

Focus:

Forest management
plans and the living
conditions of populations
in the forests of Central
Africa



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In this article, we discuss the theoretical and estimated impacts of timber production on the living conditions in the forests of Central Africa, which hosts the second largest tropical rainforest in the world after the Amazon and has a forest area estimated at 178 million hectares (Vancutsem et al., 2020). The forests of Central Africa (or the Congo Basin) are located within the current borders of the Democratic Republic of Congo (DRC), Gabon, Congo, Cameroon, the Central African Republic (CAR), and Equatorial Guinea (see Figure 1). They provide subsistence (food, construction material, medicine, and condiments) for over 100 million people (Nasi et al., 2011; de Wasseige et al., 2015), contribute to carbon sequestration, and are home to many plant and animal species, several of which (such as gorillas, chimpanzees and bongos) are endemic (Mayaux et al., 2013; Saatchi et al., 2011).

Figure 1: The tropical rainforest of West and Central Africa. This figure shows the geographic coverage of the rainforest of West Africa and the Congo Basin in 2019 as estimated by Vancutsem et al. (2021) using satellite imagery.



In addition to contributing to food security and providing ecosystem services to the planet, the forests of the Congo Basin are also home to many tree species. In 2018, the Central Africa Forest Observatory (OFAC) estimated that 49 million hectares of forest, i.e. 28% of the Basin's tropical forest area, were allocated as logging concessions for timber production (Cerutti and Nasi, 2021).¹In comparison, 45 million hectares of forest are

¹ Under a system of logging concessions, timber production takes place through the allocation of logging permits for forest areas (also called concessions) within a state's permanent forest estate. The license to log a concession authorizes the logging company that holds it to extract timber for predefined periods,

protected areas. Depending on national legislation, the other practices of forest management in the Congo Basin include communal forests, community forests, and private forests (see Wasseige et al., 2015).

To promote timber production practices that preserve the forest resource and the multiple forest services, logging companies are required to draw up forest management plans (FMP) for their concessions. Originally developed to plan harvests and sustainable management in the forests of the Northern Hemisphere, the FMP concept promoted for the management of Congo Basin concessions is a public-private contractual agreement between the logging company (concessionaire) and the state. It aims to provide a framework for the transition to sustainable logging, which guarantees the renewal of natural capital, the preservation of biodiversity, and the socio-economic development of local populations. To this end, one of the principles of FMPs is the production of forest inventories providing detailed knowledge of the available forest resources. Concessions are then partitioned into different areas known as *management series*, only part of which is operated over a 15-to-20-year cycle (production series), according to a rotation system. In theory, this approach should allow the forest resource to have regenerated by the time the initial extraction areas are revisited, and thus allow no tree to be taken without checking its diameter and young trees to continue developing. To protect the social, cultural, and economic activities of the populations living within or near the concessions and to take into account the protection of biodiversity, in particular the preservation of the existing fauna, FMPs also provide for the identification within concessions of *community development series* and *conservation series*.²

