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AN OVERVIEW OF LOGGING IN CAMEROON

An Initiative of

WORLD RESOURCES INSTITUTE

A Global Forest Watch Cameroon Report

What Is Global Forest Watch?

Approximately half of the forests that initially covered our planet have been cleared, and another 30 percent have been fragmented, or degraded, or replaced by secondary forest. Urgent steps must be taken to safeguard the remaining fifth, located mostly in the Amazon Basin, Central Africa, Canada, Southeast Asia, and Russia. As part of this effort, the World Resources Institute in 1997 started Global Forest Watch (GFW).

Global Forest Watch is identifying the threats weighing on the last frontier forests—the world's remaining large, relatively undisturbed forest ecosystems. By 2005, our goal is to have Global Forest Watch chapters up and running in 21 countries. These nations account for about 80 percent of the world's remaining forests. In the longer term, GFW monitoring will extend to nonfrontier forest regions, where ongoing development threatens smaller tracts of unique, and often highly diverse, natural forests.

GFW is an independent network of national and/or local organizations that monitor and map logging, mining, road-building, and other forest development within major forested regions of the world. Each organization gathers and reports similar information, with an emphasis on comparable, preferably mapped information that covers entire forest ecosystems.

We also recognize that forests straddle political boundaries. At the global level, we hope that the publication of national reports using comparable data and mapping techniques will provide, in the aggregate, a valuable picture of global trends in development activities and environmental conditions in the world's forests.

GFW's principal role is to provide access to better information about development activities in forests and their environmental impact. By reporting on development activities and their impact, GFW fills a vital information gap. By making this information accessible to everyone (including governments, industry, nongovernmental organizations (NGOs), forest consumers, and wood consumers), GFW promotes both transparency and accountability. We are convinced that better information about forests will lead to better decisionmaking about forest management and use, which ultimately will result in forest management regimes that provide a full range of benefits for both present and future generations.

To this end, GFW (i) tracks existing and planned development activities, (ii) identifies the actors—including companies, individuals, government agencies, and others—engaged in this development, (iii) monitors the implementation of laws and regulations established in the interest of forest stewardship, and (iv) provides data on forest ecosystems to highlight the environmental and economic tradeoffs that development options entail.

GFW is an information service. Our mandate is strictly limited to providing objective, credible, peer-reviewed data, and making that information widely available.

All Global Forest Watch publications are available from the World Resources Institute as well as on our website at www.globalforestwatch.org.

What is GFW Cameroon?

Global Forest Watch Cameroon (GFW Cameroon) is an affiliate of the international Global Forest Watch program. It is currently composed of three Cameroonian nongovernmental environmental organizations (NGOs): Cameroon Environmental Watch (CEW), the Centre pour l'Environnement et le Développement (CED), and the Centre International d'Etudes Forestières et Environnementales (CIEFE). A national advisory committee (Groupe de Suivi)—including representatives from national and international NGOs, government management agencies, and research institutions—offers periodic review input on GFW Cameroon's activities and products. The GFW international network, with help from other partners, provides technical and financial support for GFW Cameroon, with the goal of building capacity for independent, locally driven monitoring and reporting within the country.

All data presented in this report are available at www.globalforestwatch.org or by contacting us at the address provided on the inside back cover.

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FOREWORD

This report, *An Overview of Logging in Cameroon*, is one of the first products of Global Forest Watch (GFW), a remarkable new alliance that was launched by the World Resources Institute (WRI), working with nongovernmental organizations (NGOs) and local leaders from forested countries around the world. GFW links satellite imagery with on-the-ground investigation by local groups to assemble powerful information about the risks to the world's great forests, and then uses the Internet to make the information widely available.

Technological innovation is rapidly changing the way we manage and protect our forests and environment. First, technology provides us with the tools we need to get accurate and up-to-date information about forests and other ecosystems, a prerequisite for informed decisionmaking. Second, technology provides the means to make this information available to all those with a stake in natural resources. Information is powerful, and providing this information helps ensure that resources are managed for the common good.

Until recently, there were little systematic data on the condition of the world's forests. It was impossible to say how much forest had been lost and how much remained as frontier forest—large, intact, and fully functioning natural ecosystems. Forests help to slow global warming, because they store vast quantities of carbon. They control flooding, purify water, and cycle nutrients and soil, ultimately influencing food production for billions of people. And they house an incredible array of living organisms that provide the genetic material for valuable new products and a foundation for the resilience of natural systems.

In 1997, WRI and our partners collaborated with scientists and local experts around the world to map remaining frontier forests and areas that had been cleared in past generations. This work could not have happened without new information tools at our disposal: geographic information systems (GIS) to store and analyze data; access to maps derived from satellite images; and the Internet to share drafts and exchange results with our collaborators. Our report, *The Last Frontier Forests: Ecosystems and Economies on the Edge*, established that just 20 percent of the frontier forests that once blanketed the earth remain today. Much of what is left is under intense development pressure, primarily from logging and other extractive use.

Existing forest monitoring efforts have primarily been confined to tracking deforestation and forest degradation after it has happened. This work has limited use for management decisions, because once an area has been cleared or degraded, it is frequently too late to do anything about it. To fill this information gap, GFW seeks to provide early warning data on forest development and on the environmental and economic trade-offs this development entails. GFW empowers local organizations to monitor and report on their forests, assisting growing civil society institutions to gain access to remote sensing technology and the power of the Internet. These organizations are connected to a worldwide network of partners bound together by a commitment to accurate information and open dialogue about forest management. Grounded in the idea that more public information helps create better outcomes, GFW aims to become an independent source of timely and practical information on who is developing forests, where, and how.

Through this report, our Cameroonian partners have documented that Cameroon's forests are among the most biologically diverse in the Congo Basin. Yet, these forests are under rapidly growing development pressures. Given its economic and environmental implications, logging has to be carefully monitored if Cameroon wants to safeguard its forest resources for future generations. If managed properly, Cameroon's forests could offer long-term revenues without compromising the ecosystems' natural functions. GFW Cameroon found information about forest development unreliable, inconsistent, and difficult to obtain. We believe that additional public information will promote accountability and transparency and favor the implementation of commitments made to manage and protect the world's forests, which would help slow forest degradation around the world.

GFW seeks to make information available rapidly to an ever wider audience by providing forest information and maps on-line and developing a state-of-the-art Website (www.globalforestwatch.org) to post results from its multiple field activities in Cameroon, Canada, Chile, Gabon, Indonesia, Russia, and Venezuela. Reports, maps, and information from credible sources will be available for downloading. Anyone with access to the Internet can consult GFW data and contribute by providing information or views directly on-line. We hope that the array of products and activities will lead to a more constructive dialogue between forest managers and users at the local, national, and international levels.

Global Forest Watch would like to thank the following donors for their overall support of Global Forest Watch activities: AVINA, the Department for International Development (DFID) UK, IKEA, the Netherlands Ministry of Foreign Affairs, the Turner Foundation, and the World Resources Institute.

Global Forest Watch Cameroon would also like to thank the United States Agency for International Development, Central Africa Regional Program for the Environment (USAID/CARPE), and the German Federal Ministry for Economic Cooperation and Development (BMZ) for their specific support of Global Forest Watch activities in Central Africa.

Jonathan Lash
President
World Resources Institute

TERMINOLOGY

Abandoned concessions: Concessions appearing on the 1959, 1971, and 1995 maps but not listed as valid concessions in 1998-99. *(See Appendix 2: Technical Notes for more details.)*

Active concessions: Concessions listed as valid and as having been granted one or more *assiette de coupe* in 1998-99. Being granted an *assiette de coupe* implies logging took place in that concession that year. *(See Appendix 2: Technical Notes for more details.)*

Allocated concessions: UFAs (*Unités Forestière d'Aménagement*) that have been awarded but were not granted an *assiette de coupe* in 1998-99. *(See Appendix 2: Technical Notes for more details.)*

***Assiette de coupe*:** Subdivision of a logging concession indicating the surface area to be cut in a particular year.

***Autorisation de récupération*:** A type of logging right, allocated by volume.

***Convention d'exploitation*:** Exploitation contract, a type of logging right, often referred to as a concession.

Designated concessions: *Unités Forestières d'Aménagement* that had not been allocated to logging companies as of December 1999. *(See Appendix 2: Technical Notes for more details.)*

***License*:** License – a type of logging title, which was replaced in the 1995 forestry policy reform by the convention d'exploitation.

Parent groups: Corporations made up of various companies operating in the logging industry. These parent groups include national and multinational corporations. In this report, we only considered the subsidiaries of these corporations that were based in Cameroon.

Subsidiary company: A logging company linked to another company that owns all or a majority of its shares.

***Unité Forestière d'Aménagement* (UFA):** Forest management unit, subdivision of an exploitation contract; established by the 1995 forestry policy reform.

***Vente de coupe*:** Sale of standing volume, a type of logging right.

Abbreviations:

CARPE	Central Africa Regional Program for the Environment
CED	Centre pour l'Environnement et le Développement
CETELCAF	Centre de Télédéction et de Cartographie Forestière
CEW	Cameroon Environmental Watch
CIEFE	Centre International d'Etudes Forestières et Environnementales
CIFOR	Center for International Forestry Research
FAO	Food and Agriculture Organization of the United Nations
FOB	Free On Board, timber pricing.
GFW	Global Forest Watch
ITTO	International Tropical Timber Organization
IUCN	World Conservation Union
MINEF	Ministère de l'Environnement et des Forêts, the Ministry of Environment and Forests
NTFP	Nontimber Forest Product
TREES	Tropical Ecosystem Environment Observations by Satellites
WCMC	World Conservation Monitoring Centre
WRI	World Resources Institute
WWF	World Wide Fund for Nature

KEY FINDINGS

Forest Cover

- Although official estimates indicate that Cameroon's forests have shrunk by almost 2 million hectares since 1980, the most recent forest cover data are almost 10 years old.

- Forest cover estimates in the 1990s vary between 19.6 and 22.8 million hectares.

- Increased agricultural and hunting pressures, facilitated by newly created logging roads, often prevent proper regeneration of logged forest habitats.

Concession Area

- Between 1959 and today, at least 81 percent of Cameroon's unprotected forest has been allocated to logging. Abandoned, current, and future concessions cover 76 percent of the total (protected and unprotected) forest area.

- *Vente de coupe*, the least regulated type of logging title, is also the most prevalent. In 1998–99, this type of logging title covered almost 200,000 hectares of the 350,000 hectares of forest allocated for cutting.

- According to official records, the annual area logged in 1999 was a third of that reported in 1994.

Concession Holders

- Twenty five logging companies and individuals hold three quarters of Cameroon's forest concessions.

- Three parent groups, partially or wholly financed by French interests, retain almost a third of Cameroon's logging concessions.

Economic Importance

- Cameroon ranks among the world's top five tropical log exporters. Industrial roundwood production has increased by 35 percent since 1980.

- The logging industry is a mainstay of the national economy, generating US$60 million in taxes in 1997–98. Industrial roundwood exports generated US$190 million in 1998.

Biodiversity

- Relative to area, Cameroon's forests are among the most species-rich in the Congo Basin.

- Bushmeat hunting, facilitated by logging roads, poses a key threat to the country's biodiversity.

Forestry Legislation

- New legislation promises to promote better stewardship of Cameroon's forests. The World Bank touts the 1994 forest law as a potential model for the region.

- Compliance with this new legislation is a problem. Over half of operating licenses in 1997–98 failed to comply with the new regulations.

- Less than a third of UFA concessions allocated to date fully comply with the guidelines set out in the new forestry legislation.

- In the Central *(Centre)* and East *(Est)* provinces, the number of citations for illegal logging activities (violation reports) dropped by 85 percent between 1985 and 1999. During the period 1992–93, only 4 percent of these violation reports were brought to trial with the cases taken to court and fines levied.

- One out of five violation reports was dropped after the intervention of an influential person in the East and Central provinces.

SUMMARY

Cameroon contains some of the Congo Basin's most biologically diverse and most threatened forests. In recent decades, Cameroon's forests have undergone extensive conversion, with half of the historic forest cover cleared for farms and settlements. At least 20 percent of remaining forests are degraded or secondary forests.[1] Agricultural clearing is the primary cause of deforestation; however, logging development is rapidly opening up the major remaining tracts of primary forest, mostly located in the southeastern portion of the country.

Logging has significant environmental and economic consequences at both local and national levels. In this report, we rely primarily on maps and indicators to document the current and historic extent of logging, along with the key actors—companies and individuals—engaged in this activity. We also provide data on the benefits and costs of logging, both in terms of economic returns and environmental trade-offs. Cameroon recently adopted new forestry legislation that, if enforced, would help mitigate the environmental and social costs of development, as well as generate greater tax revenues. GFW Cameroon examined progress in implementing this legislation, first by looking at the legal status of existing concessions countrywide and second, by tracking enforcement efforts within two key forested provinces (the Central and East provinces).

As the maps in this report show, the spatial distribution of logging activity has moved rapidly across the country in recent decades. Once concentrated primarily along the coast, logging concessions (abandoned, current, and future) now cover 76 percent of the forested area. The most intact forests, in southeastern Cameroon, are also among the highest in extraction rates and extensive concession area. The stakes are high. Timber generates more than a quarter of Cameroon's nonpetroleum export revenues, along with some US$60 million in taxes. Forests in the southeast represent an untapped wealth; however, new logging roads could open up remaining low-access forests to bushmeat hunters, who elsewhere have severely depleted populations of key fauna,[2] including endangered forest elephants, gorillas, and chimpanzees. Logging also opens forests up to burning, agricultural clearing, and vegetation removal.

A limited number of operators benefited from logging activity in 1998-99. Of the 84 individuals and companies with active, registered concessions, 25 held title to three quarters of the forests being logged. If one groups subsidiary companies into their respective parent groups, the top three held 30 percent of the concession area. Foreign companies, primarily French, held at least half of the concession area and indirectly controlled other holdings through subcontracting practices.

The 1994 forest legislation is still a long way from being implemented. Yet it has already produced a 40 percent increase in tax revenues generated per cubic meter of wood produced. However, the open auction system on new concessions (UFAs), which was to allocate titles to the highest bidder, has slowed down because of irregularities in the first round of bidding. At least 5 of 23 UFAs allocated in 1997 appear to have been in violation of legislative guidelines, and the status of 12 others may be questionable. More than half of existing licenses, which are to be phased out in favor of the new UFA concessions, operate in violation of the law. Perhaps as a result of uncertainty over commitment to the legislative process, *ventes de coupe*, the least regulated form of logging, currently account for 55 percent of the total area allocated for cutting.

Results of the compliance assessment within the Central and East provinces highlighted additional irregularities and raised some questions. The number of violation reports issued for illegal logging and related activities declined dramatically between 1985 and 1999. Increasingly, when citations are issued, they languish in administrative files. Surprisingly, the bulk of citations are issued against individuals rather than companies (who own five times as much concession area). Violations reported in the Central province outweigh those in the East province by 23 to 1, although more area is being logged in the latter region. Lack of enforcement capacity is clearly a major reason for this problem. However, a review of 63 violation reports indicated that one in five had been terminated after "the intervention of an influential person," indicating that other factors may also be at play.

INTRODUCTION

Why are the Congo Basin's forests important?

Forests provide a range of ecological, economic and social services to humans, including protection of water and soil resources and storing carbon in biomass. Tropical forests house much of the world's terrestrial biodiversity. Globally, they provide the natural capital—through timber, mineral, and energy extraction along with nonconsumptive uses such as ecotourism—that helps fuel local and national economies. Tropical forests are also home to at least 50 million forest inhabitants worldwide.[3] Goods and services derived from Cameroon's forests are further detailed in this report.

The Congo Basin's tropical forests, which covered more than 198 million hectares[4] in 1995,[5] are the second largest contiguous rain forest in the world after those of the Amazon Basin. Between 1980 and 1995, on average, an area the size of Jamaica was cleared each year in the region (1.1 million hectares).[6] Congo Basin forests span six countries: Equatorial Guinea, Cameroon, the Central African Republic, the Democratic Republic of Congo (formerly Zaire), the Republic of Congo, and Gabon.

Why are Cameroon's forests important?

Located just north of the equator, Cameroon borders Equatorial Guinea, Gabon, and the Republic of Congo to the south, Central African Republic and Chad to the east, and Nigeria to the west. Cameroon's forests are mostly south of 6°30' north latitude and represent the northern limit of the Congo Basin's forests.

According to the United Nations Food and Agriculture Organization (FAO), in 1980, approximately 21.6 million hectares of forest covered Cameroon's 46.5 million hectares of land,[7] but by 1995, only 19.6 million hectares remained.[8] However, satellite imagery analysis by the European Commission Joint Research Centre's Tropical Ecosystem Environment Observations by Satellites Project (TREES) indicates 22.8 million hectares remained in the early 1990s, including 17.9 million hectares of dense moist forests.[9]

Figure 1: Cameroon's Location

Source: Digital Chart of the World.

Between 1980 and 1998, Cameroon's population grew from 8.6 to 14.3 million,[10] resulting in increasing demands on forest lands and resources. Forests are a key source of traditional products used for food, medicine, and construction, and constitute a major contributor to the modern economy. Local communities in Cameroon usually have usufruct rights (that is, they have rights to the produce of the land), while the government owns the trees, petroleum, minerals, and all other underground resources. The state manages natural resources, at times disregarding the interests of local populations.[11]

As pressure grows for these resources, so does the potential for conflicts between local and national economic interests.[12] In 1998, the logging sector accounted for 10 percent of the gross national product, 9 percent of tax revenues, and 28 percent of nonpetroleum export revenues.[13] Roughly 55,000 people are directly or indirectly employed in this industry.[14] With depleting oil reserves, it is expected that forests will come under increasing pressure as a source of export revenues.

Cameroon's forests are now high on the national and regional political agenda. Cameroon's President, Paul Biya, hosted the first Heads of State Summit on the Conservation and Management of Central African Forests in early 1999. Under the resulting Yaoundé Declaration, five Central African nations pledged to improve national and regional forest management.[15] Cameroon has already taken a leadership position in this direction. In the early 1990s, the administration initiated a far-reaching forest policy reform process, in conjunction with a World Bank structural adjustment loan. To date, this complex process has had mixed results, according to many stakeholders. Some argue that it has increased forest degradation and further undermined the economic viability of the logging industry.[16]

ASSESSING LOGGING DEVELOPMENT IN CAMEROON

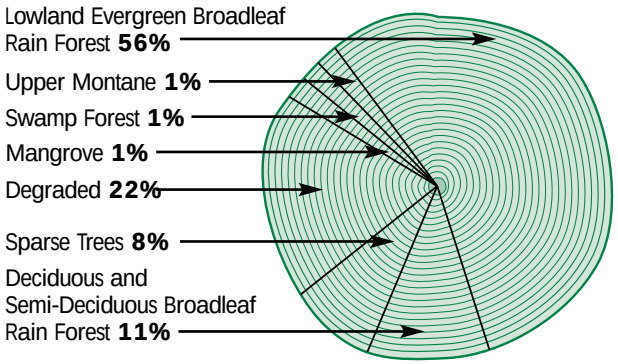
Logging is key to Cameroon's local and national economic development and has important ecological impacts. In order to assure forests are managed in the public interest, both the government and the people of Cameroon require accurate information on the logging sector and the costs and benefits of logging development. These data are essential for informed decisionmaking. To this end, Global Forest Watch Cameroon attempts to document, through a series of maps and indicators, the current and historic extent of logging, along with the key actors, companies and individuals, engaged in this activity. We also provide data on the benefits and costs of logging, both in terms of economic returns and environmental trade-offs. As noted previously, Cameroon recently adopted new forestry legislation that, if enforced, would go a long way toward mitigating the environmental and social costs of development while also generating greater tax revenues. We have examined the progress in implementing this legislation, first by looking at the legal status of existing logging concessions countrywide, and second by tracking enforcement efforts within two key forested provinces—the Central and East provinces.

Specifically, we have looked at the following questions:

- How much forest remains in Cameroon?
- What are the economic and noneconomic values of Cameroon's forests, and who benefits from them?
- How much forest has been logged in Cameroon and at what rate?
- To what extent do logging companies comply with forestry regulations, and how does the government enforce these laws?

Our results are based on existing published data, along with some field-collected information and input from experts. It should be noted that forestry data collected by government agencies are often difficult to access. It is our objective, through this report, to make as much of this information publicly available as possible and in a format (through maps and indicators) useful to a wide range of audiences in government, industry, and elsewhere. Because these data are of highly variable quality, we have attempted to highlight discrepancies, which further monitoring by the government, GFW Cameroon, or others might address.

Figure 2: Cameroon's Forest Types



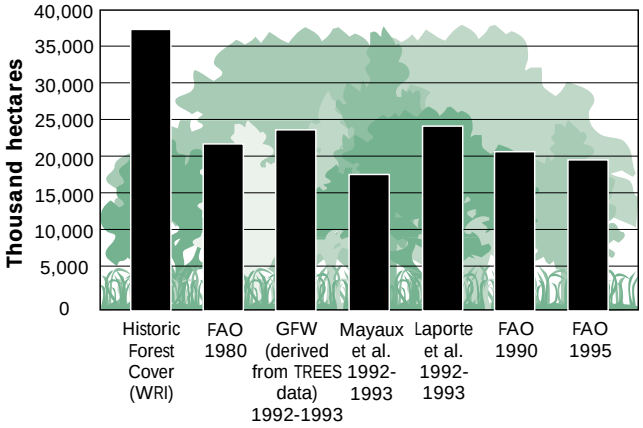
Source: World Conservation Monitoring Centre, *http://www.wcmc.org.uk/forest/data*

HOW MUCH FOREST REMAINS?

According to the FAO, Cameroon's forests covered approximately 19.6 million hectares in the mid-1990s. Given the data uncertainties described below, this figure is approximate. Lowland rain forest, including semideciduous and evergreen forest, dominate closed forest cover. Roughly 1 percent of forest cover is montane forest located around Mount Cameroon and the southwestern part of the country. Mangroves make up less than 1 percent of forest cover, primarily around the Rio del Ray and Cross River estuaries.[17]

Data presented in this report on forest cover and deforestation come from a variety of sources. Forest cover maps are provided by the TREES project, which used Advanced Very High Resolution Radiometer (AVHRR) satellite imagery from the early 1990s, with a spatial resolution of approximately 1 kilometer. According to GFW calculations based on the TREES data, some 17.9 million hectares of closed forest remained at that time.[18] Because of the age of the satellite data and the inability to distinguish plantations from other forests, these results probably overestimate current natural forest cover.

Figure 3: Cameroon's Remaining Forest Cover from Various Sources



Notes: FAO 1980 and 1995, as well as historic forest cover refer to undetermined forest classes. GFW and Laporte forest cover refer to closed and degraded forests.
Mayaux forest cover refers to closed forests.
FAO 1990 forest cover refers to montane, submontane, closed and very dry forests.
Source: *For full source and data information, see Appendixes 1 and 2.*

Cameroon has lost over half of its historic closed forest cover.

Historic forest cover is defined as forest cover prior to large-scale human disturbance. Over 18 million hectares of Cameroon's historic forests have been cleared to make way for agriculture and settlements. Most of this clearing has occurred in the central portion of Cameroon within semidecid-uous forests and savanna woodlands.[19]

Nearly 2 million hectares of forest were lost between 1980 and 1995.

