

# PRODUCTION AND COMMERCIALIZATION OF TIMBER IN ANGOLA AFTER THE DECLARATION OF INDEPENDENCE

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The policy of production and commercialization of timber before and after the independence of Angola was assessed. Historical production of timber under control of Portuguese settlers before 1975 in comparison to the production of timber after this period was reviewed. We used a combination of published scientific studies and government reports to support the background of the paper and a structured questionnaire survey from which analyses were drawn using a logistic regression model. It was found out that timber production declined dramatically after Angola gained independence; the production of logs dropped from 555 000 m<sup>3</sup> in 1973 to less than 115 400 m<sup>3</sup>. Out of the 100 mills that had existed in Angola before 1975 only twenty have been in operation today with annual wood production of less than 20% of extraction capacity. The knowledge concerning the historical production of timber before and after 1975 is not sufficient to provide suggestions for a management plan on what trees, where, and when are to be cut.

Angolan forest, forest management, forest ownerships, sawmill, wood industry



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## INTRODUCTION

Today tropical forests have been managed for timber production (Brandt et al., 2016). There is an increased interest in the role of timber production and international timber trade (Burgess, 1993). The fundamental practices for forest management are globally applicable, but differences in forest character may require modifications of the practices to best meet the needs and demands of particular locations. Understanding the development history of forest and natural resources of a country always helps understand the opportunities and challenges posed for foresters and natural resource managers in these areas (Geldenhuis, 2010). In Angola, natural forests occupy nearly 43% of the territory and the exploitation of timber from this forest was divided into two periods: the first period from 1950 to 1975, with production capacity of 326 000 m<sup>3</sup> per year (Buzá et al., 2006); the second period is from 1975 till date and the annual timber production has dropped under 20% of its annual extraction capacity. With the arrival of the Portuguese settlers in

Angola, an intensive exploitation of forest resources began. There was an increased demand for timber and this wood was mainly shipped to Portugal, especially the species *Rodendron calsamiferum* and *Terminalia superb* (Della, 1996). This timber demand motivated the settlers to grow more plantations in Angola which were established during the 1960s and 1970s, mostly by the railway companies. The wood from these plantations was used as fuel for the locomotives and as raw material for the paper company.

In Angola the forest belongs to the state but also in common view, the same forest is a property of the members of various tribal lineages. The Angolan legislation promulgated in 1992 (Law 21-c/92, the land law) says that natural forest cannot be held privately, except for small forested areas designated as agricultural and pastoral areas. Measures aiming to protect and manage forest are up to the state. Moreover, there have been unintended effects when states do not have sufficient means to ensure their policies. The dominant vision is that the domestic timber trade is a local affair (Guizol et al., 2005). The paradigm

today is that domestic timber produces little profit margins by international standards. Against all apparent logic, domestic timber is being shipped over for long distances, crossing many borders, mainly illegally, and bearing substantial transport costs and financial risks (Wunder, 2005; Wit, van Dam, 2010). Currently, international initiatives focus on market tools such as log bans, certifications of wood (FSC, PEFC, FLEGT, REDD, etc.) which do not directly affect the domestic trade. In the case of Angola currently facing oil crises, there is a pressure to incentivize the international trade of timber to diversify economy (Silva, 2016) and the fast-growing tree species have been an alternative to reduce these pressures on natural forests (Dye et al., 2002; Louw, Scholtes, 2006; Kotze, Malan, 2007). An example is the case of European bans boosting the illegal trade of domestic teak wood from Indonesia (Guizol et al., 2005). Determinants of profitability like market prices, investment costs, productivity, distance to market, resource characteristics, type of ownership, and the nature of the market should be studied (Eckelmann et al., 2010; Marfo, 2010).

The present study is divided into four sections: the first section gives an overview of the timber situation in Angola (Introduction), the second describes the methods through which the objectives were achieved. The results presented in the third section are structured into two subsections – the first gives the comparison of timber production before and after the independence of Angola and the second presents an analysis of a case study on production and commercialization of timber carried out in one of Angolan provinces. The fourth section is the discussion of the results obtained. In this study we aimed to assess the policies of production and commercialization of timber before and after the independence of Angola and for a case study the Bié Province was selected. For the study, it was also important to quantify the willingness of sawmills to sell either wood or logs.

