Forest management in Central Africa: where are we?

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SUMMARY

Today in the Central Africa region, production forests under management cover an area similar to that of protected forests. This is the result of a complex process initiated about 10 years ago, after a long gestation history and a sudden increase in speed in the mid 90s. Managed forests should be considered as an essential complement to the fundamental role of protected areas in their efforts to conserve the rich biodiversity of the region, as well as a significant contributor to economic development. In this paper we present new and updated figures about forest management in Central Africa as well as critical points to be addressed if we want to see progress towards better management and conservation.

Keywords: Central Africa, forest management, history, management plans, new paradigms

INTRODUCTION

For a decade, forestry companies in Central Africa (considered here as Cameroon, Central African Republic – CAR, Congo, Democratic Republic of Congo –DRC, Equatorial Guinea and Gabon) are increasingly engaged in a quest for more sustainable forest harvesting by developing integrated management plans. This has resulted in approximately 30 million ha. of dense rain forests under management or engaged in the process of developing a management plan (Nasi and Forni 2003).

This concept of integrated forest management goes against the actual 'mining practices' still favoured by many of the logging companies (no significant planning of the harvest, highly selective logging of a few species, frequent re-logging based on market requirements, fast creaming of large tracks of forest, etc.). The managed forests so far are characterised by their large size (several hundred thousands hectares) with the actual harvest as the only silvicultural operation, regulated by several parameters (mortality, growth, regeneration, damage to residual stands) of ecosystem dynamics; the aim being to ensure as much as possible a true sustainability of the exploited resource.

In addition to classical resource base and economical issues, biodiversity and social issues are increasingly integrated into these 'new' management plans, which aim at being more than simply a way to manage timber cutting. They take into account wildlife issues such as hunting, and create plant and animal biodiversity refuges. They also include agreements with authorities and local populations in terms of local development (roads, health infrastructure, and redistribution of a part of the timber income). Several industrial companies have agreements with scientific institutions or environmental or social NGOs to help them in developing these aspects that are new to them (Tutin and Nasi 2001).

Our paper provides an objective view of the current situation, gives some historical background in order to understand why we are at the current situation, and explores some questions and issues for the near future.

A SNAPSHOT OF THE SITUATION IN 2005

The sustainable harvesting of production forests under implemented sound management plans (which offers, in theory at least, an additional opportunity for conservation though the concept management of tropical forests for timber) is a politicized and often divisive subject (e.g. Rice *et al*. 1997, 1998, Bawa and Seidler 1998, Bowles *et al*. 1998, Lugo 1999, Pearce *et al*. 2003). However, a quick glance at Table 1 shows clearly that forest areas gazetted for production are much bigger than protected areas. Forest ecosystems under protection in Central Africa represent now about 16% of the dense forest area whereas the production forests represent in 2006 about 27% of this same area. This situation is not very likely to change in the future. Logging will continue because countries need generate income and jobs, and demand for African timber is increasing as other sources in South East Asia are disappearing. As the same time areas potentially suitable for strict protection are becoming scarcer in Africa (Muster *et al*. 2000).

TABLE 1: *Comparison of forest areas gazetted for production, under management and engaged in a certification process, under protection*

	Cameroon	Gabon	Congo	DRC	CAR	Equatorial Guinea	Total
Land area (a)	46540 000	25 767 000	34 150 000	226 705 000	62 298 000	2 805 000	398 265 000
Dense forest area (b)	**21 436 000**	**21 190 000**	**25 914 000**	**124 566 000**	**8 227 000**	**1 843 000**	**203 176 000**
Production forests (c)	10 500 000	19 000 000	12 000 000	87 000 000	3 300 000	1 250 000	133 050 000
Area gazetted for exploitation as of 02/2006	7 000 000	12 000 000	10 000 000	22 000 000	3 000 000	1 250 000	55 250 000
Area under forest management process (c)	**4 347 791**	**6 368 424**	**7 114 835**	**9 679 639**	**2 993 954**	**54 990**	**30 559 633**
Preparatory phase	79 442	1 906 888	1 724 422	2 977 527	276 840	0	6 956 119
Development of the management plan	727 699	1 538 688	3 088 253	6 702 112	1 461 948	0	13 518 700
Management plan submitted	338 771	117 606	2 302 160	0	707 947	54 990	3 521 474
Management plan agreed	3 201 879	2 805 242	0	0	547 219	0	6 554 340
Certification in process (c)							
ISO 14001	0	2 031 788	3 298 617	0	0	0	5 330 405
Pan African Forest Certification	0	874 656	0	0	0	0	874 656
Forest Stewardship Council	494 085	333 954	370 160	1 440 869	0	0	2 639 068
Others (Keurhout…)	0	1 727 788	0	0	0	0	1 727 788
Protected areas (d)	**3 227 361**	**3 955 285**	**3 819 002**	**16 141 650**	**5 017 000**	**552 000**	**32 712 298**
Category Ia (Strict Nature Reserve)	0	15 000	0	270 000	86 000	51 500	422 500
Category II (National Park)	1 748 312	2 910 285	2 247 542	8 544 000	3 102 000	303 000	18 855 139
Category IV (Habitat/ Species Management Area)	1 053 583	20 000	1 042 500	1 438 425	1 493 000	197 500	5 245 008
Category VI (Managed Resources Protected Areas)	425 466	1 010 000	528 960	5 889 225	336 000	0	8 189 651