Cameroon has the second highest annual defor-estation rate in the Congo Basin, after the Democratic Republic of Congo. According to FAO estimates, deforestation rates averaged 0.6 percent per year between 1980 and 1995—repre-senting a loss of almost a tenth of the forest cover present in 1980.[20] Agricultural encroachment, spurred in part by the expansion of cocoa and cof-fee export markets, along with production of food crops, has been the primary driver behind outright forest conversion.[21, 22]

Table 1. Percent of TREES Land Cover Types in Protected Areas

TREES Categories	Land Cover (Thousand hectares)	Protected (Thousand hectares)	Protected (%)
Dense Moist Forest	17,915	1,318	7
Secondary Forest and Rural Complexes[a]	4,879	44	1
Forest and Savanna Mosaic	2,159	0	0
Woodland	1,8	0	0
Woodland and Tree Savanna	16,687	9	0
Grassland	257	3	1
Mangroves	234	8	3
Swamp Grassland	85	0	0
Shrubs and Steppe	3,309	0	0
Water	67	1	2

Source: Calculated by WRI based on TREES data from *http://fellini.mtv.sai.jrc.it/TREES* and WCMC data from the CARPE CD-ROM.

Note: a. These are referred to as "secondary and degraded forests" in this report.

In 1992-93, at least 20 percent of remaining closed forest cover consisted of degraded and secondary forest.

Forest degradation, as opposed to deforestation, presents a significant, though unquantified, threat to Cameroon's forests. Data derived from satellite imagery in the early 1990s suggests that between 4.8[23] and 6.4[24] million hectares of forest were degraded or secondary forest. Given limitations of remote sensing technologies used, this figure only captures some types of forest degradation where the canopy is significantly affected. Selective logging, fire (particularly in montane and semideciduous forests), and overhunting are all major causes of degradation that may not be easily detected by satellite imagery. Overhunting depletes forests of key seed dispersers, such as elephants and duikers, which may ultimately result in shifts in tree species composition.[25] Logging is currently opening up the last tracts of large, intact primary forests in the country (frontier forests), which make up less than 10 percent of current forest cover.[26] According to FAO estimates for the 1980s, close to 90 percent of logging occurring in Cameroon's closed forests took place in primary forests.[27] Although logging per se results in low rates of tree removal per hectare, logging roads open previously inaccessible areas to human settlements, agricultural encroachment, and hunting pressure.

Four out of 19 West and Central African deforestation hotspots identified by TREES are located within Cameroon.

In 1997, a global expert's assessment identified hotspot areas where tropical deforestation and forest degradation posed or will pose a major threat by 2002. Four of these areas were in Cameroon. Forests within the Cross River-Korup area on the Nigerian border and a region bounded by Yaoundé, Mbalmayo, Ebolowa, and Kribi are in the process of being cleared for agriculture. New roads in the Bertoua-Abong Mbang and Djoum regions may help development, but the increased access could also result in the clearing of forests for cropland. These four hotspots cover a major portion of remaining forest area within Cameroon.[28] A separate study conducted by scientists at the University of Maryland ranked Cameroon's forests as the second most vulnerable to further degradation in Central Africa based on existing degraded forest and population densities within forested areas.[29]

HOW ARE THE FORESTS VALUED?

Forests provide a range of goods and services that benefit local economies and people. Timber products are currently the most important source of revenue derived from Cameroon's forests. Other goods and services, such as biodiversity and carbon stored in forests, are difficult to quantify economically, but represent resources of global value.

Wood Products

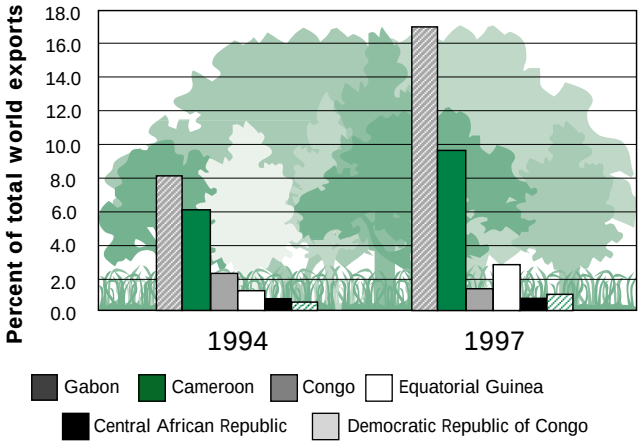
The logging industry is a mainstay of the national economy, generating about 28 percent of all nonpetroleum export revenues in 1998.[30] In 1996, logging enterprises directly employed more than 34,000 people.[31] According to one government estimate, 55,000 people currently work in the logging sector, when indirect employment is factored in.[32] Close to half of the industrial roundwood harvest is sold abroad, up from 30 percent in 1993. Cameroon's forests are a major source of the world's tropical timber, with 1.7 million cubic meters of wood exported in 1997, according to FAO figures. (FAO data may at times differ from International Tropical Timber Organization–ITTO data. *See Appendix 2: Technical Notes for details*). As oil reserves dry up, timber exports are projected to constitute an increasing share of foreign exchange revenue in coming years.[33]

As documented below, Cameroon's timber industry depends on the sale of logs, which accounted for more than 70 percent of the total timber export volume (but only 46 percent of total export revenues) in 1997.[34] This wood is harvested from a handful of the 80 species of commercial value. As a result, most logging is selective, with yields averaging only 5 cubic meters per hectare.[35] However, with Asia rapidly surpassing Europe as the primary market for Cameroonian wood, the trend may be toward more intensive harvesting, because Asian buyers are interested in a wider range of species than their European counterparts. Exports to Asia fell during the recent economic crisis, but the long-term trend is toward increasing export volumes.[36]

Cameroon ranks among the world's top five tropical log exporters.

Cameroon is the second largest exporter of tropical logs within the Congo Basin.

Figure 4: Central African Countries' Log Exports as a Percentage of World Tropical Exports

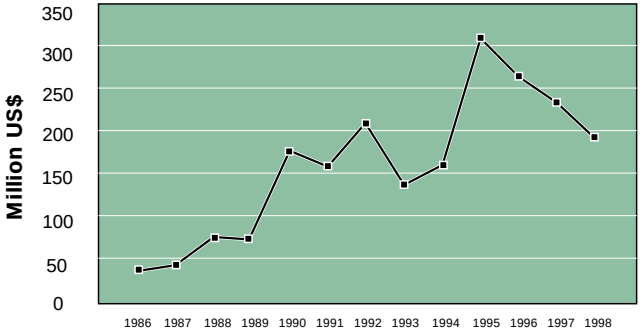


Sources: *Annual Review and Assessment of the World Timber Situation, 1998* (ITTO, 1999); Equatorial Guinea data from the Food and Agriculture Organization at http://apps.fao.org.

In 1997, Cameroon exported 1.7 million cubic meters of tropical logs, roughly 10 percent of the global total. Log exports from Cameroon have doubled since 1992. Only Gabon, Malaysia, and Papua New Guinea now outpace Cameroon in the volume of tropical logs shipped to world markets.[37] Cameroon's increased share in the global market is partly because of a greater emphasis by most tropical timber producers on exporting value-added products to bolster local processing industries.

Despite the recent Asian economic crisis, industrial roundwood exports generated on average US$230 million a year between 1996 and 1998, an increase of almost US$180 million over the 1986-88 value[38]

Figure 5: Cameroon's Industrial Roundwood Exports Value



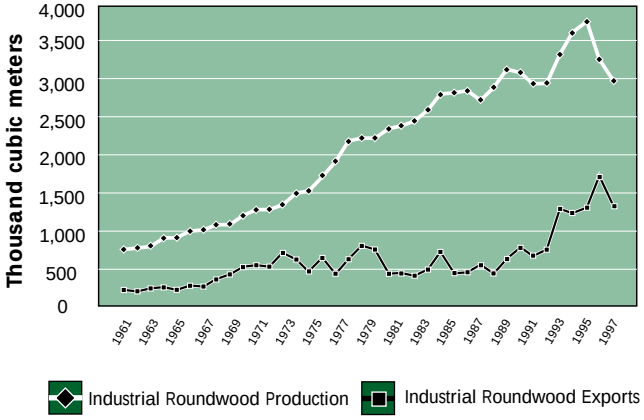
Source: Food and Agriculture Organization Statistical Databases http://apps.fao.org.

Export value data presented in Figure 5 are based on FAO numbers. In 1995, industrial roundwood exports generated a record high of US$304 million. In the late 1990s, this trend has been decreasing. In 1998, industrial roundwood exports generated US$190 million, a 20 percent decrease from 1997. This change can be explained in part by the Asian economic crisis and falling timber prices on the international markets in 1998.[39]

Total industrial roundwood production increased by 36 percent between 1980 and 1998.

The percentage of industrial roundwood production exported rose from 34 percent to 42 percent between 1980 and 1998.

Figure 6: Cameroon's Industrial Roundwood Production and Export, by Volume, 1961-98



Source: Food and Agriculture Organization Statistical Databases. http://apps.fao.org.

Total industrial roundwood production peaked in 1996 at 3.7 million cubic meters, an increase of half a million cubic meters over 1990 levels. The 1994 devaluation of the CFA led to a steep climb in production, partly because of resulting reductions in transport

costs. This price reduction attracted new investment and made it more profitable to log remote areas and harvest lower-value species for the export market.[40]

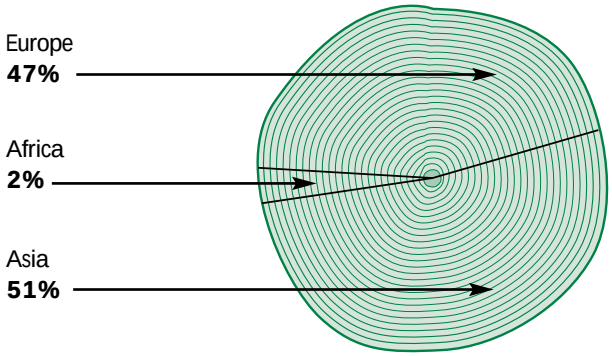
In 1998, however, industrial roundwood production was down to slightly less than 3 million cubic meters as a result of the Asian economic crisis. Increasingly, much of Cameroon's wood is shipped overseas, generating foreign revenue. The total volume consumed domestically actually declined during the 1990s, perhaps as a result of the 1994 CFA devaluation, which rendered products more expensive on local markets and led to economic stagnation.

Wood exports declined 25 percent in 1998 as a result of the Asian economic crisis.

ITTO figures indicate that total exports from Cameroon dropped by almost half a million cubic meters between 1997 and 1998. Over that period, prices for many tropical wood products on international markets declined as a result of lower Asian demand. However, the impact on Cameroon's logging sector was not nearly as severe as the impact on Gabon's logging sector. Gabon, the largest log exporter in the region, experienced a 50 percent drop in log exports over the same period.[41]

Asia has now surpassed Europe as the primary market for Cameroonian wood products.

Figure 7: Major Regional Importers of Cameroonian Logs, 1996-97

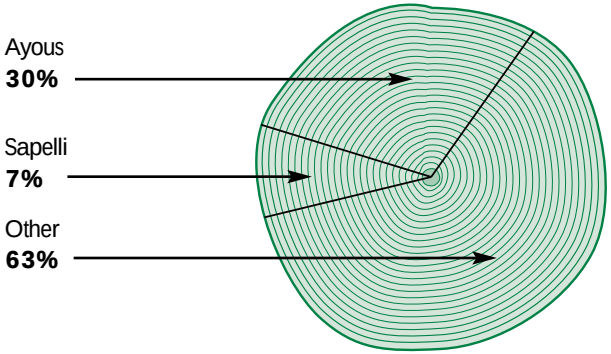


Source: Etat des Lieux du Secteur Forestier au Cameroun – Données Statistiques based on data from Societé Générale de Surveillance, 1998.

European countries once purchased 85 percent of Cameroonian exports,[42] but they now make up just under half of total demand. Although in 1994, less than 15 percent of Cameroon's logs were exported to Asia,[43] that figure rose to 51 percent in 1996-97. Ranked according to demand, Italy, China, France, the Philippines, and Japan constituted the five top importers of Cameroonian logs in 1997.[44] China is a major player in the Asian market. The total volume of Cameroonian logs exported to China has grown rapidly in recent years as a result of economic growth and corresponding demand for wood products within that country.[45]

Logging is largely focused on a small number of species.

Figure 8: Most Common Timber Species Exported in 1997, by Log Volume



Source: International Tropical Timber Organization (ITTO), *Annual Review and Assessment of the World Timber Situation* 1998 (Yokohama: ITTO, 1998).

Of the 300 tree species found in Cameroon, approximately 80 are logged commercially.[46] In 1997, of these 80 species, 5 accounted for more than half of all wood exports, and two species—Ayous and Sapelli—accounted for over a third of exports. Together these two species accounted for almost half a million cubic meters of exported logs.[47] Ayous and Sapelli are commonly used in furniture production and housing construction.[48]

Biodiversity

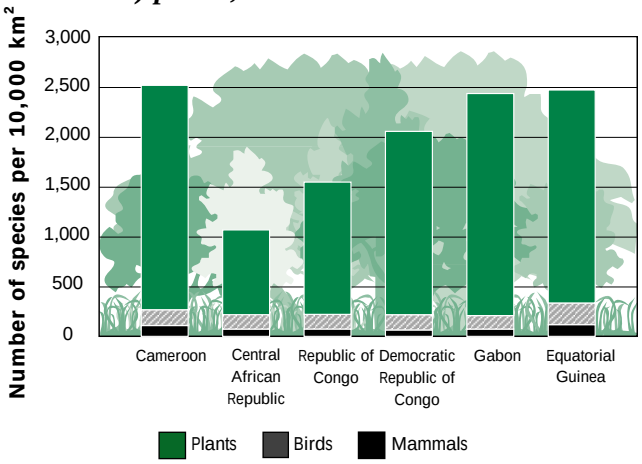
Cameroon's forests and other habitats are renowned for their rich diversity of flora and fauna. At least 8,000 species of higher plants are found in Cameroon, while over half of Africa's bird and mammal species are reportedly within the country.[49] Cameroon contains a variety of forest habitats ranging from montane forests, which are noted for their globally unique endemic species, to Atlantic coastal forests, which are rich in plants, to inland Cameroon-Congolese forests, which are renowned for their mammalian diversity.[50] Habitat loss and poaching present a major threat to the country's biodiversity. (*See Box 1 on bushmeat trade.*) Roughly 6 percent of the forest area is, at least on paper, protected within four parks and reserves covering over one million hectares of land; however, agricultural encroachment, poaching, and logging threaten all these areas.[51]

Cameroon's forests are among the most species rich in the Congo Basin.

Although species number data are known to be incomplete, Cameroon ranks among the top six countries in Africa in terms of total numbers of mammals, birds, and higher plants. Figure 9 presents an indicator of the relative species richness, showing the total number of species per 10,000 square kilometers of land.[52] By this measure, Cameroon has the highest number of plants per unit area in the region, with mammal and bird species counts surpassed only by Equatorial Guinea. Much of this diversity is found within lowland forests, which are renowned for their floristic diversity, and in the Atlantic coastal forests where high numbers of primate species, including lowland gorillas, chimpanzees, drills, and colobus monkeys are found.[53]

Cameroon's forests are home to five globally important centers of plant and bird diversity.

Figure 9: Number of Species (Plant, Mammal, and Bird) per 10,000 km² Land Cover



Source: World Resources Institute (WRI), *World Resources 1998-99* (Oxford University Press, NY, 1998).

Five forest areas in Cameroon stand out globally for their plant species richness and presence of endemic and restricted-range bird species. An assessment of global centers of plant diversity by the World Conservation Union (IUCN), and World Wide Fund for Nature (WWF) identified the forests of Korup National Park, Mount Cameroon (including nonforest areas), and the River Dja region as floristically rich areas. Korup, for example, has approximately 400 tree species, while Dja is noted for its 2,000 vascular plant species.[54] According to Birdlife International, Cameroon is home to two "Endemic Bird Areas," including the Cameroon Mountains, which contain 29 restricted-range species (12 of which are threatened), and the Cameroon and Gabon lowlands, a lowland forest area stretching from southwestern Nigeria to Gabon. The latter contains six restricted range species, two of which are threatened.[55]

Ecosystem Services

The country's forests provide a range of other benefits, from ecosystem services, such as water flow and quality maintenance and carbon storage, to nontimber products sold on local markets and used in the home.

Carbon storage

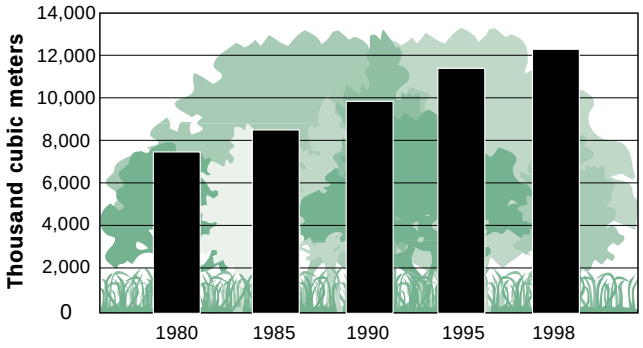
As a conservative estimate, Cameroon's forests store at least 1.3 and possibly as much as 6.6 gigatonnes of carbon, *(see Map 1)*, most of which is locked up in their vegetation.[56] These figures are not direct measurements, but rather calculated estimates. Degradation and clearing of forests worldwide over the past 150 years has contributed 30 percent of the carbon dioxide that has built up in the atmosphere.[57] As Map 1 shows, areas storing the greatest carbon are those currently being opened for logging. By encouraging reduced-impact logging methods, forest managers could help diminish release of carbon, which leads to climate change. Through

reforestation programs (to sequester carbon) and careful management and protection of remaining primary forests (to retain carbon), Cameroon could continue to provide a global environmental service. This opportunity was highlighted in a recent report, which ranked Cameroon among the top 15 most significant tropical countries in the world for potential carbon retention and sequestration.[58]

Fuelwood

Most of the wood harvested within Cameroon's forests and woodlands is used to meet local energy needs. In 1998, four times more wood was harvested for fuel than was sold as industrial roundwood. Traditional fuels, including firewood and charcoal, accounted for roughly 80 percent of all energy consumption in the country in 1995.[59]

Figure 10: Fuelwood Production, 1980-98



Source: Food and Agriculture Organization Statistical Databases. *http://apps.fao.org.*

Other nontimber products[60]

Nontimber forest products (NTFPs)—including bark, tubers, leaves, flowers, seeds, fruits, resins, honey, fungi, and animal products—play an important role in the households of the urban poor and forest-dwelling communities.[61] They are used as medicines, tools and building materials and for food, primarily within local villages and households.

It is difficult to quantify the economic importance of NTFPs, because data are lacking and most products are not marketed. However, research by the Center for International Forestry Research (CIFOR) indicates that NTFPs are an important source of cash revenue for Cameroon's forest-dependent peoples. According to their findings, nine NTFPs (including bush mango, the bark and fruits of *Garcinia cola*, palm nuts, cola nuts [*Cola acuminata*], and the African pear) generated US$1.9 million in revenues during the first half of 1996 alone. The NTFP of greatest economic value is bushmeat, which is an important source of food (annual bushmeat consumption is at least 2.5 kilos per person in Cameroon).[62] Unsustainable hunting levels, however, threaten to undermine the availability of this resource. *(See Box 1).*

The NTFP trade is an important source of income for women. They constitute the majority of poor forest dwellers in rural Cameroon but are often denied land ownership and are not guaranteed access to forest resources. With the economic crisis and the devaluation of the CFA, pharmaceutical products became more expensive. This increased the dependency of poor urban households and rural dwellers on medicinal plants.

Although NTFPs are frequently located in primary or secondary forests, many are also found in cultivated areas, such as fallowed fields and cultivated plantations. Research efforts are underway to cultivate NTFP species; however, many of these species occur only in the wild and are under stress as logging activities and forest conversion threaten their habitat, and trees that are also valued as nontimber forest products are logged. Over half of the log exports in 1998 came from five tree species that also generate NTFPs.[63] For example, nuts from Moabi (*Baillonella toxisperma*), a species found at very low densities (less than one tree per hectare), provide cooking oil and beauty products. In parts of Cameroon, this oil has become so scarce that it is no longer sold, but kept in villages for local consumption.[64] Some NTFP species respond well to disturbances caused by logging. Rattan species, bush pepper (*Piper guineensis*), alligator and sweet pepper (*Aframomum spp*), and njansang (*Ricinodendron heudelottii*) all prefer disturbed forest areas, and are often found along roads and openings.

BOX 1: Logging and Bushmeat Hunting

Logging is closely linked to bushmeat hunting and commercialization, and the subsequent decimation of wildlife. Logging roads facilitate access to previously remote forest areas, leading to intensified hunting. Once driven by local demand, hunting is increasingly a commercial activity to feed urban markets; bushmeat is considered a delicacy in Central Africa. These trends are borne out by results from a study in southeastern Cameroon that linked increased hunting with growth of the logging sector.[1]

In theory, hunting requires a permit granted by the wildlife administration, with the exception of traditional hunting and hunting outside state forests. The law also prohibits the use of certain methods, along with hunting of protected species. Because the Ministry of Environment and Forests lacks monitoring and enforcement capacity, these regulations are regularly flouted, particularly in remote forest areas, where most hunting occurs and the government has little oversight.

In addition to facilitating access to game, logging companies provide the transport needed to link hunting grounds and markets. Even when prohibited by company policy, logging truck drivers routinely carry loads of up to 200 kilograms of bushmeat, including gorillas and chimpanzees, in return for cash payments.[2]

Chimpanzee meat brings US$20-25 per piece, which explains why this species is particularly prized by hunters. Near Korup, in southwestern Cameroon, bushmeat hunting is estimated to contribute a third of all household revenue.[3] In the Dja Reserve, families consider the sale of game their second biggest source of income after cacao farming.[4]

With the expansion of logging activities throughout Cameroon's forests, bushmeat poses an increasing threat to biodiversity and ecosystem function. Although largely qualitative, reports indicate that the impacts of commercial bushmeat hunting extend beyond affecting those species targeted. For example, the slaughter of elephants has consequences on such plant species as the Moabi (*Baillonella toxisperma*), which are of economic importance and valued for traditional uses. Only elephants swallow and disperse moabi seeds.[5] While the full consequences of bushmeat hunting cannot be predicted, the impacts will be felt far beyond the immediate effects on wildlife populations.

Notes

1. K. Stromayer and A. Eboko.A *Biological Survey of Southeastern Cameroon.* European Union, Wildlife Conservation Society. New York. 1991.
2. K. Amman and J. Pierce. *Slaughter of the Apes: How the Tropical Timber Industry is Devouring Africa's Great Apes.* World Society for Protection of Animals. London. 1995.
3. M. Infield. *Hunting, Trapping, Fishing in Villages within and on the Periphery of the Korup National Park.* WWF report. Washington, DC. 1988.
4. P.K. Muchaal and G. Ngandjui. *Sectuer Ouest ce la Réserve de Faune du Dja: Evaluation de l'Impact de la Chasse Villageoise sur les Populations Animales et Propositions d'Aménagement en vue d'une Exploitation Rationelle.* ECOFAC/MEF. Youandé. 1995.
5. L. White and K. Abernathy. *A Guide to the Vegetation of the Lopé Reserve.* (Libreville: ECOFAC). 1997.