The aim was to be fulfilled through three sub-objectives: (i) to evaluate perceptions of changes in log availability and production within the post-colonial period, (ii) to quantify the wood demand operations of sawmills in this region and the systems of timber exploitation (licence and contracts), and finally (iii) to evaluate the process governing the legal production of timber in Angola versus forest management planning.

## MATERIAL AND METHODS

For this study, we used a combination of literature review of various scientific studies and annual reports from the Institute for Forestry Development in Angola (Appendix 1) to support the background of this paper as well as a questionnaire survey (Appendix 2). The target group were sawmills in the Province of

Bié (ca. 70 314 km<sup>2</sup>) located in the centre of Angola (Fig. 1). Twenty questionnaires were distributed to mills and carpentries. The specific data collected are summarized in Table 1. The sample size depended on the willingness of the respondents to cooperate. The questionnaire was based on theoretical data derived from scientific papers on the same topic, therefore its draft was pre-tested with two forest officers of the Institute for Forestry Development in Bié and subsequently corrected according to their comments and only then the questionnaire was distributed.

The survey included questions on forest ownership, types of tree species exploited, price of timber, and comparative analysis of wood production at the present and before the independence of Angola.

Due to the focus and scope of the respondents, the data were especially suitable for a qualitative analysis of individual cases. For descriptive statistics we used IBM SPSS Statistics 21.0 (IBM, 2013) software, where the logistic regression model (Equation 1) was applied to test the variables influencing the decision of sawmills to sell wood (Morgan, Teachman, 1988; Peng et al., 2002). The dependent variable was whether a sawmill sells timber or not (coded, 0 for yes and 1 for not). The independent variables were four: forest area pertaining to sawmill, time of operation in years, receiving a credit from the government, and if the sawmill has a licence to exploit timber.

Historical and present data were compared using a qualitative comparative analysis method (QCA) (Rihoux, 2006). MS Excel (2007) was used to generate synthetic graphs and tables showing past trends. Consequently, a preliminary exploratory analysis of qualitative data and connections to the research questions were made. The regression model is as follows:

$$p = \frac{1}{1 + e^{-(\beta_i + X_i\beta)}}, \quad (1)$$

where:

$p$  = probability

$X_i$  = predicted variable

$\beta_i$  = vector of regression coefficient

$e$  = Euler's constant

Logistic regression is an approach to prediction and computation of independent variables, it needs dichotomous variables (e.g. year or not, 1 or 0).  $Y$  is the variable in prediction; we are predicting that  $Y$  is equal to 1 rather than 0 by giving certain values to  $X$ . As  $X$  increases, the probability of  $Y=1$  increases, too. The logistic equation model used for our analysis requires a more complex formula and is stated in terms of probability ( $p$ ) that  $Y = 1$ . The exploration based on contracts consists of multiannual concepts in the sense that the products explored are used to supply forest industries. Moreover, to enter into this contract the following is required: (i) Sketch maps of the area, (ii) list of tree species in the area, (iii) viability of the

Table 1. Summary of the qualitative and quantitative included into the questionnaire

Primary data collection	Type of research method	Type of information collected
Semi-structured questionnaire directed to the sawmills	quantitative	forest ownership, wood production, and price of wood per m <sup>3</sup>
	qualitative	historical information on wood production, preferred species for wood production, government support to sawmills

Source: own elaboration

company's economic plan (mainly the equipment to be used), and (iv) declaration from local authorities attesting that there are no land conflicts in the area intended for exploitation.