(a) FAO 2005
(b) Mayaux et al. 2004
(c) FRM 2006
(d) Vandeweghe 2004

However, Table 1 also illustrates that the area under (or in the process of developing) management plans is of the same magnitude as the area under protection and represent now 15% of the dense forest area. It is therefore of the utmost importance while stressing the importance of protected areas as cornerstones for conservation to consider increasing the conservation value of production forests while maintaining their social and economical values. This is the purpose of the forest management plans presently developed in Central Africa.

HISTORICAL BACKGROUND

Before the Second World War

Although South East Asia is currently the main tropical timber exporting region, it is in Africa that tropical timber harvesting started in the seventeenth century with the first exports of African mahogany (*Khaya spp*.) to England. For about three centuries the tropical forest in Central Africa was selectively harvested for a few precious woods (ebony – *Diospyros crassicarpa*, padouk – *Pterocarpus soyauxii*, mahoganies – *Khaya spp*. and *Entandrophragma spp*.). This harvest was carried out manually by local people (who were generally also involved in other trading activities like ivory, slaves or natural rubber) and the timber sold to European traders located in coastal areas. Local people became 'timber fellers' as they were ivory or rubber collectors.

At the beginning of the twentieth century, the discovery by the Germans of the technological qualities of okoume (*Aucoumea klaineana*) linked to the development of an aeronautic industry triggered a rush to exploit this species (Sergent 2004). Until the First World War however this activity was relatively primitive. Trees were cut near rivers, manually pushed into the rivers (using levers called 'miroumbous' in Gabon) to be transported to trading places. Nevertheless harvested volumes increased significantly, from 5 000 tonnes in 1900 to 135 000 tonnes in 1913 (Pourtier 1989). After the War, with the availability of winches and small railroad systems ('voie Decauville'), timber harvesting became an industrial activity no longer limited to a proximity to waterways, and in the hands of European colonial enterprises. Local people were driven out of the business. But still only the most accessible sites, generally the coastal plains were prospected and harvested. The forests of the interior were almost totally untouched. The 1930's economic crash and the Second World War almost totally halted harvesting untill the 1950's.

During this colonial time, harvesting was only regulated in economic terms and there was no real silvicultural research or initative to manage forests for a sustained timber yield. It remained the case that logging was highly selective (less than 1 tree per 10ha) looking for the very best individuals of the most sought after species, machinery was light or non-existent and damage to the residual stands was probably fairly limited.

The period between 1950 and 1970

The Central African forests became really the 'green gold' for foresters in the 1950's with the availability of new machinery (chainsaws, bulldozers and logging trucks) and the emerging post-war rebuilding markets in Europe. The economic return for logging operations increased and it became possible to move to the interior of forests far from the waterways. From 1950 until 1970, tropical forests were mainly perceived by the colonial powers and private interests as a natural capital allowing the unlimited production of timber based on a sustained yield paradigm.