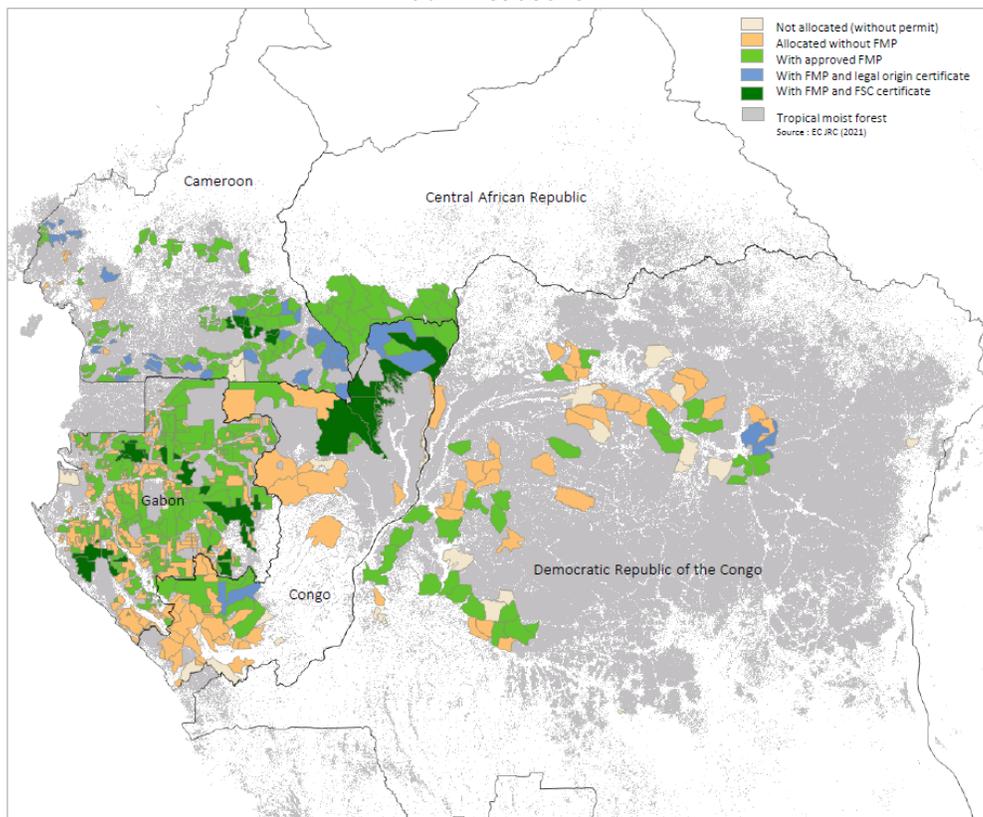
In practice, drawing up FMPs for concessions in Central African forests represents additional operating costs for companies that may hinder their competitiveness on the international market, which is also supplied by timber from South American and Asian tropical forests. Thus, depending on the financial instruments aimed at concessionaires, the share of logging concessions with approved management plans varies from country to country, and despite the objective of 100% of managed concessions in the region, in 2018 it was estimated that only 47% of the areas allocated to logging concessions in the Congo Basin had approved FMPs. In addition,

following guidelines that detail the activities authorized and the duties of the company towards its employees, the local populations, the central government, and the environment.

² *Conservation series* are areas that are protected from logging activities. They are designed to preserve tree species, fragile habitats, or the most vulnerable areas such as steep slopes and river banks. *Community development series* are areas that are reserved for the activities of local communities and indigenous populations.

the channels to certify the timber produced in concessions that have FMPs and comply with certain standards (such as the Forest Stewardship Council or FSC certification) remain marginal, and only 9% of logging concessions were certified in 2018 (see Cerutti and Nasi, 2021, and Figure 2 below for the situation in 2020).³

Figure 2: The situation of forest management and certification in the forests of Central Africa in 2020. Source: Congo Basin Forest Atlases from the World Resources Institute (WRI), updated by the authors with correspondence from forest administrations.



To supplement the literature on the environmental impact of forest use and management practices in the Congo Basin (see for example Brandt et al., 2016; Karsenty et al., 2017; Hounbedji, 2020; Tritsch et al., 2020), a new generation of work focuses on underrepresented and little studied social aspects (see Cerutti et al., 2014). In the rest of this brief, we document the theoretical mechanisms through which the implementation of FMPs affects the living conditions of populations living in or near the forests of Central Africa. Secondly, we summarize the results of studies on the effect of FMPs

³ The FSC certification offers a third-party control system that signals the extent to which the timber produced within a concession complies with a management plan that ensures the regeneration of the resource, reduces the damage caused by falling trees, and respects local communities' land rights.

on local populations. Lastly, we identify the gaps in existing knowledge that are yet to be explored.

The theoretical impact of forest management on living conditions

FMPs require that logging companies carry out socio-economic surveys to identify the local populations, their cultural and economic practices, and their various uses of forest areas and resources. The information thus gathered helps identify potential sources of conflicts between companies and local populations over the access to forest resources, and provides an opportunity to implement measures for discussion and the resolution of disputes. In addition, FMPs also invite concessionaires to describe the social measures that are to be adopted for the employees of the company and their dependents towards whom the company has legal obligations.

Insofar as FMPs contribute to identifying conflicts over the use of forest resources and clarifying the social responsibility of logging concessionaires, the design and implementation of FMPs can affect the living conditions of local populations through different mechanisms: (i) the working conditions of logging companies' employees, as well as the benefits for their dependents, (ii) the various uses of land and forest resources by local communities, (iii) the local institutions which contribute to reduced transaction costs and the participatory management of concessions, and (iv) compensation instruments for local populations through local or state taxation.