## RESULTS

Available information about forestry resources in Angola is over 30 years old and these old figures (maps, tables) are still being used to describe the same geographical area despite the obvious changes during this period. Data for the years 1975–1997 are not available. The history of timber industry in Angola was found to be linked to the presence of Portuguese settlers. The forestry laws in the country reflect the old strategies used by the Portuguese settlers to exploit timber. The demand for timber in the past motivated the Portuguese settlers to grow plantations. These plantations were introduced in 1930 and by 1975 Angola had more than 100 000 ha of eucalypts (Delgado-Matas, Pukkala, 2011). After independence of Angola in 1975, all colonial farmers, forest owners, and Portuguese merchants were forced to leave the

country and the forest sector was left unstructured (Diniz, 1991). All sawmills owned by Portuguese settlers were abandoned, therefore, the production of timber diminished drastically (Figs. 2 and 3). In the period 1994–2014 the average increment was only 55 430 m<sup>3</sup> per year. Today the access to timber exploitation is based on annual licences ensured by the Institute of Forestry Development (IFD). The exploitation based on a simple licence consists of exploitation of 500 m<sup>3</sup> of timber. This licence is valid for 12 months and can be renewed. It is intended exclusively for national companies and the local community.

### Characteristic of the respondents

Out of twenty mills addressed, five responded to the questionnaire (see Tables 2 and 3). Most of the respondents are not forest owners and exploit wood from the state forest. About 51–200 ha of the forest area on average was consigned for timber exploitation to sawmill. The distance between the forests and the mills was maximally 3–4 h by car.

Receiving a credit was a good proxy for individuals who have more information and access to the mar-

Fig. 1. Map of the study area

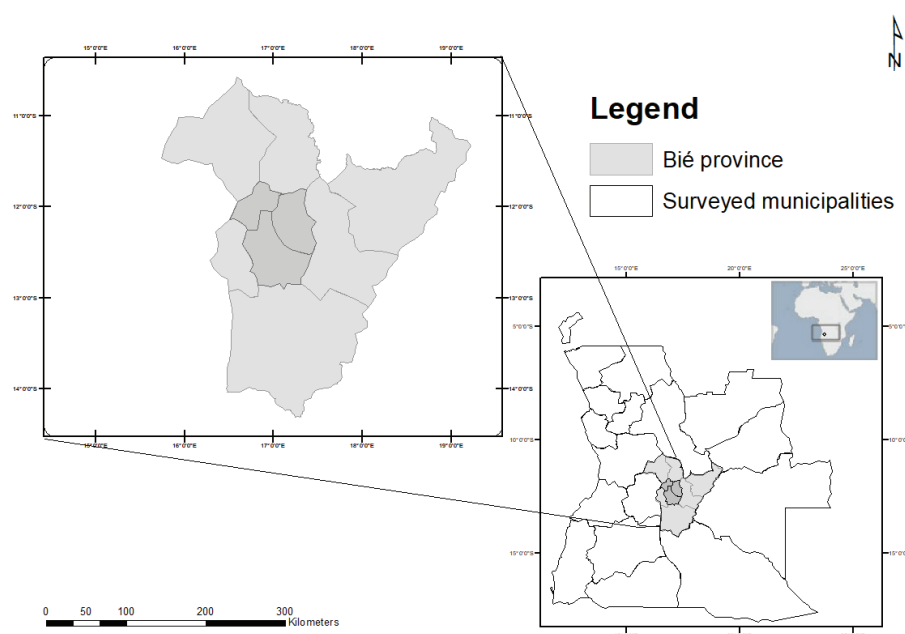


Table 2. Basic characteristics of the respondents

Items	Responses
Forest ownership <sup>1</sup>	80% state
Area of the forest (ha)	51–200
Average driving distance from sawmill to forest (h)	2–3
Average price of wood (KZ <sup>2</sup> per m <sup>3</sup> )	117,000
Preferred species	<i>Terminalia superbola</i> , <i>Brachystegia</i> sp.
Willingness to pay for a long-term licence (KZ)	95%

<sup>1</sup>majority of the forest that belongs to the villagers and is transferred by heritage;<sup>2</sup>Angolan currency

Source: author's survey

ket. The sawmills that receive credit incentives from the government were seven times more likely to sell wood logs in comparison to those that do not receive credit incentives. Sawmills with legal status (licence to exploit timber) were two times more likely willing to sell logs as it is shown on Table 4.