This period is characterized by the emergence of tropical silviculture with several foresters from Europe trying various types of silvicultural treatments in order to increase the economic value of the tropical forest (see Catinot 1965a, b, c, d, e for a thorough review). It was also the time of the large forest inventories funded by the United Nations agencies (FAO, UNDP) and carried out throughout the region. Still actual logging practices in the field were pretty disconnected to the finding of mainstream forestry research. Forest management was still largely unheard of except for the real life experiment of the Deng Deng forest that failed because the concepts were too far ahead of the time (Dupuy *et al*. 1999). The only silvicultural regulation was the definition of a minimum diameter cutting limit (MDCL) based, in fact, on existing machinery and industry capacities and not founded on any ecological ground. It was also the time when the first big tropical timber industrial groups, Rougier in Gabon, Tropical Timber in Congo and Danzer in DRC, were created.

Between 1972 and 1992

The rise of environmental consciousness at a global scale highlighted by the Stockholm Conference in 1972, put conservation as a fundamental tenet and need of human development. During the 80's, increasing concern about species extinctions gave birth to a new science: conservation biology. At the same time, the perception of forests (including tropical forests) shifted being from a simple natural capital able to provide either timber or a reserve of land to being a complex multifunctional ecosystem providing a wide range of goods and services.

While the world became more and more conscious of the importance of environmental issues and sustainable use, in Central Africa, forestry practices were slowly declining in terms of quality. Logging ceased to be a forester's business and became a way to get quickly rich for operators coming from various sectors (infrastructure and construction work, transport business, etc.) with most lacking the basic knowledge of forest ecosystems. This phenomenon was eventually aggravated by the wave of decolonization. The new sovereign countries, lacking the expertise but badly needing cash for development granted large forest concessions to the European industrialists with limited control capacities.

The period saw a boom of logging activities with over-harvesting of easily accessible areas. The forests located near the coast or easily accessible areas were logged-over

several times and depleted of most of their valuable timber. The availability of heavier machinery and the opening of the hinterland allowed the logging to move towards the interior and by the end of the period at least two-thirds of the forest stands became potentially accessible.

From Rio (1992) to today

The Rio Conference (UNCED 1992) put the environment at the forefront of the global agenda and resulted in major environmental agreements concerning forests: the Convention on Biological Diversity, the Framework Convention on Climate Change, the Convention to Combat Desertification and, in Agenda 21, the non-legally binding Forest Principles for a sustainable management of forest resources. Tropical forests became a fighting ground between proponents of conservation and production, illustrating the conflicting demands of society (Smouts 2001).

In Central Africa, this period saw the emergence of the concept of integrated management as it currently exists and is implemented on several million hectares. Under the pressure of civil society and new market demands for eco-friendly products, the private sector faced a difficult awakening to the emerging environmental and social issues, changing its perception of 'business as usual' (Cassagne *et al*. 2004).

Most forestry laws in the region were redesigned during this period and all state the need to have and implement management plans for their production forests (CAR in 1990, Cameroon in 1994, Congo in 2000, Gabon in 2001, DRC in 2002). At the same time, forestry administrations faced the impossible situation of not being able to carry out their regular control duties because of inadequate funding and staffing while being asked to develop sophisticated forest management plans.

Development banks, particularly the World Bank (WB) and the Agence Française de Développement (AFD), played a big role in this process. The WB put its weight towards reforming the forest legislations, putting in place new taxation regimes and transparent concession allocation systems (Karsenty 2004, 2005) whereas the AFD, together with the French Global Environment Facility, actively helped companies and countries willing to embark into the development of management plans and national guidelines. In Cameroon, Congo and Gabon, this assistance was mainly through loans to voluntary private companies. In CAR, given the structure of the forest sector and the limited size of the forest area, the choice has been to develop a National Forest Management Unit (Billand 2005), part of the Ministry of Forests, in charge of assisting the private companies in developing their management plan.

Following the trend, several consulting firms specializing in designing forest management plans were established in the region and hired by the companies to develop their management plans. Working in close cooperation with government, scientific institutions and the private sector, they developed new, and adapted existing, technical approaches and methodologies implementing at a production scale results coming from research on forest dynamics in long-term permanent sample plots. At the same time, environmental NGOs and private companies learned to work together on specific environmental issues, particularly the question of hunting (Tutin and Nasi 2001, Aviram *et al*. 2003).

These changes were not easy or straightforward. Mistakes were made and changes were sometimes resisted, for opposing reasons, by administrations and the private sector. People who had previously considered each other as enemies had to learn to discuss and work together to achieve a common goal. As a result several initiatives currently exist involving administrations, companies, environmental NGOs and research institutions.