The living conditions of workers and their families

FMPs include a section on social responsibility in which concessionaires describe the actions that will be taken to guarantee the safety, health, and hygiene conditions of workers and their families, and ensure their food security. By detailing their social commitment to their employees ex ante, so as to align their emoluments with the local legislation, companies in charge of managed concessions are better prepared to adapt their production strategy so as to offer jobs that meet the legal standards. Thus, FMPs may translate into a stronger commitment from logging companies within their managed concessions to offer employment contracts that comply with local laws and are better aligned with workers' expectations: building schools for employees' children, offering training to improve safety

in order to limit accidents at work, setting up social insurance, opening food stores, and improving access to healthcare and housing conditions.⁴

The living conditions of local populations

Unlike active concessions without FMPs, the implementation of FMPs can also modify the living conditions of local populations through three different mechanisms.

First, the efforts made by concessionaires to improve working and living conditions for employees and their families can also produce externalities for local populations. Indeed, the construction of public infrastructures (such as commissaries, drinking water infrastructure, electrification, hygiene, education, and health centers) for workers and their families contributes to reducing the access costs to the services provided through these infrastructures for local populations.

Secondly, drawing up FMPs implies times of interaction between concession management teams and local populations, which should help modulate the production activity so as to limit negative externalities for local communities. Thus, the identification of local populations during the preparation of FMPs contributes to improving the knowledge that management teams have of the demography and various uses of the different forest areas by the local populations. By integrating this information into FMPs, compared to situations without FMPs, it is likelier that concessionaires partition concessions into management series that minimize the possible damage and externalities generated by timber extraction and production activities. At the very least, the creation of community development series around local communities should allow limiting conflicts over use between concessionaires and local populations. In addition, socio-economic surveys and the presentation of FMPs to local communities should help identify the areas or sites of note for villagers (former villages or sacred sites) and preserve them from logging. Likewise, following these meetings, trees with a cultural, traditional, or nutritional role for the population can be identified to limit their extraction.

Finally, FMPs lead concessionaires to set up local institutions to allow the direct participation of local population representatives in the management of concessions and to arbitrate the conflicts over use stemming from the activities of concessionaires. These institutions are also used to identify the

⁴ However, these theoretical predictions assume that the working conditions promoted by local laws are competitive compared with those in other tropical forest regions, or that the timber produced in managed concessions can stand out in the marketplace.

investments in outreach and local development projects to be carried out with the taxes on concessionaires' revenue from timber production. However, investments and local development projects can be ineffective, and the restrictions imposed on the rights of use in production series and conservation series can generate conflicting situations between concessionaires that implement FMPs and local populations. In addition, the institutions created can increase inequalities between and within different local communities, and weaken the ability of populations to cooperate and produce other common services on which they depend. In the end, the impact of participatory management and local development projects on the living conditions and life outcomes of local populations therefore remains uncertain and ambiguous. In the face of such uncertainty, it is all the more important to document the evolution of the prevalence of conflict and the living conditions of local populations within managed concessions, and to compare them with the trends that would have prevailed without management plans.

What do empirical studies say about the effect of forest management on populations?

Our literature review identifies seven empirical studies published in peer-reviewed academic journals that document the effects of forest management on the living conditions and life journeys of populations in the forests of Central Africa (see Table 1). With the exception of two studies (see Cerutti et al., 2017 and Doremus, 2019), the other five describe different aspects of the living conditions of workers and local populations in connection with the activity of concessions with a FMP without however proposing measurements of these same indicators in counterfactual situations where the logging companies extract timber within concessions without FMP. Cerutti et al. (2017) carry out one of the few large-scale studies on the living conditions of employees and local populations, while also proposing an evaluation with a counterfactual. However, to document the social impacts of forest management, Cerutti et al. (2017) make the implicit assumption that managed concessions whose activity is subject to certification (in this case, the FSC certification) are likelier to implement the activities included in their FMPs than concessions with approved FMP whose timber production activity has not been certified. Thus, Cerutti et al. (2017) estimate the intensive margin of implementing FMPs: they compare the living conditions of local populations and workers, and the handling of conflicts between local communities and companies over the use of forests for 16 managed concessions with and without FSC certificates, distributed