Cultural values

Cameroon is home to one of the most ethnically diverse populations in the world. Ethnologists and anthropologists estimate that it is home to more than 250 different ethnic groups. Among the oldest groups in Cameroon are forest hunter-gatherers, pejoratively known as "pygmies," who immigrated to the region several thousand years ago. These groups rely primarily on the tropical forests of Cameroon for their livelihood, medicine, and shelter. Their cultural identity is rooted not only in language, kinship, oral history, traditional practices (e.g., rites of passage including marriage and initiation ceremonies) but also in their identification with a particular area of the forest.[65]

HOW IS FOREST DEVELOPMENT EVOLVING?

Analysis of available data on recorded concession area and production levels indicates that most of Cameroon's forests have either been logged or are under active logging development. The logging frontier is now pushing into the remaining significant tracts of primary forest within central and eastern Cameroon.

Table 2. Concession Area 1959–99

Year	Concession Area (Thousand hectares)[a]	Concession Area as a Percentage of 1992-93 Total Forest Cover[b]
1959 (Abandoned and Active Concessions)	1,886	8%
1971 (Abandoned and Active Concessions)	8,995	39%
1995 (Abandoned and Active Concessions)	14,124	62%
1999 (Abandoned, Active, and Concessions Slated for Allocation)	17,329[c]	76%

Source: Concession data from WCMC and CETELCAF. Forest cover calculated by WRI based on data from *http://fellini.mtv.sai.jrc.it/TREES*

Notes: a. Cumulative area in concessions including documented concessions in 1959, 1971, 1995 and 1999.
b. 22.8 million hectares. Includes dense moist forest and secondary and degraded forests. Calculated by WRI based on data from *http://fellini.mtv.sai.jrc.it/TREES*
c. Includes 1,134,073 hectares of concessions not represented on the maps.

Historic and planned logging development covers at least three fourths of Cameroon's forests.

Based on concession maps from 1959, 1971, 1995 and 1999, at least three fourths of Cameroon's forest cover has been logged or has been slated for logging. (*See Table 2.*) Forests classified as dense, moist forest or secondary and degraded forest by TREES (1992-93) were used to approximate the extent of forest in Cameroon prior to large scale commercial logging. This calculation likely underestimates the portion of Cameroon's forests impacted by logging because concession maps are known to be incomplete (for example, they do not include areas under *vente de coupe* and historical maps were only available for 1959 and 1971).

As Map 2 and Table 2 show, logging development has proceeded rapidly since 1959. Logging was concentrated mostly along the coast and around major urban centers in the late 1950s. Since the 1970s, logging has extended into the last remote tracts of intact forest in the east and south of the country. (*See Map 2.*) Map 2 shows areas that have been designated as concessions, but no information was available on the intensity or extent of logging within these areas.

Map 3 shows the current status of logging activity in Cameroon. Of the 17 million hectares that have been abandoned or are under current, and future concessions, roughly 4 million hectares are currently allocated for logging. We were able to map only 2.9 million hectares given incomplete geo-

graphical information for the remaining 1.1 million hectares. Map 3 and Table 3 also show that at least an additional 3.6 million hectares[66] have already been designated as logging concessions but have yet to be allocated.[67] (*See Map 3.*)

Less than a fifth of unprotected forest remains outside the logging frontier.

• With roughly 1.4 million hectares (6 percent) of its forests protected (*see Map 4*) and a further 17 million hectares (76 percent) of abandoned, current, or future logging concessions, less than 20 percent of Cameroon's unprotected forest remains free from past or planned logging development.

• Logging concessions now encircle protected areas such as the Dja Reserve, a World Heritage site. (*See Box 2.*) Some concessions are even found within the geographic boundaries of two other protected areas: the Lac Lobéké Reserve in the southeast and the Campo Reserve (as well as in a proposed protected area just east of it) in the southwest.

• Development activities other than logging may adversely affect forest ecosystems. These activities include energy and mineral extraction, as well as agriculture. They represent trade-offs between environmental services and economic benefits, which can be mitigated through careful planning. The Chad-Cameroon pipeline is one such example. (*See Box 3.*) Although the focus of this first GFW Cameroon report has been on logging, we plan on expanding our scope of work in the future.

Table 3. Concession Area in 1999

Concession Status in 1998-99	Concession Area (Thousand hectares)	Concession Area as a of 1993 Total Forest Cover[a]
Active Concessions[b]	2,573	11%
Allocated Concessions[c]	1,503	7%
Designated Concessions	3,653	16%
Abandoned Concessions	9,600	42%
Total	17,329	76%

Sources: Concession data from CETELCAF. Forest cover calculated by WRI based on data from *http://fellini.mtv.sai.jrc.it/TREES*

Notes: a. 22.8 million hectares. Includes dense moist forest and secondary and degraded forests. Calculated by WRI based on data from *http://fellini.mtv.sai.jrc.it/TREES*
b. Includes 761,576 hectares of unmapped concessions.
c. Includes 371,497 hectares of unmapped concessions.

The forests of eastern and southern Cameroon are more intensively logged than others.

Map 5 shows the percentage of forest logged in 1998-99.

When logging rights are granted for a particular area, the whole concession is not logged at once. Specific zones (*assiettes de coupe*) or predetermined amounts of standing volume are set to be cut each year. Some areas allocated for logging may never be exploited owing to poor access or excessive costs.

In 1998-99, approximately 350,000 hectares were awarded as either an *assiette de coupe* or *vente de coupe* mostly in the southeastern portion of the country, although portions of the Littoral province remain quite active. Overall, more than 3.5 percent of the forests of Sanaga-Maritime, Nkam, Ntem and Villa, and Boumba and Ngoko departments were actively logged that year. Relatively small concession areas are found around urban centers, such as Yaoundé, or in the northern parts of the forest domain, where mostly secondary and degraded forest remains. (*See Map 5.*)[68]

BOX 2: Logging and the Dja Reserve

Logging development threatens the integrity of Cameroon's protected areas in a variety of ways. As noted in this report, active concessions fall within the boundaries of several forest reserves. Although no legal concessions are found within Dja, Cameroon's largest protected forest, this reserve is now encircled by active licenses, apparently in violation of existing legislation. This development will hamper efforts to protect adjacent forestlands. In addition, logging roads associated with concessions may facilitate access by poachers and others encroaching on the reserve.

Dja, one of Cameroon's oldest protected areas, is renowned for its biodiversity. Covering 526,000 hectares, the reserve is home to 14 primate species (including western lowland gorillas, chimpanzees, and mandrills), elephants, leopards, buffaloes, and pangolins along with a wide range of plants, birds, and reptiles. Created as a Forest and Hunting Reserve in 1950, it was subsequently afforded status as a Biosphere Reserve in 1981 and a World Heritage Site in 1987 in recognition of its global conservation importance.[1]

In the early 1970s, the first logging licenses were granted in the proximity of the Reserve. Logging accelerated during the 1980s with an increase in exploitation licenses, which pushed this activity eastward (CFB, license 1740; Pallisco, 1758; SOCIB, 1791; LOREMA, 1811; Pallisco, 1818; SEPFECO, 1838).[2] During the 1990s, forest exploitation intensified, marked by the multiplication of *ventes de coupe* north, west, and east of the Reserve.

The legal status of these concessions appears to be questionable. Article 7 of the *document des normes* calls for a buffer zone that is "a protected area around the boundaries of each National Park, natural reserve, or wildlife reserve." Article 11 of that document notes that

> "the holder of a title of forest exploitation cannot conduct forest development activities on the following types of land:
> 1. areas protected for wildlife,
> 2. forest reserves,
> 3. buffer zones."

In the absence of a final management plan, forest exploitation around Dja continues unfettered on the lands that by law belong in a buffer zone.[3] This development hampers opportunities to protect surrounding forests that would help ensure the integrity of one of Cameroon's most important conservation areas.

Notes

1. World Conservation Monitoring Centre http://www.wcmc.org.uk/protected_areas/data/wh/index.ht
2. Rapport intermcdiaire 1 projet conjoint Cameroon Environmental Watch, CARPE et ECOFAC Cameroun, Février 1999 (CEW, 1999).
3. Ngoufo, "Exploitation forestière, une menace croisante," *Moabi* newsletter no. 078 Juin 1999.

On average, 5 cubic meters of logs per hectare per year are produced in Cameroon.

Unlike other parts of the world, logging companies in the Congo Basin rarely practice clearcutting. High transportation costs and a demand for specific woods from European markets have resulted in logging companies only harvesting the best quality trees of a limited number of species. This selective logging implies a low extraction rate per unit area. In reality, this practice causes overexploitation of specific species, and has been characterized as timber mining. Proper regeneration of logged areas is often prevented by logging companies returning for second cuts too soon[69] and increased agricultural and hunting pressures associated with logging road access.[70]

Box 3: The Chad-Cameroon Pipeline

Cameroon's forests are subject to a range of development pressures, including those associated with energy production. One controversial project, which has generated international attention, is the proposed Chad-Cameroon Petroleum Development and Pipeline Project (PDP). Three of the world's largest oil companies, Exxon, Shell, and the French company Elf Aquitaine, were the original promoters of this project, along with the World Bank. At an estimated cost of US$3.5 billion, the project would link 300 new oil wells in southern Chad with a marine terminal in Kribi by an 880 kilometer pipeline running through Cameroon.[1] The World Bank calculates that even after considering environmental costs and benefits, the project is a net gain to Cameroon. They estimate that Cameroon will earn US$448-494 million over the lifetime of the pipeline.[2] The project is also expected to generate nearly US$2.5 billion over 25 years for Chad.[3] World Bank financing, projected at US$370 million, is considered critical to the success of the project.[4] With World Bank approval, the companies expect not only to attract other investors, but also to mitigate disruption from corruption and political instability.[5]

In recent months, the project has hit several snags. In mid-November, Royal Dutch Shell and Elf Aquitaine unexpectedly began to reconsider their involvement in the project. Although the companies had not made an official decision as of early January 2000, speculation by the Chadian government and reports from environmental organizations suggest that withdrawal is imminent. The rationale for their decision is unclear, but political uncertainty and questions over whether the World Bank would agree to finance the project seem to have played a crucial role. Exxon has remained committed to the project and is trying to find investors to make up for the nearly 60 percent investment Elf and Shell had made in the PDP.[6]

In addition to financial problems, the PDP has also been hampered by charges that it poses a significant environmental risk to natural habitats. The pipeline would cross seven major rivers in Cameroon and would travel through forests, savannas, and settlements of the Bakola pygmies. The Kribi region, the proposed site for the terminal, includes relatively undisturbed natural areas and supports a thriving local artisan and fishing community. The offshore loading facility at Kribi, where millions of barrels of oil would be transferred to tankers, would be a single-hulled vessel, potentially vulnerable to spills. The Environmental Defense Fund has lobbied hard against this development, claiming it poses serious risks to Cameroon's forests, littoral habitats, wildlife, and indigenous peoples.[7]

In their environmental assessment of the Cameroon portion of the project, the World Bank concedes that impacts on Cameroon's ecology would include removal of vegetation and trees, potential unplanned settlements, soil erosion, possible spread of invasive species, and facilitation of illegal hunting and logging activities.[8] The World Bank addressed some of these environmental issues in a summer 1999 report on the status of the PDP:

> The pipeline will be routed to minimize adverse environmental impact on the natural habitat and people . . . . The pipeline [will largely follow a course where there are existing roads or railways] and avoid undisturbed forest areas . . . as well as Bakola pygmies villages, dwellings, and cultural property . . . .
>
> The private sponsors plan to finance the conservation of two new national parks in Cameroon (Campo-Ma'an and Mbam-Djerem), which will exceed an area of about half a million hectares. . .[9]

Nevertheless, even with the changes made as a result of the environmental assessment, several NGOs and prominent African figures, including Archbishop Desmond Tutu, have called for a two-year moratorium on construction.[10] They are concerned that corruption will prevent potential oil revenues from benefitting the general population of Cameroon. In addition they feel that the technical and environmental guarantees are insufficient.[11]

Notes:

1. Environmental Defense Fund. "The Chad Cameroon Oil and Pipeline Project: Putting People at Risk." Online at : http://www.edf.org (January 26, 2000).
2. Esso Exploration and Production Chad Inc., Dames and Moore, COTCO/ Esso Pipeline Company, and Societé Nationale des Hydrocarbures. [*Chad, Cameroon-Petroleum Development and Pipeline Project: environmental assessment. (Vol. 7.)*] (Washington, DC: The World Bank Group, 1998). Online at: http://www_wds.worldbank.org (February 20, 2000).
3. Africa News Online. 1999. "IRIN Focus on the Chad-Cameroon oil project." Online at: http://www.africanews.org (February 20, 2000).
4. Mbendi. "Oil Industry Profile–Upstream Cameroon." Online at: http://www.mbendi.co.za/indy/oilg/oilgcaus.htm (February 20, 2000).
5. Rainforest Action Network. *World Rainforest Report.* (San Fransisco: Rainforest Action Network, 1999). Online at: (http://www.ran.org/ran (February 20, 2000).
6. Africa News Online. 1999. "IRIN Focus on the Chad-Cameroon oil project." Online at: http://www.africanews.org (February 20, 2000).
7. Environmental Defense Fund. "Open letter to Mr. James D. Wolfensohn." Online at: http://www.edf.org (January 26, 2000).
8. Esso Exploration and Production Chad Inc., Darnes and Moore, COTCO/ Esso Pipeline Company, and Societé Nationale des Hydrocarbures. [*Chad, Cameroon-Petroleum Development and Pipeline Project: environmental assessment. (Vol. 7.)*] (Washington, DC: The World Bank Group, 1998). Online at: http://www_wds.worldbank.org (February 20, 2000).
9. World Bank Group. Online at: http://www.worldbank.org/afr/ccproj/project.htm (January 26, 2000).
10. Environmental Defense Fund. " The Chad Cameroon Oil and Pipeline Project: Putting People at Risk." Online at : http://www.edf.org (January 26, 2000).
11. Samuel Nguifo, *Centre pour l'Environnement et le Développement.* Personal communication, January 2000.

Map 6 shows an estimation of the volume of timber produced per unit area of forest actively logged in 1997-98 (either under a *vente de coupe* or an *assiette de coupe*). For more information on how these rates were calculated, see Appendix 2: Technical Notes. (*See Map 6.*)

• Studies have shown that logging in Africa leads on average to the destruction of 17 percent of the forest cover. Extracting 3.5 to 5.5 cubic meters per hectare in tropical forests results in the ancillary loss of an additional 2 to 3.8 cubic meters per hectare.[71]

• Production levels for Cameroon's southeastern forests (in the Boumba and Ngoko department) confirm that a high proportion of forest is actively being logged in these regions. These forests, at the heart of Cameroon's remaining primary forest, are being logged at a rate of more than eight cubic meters per hectare per year.

• The Central department in the northern portion of Cameroon's forests, which has a long history of logging, is still under intense logging pressure. More than 10 cubic meters per hectare per year are produced in the Mbam and Kim and the Haute–Sanaga departments. These reported extraction rates may be artificially high because of illegal logging. It is possible that the volumes declared are actually obtained from a larger area than reported.[72]

• The Ntem and Villa department in the south produces less than five cubic meters of logs per hectare but has one of the highest proportions of forest actively logged in the country.

Table 4. Forest Cover, Protected Area, and Concession Area

1993 Forest Cover[a]	22.8 million hectares
Protected Area[b]	1.4 million hectares
Unprotected Forest Cover	21.4 million hectares
1999 Concession Area[c]	7.7 million hectares
Protected Area as a Percentage of 1993 Forest Cover	6.1%
1999 Concession Area[c] as a Percentage of Unprotected Forest Cover	36%
1959–1999 Cumulative Concession Area[d] as a Percentage of Unprotected Forest Cover	81%

Sources: Concession data from WCMC and CETELCAF. Forest cover calculated by WRI based on data from *http://fellini.mtv.sai.jrc.it/TREES*. Protected area calculated by WRI from WCMC data.

Notes:

a. Includes dense moist forest and secondary and degraded forest. Calculated by WRI based on data from *http://fellini.mtv.sai.jrc.it/TREES*

b. Calculated from WCMC spatial data.

c. Includes active, allocated and designated concessions. Also includes 1.1 million ha of concessions not represented on the maps.

d. Includes abandoned, active, allocated and designated concessions. Also includes 1.1 million ha of concessions not represented on the maps.

Ventes de Coupes *made up 55 percent of all concession area logged in 1998-99.*

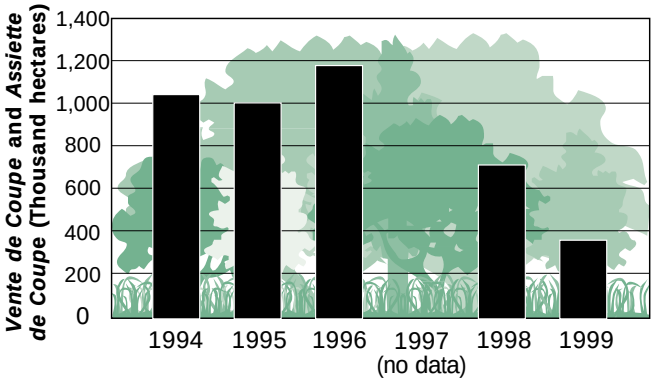
• Little georeferenced information exists for *ventes de coupe*, which are rarely depicted on official government maps. GFW was only able to determine in which departments they are located. Despite accounting for less than 5 percent of allocated concession land, their impact on forest resources should not be minimized, as *ventes de coupe* represent the majority of the area logged in a particular year (almost 200,000 hectares in 1998-99).

Records indicate that the annual area logged decreased by 66 percent between 1994 and 1999.

Given that production levels between 1994 and 1999 have decreased by only 10 percent, it is interesting to note that the area logged per year seems to have decreased at a significantly greater rate, according to official records. This may be explained by one or more of the following reasons.

1. Areas logged may not be fully reported as a result of unauthorized logging or incomplete official records.
2. Logging companies are extracting more timber volume per hectare in response to market demand for a broader array of species.

Figure 11: Area Harvested in 1994-99



Sources: Richard Eba'a Atyi, *Cameroon's Logging Industry: Structure, Economic Importance and Effects of Devaluation.* CIFOR, paper 14, (August 1998); GFW Cameroon based on information provided by SIGIF.

The government has expressed intentions of reducing the annual logging area to approximately 230,000 hectares by the time the Permanent Forest Domain has been fully allocated.[73] If such is the case, and current extraction rates are maintained, annual production should level out at approximately 1.1 million cubic meters per year,[74] a 63 percent decrease compared to 1998 production volume.

WHO IS LOGGING CAMEROON'S FORESTS?

By 1998, 479 logging companies were registered in Cameroon, up from 177 in 1990 and 106 in 1980.[75] This reflects a trend toward increasing investment in the logging industry, reportedly in part driven by recent declining revenues from cocoa and other agricultural products.[76] However, only a portion of these registered logging companies hold current concessions.

In 1999, 84 individuals and companies had valid documented logging rights (licenses, concessions, or *ventes de coupe*) within Cameroon's forests. As is the pattern in many countries, a small number of operators control much of the area being logged. On paper, it is difficult to get a clear picture of who the key actors are in the Cameroon logging sector because of the widespread practice of subcontracting (*affermage*) to multiple subsidiary companies and the lack of information about the companies and individuals registered as concession owners. However, it is commonly accepted that a few large, mostly European, companies tend to dominate the industry. For example, GFW has documented that almost two thirds of the concession area is partially or wholly controlled by non-Cameroonian companies, although the affiliation of 19 percent of concession owners recorded is unknown. In part because they are better capitalized, foreign companies play a disproportionately important economic role in the logging sector. According to a recent CIFOR study, in 1996 foreign companies and joint ventures exported over 70 percent of Cameroon's timber, while non-Cameroonians owned more than half of sawmills and other primary processing facilities, including those with the greatest processing capacity.[77]

One third of Cameroon's concession owners hold three quarters of the concession area.

Out of 84 registered concession holders in 1998-99, 25 held 75 percent of the concession area. Cameroon's forests are controlled by a small group of operators who, through their management strategies and logging practices, could significantly affect the future of this natural resource. The number of influential operators may actually be lower given the extent of subcontracting and subsidiaries. For example, the Hazim group may not log large areas, but through subcontracting to numerous smaller logging companies, it was one of the largest log exporters in 1998-99.[78] Many of the 84 registered concession holders are subsidiaries of larger parent groups. Table 5 shows the affiliations of several concession holders. As Table 5 illustrates, three French companies (Thanry, Bolloré, and Coron) hold almost one third of Cameroon's logging concession area. In addition, many concession holders are nothing more than a registered name on the logging title, while the real beneficiaries are subcontracted logging companies.[79]

Ten parent groups, including five partially or wholly financed by French assets, hold half of Cameroon's logging concessions.

Map 7 shows the top six parent groups, each of which held more than 100,000 hectares (combining the holdings of their subsidiaries). (*See Map 7 and Figure 12.*)

Foreign companies leased more than half of the concession area in 1998-99.

When joint ventures between Cameroonian and foreign companies are included, foreign operators wholly or partially held close to two thirds of the concession area. Major foreign operators during this period included French companies, which leased over one third of the concession area, as well as Italian, Lebanese, and Belgian interests. They are ranked according to total holdings in Table 6.

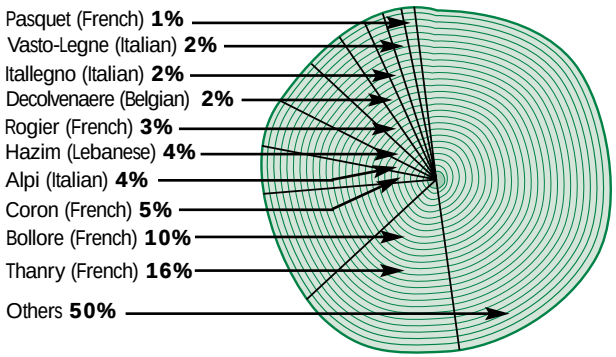
Table 5. Logging Companies and Subsidiaries

Company[a] (Subsidiaries)	Concession Area 1998-99 (Thousand hectares)	Percentage of Total Concession Area 1998-99
Thanry (CIBC, SAB, SEBC, CFC, Prenant)	650	16%
Bollore (La Forestière de Campo, SIBAF)	412	10%
Coron	212	5%
Alpi (Alpicam, Grumcam)	204	5%
Hazim (SFH)	157	4%
Rougier (SFID)	132	3%
Decolvenaere (SOTREF, SFIL)	75	2%
Itallegno (ECAM)	69	2%
Vasto-Legneault (SEFAC)	63	2%
Pasquet (Pallisco)	61	1%
Others	2,019	50%
Total	**4,054**	**100%**

Sources: Concession area calculated by GFW Cameroon based on data provided by SIGIF; Information on companies and subsidiaries derived from Greenpeace International, *Buying Destruction*, (Amsterdam 1999); JC Carret, CERNA (Personal communication, December 1999), Alain Karsenty, CIRAD (Personal communication, December 1999), Dominiek Plouvier, WWF Belgium (Personal communication, December 1999).