WHAT IS A GOOD MANAGEMENT PLAN IN CENTRAL AFRICA TODAY?

Forest management plans in Central Africa are built around a common set of features and activities and differ only marginally from one concession or one country to the other. In this section we will briefly highlight the characteristics of these new management plans (see Bayol and Borie 2004 for details).

Depending on available remote sensing and cartographic documents, a set of base maps is developed. These maps (vegetation types, topography, infrastructure, etc.) are the cornerstone of the following activities such as road planning and inventory design; their quality is therefore of tremendous importance. The second operation is the management inventory: a systematic sampling (0.5 to 1.5%) of the whole concession providing an assessment of the timber resource, its spatial distribution and its production potential. This operation is probably the most costly single one in the whole management process (around US$4/ha, or US$ 800 000 for a 200 000 ha concession) and requires both financial and logistic capacities from the logging company. To optimize the cost, other information concerning tree regeneration, fauna, non-timber forest products, human activities etc. is collected at the same time than the main timber inventory. All collected data are then entered into a spatially referenced database. If particularly important sites (either for biodiversity or for cultural aspects) are located during the management inventory, specific detailed studies can be commissioned by the company or the sites can be immediately taken out of the production area. At the same time, a specific study of the socio-economic characteristics of the concession and its surroundings is carried out to obtain data on the human settlements and of the various uses of the forest by local peoples.

After all these building bricks have been collected the determination of the specific management parameters for the concession takes place. This operation is conducted as a negotiation between the firm in charge of preparing the plan, the logging company, the national forestry administration and eventually the local authorities. During this phase, several agreements must be reached about the fundamental parameters that will shape the management plan (Fargeot *et al*. 2004): the list of commercial species selected to assess the

timber yield, the zoning of the concession (Where to exploit? Where to start the harvesting? Where to protect? For what reason?), the various commercial tree species recovery rates to be obtained at the end of the rotation, the minimum diameter cutting limits, the setup and location of infrastructures, the design and location of permanent sample plots to monitor forest dynamics, etc.

The finalized management plan is then submitted for the approval of the forestry administration and officially agreed by a government decree. It is really a contract between the State, owner of the resource, and the logging company.

WHAT'S NEXT?

Among the many challenges ahead of us to sustain the rich biodiversity, social and economical value of production forests in Central Africa, we believe that the following three are among the most critical and need to be addressed in a constructive way by all the actors: the international donor community, governments, forestry administrations, logging companies, environmental or social NGOs, research institutions and civil society.

Implementation of the existing management plans

The actual implementation of the management plan is also a challenge for the companies as well as for other stakeholders. The need to use reduced impact logging techniques such as individual tree marking, skid trail planning, and directional felling, and to achieve high standards of performance to obtain a certification implies a serious effort in training staff and in changing old habits. Harvest planning becomes much more constraining and the company must develop better and more sophisticated tools both in term of assessing the resource and of forecasting market demands as in the management plan it is not possible anymore to come back in a previously logged area before the end of the rotation.

For the most advanced companies, one witnesses a true modernization of harvesting activities with the use of portable computers and GPS to carry out harvest inventories. Trees to be cut are assessed for quantity, quality and located with the GPS; the complete information is recorded in a GIS and precise harvest maps are produced allowing a proper skid trail planning. This is completed with chain of custody processes which permit the tracing of logs and processed products from the forest to the buyer.

As stated before, new partnerships begin to emerge between NGOs and companies to solve issues related to the environment and especially hunting. Fauna management plans are designed including specific hunting management plans, local production of alternative sources of proteins (e.g. fish or poultry farming) or provision of alternative sources of proteins by the company (e.g. frozen meat import). Permanents sample plot networks are designed with research institutions and implemented by the companies in order to monitor the reaction of the various forest types to the harvest and to refine parameters of the management plans.

To successfully design and implement all the above, an important investment in human capacity building at all levels (from the tree feller to the CEO) is needed from the companies. This is the case for the 'best' ones but there are many still lagging behind, even among those involved in the management process. Now that the management process seems well engaged, the international donor community should consider shifting (at least partially) its priorities from supporting the costs to develop management plans towards building human and technical capacities of companies, administrations and NGOs working together.