across 69 villages in Cameroon, Congo, and Gabon (see Cerutti et al., 2017).⁵

The living conditions of employees

In their study, Cerutti et al. (2017) find that concessions with an approved FMP (with and without FSC certificates) provide their employees with various services that improve their working conditions. Thus, all the concessions with an approved FMP that agreed to participate in the surveys had stores for the exclusive use of employees (commissaries). A significant share of workers (around 1 in 4) had a permanent employment contract and protective equipment. Salary conditions varied among employees, but the authors observe that just over one in four had a higher salary than what was required by local regulations. The living spaces built from sustainable materials for employees and their families were often electrified. At the margin, Cerutti et al. (2017) find that the living spaces were likelier to be better equipped, with individual toilets within FSC certified concessions. Within FSC certified concessions, logging companies were likelier to subsidize the prices of the products sold to their employees in commissaries, and Cerutti et al. (2017) observe at the margin that employees were more satisfied with their purchasing power. The same goes for access to permanent (drinking and non-drinking) water distribution and electricity systems and their maintenance, reaching all the houses within the camps and making it possible to meet basic water and energy needs (drinking, bathing, and cooking). In addition, health expenses were covered by concessionaires for all the employees of FSC certified concessions, compared with 1 in 4 employees in managed concessions without certificates. Lastly, in contrast to employee-health personnel ratios (80 to 88 employees per healthcare worker) which are similar between concessions with approved FMP with and without FSC certificates, healthcare workers in FSC certified concessions were more qualified, regularly present, and available. All these results suggest that the concessions with approved FMP observed by Cerutti et al. (2017) provide their employees with working and living conditions that seem to align with local laws. In addition, companies whose timber stands out thanks to the FSC certification also manage to marginally improve their employees' purchasing power and living and working conditions.

⁵ Conversely, an extensive margin study would have compared managed concessions to similar concessions without FMPs.

The living conditions of local populations

The studies that document the effects of timber production management practices on the living conditions of local populations can be classified into two groups: on the one hand, those describing the institutions set up to coordinate the actions of local communities and logging companies, and on the other, those documenting the living conditions of local populations. The study by Cerutti et al. (2017) contributes to these two dimensions and notes that out of the 69 villages in the sample, at least one in three had institutions that allowed it to contribute to the participatory management of the concession. Villages bordering certified concessions are likelier to create new institutions that operate more democratically (with written bylaws, periodic elections and renewal of members, and permission for external members to participate in official meetings). Following interviews with the various village communities, Cerutti et al. (2017) report that the institutions created serve as intermediaries to compensate for the loss and damage undergone by the local populations near the production sites due to the activities of the concessionaires. These institutions are also instrumental in the use of community development funds through which the concessionaires make a share of the private profits from logging available, in addition to the taxes provided for by law. These funds are used to invest in projects to improve local livelihoods and foster local development. Detailed data from four logging companies that have FSC-certified concessions indicate an average amount distributed of around 55,000€ per company per year. This represents an average of 56€ per capita per year, i.e. around 16% of the average annual rural income in Cameroon (estimated at 350€).⁶

These results are in line with a previous study conducted in 18 villages bordering FSC concessions in Cameroon which also reports that institutions are created within managed concessions with FSC certificates and contribute to reducing tensions between logging companies and local populations, and to making forest regulations effective (see Tsanga et al., 2014). However, in a study aiming to estimate the costs associated with conflicts over forest use between communities and logging companies,

⁶ It should be noted that the certification codifies the nature of the relations that concessionaires must maintain with local populations. Also, Cerutti et al. (2017) find that the existence of compensation mechanisms (payment to ad hoc commissions established between plaintiffs and companies) was confirmed for all the villages bordering concessions with FSC certificates, compared with 1 in 4 villages for those bordering concessions with FMPs and without certificate. In addition, the commitment of concessions with FSC certificates towards local communities was qualitatively better than what was observed in concessions with FMPs and without certificate. This also translates into the systematic resort to community development funds for all the villages bordering certified concessions, compared with only 2 in 5 villages for concessions with an approved FMP and without certificates.

Lescuyer et al. (2015) find that forums for negotiation between local populations and companies are not sufficient to resolve all conflicts. Lescuyer et al. (2015) estimate in several cases that the costs related to the resolution of certain conflicts over forest use within concessions with FMPs were too high to be absorbed by the logging companies, the populations, or the public authorities.⁷

Regarding direct contributions to improving living conditions, the analysis in Cerutti et al. (2017) does not clearly determine whether local populations benefit as much as employees from the infrastructures built (commissaries, drinking and non-drinking water supply, electrification, schools, and health centers) by concessionaires. However, even if the differences are not statistically different between villages bordering managed concessions with and without FSC, Cerutti et al. (2017) note that during group discussions in the different villages, the local populations (in particular those close to certified concessions) perceived the constraints imposed to protect biodiversity as obstacles to their customary rights to practice shifting cultivation and hunting and gathering. This conclusion is in line with the results of Doremus (2019) and Defo (2020).