Note: a. These companies are called parent-groups in this report.

Figure 12: Largest Concession Holders, by Surface Area in 1998-99



Sources: GFW Cameroon based on data provided by SIGIF; Greenpeace International, *Buying Destruction*, (Amsterdam 1999); JC Carret (Personal communication, December 1999), Alain Karsenty (Personal communication, December 1999), Dominiek Plouvier (Personal communication, December 1999).

Table 6. Nationality of Concession Holders

Nationality	Concession Area Allocated in 1998-99 (Thousand hectares)	Percentage of Total Concession Area 1998-99
French	1,466	36%
Lebanese	423	10%
Italian	353	9%
Belgian	75	2%
Other Foreign	13	0%
Mixed	226	6%
Foreign and Cameroonian	715	18%
Undetermined	782	19%
Subtotal Foreign	*2,330*	*57%*
Total	**4,054**[a]	**100%**

Sources: Concession area calculated by GFW Cameroon based on data provided by SIGIF; Information on nationalities derived from Greenpeace International, *Buying Destruction*, (Amsterdam 1999); JC Carret, CERNA (Personal communication, December 1999), Alain Karsenty, CIRAD (Personal communication, December 1999), Dominiek Plouvier, WWF Belgium (Personal communication, December 1999).

Note:
a. Due to rounding, numbers do not add up.

HOW IS FOREST DEVELOPMENT LEGISLATED AND REGULATED?

Prior to 1994, Cameroon's forest resources were regulated by the Forest Law of 1981 and the Implementation Decree of 1983, but this legislation failed to provide a legal framework for land-use planning and the integration of forest production and conservation. The World Bank sought to improve forest management in the region by using Cameroon as a model country for developing a forestry policy reform process, which was used as a condition for granting structural adjustment loans. This reform sought to address conflicting economic, social, and environmental goals. The lessons learned during that process are of national and regional importance, because Cameroon's innovative reforms could inspire policy reforms elsewhere in the Congo Basin to improve forest management.[80]

On January 20, 1994, parliament passed law 94-1, which regulates Cameroon's forestry activities. This law was followed by decree 95/531/PM, which detailed the implementation of forestry regulations. This law introduced four major changes:[81]

- Allocation of concessions through an auction system;
- New pricing and taxing mechanisms;
- Requirements for management plans; and
- Provisions for community forestry.

The Main Provisions of the Current Forestry Code

Forest Estate

Forests in Cameroon are divided between the Permanent Forest Domain and the Nonpermanent Forest Domain.

By law, the Permanent Forest Domain must cover at least 30 percent of the national territory and is further divided into council forests (*Forêts Communales*) and state forests (*Forêts Domaniales*), which include protected areas and logging concessions.[82]

The Nonpermanent Forest Domain includes the remaining forests, which may be converted to non-forest land. The law provides for community forests, which are designed to promote village-based forest resource management. To this end, the government is supposed to provide communities with free technical assistance.

Logging

Any logging activity is subject to approval by the authority in charge of forests and can only be granted to residents of Cameroon or companies registered in Cameroon.[83]

Table 7. Types of Logging Titles

Types of Logging Title	*Ventes de Coupe*	Exploitation Permits	*Autorisation de Récupération*	*Convention d'Exploitation* (UFAs)
Ownership	Some are reserved for nationals.	Reserved for nationals.	Reserved for nationals.	Some are reserved for nationals.
Allocation Process	Allocated by the minister in charge of forests, after a competitive call for tenders.	Allocated by the minister in charge of forests.	Allocated by the provincial representative of the ministry in charge of forests.	Allocated through a competitive bidding process, after preselection by a government commission.
Location	In the Nonpermanent Forest Domain and the Permanent Forest Domain.[a]	In the Nonpermanent Forest Domain.	In the Nonpermanent Forest Domain.	In the Nonpermanent Forest Domain.
Time Period	Allocated for one year with two renewals possible.	Allocated for one year maximum.	Allocated for three months maximum.	Allocated for 15 years renewable, reassessed every three years.
Maximum Volume or Area	2,500 hectares in size.	May not exceed 500 cubic meters in volume.	May not exceed 30 cubic meters in volume.	May not exceed 200,000 hectares.
Management Requirements				Require management plans, construction of a processing industry, involvement of local populations, etc. In the first three years of a concession allocation, the owner is allowed to log one *assiette de coupe* per year.[b]

Source: Law 94/01 of January, 20th 1994. Section 45, 46, 48, 49; Decree 95/531/PM of August 23rd, 1995. Articles 67, 81, 82, 86, 91; Ministère de l'Environnement et des Forêts. 1999. *Planification de l'Attribution des Titres d'Exploitation Forestière.* Yaoundé, Cameroon.

Notes:

a. There is some confusion regarding elements of the law as it applies to restrictions on logging titles. For example, government reviewers indicated that *ventes de coupe* were illegal in the Permanent Forest Domain, and that both national and foreign logging companies could operate in the Permanent Forest Domain, which is contrary to information provided to us by the World Bank.

b. Decree 95/531/PM of August 23rd, 1995. Article 67.

• Logging in the Permanent Forest Domain is carried out in the state forest through *vente de coupe* or a *convention d'exploitation*. The latter is commonly called a concession and may be composed of one or more *Unités Forestières d'Aménagement* (UFA).[84]

• Logging in the Nonpermanent Forest Domain is carried out through vente de coupe, a permit, or an autorisation de récupération.

Management Plans

Logging companies holding UFAs are responsible for developing management plans and submitting them to the Ministry of Environment and Forests (MINEF) within three years of the concession allocation. These plans must address the ecological, economic, and social aspects of maintaining a sustainable logging operation, as defined by administrative texts (Decisions 0107/D/MINEF/CAB and 0108/D/MINEF/CAB of February 9th, 1998.) Each concession is supposed to be divided into sections to be logged during a five-year time frame, with an overall rotation period of 25 years. These sections are further subdivided into five assiettes de coupe. To date, 10 companies have completed vegetation inventories, and 3 have submitted full management plans. Once these plans are accepted, the logging rights are finalized and the 15-year validity period officially begins.[85]

Forest Taxation

The information presented in Tables 8 and 9 is for direct forestry taxes only. Other nonforestry taxes are applied to logging activities, just as they are to any other economic activity in Cameroon. Forestry taxes are established annually by a fiscal law.[86]

Table 8. Basic Forestry Taxes

Stumpage Tax	Allocation Tax[a]	Export Tax	Transfer Tax
2.5% of FOB[b] price.	Applied per year per hectare. 1,500 CFA Francs (US$ 2.40) for UFA concessions and licenses. 2,500 CFA Francs (US$ 3.90) for Vente de Coupe	Applied to volume of raw logs exceeding the allowed quota. Varies from 8,000 CFA Francs (US$ 12.60) to 15,000 CFA Francs (US$ 23.60) per cubic meter.	100 CFA Francs (US$ 0.16) per hectare.

Source: *Contribution du Secteur Forestier à l'Economie Nationale*. Ministère de l'Economie et des Finances. Yaoundé, Cameroon, 1998.

Notes:
a. These are only base rates, to be paid by hectare and by year. The full price incorporates the level of the bid over that base rate.
b. FOB = Free On Board.

Table 9. Comparison of Cameroon and Gabon's Forestry Taxes

Amount Actually Recovered, 1997	Cameroon (Million CFA)	Cameroon (Million US Dollars)[a]	Gabon (Million CFA)	Gabon (Million US Dollars))
Area Tax	1,145	1.8	66	0.1
Export Tax	29,200	46	16,672	26.3
Other[b]	6,408	10.1	2,140	3.4
Total	**36,753**	**57.9**	**18,878**	**29.8**

Sources: *Analyse du système actuel de fiscalité forestière au Gabon.* Ernst and Young, 1998. *Contribution du Secteur Forestier à l'Economie Nationale.* Ministère de l'Economie et des Finances. Yaoundé, Cameroon 1998.

Notes:
a. As of January 8th, 2000, 100 CFA Francs = 0.1576 US Dollars.
b. Other taxes in Gabon include allocation and transformation taxes. In Cameroon, they include stumpage, auction revenues, transfer taxes, etc.

Cameroon's forestry fiscal revenues are twice as high as those of Gabon.

This difference in revenue is shown in Table 9.

The new taxation system increased fiscal revenues, boosting the share value of the wood from 6,000 CFA (US$9.40) to 10,000 CFA (US$15.80) per cubic meter;[87] however, tax recovery is still a major problem. This responsibility has shifted from the MINEF to the Ministry of Economy and Finance, which has contracted an independent Swiss company (SGS) to control log exports going through Douala.[88]

HOW DOES COMPLIANCE ALIGN WITH EXISTING LEGISLATION?

GFW Cameroon assessed compliance with existing forest regulations through a two-tiered process. We conducted an overall coarse-scale assessment for the country using readily available information and focusing primarily on the legal status of concessions. We followed this up with a fine-scale assessment, examining the types and numbers of citations issued for noncompliance with regulations. For the fine-scale assessment, we focused on two major forest provinces in Cameroon, the East and the Central. This work is based on provincial records and field-derived information.

Our results indicate significant and widespread irregularities, both in the status of existing concessions and in the enforcement of existing regulations. These are documented below. When available, we have provided possible explanations for these irregularities. In general, low levels of compliance appear to be caused by legal loopholes, a lack of enforcement owing, at least partially, to a lack of administrative capacity (*see Box 4*), and corruption.[89]

Results of the Coarse-scale Assessment

We conducted the coarse-scale assessment through literature searches highlighting examples of infraction and by collecting national government data on logging rights allocation and activity. This analysis is not complete. For example, it has been reported that individuals with "suspicious documentation"[90] have been authorized to carry out logging activity. We did not attempt to examine the paper trail behind the granting of concessions that appeared to be in compliance with existing regulations.

Fifty-six percent of licenses were operating irregularly in 1997-98.

The MINEF used to allocate licenses, a formally used type of logging title, with a duration of up to five years. Licenses were replaced in the 1994 law by logging concessions (convention d'exploitation) composed of one or more UFAs, but as the new legislation was not immediately applied, a few licenses were allocated up until 1995. Special arrangements allow license holders to extend their logging rights for up to three years after their licenses have expired. During this period, only one assiette de coupe (2,500 hectares maximum) was awarded per year per license.[91]

- A license is operating irregularly if:

1. it has expired, but has nonetheless been awarded an *assiette de coupe*.
2. it is operating in a protected area;
3. it has been allocated after 1994.

- According to government records[92], during the period 1997-98, 29 of 52 active[93] licenses (56 percent) continued to operate even though the duration of their logging rights had expired. (*See Map 8.*)

- One of those, License 1702, belonging to La Forestière de Campo, is located within the boundaries of the Campo Reserve, Cameroon's second largest protected area.

One fourth of the UFA concession allocations appear to comply fully with the guidelines set by the new legislation.[94]

At least 21 of the 31 allocated UFAs did not go to the highest bidder.

Thirty-three UFAs were scheduled to be allocated by 1999. Of these 33 UFAs, 7 were allocated through a discretionary process (*de gré à gré*) in 1996, violating the new legislation that called for a competitive allocation process. The remaining 26 UFAs underwent a public and competitive bidding process in 1997. To ensure that only qualified operators were considered in this bidding process, an interministerial committee preselected and ranked bidders according to financial, technical, and past performance criteria. The highest bidder from that list was then to be awarded the concession.[95]

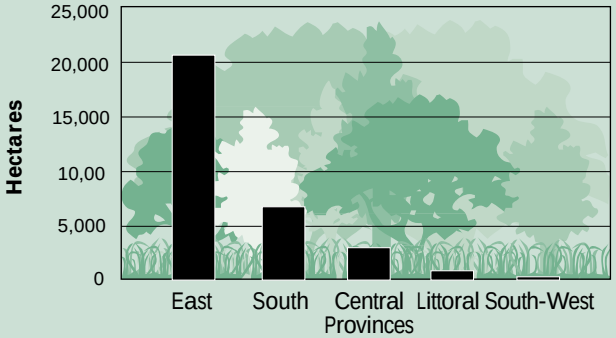
BOX 4: Logistical Capacity of the Ministry of Environment and Forests

The Ministry of Environment and Forests (MINEF) employed 2,340 people in 1999. Approximately 13 percent of the employees were assigned to the central administration, while the remaining were delegated to various external services (provincial offices, l'Office National de Développement des Forêts (ONADEF), and bilateral forestry projects, among others). As of December 1999, many MINEF employees were still waiting for an assignment within a specific service, which may explain the reportedly decreasing efficiency of the Ministry.

Staff Shortages Undermine MINEF's Work. MINEF stopped hiring new staff in 1992, and has been losing 10 to 15 employees per year through retirement. Table A presents data on the logistical capacity for five provinces where most of Cameroon's logging operations were found in 1998-99. The East province, home to the majority of the concession area, had far fewer MINEF agents overall and fewer agents per area under concession than most other forested provinces. In the five major forested provinces combined, there was on average one MINEF field agent responsible for the inspection of 5,000 hectares of concession. In the East province alone, in 1998-99, one MINEF field agent was responsible for an average of almost 21,000 hectares of concession. It appears likely that there is inadequate MINEF oversight in the East province given the level of logging activity occurring there.

Field staff from MINEF suffers from limited transportation means and office space. Because of inadequate transportation, most MINEF agents are unable to reach logging concessions to be inspected by their own means. In the late 1980s, MINEF was forced to sell most of its vehicles as a result of the economic crisis. In 1998, each provincial office then acquired one four-wheel-drive vehicle. The departmental offices remained without transportation, except for vehicles made available by some bi- and multilateral projects. However, maintenance of these vehicles remains a constant issue. Many provincial and departmental offices also suffer from nonexistent or inappropriate buildings.

Figure A: Concession Area per Agent, 1998-99



Sources: Théophile Ndjodo, *Présentation Succinte des Conditions de Travail et des Capacités Logistiques du Ministère de l'Environnement et des Forêts du Cameroun,* (Unpublished).

Table A. Summary of MINEF's Logistical Capacity

Provinces	East	South	Central	Littoral	South-West
Number of Agents	116	115	232	167	163
Number of 4WD Vehicles	1	1	1	1	1
Number of Motorbikes	4	4	10	4	6
Concession Area (hectare) per Agent	2,0859	6,608	2,762	306	31

Source: Théophile Ndjodo, *Présentation Succinte des Conditions de Travail et des Capacités Logistiques du Ministère de l'Environnement et des Forêts du Cameroun,* (Unpublished).

Technical Notes:
A few administrative reports document MINEF's logistical capacity, but an accurate and up-to-date evaluation would require field trips to the various provincial offices. We were unable to conduct such a study at this time. The information presented here on the logistical situation provides a cursory overview documented by existing official reports.

The number of agents presented in Table A refers to agents assigned to forestry monitoring and regulation enforcement within five provincial or departmental offices. It does not reflect agents assigned to multilateral projects, ONADEF, or wildlife services.

Concession areas presented in this box were provided by the MINEF author and differ by approximately 5 percent from those presented in the rest of the report. The ratios of concession area per agent were calculated with the concession area numbers shown in Table B.

Table B. Concession Area Used for Ratios Presented in Box 4

Province	Concession Area 1998-99 (hectares)
East	2,419,601
South	759,949
Central	640,803
Littoral	51,160
South-West	5,000

Source: Théophile Ndjodo, *Présentation Succinte des Conditions de Travail et des Capacités Logistiques du Ministère de l'Environnement et des Forêts du Cameroun,* (Unpublished).

Source:
This box is based on an unpublished assessment of MINEF's logistical capacity by Théophile Ndjodo, MINEF's focal point for Global Forest Watch Cameroon.

A total of 24 out of 26 UFAs were allocated at this auction.[96] Thus, over the period 1996-97, 31 UFAs were allocated, including the 7 UFAs allocated *de gré à gré* in 1996. We were able to obtain documentation for the allocation of only 23 of these UFAs.[97]

What happened to these 23 UFAs? *(See Map 9.)*

a. Five UFA concessions were granted to bidders not recommended by the interministerial commission and who had not offered the highest bid. According to the law, this is irregular.

b. Nine UFA concessions were allocated to bidders recommended by the interministerial commission, but who had not offered the highest bid. Under the law, it is difficult to determine whether these were regular or irregular allocations. Some of these allocations seem to have been discretionary. For example, UFA 10-057 was given to M. Mbeng, who received the highest technical ranking, but had only made the seventh highest financial offer. The commission justified this allocation on the grounds that M. Mbeng is the ex-director of the forest department and had South African partners. The highest competing bidder offered 10 times more than M. Mbeng and had received the second highest technical ranking.[98] One of these UFAs (UFA 09-013 allocated to the MAF company) was ultimately cancelled for nonpayment of the bid.[99]

c. Three UFA concessions were allotted to bidders not recommended by the commission, who nevertheless had offered the highest bid. Under existing legislation, it is unclear if these were regular allocations or not. It is also unclear why the commission did not recommend these bidders, as they had received qualifying technical grades.

d. Finally, 6 of the 23 UFA concessions were allocated to bidders recommended by the commission and who had offered the highest bid. According to the law, these allocations seem to be completely regular.

Table 10. Revenue Foregone During the Allocation of UFAs in 1997

UFA	Size (ha)	Allocated Bid Price (CFA/ha)	Total Bid for UFA (1,000 CFA)	Highest Proposed Bid (CFA/ha)	Total Highest Proposed Bid (1,000 CFA)	Revenue Foregone (1,000 CFA)
08-003	53,160	1,000	53,160	2,520	133,963	80,803
09-025	96,334	800	77,067	2,300	221,568	144,501
09-013	52,011	1,550	80,617	1,700	88,419	7,802
09-021	41,965	400	16,787	1,300	54,554	37,769
09-023	56,192	450	25,286	2,025	113,789	88,502
10-009	88,796	1,050	93,236	3,700	328,545	235,309
10-012	62,597	750	46,948	1,000	62,597	15,649
10-015	155,421	1,000	155,421	2,725	423,522	268,101
10-018	65,832	900	59,249	3,700	243,578	184,330
10-021	71,533	2,500	178,833	4,500	321,899	143,066
10-023	62,389	1,600	99,822	4,100	255,795	155,972
10-029	46,922	400	18,769	1,300	60,999	42,230
10-041	64,961	1,400	90,945	2,350	152,658	61,713
10-057	32,293	465	15,016	5,000	161,465	146,449
Total	**950,406**		**1,011,155**		**2,623,352**	**1,612,196[a]**
Total (in US Dollars)[b]			**1,593,580**		**4,134,403**	**2,540,820[c]**

Source: Résultat des déliberations de la commission interministerielle d'attribution des concessions forestières. Session de Mai 1997.

Notes:

a. Calculated by summing up the revenue foregone for each concession in this table.

b. As of January 8th, 2000, 100 CFA Francs = 0.1576 US Dollars.

c. Calculated by converting the revenue foregone in CFA.

The government has foregone more than US$2.5 million by not allocating 14 UFAs to the highest bidder.

The government lost 1.6 billion CFA (roughly US$2.5 million) by not allocating concessions to the highest bidder in 1997.[100] Given the 7 UFAs allocated *de gré à gré* in 1996 (circumventing the bidding process), this figure is an underestimation. This 1.6 billion CFA is approximately 4 percent of the forestry tax revenues in 1997–98.

In an attempt to increase transparency in future concession allocations, an independent monitor will be involved as of 1999.

The confusion and irregularities that have plagued the new bidding process have been a source of frustration for the World Bank, the logging companies, the government, and concerned citizens' groups. The government of Cameroon and the World Bank have agreed to improve the bidding process and appoint an independent observer to ensure that future allocations are made in accordance with the agreed procedures. To date, some of the concessions seemingly irregularly allocated in 1997 have not been paid for and management plans for these areas have yet to be initiated as required by law. As a result, the MINEF has formally communicated to these companies that failure to comply with payment and management plan requirements will result in the concessions being returned to the administration at the end of the three-year provisionary contract. The World Bank has advocated earlier cancellation. However, given the nature of the 1997 provisionary contracts and the reported protection that some of the concessionaires seem to enjoy from high ranking authorities, the MINEF seems to lack the capacity to address this issue fully and promptly.[101]

Concession allocation temporarily stopped after 1997 in order for all parties to clarify the procedures. However, the logging sector was prosperous at that time, and people were eager to have logging titles. Unable to acquire UFAs, logging companies obtained an increasing number of *ventes de coupe* and *autorisations de récupération* and at times even engaged in logging without any authorization.[102] An additional 26 UFAs are set to be allocated in January 2000.

The transition to a logging landscape dominated by UFA concessions has slowed, and companies are increasingly shifting to more easily obtainable and flexible *ventes de coupe*. The government supposedly allocates these *ventes de coupe* according to the same competitive bidding process, and 54 *ventes de coupe* were placed on the auction block in August 1999. These allocations were the first to be reviewed by an independent observer, who wrote a critical report of the process.[103] However, GFW was unable to access this report prior to publication of our results.

Three companies hold more than 200,000 hectares of concessions, in violation of the law.

As noted earlier, many companies are subsidiaries of larger groups. However, each subsidiary company is recognized as its own legal entity, and according to section 49 of law 94-1,[104] each company is entitled to a maximum of 200,000 hectares of concession area. Three subsidiary companies, all French-owned, operate in violation of this law: SIBAF (1 license, 1 UFA), CFC (4 UFAs), and Coron (2 UFAs). Their combined concession area represents 16 percent of the total concession area allocated in 1998-99. Through their subsidiary companies, some parent groups hold more than 500,000 hectares.[105]

Local communities do not always receive the financial compensation they are entitled to from logging companies.

Theoretically, within the Permanent Forest Domain, 10 percent of the tax levied on concessions (UFAs) is to be paid to neighboring local communities.[106] Within the Nonpermanent Forest Domain, a percentage of the felling tax levied on *ventes de coupe* is to be paid to neighboring local communities.[107] An administrative order set that *vente de coupe* holders should pay 1,000 CFA per cubic meter to communities, but it was ultimately cancelled.

In practice, there are a wide variety of arrangements made between local communities and logging companies. Although it sometimes took protests, roadblocks, and other civil disobedience actions,[108] some communities have been able to attain their due compensation from logging companies as dictated under national laws.[109] There are, however, accounts of logging companies not respecting the guidelines for distributing revenues to local communities.[110]

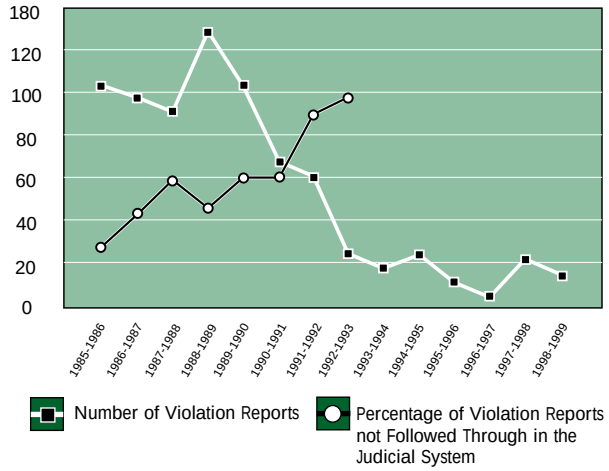
The log export ban has not been implemented.

