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Discussion paper

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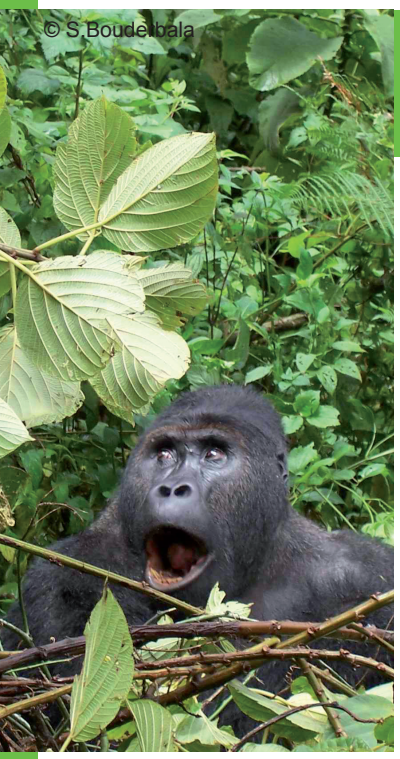
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What environmental effectiveness of forest concession's management plan ?

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The environmental effectiveness of Central African management plans has recently become a topic of debate. The first discussion focused on additional deforestation connected to concessions with a management plan, as opposed to concessions without. Conclusions of an article published in early 2016 that supported this debate were challenged by researchers who pointed out certain choices judged arbitrary and proposed other ways to measure effectiveness. The sustainability of managed exploitations also became a subject of debate. The uncertainty of the recovery of several major commercial species after several rotations challenges the idea of sustainable management. However, since this process requires several decades, due attention must be given to the evolution of the market, technical progress and possible changes in the method governing the very long-term use of the forest ecosystems.
Sustainability is still an open, unresolved question.

An article published in Land Use Policy (LUP) in March 2016[1] states that deforestation in Republic of Congo was higher in the concessions with a management plan than in the other concessions. The analysis of the impact evaluation that led researchers to this conclusion is based on a randomly based selection of matched parcels in concessions with a management plan. Although there can be no doubt about the relevance of the method, some choices and interpretations need to be discussed.

Researchers feel that part of the explanation is that forest roads are more developed in the concessions with Forest Management Plans (FMPs). The social specifications of FMPs, which leads to increases in population, then to local development, would have also contributed to higher deforestation. A group of 22 specialists in forest research in the sub-region[2] considered this issue and analysed deforestation at the concession level for a given time interval. According to their findings, the deforestation level in their area of study was lower in concessions with a FMP than in the others. And if we compare deforestation in FMP and non-FMP concessions, assuming that yield levels are the same, the FMP concessions are approximately twice as "efficient". In other words, half as much forest cover was lost per cubic meter in concessions with management plans. On the other hand, the land areas that were actually affected by deforestation were very small: LUP contributors estimated that the additional average annual deforestation rate on 1,116 ha in the FMP concessions amounted to 0.0035% of the 3.3 million hectares of managed forestlands in Congo.

In a more detailed analysis of the methodology, the group of 22 scientists explained that the LUP article showed a bias in its plot selection – or non-selection – choices. It is significant that the LUP contributors, who rightfully wanted to use a method that neutralised all factors other than FMP (type of forest, distance from roads and markets, etc.), did not compare deforestation on the basis of equivalent timber yields.

[1] Brandt J.S., Nolte C. & Agrawal A., 2016. Deforestation and timber production in Congo after implementation of sustainable management policy, *Land Use Policy* 52:15-22.
[2] Karsenty A. *et al*, 2016. Does forest management in Congro cause greater deforestation? http://dpfac.cirad.fr/amenagement-et-deforestation

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Thereupon, the decision to attribute high population density (causing a high deforestation rate) to the presence of an industrial unit that attracts more people or to a national road built by the State requires a "theory of change"[3]. The LUP contributors decided to attribute the high population density to the existence of the industrial unit. This calls for debate and a precise analysis of local dynamics.