In northern Congo, Doremus (2019) measures and compares the diet, health, and wealth indicators of a population of Aka hunter-gatherers divided between two managed concessions, one with an FSC certificate and the other without such a certificate. In this context, the results indicate that the hunting restrictions within the concession with an FSC certificate – which are prompted to impose a stricter control of conservation activities – reduce the food security of the local Aka populations, whose livelihood depends on consuming non-timber forest products. Additional analyses suggest that the Aka who live within the managed concession with an FSC certificate are also more often ill than their peers who live in a neighboring managed concession without an FSC certificate.

In south-east Cameroon, Defo (2020) uses socio-economic data from 2011 to 2018 from populations living around Ngoyla, where part of the forest has

⁷ For example, in certain cases studied by Lescuyer et al. (2015), the costs for companies as part of their social obligations to settle conflicts over use include the promotion of agroforestry activities, tree planting, and animal husbandry for local populations. These investments are meant to provide sources of income for the local population to create and implement new development plans. Secondly, by reducing the area of concessions to accommodate development areas for the local population, the State bears a significant opportunity cost linked to the reduction of the taxable area of concessions, and consequently of the amount of logging taxes paid to the state. This reduction in logging taxes directly benefits logging companies. Finally, local populations sometimes bear significant opportunity costs when they reduce some of their illegal practices in concessions – timber production and the sale of agricultural land or products from hunting (see Lescuyer et al., 2015).

been allocated to timber production since 2012. Defo finds that the positive socio-economic impacts of logging in Ngoyla six years later were lower than expected. While logging promised positive outcomes for the population's well-being (education, health, and water supply), surveys conducted in 2018 indicate a marked decline in the populations of certain animal species, a decreased availability of certain non-timber forest products, an increase in social tensions, and a deterioration in school and health services. To explain this result, Defo (2020) suggests differences between the commitments made by the companies and their actual implementation in the field.

Unlike the results of Doremus (2019) and Defo (2020), Lescuyer et al. (2012) report in their study area that the teams of the concessions with FMP estimate that, despite their efforts, controlling the access to non-wood products within the production and conservation series remained difficult to implement because it involved mobile activities carried out over large areas by several actors operating independently.⁸ Thus, for a panel of households bordering a managed concession from 1995 to 2008, Lescuyer et al. (2012) find no evidence that banning commercial hunting within concessions affected the intensity of hunting. In contrast, Lescuyer et al. (2012) observe that a track opened by the logging company in the study area – to facilitate access to the production series and transport the logs (to the sawmill and then to the capital) – was accompanied with the spreading of cultivation areas along the track to limit the costs of transporting crops and facilitate the sale of agricultural products. In this case, the presence of a logging concession seems to have improved the accessibility and trading opportunities for the local population's production. By studying the evolution of household income between 1995 and 2008, Lescuyer et al. (2012) conclude that the logging concession did not prevent household income growth in their study area. This conclusion is also in line with the results of the study conducted by Taedoumg et al. (2018) in Gabon, who find that the timber production from two tree species within a managed concession did not reduce the availability of fruit from these trees to local populations.

⁸ The study by Lescuyer et al. (2012) is based on a review of 30 FMPs, individual interviews with the management teams of 9 logging concessions, and a case study of the evolution between 1995 and 2008 of the customary rights and livelihoods of a panel of households in two villages bordering a managed logging concession.

Table 1: Summary of seven studies analyzing the living conditions of populations in connection with the management of production forests in Central Africa