Article 71 of law 94-1 set a local wood-processing objective of 70 percent to be achieved by 1999, at which time a log export ban was scheduled to take effect. As of 1998, according to ITTO figures, logs still made up more than 70 percent of exports. A June 1999 administrative order essentially loosened these restrictions. Under this revision, a log export ban was applied to 20 timber species; however, exceptions were made for two species, Ayous and Sapelli. This exception allowed for much of Cameroon's current logging trade to continue because these two species represented more than a third of all logs exported in 1997.[111] However, in August 1999, the government issued another set of guidelines that banned Sapelli exports while allowing for continued exports of Ayous and opening possibilities for the promotion of other currently underutilized species.[112]

Results of the Fine-scale Assessment

We conducted the fine-scale assessment in both the Central and the East provinces by collecting provincial government data, as well as field data on specific logging violations and the ensuing judicial process. A violation report is an official documentation established by a MINEF agent, when he or she witnesses an offense of the forestry law. These reports are a good starting point for monitoring the type of infractions committed and the ability, or willingness, of the government to enforce its policy.

Figure 13: Survey of Violation Reports, East and Central Provinces, 1985-99



Source: Field survey 1998-1999. Cameroon Environmental Watch.

The number of violation reports registered dropped considerably (85 percent) between 1985 and 1999.

There are at least four possible reasons for the dramatic decline in the number of violation reports.

1. Companies and individuals engaged in logging may have made a greater effort to comply with management laws and regulations.
2. The administration's lack of capacity to enforce the law may have resulted in fewer violations being reported. Progressive economic crises beginning in the 1980s have taken their toll on the technical and logistical resources available for monitoring and controlling logging activities.
3. Government agent uncertainty over regulatory changes associated with the new forest policy reform may have resulted in less monitoring and enforcement.
4. Corruption within the administration may have also encouraged less vigilant reporting of violations and law enforcement. This phenomenon could also explain the restricted access to relevant documents, which made judicial follow-through difficult.

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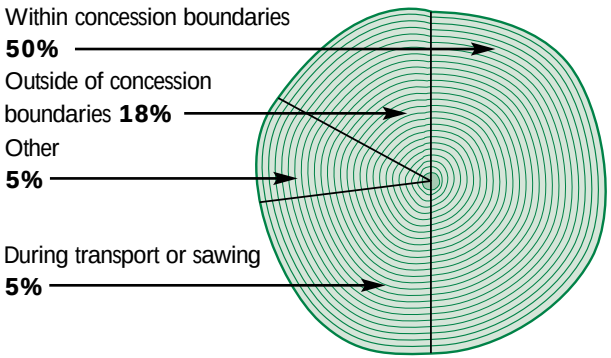
Ninety-six percent of violations reported in 1992-93 were followed by incomplete judicial procedures.

As Figure 13 shows, even when violation reports have been prepared, they increasingly tend to languish in administrative files, rather than be acted upon through the judicial process. Therefore, not only are fewer violations documented, but the vast majority of documented violations do not result in any imposed penalties. We were only able to obtain information on judicial follow-through up to 1993.

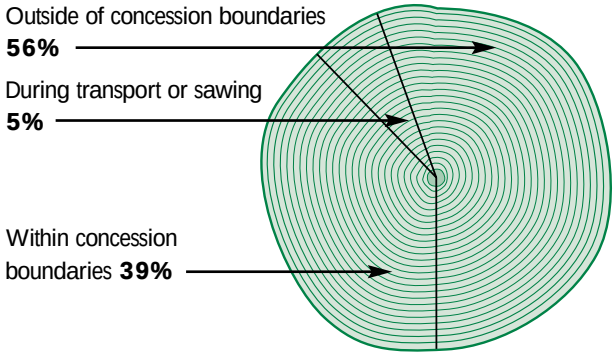
Forty-four percent of logging violations are committed within logging concessions.[113]

Figure 14: Types of Violations in the East Province, 1995-98



Source: Field survey and analysis of data from the Délégation Provinciale de l'Environnement de l'Est, by Cameroon Environmental Watch, 1999.

Figure 15: Types of Violations in the Central Province, 1995-98



Source: Field survey and analysis of data from the Délégation Provinciale de l'Environnement du Centre, by Cameroon Environmental Watch, 1999.

• Violations committed within logging concessions include the felling of the wrong timber species, logging protected timber species, mislabeling logs, and cutting undersized trees. (*See Appendix 2: Technical Notes, for details.*) These types of violations are more common in the East province, where logging concessions are large and remote, and thereby removed from administration oversight. The MINEF agents often depend on logging companies for transportation to and from the concessions to be inspected, which prevents surprise inspections.

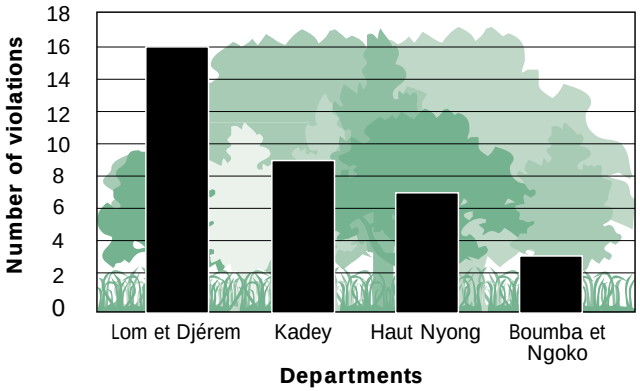
• Violations committed outside of logging concessions include logging without authorization, logging outside of the concession boundaries, and logging within a protected area.[114] These violations are more common in the Central province, where there is less unallocated primary forest compared to the East province.

• Violations committed during transport include hauling logs without authorization, transporting illegally felled logs, and transporting more logs than allowed by law.

Fewer violations are reported in the East province than in the Central province.

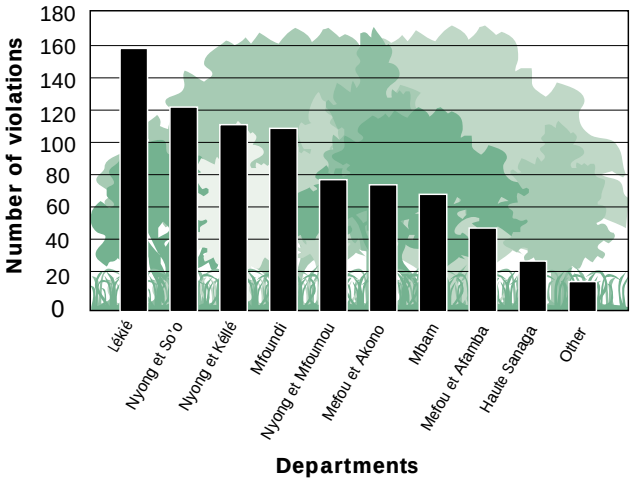
• Despite the fact that more logging is underway in the East province, there were 23 times as many violations reported in the Central province.[115] Although it is possible that individuals and logging companies are increasing efforts to follow regulations, as noted above, the East province is more remote, and, therefore, less frequently and accurately monitored by the administration.

Figure 16: Number of Violations in the East Province, by Department, 1995-98



Source: Field survey and analysis of data from the Délégation Provinciale de l'Environnement de l'Est, by Cameroon Environmental Watch, 1999.

Figure 17: Number of Violations in the Central Province, by Department, 1995-98

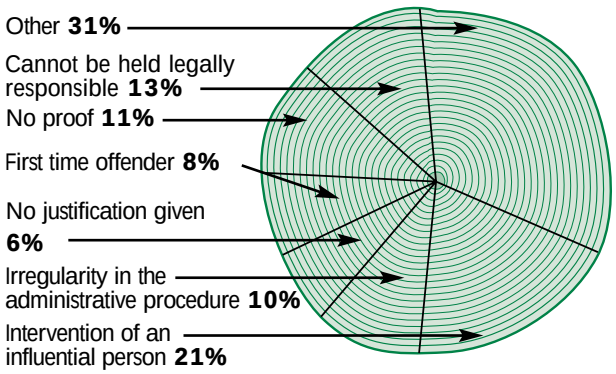


Source: Field survey and analysis of data from the Délégation Provinciale de l'Environnement du Centre, by Cameroon Environmental Watch, 1999.

These results show important subregional differences in reporting. The number of violation reports registered varies tremendously from one department to the next, perhaps reflecting differences in capacity and commitment for enforcing the law, data quality, and local logging practices.

One fifth of all violation reports registered are not fully followed through in the judicial process because of the "intervention of an influential person."

Figure 18: Justification for Incomplete Judicial Follow-through of Violation Reports, 1995-98

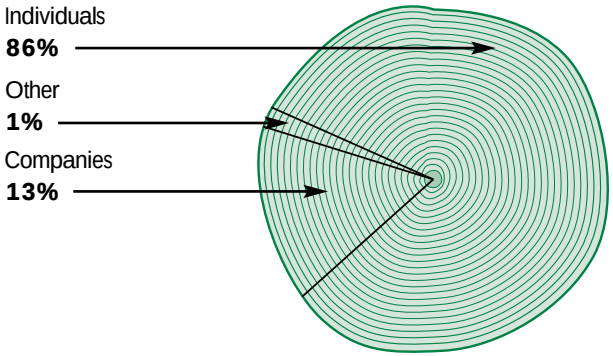


Source: Cameroon Environmental Watch, 1999.

Thirteen out of 63 violation reports that were not subjected to judicial follow-through had been marked with the notation, "stopped at the intervention of an influential person."[116]

Most violation reports are issued against individuals rather than against companies. However, companies own more than five times more logging rights than do individuals.

Figure 19: Categories of Offenders, 1995-98



Source: Cameroon Environmental Watch, 1999.

There are at least three possible reasons explaining this trend.

- Individuals generally have fewer financial means and thus tend to emphasize short-term gain over long-term investment. To this end, they are less committed to following regulations.
- Logging companies, especially the larger ones, have more technical and financial resources for implementing management regulations and tend to be more aware of regulatory details.
- Logging companies often have access to significant amounts of financial resources and, in some cases, have developed important influential connections, which may allow them to avoid administrative scrutiny.

CONCLUSION

Global Forest Watch Cameroon's initial work has focused on the logging sector. Many of the data presented in this report are secondary and derived from MINEF, as well as other sources. These data, while incomplete, show that forest development is evolving rapidly. Although logging contributes to Cameroon's economic development at both national and local levels, significant indirect costs are incurred, including the loss of biodiversity and environmental goods and services. Logging companies can play an important role in promoting sustainable forest management in Cameroon.

The new forestry laws, if fully implemented, could improve forest management, promote a more efficient logging industry, and help further conservation goals, in part by creating incentives for local people to maintain land as forest. However, given the irregularities in the allocation of logging rights and logging operations documented in this report, major constraints limit the effectiveness of the new law. Implementing forestry reforms in Cameroon is a complex process. The confusion and irregularities reported here reflect conflicts between private and government economic interests, as well as between traditional and modern governance values.

The political will expressed in the reform process is undermined by the lack of implementation of the laws in the field. Weak logistical and human capacity is hindering accurate field monitoring of logging activities. Field agents from MINEF often have to depend on logging companies for transportation to the concession sites to be inspected, which can result in a disincentive for enforcement of forestry laws.

Access to and availability of high-quality data are key challenges to overcome to develop better management strategies. For example, while preparing this report, we often had to sort through conflicting information. Sound decisions cannot be made without access to the proper information, while the effectiveness of these decisions cannot be assessed without making this information publicly available. To this end, GFW Cameroon is committed to helping improve the information base needed to guide decisionmaking and promote public involvement in that process.

Future GFW Cameroon activities will include a greater emphasis on collecting primary field data and tracking other development activities that lead to forest change. We will make this information available as widely as possible through maps, subsequent reports, and other products that are useful to both technical and nontechnical audiences. We want to ensure that information is effectively communicated to all those with an interest in promoting the sustainable management and protection of Cameroon's forests.

NOTES

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111. International Tropical Timber Organization (ITTO), *Annual Review and Assessment of the World Timber Situation 1998* (Yokohama: ITTO, 1998).
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113. This applies to violations committed in both the East and Central provinces. Based on field surveys and analysis of data from the Délegations Provinciales de l'Environnement du Centre et de l'Est, by Cameroon Environmental Watch, 1999.
114. During the GFW Cameroon Advisory Committee meeting on December 22, 1999, in Yaoundé, M. Minbimi pointed out the example of the Campo Reserve in the southwestern part of the country, which is currently logged by the Bolloré group.
115. Based on field surveys and analysis of data from the Délegations Provinciales de l'Environnement du Centre et de l'Est by Cameroon Environmental Watch, 1999.
116. Based on field survey and analysis of data from the Délegations Provinciales de l'Environnement du Centre et de l'Est by Cameroon Environmental Watch, 1999.

APPENDIX 1: DATA SOURCES

Figure 2. Cameroon's Forest Types

Forest Types	Total Forest Area (square kilometers)	Percentage of Total Area	Protected Area (square kilometers)	Percentage of Total Protected Area
Mangrove	2,275	0.8%	44	0.2%
Swamp Forest	2,208	0.8%	0	0.0%
Upper Montane	3,188	1.1%	6	0.0%
Lowland Evergreen Broadleaf Rainforest	163,582	56.4%	11,354	63.6%
Deciduous and Semi-Decidious Broadleaf Rainforest	31,111	10.7%	630	3.5%
Sparse Trees	24,163	8.3%	5,259	29.5%
Degraded	63,438	21.9%	560	3.1%
Total	**289,965**	**100.0%**	**17,853**	**100.0%**

Source: World Conservation Monitoring Centre, http://www.wcmc.org.uk/forest/data.

Figure 3. Cameroon's Remaining Forest Cover from Various Sources (in thousand hectares)

	GFW 1992-1993 based on TREES data	Mayaux et al. 1992-93 TREES data	Laporte et al. 1992-93	WRI Historic Forest Cover	FAO 1980	FAO 1990	FAO 1995
Montane and Submontane	–	–	–	–	–	1,767	–
Mangrove	–	–	–	–	–	–	–
Other Closed Forest	17,915	17,378	17,385	–	–	18,499	–
Very Dry Forest	–	–	–	–	–	86	–
Degraded	4,879	–	6,477	–	–	–	–
Undetermined	–	–	–	37,400	21,573	–	19,582
Total	**22,794**	**17,378**	**23,862**	**37,400**	**21,573**	**20,352**	**19,582**
Total minus Dry	**22,794**	**–**	**23,862**	**–**	**–**	**20,266**	**19,582**

Sources: GFW based on Tropical Ecosystem Environment Observation by Satellite (TREES). "Tropical Forest Area Measurements." Online at: http://fellini.mtv.sai.jrc.it/trees/statistics (January 27, 2000). *See Appendix 2: Technical Notes, for details.* CARPE, Laporte, Goetz, Justice, Heinicke, 1998, "A new land cover map of Central Africa derived from multiresolution multi temporal AVHRR data" in *International Journal of Remote Sensing* (19) #18, pp. 3537-3550; P. Mayaux, F. Archard, and J.P. Malingreau. 1998. "Global tropical forest area measurements derived from coarse resolution satellite imagery: a comparison with other approaches" in *Environmental Conservation* 25:37-52; World Resources Institute (WRI), *World Resources 1998-99* (Oxford University Press, NY, 1998); FAO 1990, Food and Agriculture Organization of the United Nations, Forest Resources Division, *Forest Resources Assessment 1990*: Tropical Countries (FAO, Rome 1993); FAO 1995, Food and Agriculture Organization of the United Nations, Forest Resources Division, *State of the World's Forests* 1997 (FAO, Rome 1997). FAO undated, Food and Agriculture Organization of the United Nations, Système Mondial de Surveillance Continue de l'Environnement.

Notes: FAO 1980 and 1995, as well as historic forest cover refer to undetermined forest classes. GFW and Laporte forest cover refer to closed and degraded forests.
Mayaux forest cover refers to closed forests.
FAO 1990 forest cover refers to montane, submontane, closed and very dry forests.

Figure 4. Central African Countries' Log Exports as a Percentage of World Tropical Log Exports

	Volume Of Logs Exported (thousand cubic meters)						
	1992	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
Gabon	1,050	1,500	1,500	1,700	1,800	3,000	1,500
Cameroon	800	850	1,150	1,304	1,101	1,706	1,280
Republic of Congo	348	340	450	450	500	213	300
Democratic Republic of Congo	96	42	112	97	100	100	90
Central African Republic	–	–	84	73	42	127	100
Equatorial Guinea	133	156	216	267	406	510	510
World	**–**	**–**	**18,351**	**–**	**–**	**17,685**	**–**

Percentage of World Export

	1994	**1997**
Gabon	8.2	17.0
Cameroon	6.3	9.6
Republic of Congo	2.5	1.2
Equatorial Guinea	1.2	2.9
Democratic Republic of Congo	0.6	0.6
Central African Republic	0.5	0.7

Sources: International Tropical Timber Organization (ITTO), *Annual Review and Assessment of the World Timber Situation, 1998* (ITTO, 1999); Equatorial Guinea data from the Food and Agriculture Organization at http://apps.fao.org.

Figure 5. Cameroon's Industrial Roundwood Exports Value

	1986	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
Industrial Roundwood Exports Value (Million US$)	37	48	75	72	180	157	205	138	161	304	267	237	190

Source: Food and Agriculture Organization Statistical Databases.
http://apps.fao.org.

Figure 6. Cameroon Industrial Roundwood Production and Export, by Volume 1961-98

	Industrial Roundwood Production Volume (thousand cubic meters)	Industrial Roundwood Exports Volume (thousand cubic meters)	Industrial Roundwood Exports Value (thousand US$)
1961	758	165	5
1962	769	157	5
1963	799	207	6
1964	903	228	7
1965	917	218	8
1966	994	286	9
1967	1,003	279	11
1968	1,064	364	14
1969	1,069	426	14
1970	1,195	511	15
1971	1,276	546	17
1972	1,287	515	18
1973	1,365	703	46
1974	1,493	647	49
1975	1,507	472	31
1976	1,721	599	49
1977	1,915	397	33
1978	2,154	654	79
1979	2,194	843	101
1980	2,196	743	114
1981	2,300	444	56
1982	2,324	448	46
1983	2,411	391	34
1984	2,576	496	33
1985	2,765	746	64
1986	2,779	411	37
1987	2,803	442	48
1988	2,708	538	75
1989	2,872	457	72
1990	3,136	623	180
1991	3,085	771	157
1992	2,929	680	205
1993	2,936	792	138
1994	3,311	1,255	161
1995	3,588	1,236	304
1996	3,733	1,307	267
1997	3,255	1,706	237
1998	2,980	1,280	190

Sources: Food and Agriculture Organization Statistical Databases. http://apps.fao.org.

Figure 7. Major Regional Importers of Cameroonian Logs, 1996-97

Regions	Volume (cubic meters)
Africa	42,016
Asia	853,614
Americas	572
Europe	809,817

Source: Centre pour l'Environnement et le Développement. *Etat des Lieux du Secteur Forestier au Cameroun* – Données Statistiques à partir de données de la Societé Générale de Surveillance, 1998.

Figure 8. Most Common Timber Species Exported in 1997, by Log Volume

Species	Volume (cubic meters)
Ayous	385,000
Sapeli	88,000
Other*	808,000

* includes 78 species

Source: International Tropical Timber Organization (ITTO), *Annual Review and Assessment of the World Timber Situation 1998* (Yokohama: ITTO, 1998).

Figure 9. Number of Species (Plant, Mammal, and Bird) per 10,000 km^2 Land Area

Species/10,000 km^2	Mammals	Birds	Plants	Total
Cameroon	83	193	2,237	2,513
Central African Republic	53	137	921	1,111
Republic of Congo	62	140	1,356	1,558
Democratic Republic of Congo	69	153	1,817	2,039
Gabon	64	157	2,197	2,418
Equatorial Guinea	131	194	2,135	2,460

Source: World Resources Institute (WRI), *World Resources 1998-99* (Oxford University Press, NY, 1998).

Figure 10. Fuelwood Production, 1980-98

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Production (thousand cubic meters)	7,376	7,589	7,808	8,033	8,265	8,503	8,747	8,997	9,254	9,517	9,787	10,054	10,339	10,630	10,929	11,235	11,547	11,867	12,192

Source: Food and Agriculture Organization Statistical Databases. http://apps.fao.org.

Figure 11. Area Harvested in 1994-1999

	Number of *Assiette de Coupe*	Number of *Vente de Coupe*	Area (hectares)
1994	246	171	1,042,500
1995	233	168	1,002,500
1996	298	173	1,177,500
1997	–	–	–
1998	153	130	713,436
1999	64	77	348,645

Sources: Richard Eba'a Atyi, *Cameroon's Logging Industry: Structure, Economic Importance and Effects of Devaluation.* CIFOR, paper 14, August 1998; GFW Cameroon based on information provided by SIGIF.

Figure 12. Largest Concession Holders, by Surface Area in 1998-99

Company	Concession Area (hectares) 1998-1999	Percentage Of Concession Area 1998-1999
Others	2,019,341	50%
Thanry	650,124	16%
Bollore	411,575	10%
Coron	211,760	5%
Alpi	203,512	5%
Hazim	157,013	4%
Rougier	132,192	3%
Decolvenaere	75,306	2%
Itallegno	69,359	2%
Vasto-Legne	62,597	2%
Pasquet	60,780	1%
Total	**4,053,559**	**100%**

Sources: GFW Cameroon based on data provided by SIGIF; Greenpeace International, *Buying Destruction*, (Amsterdam 1999); JC Carret (Personal communication, December 1999), Alain Karsenty (Personal communication, December 1999), Dominiek Plouvier (Personal communication, December 1999).

Figure 13. Survey of Violation Reports, East and Central Provinces, 1985-99

Year	Number of Violation Reports	Violation Reports Followed Through in the Judicial System	Violation Reports not Followed Through in the Judicial System	Percentage of Violation Reports not Followed Through in the Judicial System
1985-1986	106	78	29	27
1986-1987	100	59	41	41
1987-1988	93	38	55	59
1988-1989	129	71	60	47
1989-1990	106	42	64	60
1990-1991	71	28	43	61
1991-1992	64	7	57	89
1992-1993	26	1	25	96
1993-1994	20	–	–	–
1994-1995	27	–	–	–
1995-1996	15	–	–	–
1996-1997	7	–	–	–
1997-1998	24	–	–	–
1998-1999	15	–	–	–

Source: Field survey 1998-1999. Cameroon Environmental Watch, as commissioned by Global Forest Watch.

Figure 14. Types of Violations in the East Province, 1995-98

Type of Violation in the East Province	Number of Violations
Outside of Concession Boundaries	9
Within Concession Boundaries	24
During Transport or Sawing	12
Other	4
Total	**49**

Source: Field survey and analysis of data from the Délégation Provinciale de l'Environnement de l'Est, by Cameroon Environmental Watch, 1999, as commissioned by Global Forest Watch.

