A silvicultural system under a REDD+ scenario: Case study

Adrien Djomo
Department of Geography, Queen's University, Kingston, Canada.
Email: djomoa@queensu.ca

Introduction and objectives

In the past decades, deforestation and forest degradation accounted for about 20% of greenhouse gas emissions showing that the mitigation of global warming cannot be achieved without the implication of forest contributions in international agreements. At the 2007 Bali UNFCCC meeting (COP-13), an agreement was reached on "the urgent need to take further meaningful actions to reduce emissions from deforestation and forest degradation (REDD)". A silvilcultural system is required to reduce the impact of logging. To assess the impact of the logging on the remaining stand dynamics and to assess a silvicultural system which may best fit under REDD+, a study was conducted in a moist forest in Cameroon.

Methods

The sampling plots were chosen in zones with different logging intensities. The number of sampling plots used for this research was 30, which represented a surface area of 3 ha.

In the entire sample plot, all trees ≥ 20 cm dbh were recorded. For each tree, the species name, the dbh, the class of quality, the stratum and their exact location on the field with x and y coordinates were assessed. In the *Subplot*, all the small trees with diameter between 10-19 cm were recorded.

The yearly increment of commercial species was obtained based on existing information.

Results

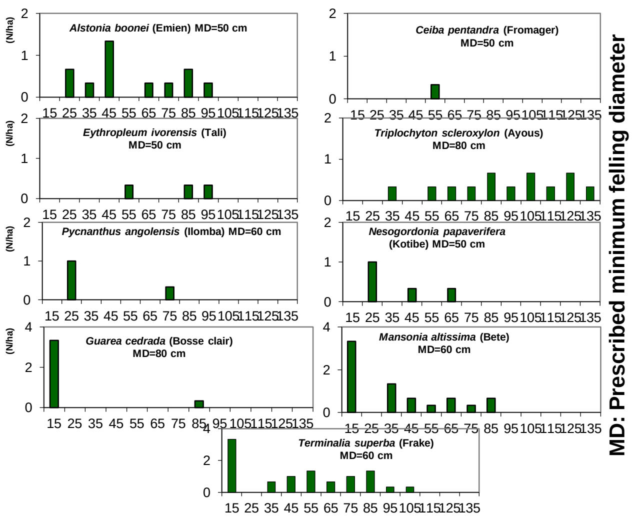
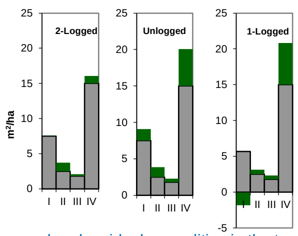


Fig. 1. Diameter distribution of commercial species. The minimum felling diameter (MD) is the limit from which all the trees should be cut. *Alstonia boonei, Terminalia superba, Mansonia altísima*, and *Nesogordonia papaverifera* have enough regeneration to overcome the harvestable trees. For *Triplochyton scleroxylon, Erythropleum ivorense, Pycnanthus angolensis, Guarea cedrata,* and *Ceiba pentandra,* further investigation on reconstitution needs to be carried out.

•Residual normalities



Green shade above: removal surplus which are harvestable in each species group.

Green shade below: loss which has to be compensated by the temporal ingrowths on group I in the 1-Logged forest.

Gray shade: normal proposal of basal area which will remain on the stand in each species group.

Fig. 2. Normal proposal and residual normalities in the two Logged compartments and the Unlogged compartment, expressed in m^2/ha. I: mature merchantable species; II: immature merchantable species; III: other species with prescribed MD; IV: the rest.

Proposed silvilcultural system.

Year	Operations
L-3	Stratification of the forest according to the ecological characteristics and past logging operations; planning of activities
L-2	Inventory of the entire forest at low intensity in transect lines. Use for example plots S of 20 m × 250 m subdivided in two subplots S1 of 20 m × 5 m and S2 of 5 m × 5 m. In the plots S, all trees with dbh > 10 cm are counted. In the subplot S1, all trees with dbh between 5-10 cm are counted; in the subplot S2 evaluate the natural regeneration with dbh < 5 cm. Diameter distribution and percentage of reconstitution analysis and estimation of MFD. Growth projection analysis and estimation of an avoidable damage reduction with the related carbon estimation Inventory in at least 2 to 3 permanent plots of 100 m × 100 m located on different ecological zones. The permanent plots should be subdivided in subplots S1 and S2. Measure trees as mentioned above.
L-1	-Inventory of 1/30 of the total forest. In this section of the forest, count all the trees ≥ MFD. Sampling intensity: 100 %. -Marking of at least one future crop tree per ha and trees to be felled. Ensure that all commercial tree species to be harvested are represented in the future crop trees.
L	Felling of marked trees on the above mentioned 1/30 of the forest. -Post felling inventory; Thinning of the future crop trees. Logging damage analysis.
L+5	2nd inventory on the permanent plots.
L+10	3rd inventory on the permanent plots. End of the first commitment period. 2nd inventory of the entire forest at low intensity. Evaluation of avoided logging damage. New carbon pools estimations.
L+15	4th inventory on the permanent plots.
L+20	5th inventory on the permanent plots. End of the second commitment period. 3rd inventory of the entire forest at low intensity. Evaluation of avoided logging damage. New carbon pools estimations.
L+25	6th inventory on the permanent plots
L+30	End of the felling cycle. Inventory on the permanent plots. End of the third commitment period. Inventory of the entire forest at low intensity. Evaluation. Start of a new cycle.

L: Year of logging; L-1: one year before logging; L+5: five years after logging. Logging takes place each year in a 1/30 section of the forest. Always repeat inventory before logging and post inventory after logging in each logged section of the forest.

Discussions

The harvestable species prediction growth suggested the increase of the number of stems per hectare and the corresponding basal area from 12.3 N/ha and 7.4 m^2/ha respectively to 18.6 N/ha and 11.2 m^2/ha respectively at the end of the cutting cycle (30 years), if there is a sustainable harvest, and no unpredictable event which can seriously create damage in the forest stand.

Alstonia boonei, Triplochyton scleroxylon, Mansonia altisima, and *Nesogordonia papaverifera* have a good potential to allow the reconstitution of the harvestable trees at the end of the felling cycle.

To ensure sustainability, the minimum felling diameter of these species should be increased: *Erythropleum ivorense* (from 50 to 90)*, Mansonia altissima* (from 60 to 70) *Terminalia superba* (from 60 to 70) and *Triplochyton scleroxylon* (from 80 to 110).

All the *Ceiba pentandra* should remain in the CFY as mother trees.

The residual normality concept seems to be a practical tool for ensuring sustainable harvest levels. However, further study is needed to evaluate its applicability in Cameroon.

References

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