The importance of sustained maintenance of productive forestry capital

In the managed forests, the logging roads have an average service life of less than four years. After that period they are completely covered with pioneer species and after 20 years these roads no longer appear on Landsat satellite images (Kleinschroth *et al.*, 2015). Similarly, it takes less than 30 years for the regrowth of the forest biomass after timber extraction (Gourlet-Fleury *et al.*, 2013). Hence in many cases, the issue is not permanent deforestation but transient loss of forest cover[4].

Furthermore, the preservation of a large number of seed banks and less damage to saplings gives us reason to believe that there will be less change and a better balance in the composition of the managed forests than in the others. Maintaining a better forest production capacity (composition of forest stands and structure of tree populations for logging) are a favourable (although non sufficient) reason for continuing forestry development. Conversely, a forest whose production capacity has been ruined as the result of the absence of FMP could be subjected to stronger pressure from sources anxious to convert the forestland into farming land, in other words, to higher deforestation rates.

It is not possible to measure the impact of FMPs on the future of the forestland over such short periods of time. In a rigorous approach – that would be difficult to implement – an analysis of this kind would take a few decades, not just a few years since the benefits of a well-implemented FMPs can only been assessed after a species rotation, which general requires 25 to 30 years. Considering the pace of scarring along forest roads (4 years), skid trails and felling gaps in the forest cover (1 year), the same analysis conducted over a long-term period would automatically give very different results.

Besides the direct effects (timber harvesting, and damage from logging) of forest operations as practiced in the managed concessions (where low-impact logging techniques are sometimes used) and the non-FMP concessions, indirect longer-term impacts will also have an effect on the dynamics of the logged species, the regeneration of the exploitable species between two rotation periods and, in a more general manner, on long-term forest yields. Studies have shown that wildlife losses are much higher in the unmanaged forests than in the managed forests (Clark *et al.*, 2009, Stokes *et al.*, 2010). This loss of species abundance will probably have an effect on forest regeneration with lower recruitment of trees whose dispersers no longer exist (Terborgh *et al.*, 2008), since most tree seeds in the African tropical forests were dispersed by the wild animals.

If we focus on minor differences in deforestation rates between the managed and the unmanaged forests, we are probably "barking up the wrong tree".

> ***The long-term goal of forest management is sustainable forest development and conservation of the forests' output capacity to avoid, in so far as possible, the assignment of forestlands to other uses after the first felling cycles.***

Forest management is an attempt to find a compromise between socio-economic development and the conservation of ecosystem services. Let us not forget, however, that the existence of a government-endorsed management plan does not necessarily mean that the plan will be implemented or that logging practices will change. Lastly, even when the management plans are well implemented by forest employees who have been properly trained by qualified engineers, the plans cannot guarantee sustainable management, a multidimensional concept that can only be assessed on a long-term basis.

This is the question that we will examine in the following section.

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[3] A theory of change is a specific type of methodology for thinking about how change occurs in a given context. It is required to determine the contribution of a given intervention to an observed outcome (backward mapping).

[4] This is not deforestation according to the FAO definition since there is no permanent change in land use.

An open question: the sustainability of forest management as practiced today

This discussion provides an opportunity to examine the effectiveness of forest management plans on the environment, beyond the limited scope of deforestation in forest concessions. There are various criteria for evaluating effectiveness :

- long-term recovery of logged species and the maintenance of ecosystem services connected to the conservation of forestry resources through selective logging ;
- the capacity of harvested forests to generate permanent revenue for the local populations, the forestry sector and the State, especially by limiting the risk of seeing forestlands converted into farmlands.

Research from the DynafFor project and the M'Baïki experimental site in Central African Republic suggest that current forestry operations, which follow certain management rules, do not always ensure adequate economic recovery of the most harvested species, e.g. the Sapelli, which are essential to the profitability of these forestry operations. The problem of specie renewal is partly connected to the nature of the species: without proper silviculture, problems of light in the forests and soil characteristics can prevent sufficient recruitment, i.e. presence of saplings. Logging operations contribute to the scarcity of species.

These findings tend to challenge the idea of the sustainability of current management plans, sustainability understood as the capacity for limitless renewal of harvested timber volumes (the "sustained yield") after deduction of the "primary forest premium", in other words the exceptional volume of timber from the first harvest, – connected to the accumulation of biomass from ancient, large-size trees over several centuries.