Figure 15. Types of Violations in the Central Province, 1995-98

Type of Violation in the Central Province	Number of Violations
Outside of Concession Boundaries	34
Within Concession Boundaries	24
During Transport or Sawing	3
Total	**61**

Source: Field survey and analysis of data from the Délegation Provinciale de l'Environnement du Centre, by Cameroon Environmental Watch, 1999, as commissioned by Global Forest Watch.

Figure 16. Number of Violations in the East Province, by Department, 1985-98

Department	Number of Violations	Percentage
Lom et Djérem	16	46%
Kadey	9	26%
Haut Nyong	7	20%
Boumba et Ngoko	3	9%
Total	**35**	**100%**

Source: Field survey and analysis of data from the Délegation Provinciale de l'Environnement de l'Est, by Cameroon Environmental Watch, 1999, as commissioned by Global Forest Watch

Figure 17. Number of Violations in the Central Province, by Department, 1995-98

Department	Number of Violations	Percentage
Lékié	158	20%
Nyong et So'o	121	15%
Nyong et Kéllé	110	14%
Mfoundi	107	13%
Nyong et Mfoumou	77	10%
Mefou et Akono	74	9%
Mbam	65	8%
Mefou et Afamba	46	6%
Haute Sanaga	25	3%
Autres	11	1%
Total	**794**	**100%**

Source: Field survey and analysis of data from the Délegation Provinciale de l'Environnement du Centre, by Cameroon Environmental Watch, 1999, as commissioned by Global Forest Watch.

Figure 18. Justification for Incomplete Judicial Follow-through of Violation Reports, 1995-98

Justification	Number of Violations Reports	Percentage
After intervention of an influential person	13	21
Irregularity in the administrative procedure	6	10
No justification	4	6
First-time offender	5	8
No proof	7	11
Cannot be held legally responsible	8	13
Other	20	32
Total	**63**	

Source: Cameroon Environmental Watch, 1999, as commissioned by Global Forest Watch.

Figure 19. Categories of Offenders, 1995-98

Number of Violations	1 Violation	2 Violations	3 Violations	More than 3 Violations	Total
Individuals	647	10	2	0	659
Companies	76	14	7	1	98
Other	11	0	0	0	11

Source: Cameroon Environmental Watch, 1999, as commissioned by Global Forest Watch.

Figure A. Concession Area per Agent

Provinces	East	South	Central	Littoral	South-West
Number of agents	116	115	232	167	163
Concession area (hectares)	2,419,601	759,949	640,803	51,160	5,000
Concession area per agent (hectares)	20,859	6,608	2,762	306	31

Source: Théophile Ndjodo, Présentation Succinte des Conditions de Travail et des Capacités Logistiques du Ministère de l'Environnement et des Forêts du Cameroun, (Unpublished)

APPENDIX 2: TECHNICAL NOTES

Because of rounding, all the percentages presented in this report may not always add up to exactly 100 percent, or to the reported totals.

Forest Cover

Estimates of forest cover vary depending on the source *(see Table 1)*. Throughout this report, we refer to five estimates:

i) Global Forest Watch's area estimates based on the forest maps produced by the TREES project, an initiative of the European Commission's Joint Research Centre;
ii) area estimates published by Mayaux et al. that were based on TREES imagery;
iii) area estimates published by Laporte et al.;
iv) forest statistics produced by the FAO;
v) Historic forest cover estimated by WRI.

● GFW's forest cover estimates are based on landcover maps published by TREES, which are available on the Internet (http://fellini.mtv.saic.jrc.it/TREES/). TREES maps originated from multi-date satellite imagery that was recorded with Advanced Very High Resolution Radiometer (AVHRR) 1.1-km resolution, onboard National Oceanic and Atmospheric Administration (NOAA) satellites to identify landcover and forest categories in the tropics. The imagery used was acquired during the dry season between 1992 and 1993. GFW used two categories of the TREES dataset: dense moist forests and the secondary forest/rural complex, referred to as secondary and degraded forests in this report. TREES defines dense moist forests as zones with more than 70 percent forest cover in each pixel, and secondary forest/rural complexes (degraded forests) as zones with 10-70 percent forest cover.

We downloaded the TREES dataset for Africa, which is provided in a geographic projection. To reduce the TREES landcover to depict only Cameroon, we used the political boundaries provided in the Digital Chart of the World as a mask to subset the raster map in a geographic information system (GIS). We calculated GFW area estimates by multiplying each forest cell in the TREES landcover raster map by the area it covered on the ground. Cell area was adjusted for latitudinal variation caused by the earth's curvature.

Global Forest Watch's estimates for closed forest cover area are approximately 5,300-5,400 km^2 greater than previously published estimates based on TREES data and combinations of AVHRR satellite imagery with higher-resolution satellite data (Laporte et al. 1998, Mayaux et al. 1998). These minor discrepancies (approximately 3 percent) in forest cover estimates can be explained by i) differences in the procedures used for calculating area, ii) changes resulting from data processing such as projection, and iii) differences in image classification.

● Mayaux et al., 1998 estimated forest cover from TREES data by adjusting estimates from AVHRR imagery with data from high-resolution Landsat Thematic Mapper (TM) imagery. This adjustment corrects for biases from misclassification and spatial aggregation errors. The procedure used was restricted to country-level area estimates and did not provide information on provincial and departmental levels. We could not use the adjustment for our analysis, because adjustments to area estimates were not spatially referenced and could not be assumed to be equally distributed across provincial and departmental levels. Because GFW Cameroon is interested in how forest area is related to the spatial distribution of ecological and socioeconomic variables at provincial levels, we relied on our own area calculations based on TREES maps without applying a calibration function.

● Area estimates provided by Laporte et al. were also derived from the classification of AVHRR imagery. This classification was improved by using ancillary data, maps, and Landsat Multispectral Scanner (MSS) imagery. This map was a precursor to the TREES map and was used as a baseline map for the TREES project.

● FAO defines tropical forest as wooded area with at least 10 percent crown cover. FAO forest cover estimates are available for 1980, 1990, and 1995 and are based on non-spatial, statistical models incorporating baseline forest inventory data. The baseline data are generally outdated, and are standardized to a common year using a statistical model based on population growth rates. Given that deforestation is associated with a range of factors, including land tenure, economic conditions, and development policies, this population-driven model may not be accurate.

Table I. Comparison of Forest Area Estimates (km^2) for Cameroon Derived from Nonspatial Forest Statistics and Satellite Imagery.

Land cover	Nonspatial statistics	NOAA-AVHRR Satellite Imagery Acquired 1992-1993		
	FAO	Mayaux et al.	Laporte et al.	GFW
Closed Forest	–	173,780	173,850	179,152
Degraded Forest	–	–	64,773	48,791
Total	**195,820**	**–**	**238,623**	**227,943**

Sources: GFW based on http://fellini.mtv.sai.jrc.it/TREES; Mayaux, P., F. Archard, and J.P. Malingreau. 1998. "Global tropical forest area measurements derived from coarse resolution satellite imagery: a comparison with other approaches." *Environmental Conservation* 25:37-52; Laporte, Goetz, Justice, Heinicke, 1998, "A New Land Cover Map of Central Africa Derived from Multiresolution Multitemporal AVHRR Data" in *International Journal of Remote Sensing* (19) #18, pp. 3537-3550; FAO 1995, Food and Agriculture Organization of the United Nations, Forest Resources Division, *State of the World's Forests 1997* (FAO, Rome 1997).

● Historic forest cover is defined as forest cover prior to large-scale human disturbance as estimated by potential vegetation. For more information, consult Bryant et al. *The Last Frontier Forests: Ecosystems and Economies on the Edge (*WRI, 1997).

Forest Development Trends

The maps presented in this report are based on various data sets.

● We calculated high and low estimates of how much carbon is stored in Cameroon's vegetation by applying Jerry Olson's published carbon density estimates (*Carbon in Live Vegetation of Major World Ecosystems*, 1983) to a more current vegetation map (the Global Land Cover Characterization Dataset), produced at the Earth Resources Observation Systems (EROS) Data Center using AVHRR data from 1992-93. Map 1 presents the high carbon estimate.

● Information on concession areas was obtained for four years: 1959, 1971, 1995, and 1999. The 1959 and 1971 maps were digitized by the World Conservation Monitoring Centre (WCMC). Although these maps indicate the approximate location of allocated logging concessions, they do not reflect the precise location of logging activity, or its intensity. The 1995 map was acquired as an ArcView spatial data file by WRI in 1997 from Centre de Télédétection et de Cartographie Forestière (CETELCAF). The 1999 map was based on the previous data file, which already included the UFA boundaries. The Système Informatique de Gestion des Informations Forestières (SIGIF) provided information on concession activity, based on the allocation of *assiette de coupe*, in 1997-98 and 1998-99. These maps do not depict the full extent of allocated concessions. In 1999 alone, 1.1 million hectares of logging concessions, including all the *vente de coupe* area, could not be mapped as spatial coordinates were not available.

● Throughout the report, concessions are referred to as abandoned, active, allocated, or designated. These terms are further explained below.
Abandoned concessions are concessions appearing on the 1959, 1971, and 1995 maps, but not listed as active concessions in 1998-99.
Active concessions are those that have been granted one or *more assiette de coupe* in 1998-99. Allocation of *assiettes de coupe* implies that logging took place in that concession during that year.
Allocated concessions are UFAs that have been awarded but were not granted an *assiette de coupe* in 1998-99.
Designated concessions are UFAs featured in the digital file provided by CETELCAF that had not been allocated to logging companies as of December 1999.

● The forest cover layer is from the TREES project and presents an estimate of forest extent over the 1992–93 period. This data set was used as baseline data for maps presenting information for different time periods.

● The time series in Map 2 presents cumulative logging concession area from 1959 through 1999, and is overlaid with forest cover for 1992-93.

● Forest Reserves are included in Map 3. These are designated protected forests, which, though not assigned an IUCN category, could be considered similar to IUCN category VI ("Managed Resource Protected Area: a protected area managed mainly for the sustainable use of natural ecosystems"). These were digitized by WCMC and can be accessed through the CARPE CD-ROM.

● Map 4 depicts IUCN protected areas categories I through IV. These were digitized by WCMC as an ArcView shape file, and can be accessed through the CARPE Data CD-ROM. There are some significant differences between the spatial data provided by WCMC, the data published in the 1997 United Nations List of Protected Areas and data provided by the Cameroonian Government. We have used WCMC's protected areas estimates derived from spatial data to maintain consistency with other spatial datasets used throughout this report, but these may be overestimated.

● The percentage of forest logged presented in Map 5 was based on concession area provided to WRI by SIGIF for 1998–1999. Data were not available for some departments. The percentage was calculated as follows:

$$\frac{\text{(}\textit{vente de coupe}\text{ area + }\textit{assiette de coupe}\text{ area) in square kilometers}}{\text{(area of dense moist forest + area of secondary and degraded forest) in square kilometers}} \times 100$$

Table II. Protected Area Estimates

Protected Area	IUCN area (hectares)	Government Area (hectares)	WCMC Spatial Area (hectares)
Campo	300,000	500,000	264,179
Dja	526,000	526,000	623,438
Douala-Edéa	160,000	–	134,293
Kimbi River	5,625	–	9,418
Korup	125,900	–	126,280
Lac Lobeké	43,000	150,000	216,850
Lac Ossa	4,000	–	5,527
Santchou	7,000	–	7,110
Total	**1,171,525**	**–**	**1,387,095**

Source: IUCN (1998). 1997 United Nations List of Protected Areas. Prepared by WCMC and WCPA. IUCN, Gland, Switzerland and Cambridge, UK. Lxii + 412pp. GFW spatial calculations based on spatial data from WCMC.

Note: a. In a personal communication, Simon Blythe from the WCMC indicated that the government of Cameroon had recently informed WCMC that the Lac Lobeké protected area was 92,503 hectares.

● The yearly extraction rates estimates for 1997–1998 presented in Map 6 are based on production volume data for 1996–1997 (the latest year for which we were able to obtain production data by department), and on concession area information provided by the SIGIF for 1997–1998. Areas labeled "no data" indicate missing information that prevented the calculation of extraction rates, although this designation does not necessarily indicate lack of logging activity. The extraction rates were calculated as follows:

$$\frac{\text{Production volume in cubic meters}}{\text{(}\textit{vente de coupe}\text{ area + }\textit{assiette de coupe}\text{ area) in hectares}} \times 100$$

These rates underestimate the actual wood volume removed from the forest, because they do not account for trees destroyed or damaged in the felling of desired trees, trees wasted in the felling or transport process, or undeclared production.

● Map 7 shows those concessions held by parent groups with more than 100,000 hectares in total holdings. Missing data prevented the mapping of all holdings. No concessions held by either Coron and Hazim could be mapped.

● Map 8 presents irregularities in license activity for 1997–1998. This map is based on spatial data provided by CETELCAF and a list of valid concessions provided by the Centre pour l'Environnement et le Développement. Licenses were considered

Table III. Timber Production and Export Data, 1993-98

Production Volume Data (thousand cubic meters)						
	1993	**1994**	**1995**	**1996**	**1997**	**1998**
FAO (Industrial roundwood)	2,936	3,311	3,588	3,733	3,255	2,980
FAO (Sawlogs + Veneer Logs)	2,096	2,447	2,700	2,820	2,317	2,016
FAO (Other industrial roundwood)	840	864	888	913	938	964
FAO (Sawnwood)	579	647	676	685	560	588
FAO (Veneerwood)	31	31	31	31	61	59
FAO (Plywood)	43	43	43	43	90	89
ITTO (Logs)	2,815	3,300	3,000	2,800	3,000	2,895
ITTO (Sawnwood)	650	725	520	580	560	588
ITTO (Veneerwood)	28	38	61	61	61	58
ITTO (Plywood)	63	78	80	88	90	89
Export Volume Data (thousand cubic meters)						
	1993	**1994**	**1995**	**1996**	**1997**	**1998**
FAO (Industrial roundwood)	791	1,255	1,236	1,307	1,706	1,280
FAO (Sawnwood)	187	286	222	316	342	356
FAO (Veneerwood)	17	25	25	27	37	41
FAO (Plywood)	3	11	5	12	45	41
ITTO (Logs)	850	1,150	1,304	1,101	1,706	1,280
ITTO (Sawnwood)	142	218	289	284	392	405
ITTO (Veneerwood)	26	38	60	51	37	41
ITTO (Plywood)	25	20	20	35	45	41
Export Value Data (thousand US Dollars)						
	1993	**1994**	**1995**	**1996**	**1997**	**1998**
FAO (Industrial roundwood)	138	161	304	267	237	190
FAO (Sawnwood)	53	109	105	131	163	177
FAO (Veneerwood)	16	23	22	21	30	31
FAO (Plywood)	2	6	4	7	12	14
ITTO (Logs)	–	323	–	155	237	–
ITTO (Sawnwood)	–	123	–	150	194	–
ITTO (Veneerwood)	–	23	–	14	10	–
ITTO (Plywood)	–	5	–	12	15	–

Sources: Food and Agricultural Organization Statistical Databases. http://apps.fao.org. International Tropical Timber Organization, *Annual Review and Assessment of the World Timber Situation 1998* (Yokohama: ITTO, 1998), *Annual Review and Assessment of the World Timber Situation 1996* (Yokohama: ITTO, 1996).

"lapsed" (category 1) if they were active in 1997–1998, but had an expiration date before 1997. Licenses that fully or partially overlapped with Protected Areas (IUCN categories I through IV) were also considered "irregular."

● Map 9 is based on the digital data provided by CETELCAF and results from the *Résultat des déliberations de la commission interministerielle d'attribution des concessions forestières*. Session de Mai 1997. Based on this latter document, we were able to determine four outcomes of the 1997 UFA allocation process. These are described below.

1. UFAs allocated to bidders not recommended by the interministerial commission, and who had not offered the highest bid. Under the law, this is irregular.
2. UFAs allocated to bidders recommended by the interministerial commission, but who had not offered the highest bid. Under the law, the regularity of these allocations is questionable.
3. UFAs allocated to bidders not recommended by the commission, who nevertheless had offered the highest bid. Under the law, the regularity of these allocations is undetermined.
4. UFAs allocated to bidders recommended by the commission and who had offered the highest bid. Under the law these seem to be regular.

Table IV. Top Five Importing Countries of Cameroonian Logs, 1997

Importing Country 1997	Volume (thousand cubic meters) Reported by Cameroon	Volume (thousand cubic meters) Reported by Importing Country	Cameroon Declared Figure as a Percentage of Volume by Importer
Italy	297,051	59,158	502
China	276,402	319,850	86
France	211,890	189,608	112
Philippines	202,029	4,000	5,051
Japan	200,618	118,000	170

Source: International Tropical Timber Organization (ITTO), *Annual Review and Assessment of the World Timber Situation 1998* (Yokohama: ITTO, 1998).

Wood Products

● The value and volume of timber production and export is difficult to assess. International reporting agencies, such as the FAO and ITTO, present significantly different data. This may be explained by the fact that they use different questionnaires, terminology, and government sources for their raw data. From year to year, the government corrects the previous year's figures, which explains why some of the data reported may not be consistent for a specific year from one report to the next. FAO and ITTO are attempting to address some of these issues by developing common reporting terminology and will be obtaining data from common sources within countries.

● Table III presents ITTO and FAO data from 1993 through 1999. The FAO industrial roundwood production equals the FAO (sawlogs and veneer logs) production plus the FAO other industrial roundwood production. Export figures from the FAO are only available for industrial roundwood, with no distinction between (sawlogs and veneer logs) and other industrial roundwood. Although we have sought advice from experts as to how to compare figures from these organizations, the figures are not strictly comparable. It appears, however, that ITTO logs can be roughly compared to FAO industrial roundwood.

● Discrepancies also exist between Cameroonian government export volumes reported and the corresponding import volumes reported by the destination country. As Table IV indicates, significant discrepancies exist between ITTO quotes for log export volumes from Cameroon, as compared to reported imports. The latter figures are derived from a variety of unofficial sources, such as trade journals and statistical reports. Major importers of Cameroonian raw logs, by total imports, are listed below.

Biodiversity

● The number of species per 10,000 square kilometers provides a relative estimate for comparing numbers of species among countries of varying size. As the relationship between area and species number is nonlinear (i.e., as the area sampled increases, the number of new species located decreases), a species-area curve has been used to standardize these species numbers. This curve predicts how many species a country would have, given its current number of species, if it were a uniform 10,000 square kilometers in size. This number is calculated using the formula: $S = cAz$, where S = *the number of endangered species*, A = area, and c and z are constants. The slope of the species-area curve is determined by the constant z, which is approximately *0.33* for large areas containing many habitats. This constant is based on data from previous studies of species-area relationships. For further information, see World Resources Institute, *World Resources 1996-1997* (New York: Oxford University Press, 1996).

Compliance Assessment

● The following is a list of the various types of violations reported in the Central and East provinces (derived from field surveys by Cameroon Environmental Watch):

1. Fraudulent logging.
2. Not marking wood out of logging camp.
3. Fraudulent use of administrative documents.
4. Complicity in the evacuation of illegally harvested wood.
5. Logging beyond the established time frame.
6. Cut and sale of wood without authorization.
7. Cut and processing of a protected timber species.
8. Unauthorized logging in the National State Domain.
9. Fraudulent documentation, obstruction of justice.
10. Harvesting of unauthorized timber species.
11. Logging of trees smaller than the minimum diameter.
12. Logging beyond the concession boundaries.
13. Illegal recovery of previously felled trees.
14. Conditions defined for the *assiette de coupe* not respected.
15. Unauthorized sawmill.
16. Illegal logging of protected timber species within the National State Domain.
17. Logging without valid renewal title.
18. Minimum diameter of harvestable trees not respected.
19. Disregard of established cutting standards.
20. Logging and processing of protected timber species within a forest reserve.
21. Fraudulent marking of logs.
22. Unauthorized holding and transport of wood.
23. Transport of wood without documentation.
24. Logging without proper documentation.
25. Logging within a forest reserve.
26. Undocumented logging title.
27. Inappropriate documentation in the logging camp.
28. Illegal logging of timber species listed in Annex 1 of the Convention on the International Trade of Endangered Species (CITES).
29. Logging of species other than the intended species.

Notes:

1. Mayaux, P., E. Janodet, C. Blair-Meyers, and P. Legeay. 1997. *Vegetation map of Central Africa* at 1:5,000,000. Tropical Ecosystem Environment Observations by Satellites. Joint Research Centre. European Commission, TREE Series D, EUR 17322 EN.
2. Mayaux, P., F. Archard, and J.-P. Malingreau. 1998. "Global tropical forest area measurements derived from coarse resolution satellite imagery: a comparison with other approaches." *Environmental Conservation* 25:37-52.
3. Laporte, N., S. J. Goetz, C. O. Justice, and M. Heinecke. 1998. "A new land cover map of central Africa derived from multi-resolution, multi-temporal AVHRR data." *International Journal of Remote Sensing* 18: 3537-3550
4. Food and Agriculture Organization of the United Nations, Forest Resources Division, *State of the World's Forests 1997* (FAO, Rome 1997).
5. Mayaux, P., F. Archard, and J.-P. Malingreau. 1998. "Global tropical forest area measurements derived from coarse resolution satellite imagery: a comparison with other approaches." *Environmental Conservation* 25:37-52.
6. ESRI. 1992. Digital charts of the world. Environmental Systems Research Institute, Inc., Redlands, California.
7. Mayaux, P., F. Archard, and J.-P. Malingreau. 1998. "Global tropical forest area measurements derived from coarse resolution satellite imagery: a comparison with other approaches." *Environmental Conservation* 25:37-52.
8. Mayaux, P., T. Richards, and E. Janoder. 1999. "A vegetation map of Central Africa derived from satellite imagery." *Journal of Biogeography* 26: 353-366.
9. Nadine Laporte, University of Maryland. Personal communication. February 2000.
10. Dirk Bryant, Daniel Nielsen and Laura Tangley, *The Last Frontier Forests: Ecosystems and Economies on the Edge* (Washington DC: World Resources Institute, 1997).
11. IUCN (1998). 1997 United Nations List of Protected Areas. Prepared by WCMC and WCPA. IUCN, Gland, Switzerland and Cambridge, UK. Lxii + 412pp.
12. The CARPE data CD-ROM was produced by World Wildlife Fund, and World Resources Institute with data from the European Union's Joint Research Center and World Conservation Monitoring Centre.
13. IUCN (1998). 1997 United Nations List of Protected Areas. Prepared by WCMC and WCPA. IUCN, Gland, Switzerland and Cambridge, UK. Lxii + 412pp.
14. Centre pour l'Environnement et le Développement. 1999. *Etat des Lieux du Secteur Forestier au Cameroun* – Données Statistiques. Yaoundé: CED.
15. Centre pour l'Environnement et le Développement. 1999. *Etat des Lieux du Secteur Forestier au Cameroun* – Données Statistiques. Yaoundé: CED.

16. Active licenses in 1997-98 were defined as licenses logging one or more *assiette de coupe* over that time period.

APPENDIX 3: REVIEW COMMENTS

A key principle of Global Forest Watch is that transparency and accountability are essential for developing better natural resources management. In preparing this report, we faced difficulties both in accessing existing information and deriving documentation on these data, in terms of definitions used, how data were collected, and quality of the information among others. In the interest of promoting open, public, and transparent information policies, GFW products include detailed notes on data we have assembled (*See Appendixes 1 and 2*), and a summary of the major comments experts provided in reviewing early drafts. These are listed below, along with information on how comments were addressed.