Forest law enforcement and governance

As highlighted before, developing and implementing a proper management plan is costly. Some companies are committed, others not; both operate often in the same areas giving a competitive edge to non-committed ones. So, how can we 'level the playing field' to ensure an economic edge to companies genuinely engaged in forest management?

Firstly, at the international level, donor countries and institutions must help improving the level of forest law enforcement and of forest governance in the countries of the region. This is the purpose of the AFLEG (African Forest Law Enforcement and Governance) process which aim at strengthening high-level commitment in Africa to build capacity for forest law enforcement, in particular relating to illegal logging and hunting, associated trade, and corruption. One of the first practical outcome of this process, a part of international meetings, has been the importance put on being able to certify that particular timber was of legal origin in order to enter public procurement markets in some European countries (France, UK andGermany). As a result specific legality certification schemes were developed such as the label OLB – Origine et Légalité des Bois (Eurocertifor-BVQI 2004).

Secondly, specific regulatory frameworks conducive to better forest management should be put into place (Karsenty 2005a, b). These legislative changes, affecting sectoral and extra-sectoral policies should be conducted in collaboration with the administrations and the companies if one wants the new legislations to be implemented. During the last five years, several donors have been pushing countries in Central Africa towards these changes (new taxation systems, concessions allocated through auctions, etc.). The most important point here is adherence to the law for all involved. Pragmatic and specific solutions should be found on a case by case basis: DRC is completely different from Cameroon, and even in one country like Congo the situation in the South is totally different from the North.

Lastly, markets should recognize the quality of forest management. This is the role of forest certification and chain-of-custody schemes. Companies should seek to obtain a proper certification as soon as their concessions have a management plan. To date, only the most advanced companies, generally with large concessions are involved in such a certification process and though certified areas are increasing in Central Africa (Table 1) much remains to be done especially to

commit small-scale forestry.

Evolution of management paradigms

With all the improvements that have been brought by the development of management plans in Central Africa, one must recognise that the basic tenets of forest management have not really changed and are still largely based on European models 'exported' to the tropics in the 50s. These 'old' management paradigms are challenged for several reasons among which:

- Some technical prescriptions of the management plans seem unrealistic given existing capacities, therefore hindering their adoption or implementation by a large part of the operators in the tropics.
- The existing management models seem to be viable only for big concessions in largely untouched logged forests whereas there is an increasing number of small to medium scale enterprises working in secondary or logged-over forests.
- New concepts of integrated natural resource management, ecosystem approach, and ecosystem management are gaining in strength.

Evolution is necessary. It will happen through a sustained dialogue between administrations, companies, NGOs and research institutions, under the scrutiny of civil society. New technical approaches will be developed to accommodate small forestry operators, community based forestry or secondary forests. The authors are reasonably optimistic that this process will be fairly rapid because such a dialogue has already been established in the process of developing the first generation of forest management plans in Central Africa.

CONCLUSION

A lot has been achieved in the last 10 years, but much remains to be done in the near future if we are to sustain the good elements and remove the bad ones. This is not yet a perfect scenario but today's situation with about 30 millions hectares of forest under management is certainly better than it was 10 years ago. Many people do not really know or recognise the progress made, some for ideological reasons, others, more numerous, because there is very little information available outside of the small circle of involved people. Companies, administration, NGOs and others must make a real effort in objectively and proactively informing society about their achievements, and also their failures.

We are now at a turning point. Depending on progress with the three issues raised in the previous section, we could witness either a dramatic increase in properly managed areas or, a total abandonment and return to the old business-as-usual mining of the forests.

REFERENCES

AVIRAM, R., BASS, M. and PARKER, K 2003. Extracting hope for bushmeat: case studies of oil, gas, mining and logging industry efforts for improved wildlife management. Report prepared for The Bushmeat Crisis Task Force by The Sustainable Development and Conservation Biology Problem Solving Team 1, University of Maryland, College Park, 58p. at http://www.bushmeat.org/pdf/PS_Private.pdf

BAWA, K. S. and SEIDLER, R. 1998. Natural forest management and conservation of biodiversity in the tropics. Conservation Biology 12(1):46–55.

BAYOL, N. and BORIE, J.-M. 2004. Technical management schemes for production forests in Central Africa. Bois et Forêts des Tropiques 281(3):35-50

BILLAND, A. 2005. Le projet d'appui à la rédaction des plans d'aménagement forestier en RCA. Le Flamboyant 59/60:43-44.

