo Basin, one should, however, acknowledge that they are part of a broader dynamic and that logging activities (particularly informal ones) can sometimes be the premise of other economic activities in remote areas.

While progress has been made in terms of SFM in industrial concessions, it has to be pursued and strengthened with a sustained attention from all stakeholders. In addition, the main challenge is certainly to make sure that these advancements are also applied to the informal sector, which has been historically off the radar and which proves to have substantial long-term impacts on forest cover.

The REDD+ mechanism could certainly provide an opportunity for Basin countries to support their logging sector and to help reconcile the current dualistic configuration that tends to erode the overall progress made in the industrial sector. The REDD+ resources could be used for "no-regrets" measures**.** Such measures, while differing from country to country, should seek to create the enabling conditions for the implementation of an inclusive, green growth.

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