The review process

This report and the maps presented in it underwent two external review processes. An initial draft was submitted for comments to the GFW Cameroon advisory group, during a day-long workshop held in Yaoundé, Cameroon, on December 22, 1999. The draft was also sent out to international experts on Cameroonian forestry issues, who submitted comments by post and e-mail. All reviewers participating in these processes did so independently of their institutional affiliations.

(i) GFW Cameroon advisory committee review. An independent advisory committee composed of representatives of the Cameroonian Forestry Department and other relevant agencies (Institut National de Cartographie, Groupe National de Travail sur la Certification Forestière et la Gestion Durable des Forêts), along with scientists and individuals working within nongovernmental conservation organizations (ECOFAC, FTPP, WWF, local NGOs) reviewed the draft report, during a day-long workshop. The following individuals attended this session: Sévérin Cécile Abéga, Henriette Bikié, Jean-Daniel Owona Ebambou, Chantal Thérèse Enyegue, Bienvenu Kuibo, Patrice Bigombe Logo, Olivier Iyebi Mandjek, Parfait Minbimi, Théophile Nga Ndjodo, Roger Ngoufo, Samuel Nguiffo, Léonard Ntonga, Zacharie Nzooh, and Nicodème Tchamou. A number of these individuals participated in two earlier workshops which defined GFW Cameroon activities and the scope of this report.

(ii) Mail review. The following people were asked to comment on this draft by mail (an asterisk denotes reviewers who were unable to comment on the report within our short deadline): Fred Swartzendruber, Laurent Somé, Jim Graham, David Wilkie, Ndinga Assitou, Théodore Tréfon, Roger Fotso,* Jean-Luc Roux,* Giuseppe Topa, Korinna Horta,* Alain Karsenty, Steve Gartlan, Guido Broejkhoven,* Michael Brown, Jean-Christophe Carret, and Dominiek Plouvier. These reviewers represent the following institutions: CARPE, USAID, Biodiversity Support Program, WWF-Cameroon, World Bank, Environmental Defense Fund, World Conservation Union (IUCN) CIRAD, CERNA, Avenir des Peuples et des Forêts Tropicales, and Innovative Resources Management. Several WRI staff (Matt Arnold, Jake Brunner, Dirk Bryant, Tony Janetos, Jonathan Lash, Peter Leimgruber, Cathy Plume, Mark Rowheder, Nigel Sizer, and Dan Tunstall) also provided input.

In addition, specific maps and sections of the report were circulated to the following individuals for input on questions raised during the review process: Laurie Clark (CARPE/US Forest Service), Steve Johnson (International Tropical Timber Organization), Nadine Laporte (University of Maryland), Philippe Mayaux (TREES), Ousseynou Ndoye (Center for International Forestry Research), and Pascal Nzokou (former staffer of SIGIF).

Major review comments and how they were addressed

Most of the comments received concerned the structure and presentation of materials within this report, as well as the extent to which we addressed certain topics. We received limited input on data underlying our maps and graphics. This may be owing to a basic lack of information on logging development trends in Cameroon (including the specific location of concessions), lack of documentation on the protocols and methods used under government data collection efforts, and inaccessibility of some existing data sets. Major comments follow.

- **The draft document required restructuring.** Several reviewers felt the structure of the initial draft failed to properly frame the issues it presented. In response, changes were made to the key findings section and the introduction. The key findings were reorganized around several thematic categories. The introduction was revised to more fully address the question of why logging is a critical issue in Cameroon. This revision included highlighting the

economic and environmental benefits and trade-offs logging entails. To this end, we also moved the section on forest values so that it would appear before the section on development trends. In addition, we highlighted data insufficiencies, which must be met to assure informed decisionmaking. One reviewer suggested an alternative framework for presenting our indicators; however, we lacked some of the data for the indicators proposed.

- **There was insufficient coverage of social and population issues as they relate to forests.**

In response, we added basic information on population growth and land tenure in the introduction. We also consulted Laurie Clark (CARPE) and Ousseynou Ndoye (CIFOR) to bolster the section on Nontimber Forest Products (NTFP). We added a brief section on cultural values associated with forests, but we did not include maps and information on the various ethnic groups and their geographical distribution in Cameroon. Although such data are available, we lacked the resources and expertise to develop quality maps and indicators addressing this issue. In future monitoring and reporting activities, GFW Cameroon intends to provide greater focus on local people and the values they derive from forests.

- **More information was needed on current forest cover.**

As the report highlights, data on forest cover are old and vary significantly from one source to another. Reviewers recommended that we include more material on the various existing estimates and how they differ. In response, we prepared a detailed section on the different forest cover estimates available for inclusion in the Technical Notes section. To provide consistency in the text, we used our own forest cover statistics (derived from TREES data) as a baseline for referencing all indicators presented in the report. In discussing forest cover trends data, we did use FAO figures, as these are the only ones available for multiple time periods.

- **We failed to highlight the importance of non-timber development in shaping Cameroon's forests.**

As noted in the text, this report focuses on the logging sector, because this development is particularly widespread, and because logging roads are instrumental in opening forests up to agricultural clearing, bushmeat hunting, and other activities that shape Cameroon's forest ecosystems. We included a new box on the Chad-Cameroon pipeline to illustrate some of the other pressures that potentially affect forests. We also presented additional background information on underlying trends that influence deforestation rates.

- **Reviewers provided contradictory feedback on the legal section.**

It was abundantly clear through the review process that various aspects of Cameroon's forest legislation are unclear and subject to differing interpretation. The legal section of this report draws on law 1/94 and the 1995 implementing decree. We presented drafts to the World Bank, representatives of the Ministry of Environment and Forests in Cameroon, and other experts. We received contradictory feedback from these reviewers, mainly on the legality of *ventes de coupe* in the Permanent Forest Domain. To address this, we referred to the legal text at issue and, in the interest of objectivity, where interpretation was unclear, presented alternative explanations. In addition, some reviewers recommended we present a more in-depth description of irregularities in the allocation of UFAs. However, this particular issue is politically sensitive and, as several reviewers pointed out, extremely complex. For these reasons, our overview of the allocation process is strictly limited to information we can document with data and published reports we were able to access. It should be noted that much of the information presented here on the legality of existing concessions has never been distributed publicly. By limiting our presentation to basic facts, we provide information needed for various stakeholder groups in Cameroon to further interpret and debate these findings.

- **The report underrepresented the role of large multinational logging companies.**

Early draft of this report only included information on titled concession holders. Several reviewers commented that as a result we failed to identify major players in the logging industry in Cameroon, because many of the title holders are merely subsidiaries of larger multinational companies ("parent groups"). In response, we added a section on these larger parent groups, presenting what information we could collect on their connection to the subsidiary companies actually registered as concession holders. We also revised Map 7 in this report to reflect holdings of parent groups, where known.

- **The fiscal information presented was incomplete.**

We were advised to distinguish between direct and indirect forestry taxes. Indirect forestry taxes are numerous and difficult to quantify systematically. Given data and time constraints, we were only able to present information on direct forestry taxes. In addition, reviewers noted that the section on revenue distribution to local communities was incomplete and misrepresentative. It is very difficult to determine the degree to which local communities are actually compensated for by logging operations, as required under the law. For this reason, we only presented data on potential returns and mentioned that practical arrangements differed from community to community. Given the importance of economic values derived from forests, future GFW Cameroon monitoring activities will emphasize collection of fiscal data and information on community compensation.

- **Administrative boundaries and the status of logging concessions may be inaccurately depicted in our maps.**

Several reviewers questioned the administrative boundaries demarcated in our maps. These data are derived from the National Center for Geographic Information and Analysis (NCGIA) and considered a global standard. In the future, we will explore availability of more detailed national data sets. If available, we will include this information in updated maps presented on the GFW Website and in future reports.

As this report was going to press, we were informed by Yvan Cuson, an advisor with MINEF, that UFA 10-015 has been cancelled, and that license 1568 is not active. These comments came after the data had been reviewed by the GFW advisory committee, which includes MINEF staff, and it was too late in the production process to obtain the proper documentation for this new information and incorporate it in this report. We did decide, however, to withhold the inclusion of a list of concessions with their owners and activity status as we had planned. We hope to work closely with MINEF to update this list, and our maps, with the best information available and will distribute those products through the GFW website in the upcoming months.

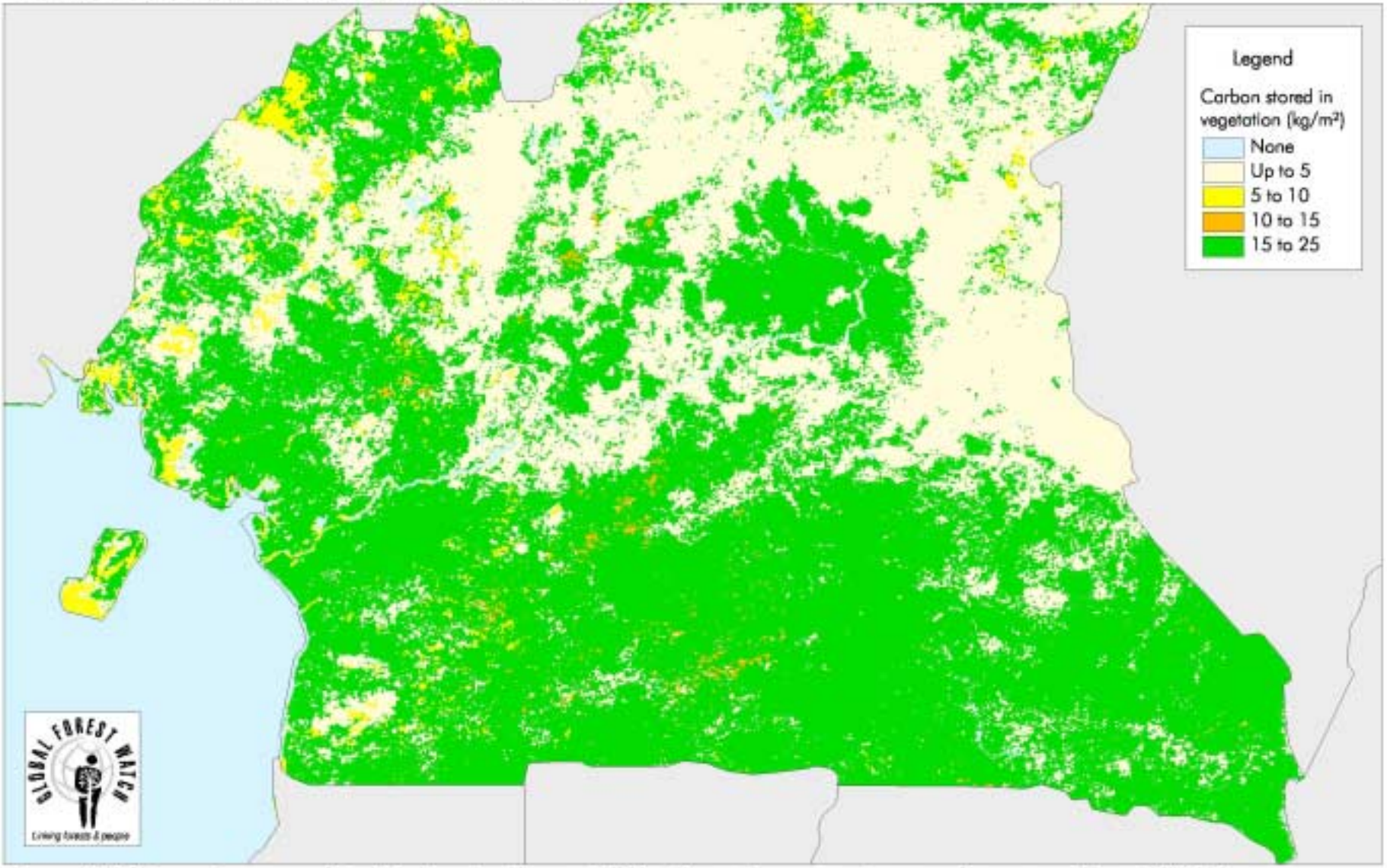
- **The maps are too complex.**

Reviewers also felt the initial draft maps were difficult to understand. In response, we provided more information in the titles and legends, as well as more detailed explanations of these maps in *Appendix 2: Technical Notes*.

- **The report presented unsubstantiated claims.**

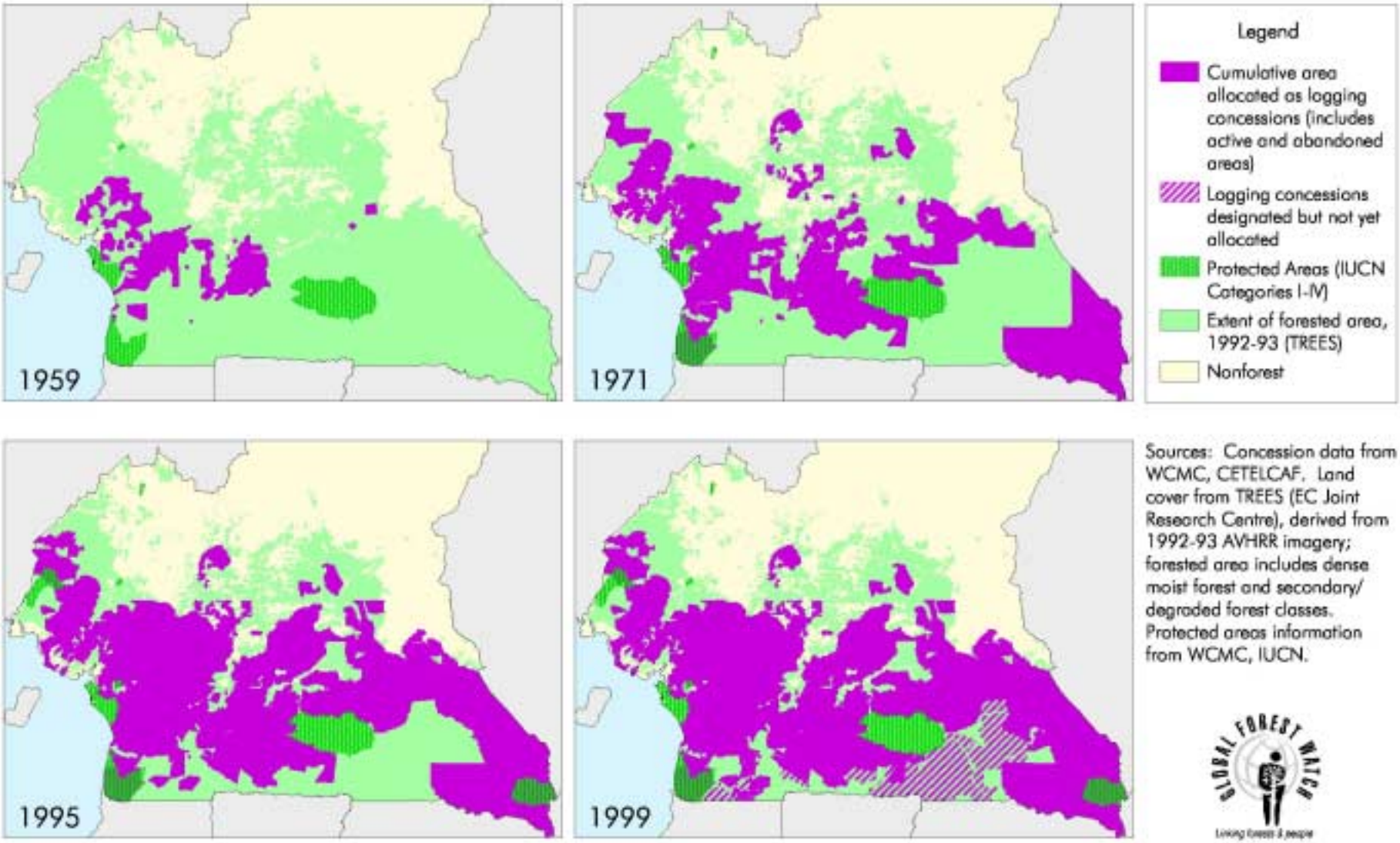
Reviewers noted several statements in earlier drafts, which were unsubstantiated. In response, we added references to support these findings or else deleted statements that we could not properly document.

CAMEROON Carbon Sequestered by Cameroon's Forests



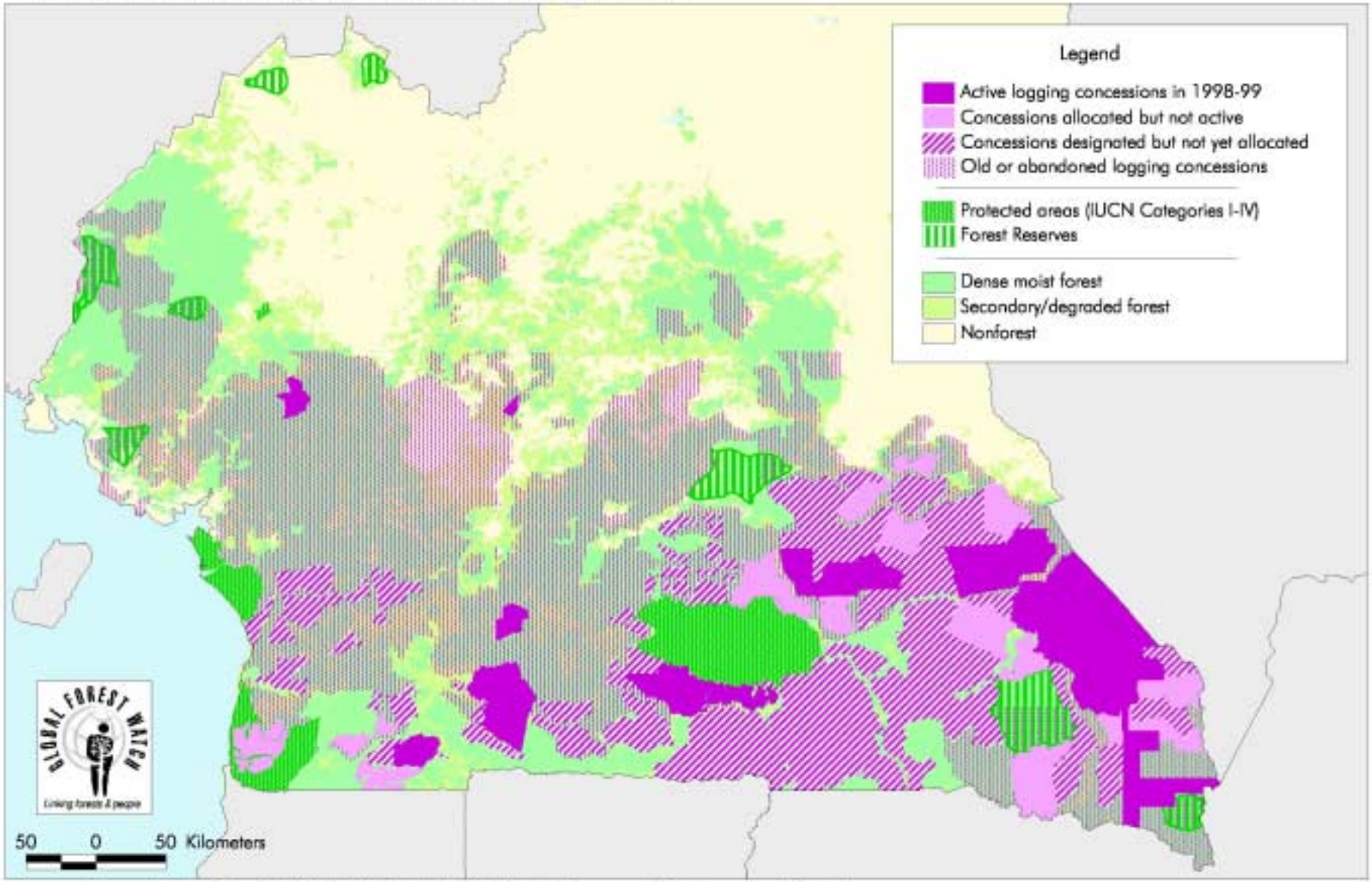
Sources: World Resources Institute unpublished data based on: Olson et al. 1983. Carbon in live vegetation of major world ecosystems. Report ORNL-5862, Oak Ridge National Laboratory, Oak Ridge, TN, USA. Global 1km land cover characterization database, USGS EROS Data Center, 1998.

CAMEROON Extent of Logging Concessions and Protected Areas, 1959-99



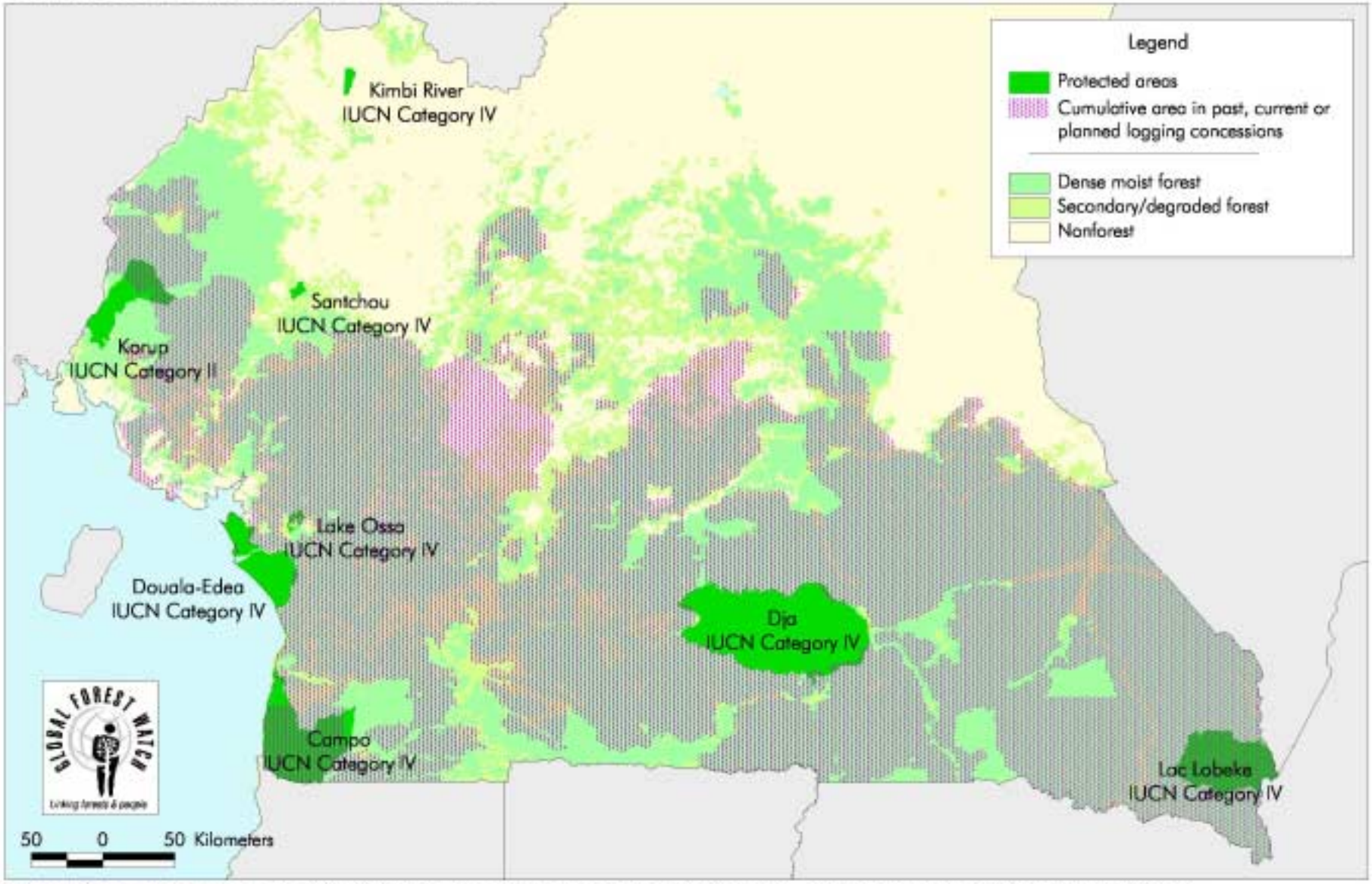
Sources: Concession data from WCMC, CETELCAF. Land cover from TREES (EC Joint Research Centre), derived from 1992-93 AVHRR imagery; forested area includes dense moist forest and secondary/ degraded forest classes. Protected areas information from WCMC, IUCN.