		Cerutti et al, 2017	Doremus, 2019	Defo, 2020	Lescuyer et al., 2012	Lescuyer et al., 2015	Taedoumg et al. 2018	Tsanga et al., 2014
1. Working conditions on site								
Working conditions	Safe work equipment provided	↔						
	Equipment control and maintenance procedure	↑						
	Employer-provided healthcare	↑						
Contractual terms	Number on staff/contract type (permanent or not)	↔						
	Wage rate	↔						
	Worker organization/union	↑						
2. Living conditions in and near camps, local populations								
Quality of life	Commissary	↑		↔	↔			
	Drinking water availability and quality	↑			↔			
Education, culture	Number of schools			↔				
	Number of teachers/population			↓	↔			
Health conditions	Access to healthcare	↑		↔	↔			
	Average number of individuals/doctors/nurses	↑		↓				
	Illness occurrence			↓				
Housing	Access to electricity	↑				↔		
	Construction material for housing (durability)			↑	↔			
	Rental agreement/occupation of housing	↑						
Accessibility	Access infrastructures built (roads, bridges, ferries, ...)			↑	↑			
	Better access to market, trading opportunities				↑			
	Employment opportunities			↑	↑			
3. Customary rights								
Access to resources	Hunting product quality and availability	↔	↓	↓	↔	↑		
	Non-timber forest product quality and availability	↔	↓	↔	↔	↔	↔	
	Firewood quality and availability					↔		
Land rights	Restrictions on land access, agriculture in concession	↓	↑	↔	↔	↑	↔	
4. Institutions, consultation, benefit sharing mechanisms								
Participation – Consultation	Quality of mechanisms to compensate for losses	↑						
	Efficiency of organizations and forums for discussion	↑						↑
	Evidence of existence, quality, and follow-up of consultations	↑						↑
	Quality and quantity of benefits (private mechanisms)	↑						↑
	Conflict resolution support							↑

Cerutti et al., 2017 – Gabon, Cameroon, and Congo (FSC vs no-FSC); Doremus, 2019 – northern Congo (2 concessions: FSC vs FMP); Defo, 2020 – Cameroon (villages around a concession); Lescuyer et al., 2012 – Cameroon (2 villages around a concession with an FMP); Lescuyer et al., 2015 – Cameroon, Gabon, and DRC (villages around no-FMP, FMP, and FSC concessions); Taedoumg et al., 2018 – Gabon (villages around concessions); Tsanga et al., 2014 – Cameroon (18 villages around six FSC concession forest management units).

Conclusion

To meet the demand for timber with logging practices which (i) allow to safeguard forest resources to future generations, and (ii) promote the equitable sharing of the benefits from the sale of timber for all stakeholders, the forest States of Central Africa have mandated the creation and implementation of forest management plans within the forests in their permanent estate that are allocated to timber production. In theory, FMPs should lead to improving the living conditions of employees (and their dependents) within managed concessions by making the duties related to the social responsibility of logging companies explicit and predictable. Designing FMPs allows concessions to make a census of local populations, determining their cultural practices, their economic activities, and their various uses of forest areas and resources to (i) identify the timber production series that minimize conflicts over use, and (ii) set up institutions that serve as forums to share the benefits from timber production and resolve conflicts between local populations and logging companies. However, insofar as the implementation of FMPs contributes to limiting the forest use rights of local populations and as the activities of the local institutions may fail to resolve conflicts over use or to propose adequate compensation, the net effect of forest management on the living conditions of local populations is uncertain. In addition, the socio-economic benefits for local populations of public investments financed through logging taxes paid to the public authorities depend on the nature of the investments made.

To overcome these theoretical ambiguities, a few empirical studies document the living conditions of local populations and employees in connection with the development of concessions in the forests of Central Africa. They indicate that the living and working conditions of logging company employees in managed concessions largely comply with the laws of each country and that they are marginally better in FSC-certified concessions (see Cerutti et al., 2017). However, the studies suggest heterogeneous effects of FMPs on the one hand regarding the conflicts between concessionaires and local populations, and on the other, regarding the customary rights and living conditions of local populations. In northern Congo, Doremus (2019) finds that restrictions on hunting activities and on the use of non-timber forest products were associated with a decline in food security and income for Aka populations. In south-east Cameroon, Defo (2020) also reports a drop in income from hunting and the services derived from the access to certain non-timber forest products, and deteriorating socio-economic conditions for local populations. Conversely,

other studies find more mixed results in other contexts (see Cerutti et al. 2017, Lescuyer et al., 2012, Taedoumg et al., 2018, and Tsanga et al., 2014).

To help determine whether forest management plans are an effective tool to promote multiple uses of forests and identify additional measures to improve their effectiveness and understand the variability reported in previous work, further studies that propose more precise estimates of the average effect of FMPs on the living conditions of populations near concessions in the forests of Central Africa, will be useful. To this end, it appears necessary to observe the living conditions of populations living near several managed concessions in different circumstances, as proposed by Cerutti et al. (2017). To disentangle the potential effect of FMPs from variations in the living conditions of populations that are not specific to the implementation of FMPs, it is also important to propose methodological approaches that compare the living conditions of populations living near concessions with FMPs that produce timber with the living conditions of populations living near similar concessions without FMPs.

Kenneth HOUNGBEDJI and Benoit MERTENS

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