BOWLES, I. A., DA FONSECA, G. A. B., MITTERMEIER, R. A. and RICE R. E. 1998. Logging and tropical forest conservation. Science 280:1899–1900.

CASSAGNE, B., BAYOL, N. and ROUGIER, F. 2004. From concession holders to forest ecosystem managers: the example of Rougier Gabon. Bois et Forêts des Tropiques 281(3):61-70

CATINOT, R. 1965a. Sylviculture en forêt dense africaine. Bois et Forêts des Tropiques 100:5-18

CATINOT, R. 1965b. Sylviculture en forêt dense africaine (suite 1). Bois et Forêts des Tropiques 101:3-16.

CATINOT, R. 1965c. Sylviculture en forêt dense africaine (suite 2). Bois et Forêts des Tropiques 102:3-16

CATINOT, R. 1965d. Sylviculture en forêt dense africaine (suite 3). Bois et Forêts des Tropiques 103:3-16

CATINOT, R. 1965e. Sylviculture en forêt dense africaine : perspectives d'aménagement. Bois et Forêts des Tropiques 104:17-29

DUPUY, B., MAITRE, H.-F., AMSALLEM, I. 1999. Techniques de gestion des écosystèmes forestiers tropicaux: état de l'art. Document de travail préparé pour la Banque mondiale 'Forest Policy Implementation Review and Strategy', FAO, CIRAD, at http://www.fao.org/documents/show_cdr.asp?url_file=//docrep/003/x4130f/X4130f00.htm

EUROCERTIFOR-BVQI, 2004. Système de Certification et contrôle, origine de la légalité des bois, référentiel pour la certification des exploitants forestiers. http://www.bvqi.fr

FARGEOT, C., FORNI, E. and NASI, R. 2004. Reflections on the management of production forests in the Congo Basin. Bois et Forêts des Tropiques 281(3):19-34

KARSENTY, A. 2004. Enjeux des réformes récentes de la fiscalité forestière dans le bassin du Congo. Bois et Forêts des Tropiques, 281: 51-60.

KARSENTY, A. 2005a. Les enjeux des réformes dans le secteur forestier en Afrique Centrale. Cahiers du GEMDEV Vol. 30: 'Quel développement durable pour les pays en voie de développement?'.

KARSENTY, A. 2005b. Le bois en Afrique centrale, un problème de gouvernance. Géopolitique Africaine, Vol. 17, 101-115. http://www.african-geopolitics.org/show.aspx?ArticleId=3808

LUGO, A. E. 1999. Will concern for biodiversity spell doom to tropical forest management? Science of the Total Environment 240:123–131.

MUSTERS, C.J.M., DE GRAAF, H.J., TER KEURS, W.J. 2000. Can protected areas be expanded in Africa? *Science* Vol. 287, no. 5459, pp. 1759-1760. 10 Mar 2000.

NASI, R. and FORNI, E. 2003. La gestion durable des forêts. *Le Flamboyant* 56:39-40.

PEARCE, D., PUTZ, F. and VANCLAY, J. 2003. Sustainable forestry in the tropics: panacea or folly? Forest Ecology and Management 172:229-247

POURTIER, R. 1989. Le Gabon. Tome 2: Etat et développement. L'Harmattan, Paris, 342 p.

RICE, R. E., GULLISON, R.E. and REID W. J. 1997. Can sustainable management save tropical forests? Scientific American 276:34–39.

RICE, R., SUGAL, C. and BOWLES I. 1998. Sustainable forest management: a review of the current conventional wisdom. Conservation International, Washington, D.C., USA.

SERGENT, A. 2004. Le développement des territoires forestiers d'Afrique Centrale: étude historique des conséquences socio-territoriales des modes de gestion appliqués aux espaces forestiers. Mémoire de DEA, Université de Bordeaux 3, Bordeaux, 96p.

SMOUTS M.C., 2001. Forêts tropicales. Jungle internationale. Les revers d'une écopolitique mondiale, Presses de sciences Po, 349p.

TUTIN, C. and NASI, R. 2001. Atelier sur la gestion de la faune sur les concessions de l'exploitation forestière d'Afrique centrale. *Bois et Forêts des Tropiques* 269: 90-92.