CAMEROON Current Logging Concession Status, 1998-99



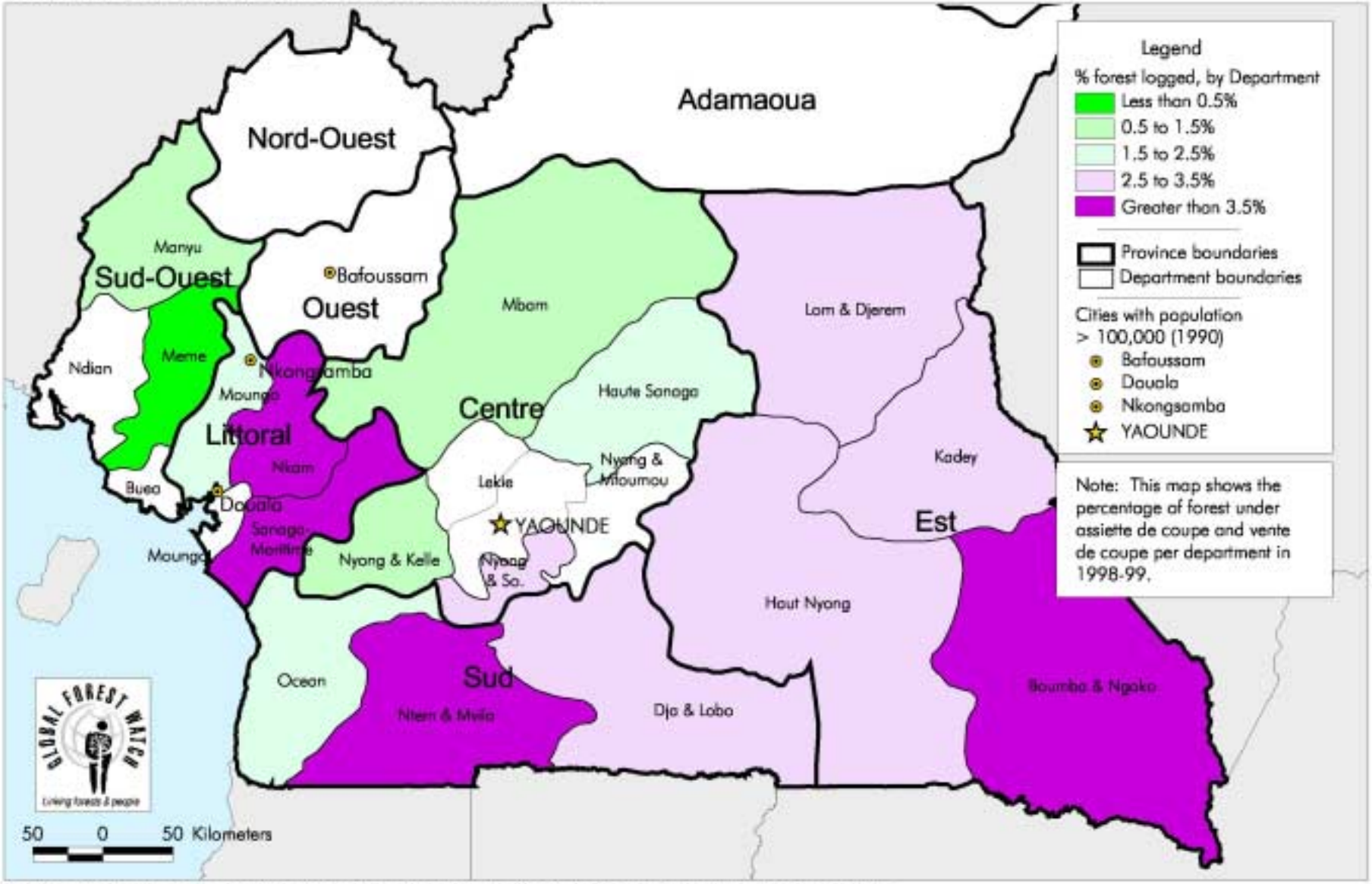
Sources: Concession data from CETELCAF, CED, and MINEF. Protected areas and forest reserves information from WCMC, IUCN. Land cover from TREES (EC Joint Research Centre), derived from 1992-93 AVHRR imagery.

CAMEROON Cameroon's Protected Areas



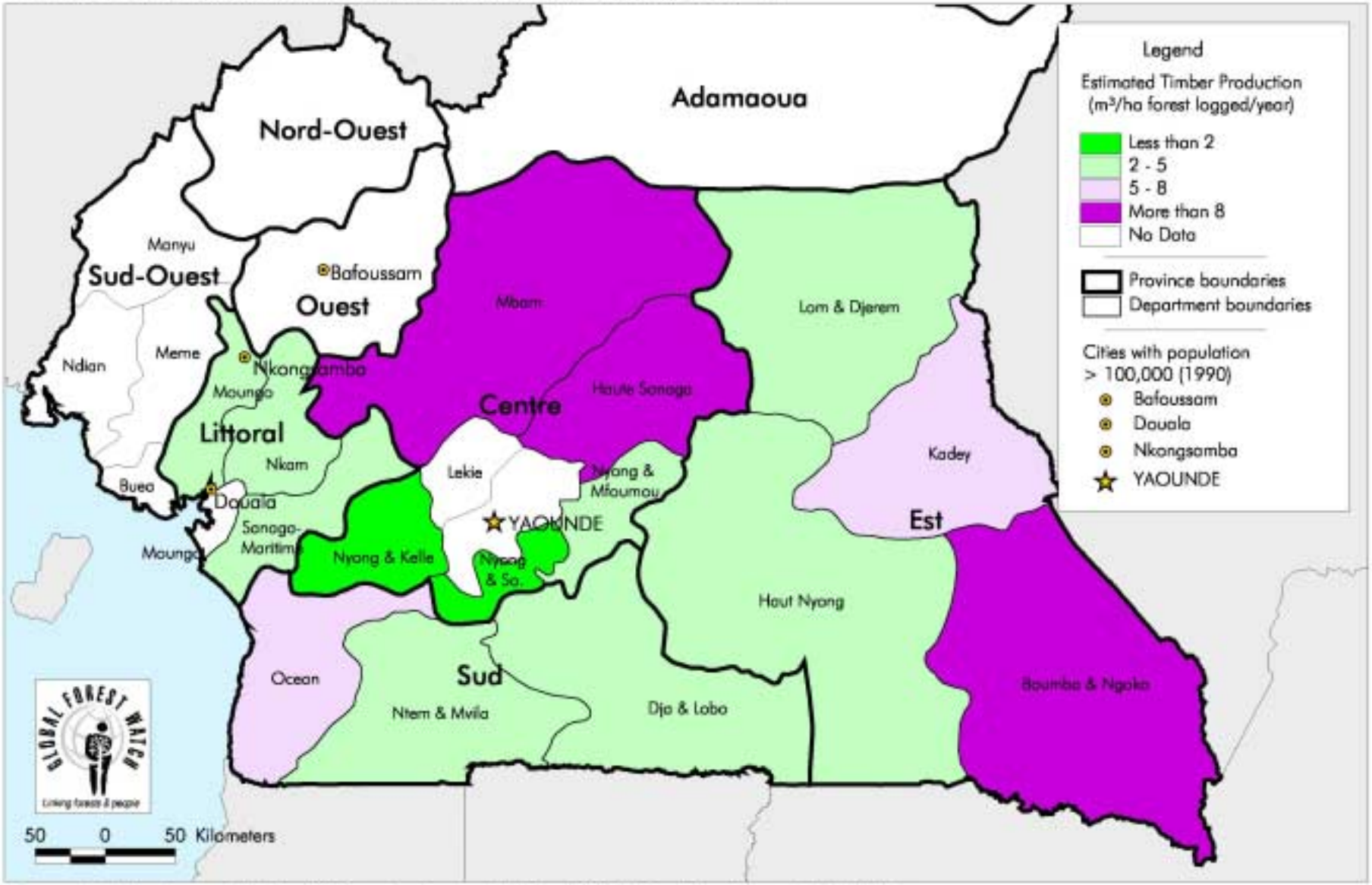
Sources: Concession information from CETELCAF. Protected areas information from WCMC, IUCN. Land cover from TREES (EC Joint Research Centre), derived from 1992-93 AVHRR satellite imagery.

CAMEROON Percentage of Forest Logged, 1998-99



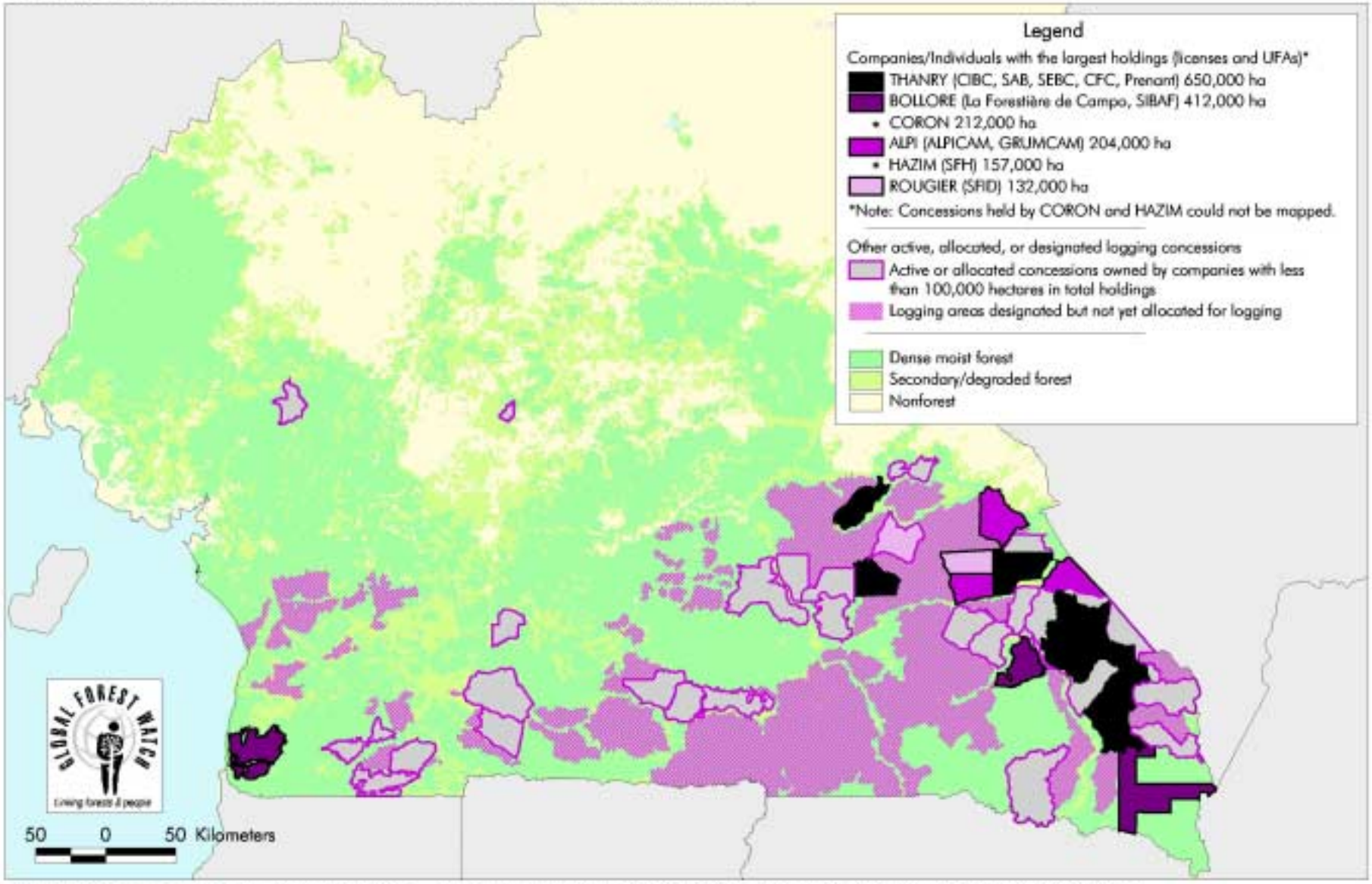
Sources: Assiette de coupe data from CED, vente de coupe data from MINEF. Population data and administrative boundaries from the National Center for Geographic Information and Analysis (NCGIA).

CAMEROON Estimated Timber Production by Department, 1997-98



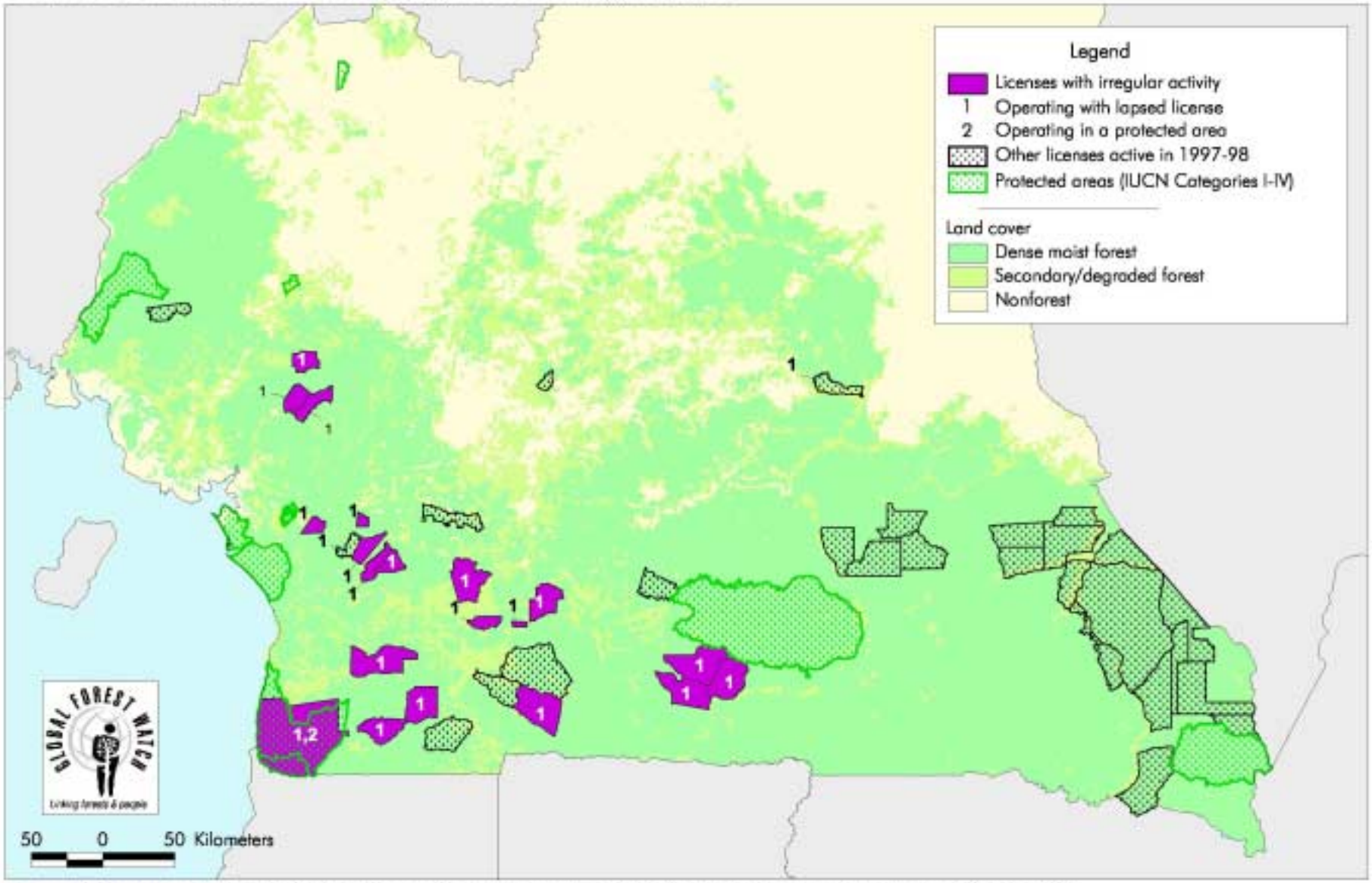
Sources: Assiettes de coupe data from CED, ventes de coupe data from MINEF. Population data and administrative boundaries from the National Center for Geographic Information and Analysis (NCGIA).

CAMEROON Largest Concession Holders in Cameroon, 1998-99



Sources: Concession information from CED, MINEF. Concession spatial data from CETELCAF. Protected areas information from WCMC, IUCN. Land cover from TREES (EC Joint Research Centre), derived from 1992-93 AVHRR imagery.

CAMEROON Irregularities in Logging License Activity, 1997-98

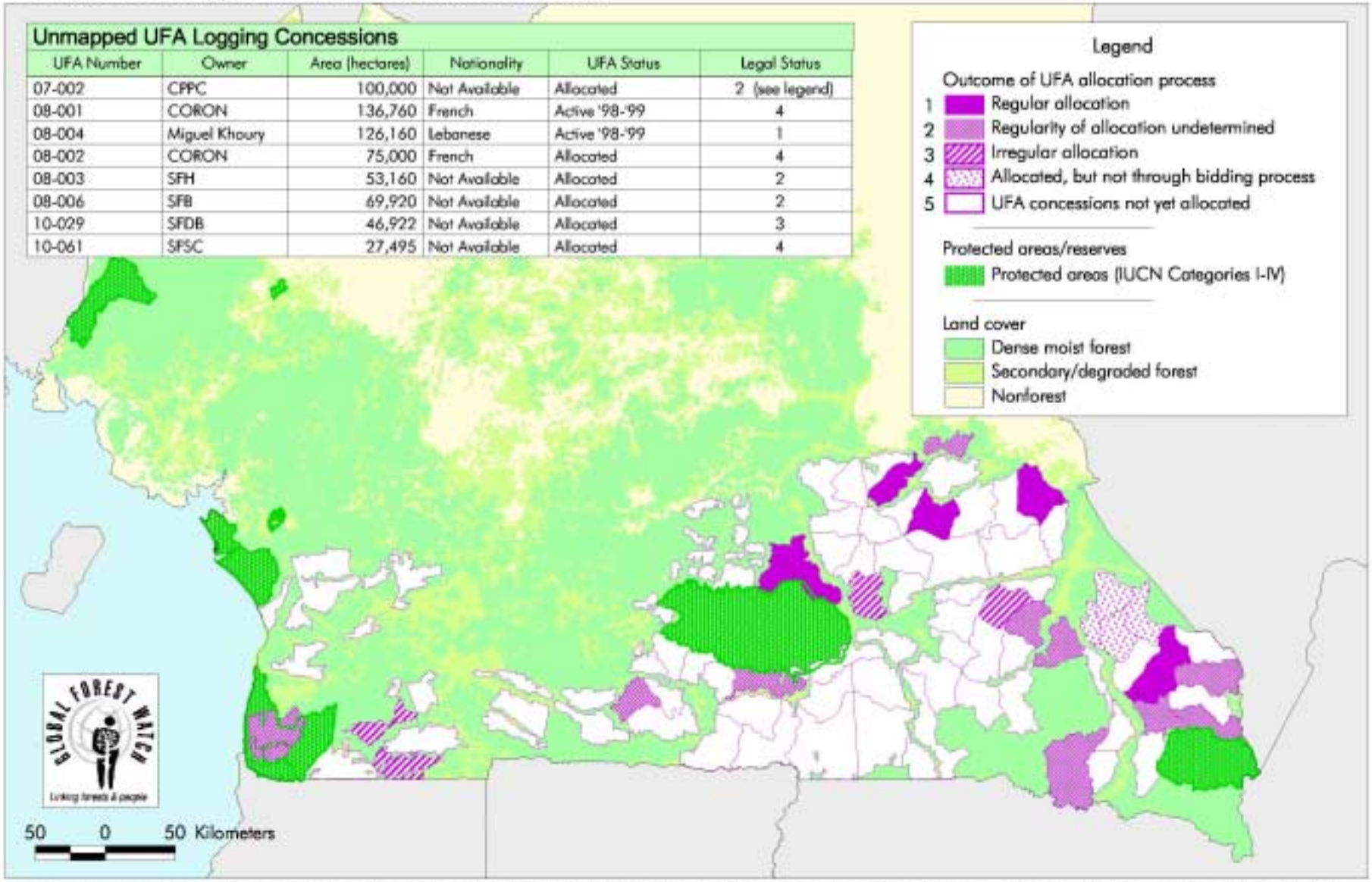


Sources: Concession data from CED, MINEF. Concession spatial data from CETELCAF. Protected areas information from WCMC, IUCN. Land cover from TREES (EC Joint Research Centre), derived from 1992-93 AVHRR imagery.

CAMEROON Irregularities in Concession Allocation

Unmapped UFA Logging Concessions

UFA Number	Owner	Area (hectares)	Nationality	UFA Status	Legal Status
07-002	CPPC	100,000	Not Available	Allocated	2 (see legend)
08-001	CORON	136,760	French	Active '98-'99	4
08-004	Miguel Khoury	126,160	Lebanese	Active '98-'99	1
08-002	CORON	75,000	French	Allocated	4
08-003	SFH	53,160	Not Available	Allocated	2
08-006	SFB	69,920	Not Available	Allocated	2
10-029	SFDB	46,922	Not Available	Allocated	3
10-061	SFSC	27,495	Not Available	Allocated	4



Sources: Concession allocation data from the Commission Interministerielle d'Attribution des Concessions Forestières, Cameroon. Concession spatial data from CETELCAF. Protected areas information from WCMC, IUCN. Land cover from TREES (EC Joint Research Centre), derived from 1992-93 AVHRR imagery.

All data presented in this report are available at
http://www.globalforestwatch.org/ or by contacting:

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