But, on the one hand, simulations do not indicates there is a risk of species disappearance and, on the other, such an evolution involves long-term phenomena that extend over several rotation periods (50 to 90 years), periods so long that we cannot know what the future generations will be requiring of the forests, what will be the markets and wood processing amelioration techniques (Karsenty and Gourlet-Fleury, 2006). Logging in Central Africa is extremely selective. It is limited to fewer than a dozen species, thus leaving room for the future exploitation of what is now called the "secondary species", if their price goes up, which is a feasible hypothesis as the supply of traditional species dwindles. We must also factor in how technical progress in wood processing and treatment will free industry from excessive dependence on the intrinsic quality of wood to generate economic value. Lastly, in half a century the relations between African societies and their forests may be very different from what they are today, and the possibility of capitalising on the many resources offered by the ecosystem may extend well beyond timber.

> ***Uncertainties about conditions in the future does not dispense us from acting now to increase the collective benefits from goods and services that can be obtained from forest management.***

There are two advisable lines of action :

- the development of silviculture adapted to the current situation of forests landscapes and ongoing climatic changes ;
- the development of resources other than timber in multi-use managed concessions to increase the income of people relying on these landscapes, starting with the users of the concession areas.

Designing an adapted silviculture

Several types of silviculture can be considered, from intensive silviculture based on eucalyptus, teak and other fast-maturing productive species near the villages to more extensive silviculture based on the indigenous species in natural forests ("recovery plantations") designed to alleviate the pressure on the natural forests all the while contributing to forest recovery or it maintaining.

Plantations of this type could be developed on degraded forests using various methods (row planting, in spots, on former trails, etc.) or in or around zones with very little natural forestland. One of the advantages of developing new stands is the possibility of storing carbon and, at the same time, protecting natural forests (e.g. against fires) and reconstituting biodiversity. If these "new forests" are well located, they could also be used to maintain an ecological connectivity between the former forest refuge areas of Central Africa.

Toward multi-use… and multi-user concessions ?

One solution to reducing the profitability gap between forestry and commercial agriculture is to

> ***authorise the exploitation of resources other than timber in the forest concessions.***

A managed concession is a vast area composed of forests, savanna, wetlands, fire-ravaged land where, thus, there is a great diversity of resources. Because of rules and regulations on felling cycles (generally 25 or 30 years) only a small part of the area is exploited each year. The law generally only authorises the opening of two annual logging stands maximum per year and these surface areas are closed throughout the rotation period. Thus, logging operations are active on 2/25th or 2/30th of the forestland, leaving room to capitalise certain resources in the annual stands that have already been exploited or are scheduled for exploitation at a future date. In Cameroon, the combination of the right to remove timber with the right to operate safari hunts has been tested. In the Republic of Congo in September 2015, the industrial forest company CIB signed an agreement (under the auspices of the Ministry of Forests) with a safari company authorising the latter to develop sport hunting on one of the CIB's Forest Management Unit, with due respect for FSC standards.

There are also other resources that can also be capitalised. Non-woody products with high commercial value (like the sap of Okume trees in Gabon) or prized on the national market (like *Irvingia gabonensis* almonds) could be used as the starting point for a business sector that combines processing and promotion on urban markets, and for export. Seriously degraded zones could be restored and developed by planting trees that are important for the village economy or perennial crops. Part of the waste from the timber could be used in the industrial production of charcoal (where transport costs are not prohibitive).

> ***These resources are already being exploited by, - and generate significant income for, - the persons living within the concession area. This is not a plan to deprive them of this source of livelihood.***

On the contrary. The activities mentioned above will require financial, technical and organisational support to increase their added value. The coexistence of an industrial timber company could be very beneficial if the institutional structure of the concession evolves accordingly and the concessionaires are allowed to expand their activities to include other products.

Developments of this kind will only be legitimate as part of a co-management process that involves the resource-user community in and around the concession, with and equitable distribution of benefits stemming from an enlarged valorisation of forest ecosystem resource. The forest concession's regime must achieve an in-depth evolution.

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