## DISCUSSION

The discussion of the results was fundamentally based on the results of the comparisons. Knowledge on the historical production of timber before and after 1975 is insufficient to suggest management planning on what trees, where, and when are to be cut. This was verified by the fact that even logging companies operating in the country do not undertake any forest inventory before they exploit timber. New data about exploitation of timber cannot be compared with the old data, because it is not known precisely which species were exploited and in what quantities. The regime of timber extraction applied in the country is

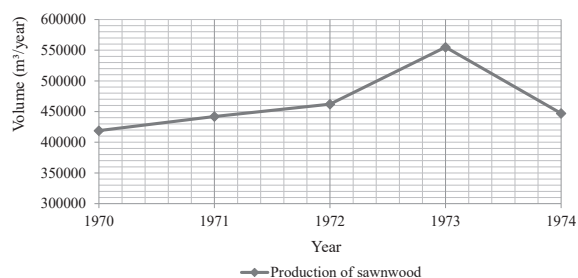


Fig. 2. Timber production in 1970–1974 (before Angola gained independence)  
source: Institute of Forestry Development MINADER (2013)

Table 3. Sawmills<sup>1</sup> in the region and their annual capacity

Mills	Capacity (m <sup>3</sup> per month)	Annual production (m <sup>3</sup> )
Lumenye mill <sup>a</sup>	95	1,140
Chissindo mill <sup>b</sup>	40	480
Lopes mill <sup>b</sup>	35	420
Camacupa mill <sup>a</sup>	75	900
Safrimetal <sup>a</sup>	47	564
Total	245	2,940

<sup>1</sup>officially these mills are considered as carpentries; <sup>a</sup>mills extracting logs from state forest and also processing logs from other sources, <sup>b</sup>extracting logs only from private forest

Source: author's survey

not ideal. The companies operating there just focus on exploitation under the regime of licences; therefore, the companies only license themselves to exploit valuable commercial timber.

The timber exploitation development in Angola after 1975 (Figs. 2 and 3) can be described by the course of the so-called symmetric logistic distribution curve or 'Hubbert curve', the scenario is analogous as in the exploitation of many non-renewable resources – a rapid increase (see Fig. 2) in production followed by a peak and then decline (Shearman et al., 2012). According to Shearman et al. (2012), this fact has been verified in many Asia-Pacific countries over the past few decades. In Angola, the main reason was to paralyze all mills that belonged to the Portuguese settlers. Moreover, this fact was followed by a gap of 23 years during which no records on timber production were made. During this period the production of timber was uncontrolled. Huntley, Matos (1994) and Romeras et al. (2014) by providing baseline information to guide research and conservation efforts. This study focuses on the timber trees of Angola,

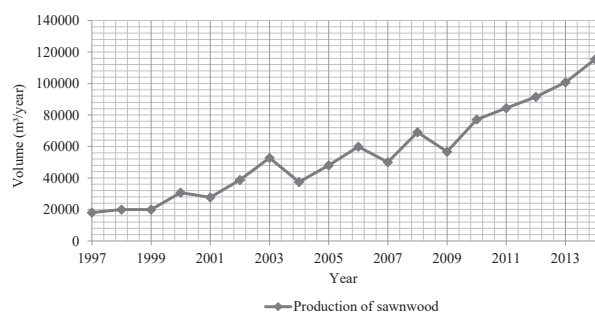


Fig. 3. Timber production in 1997–2014 (after Angola gained independence)  
source: Institute of Forestry Development MINADER (2013)

Table 4 Variable influencing the decision of sawmills to sell logs in Bié province

Variable in the equation	Exp(B) – predicted odds	P-value
Area of forest (ha)	1.16	0.3
Period of existence of sawmills	1.87	0.2
Credit from government	7	0.008*
Licence to exploit timber	2.1	0.15

\*significant at 5% level of confidence

Source: author's survey

combining herbarium (2670 records noted that timber tree species in this period were under increasing risk, thus calling for efforts to promote their conservation and sustainable exploitation. There are a lot of professional charcoal-makers, locally called 'Carvoeiros', working under contracts or licences provided by the IFD in exploiting timber for charcoaling. Studies on deforestation in Angola are scarce (Cabraal et al., 2011; Schneibel et al., 2016). Future research should be done in this field, aimed especially at determining the quantity of individual tree species to be exploited every year.

After gaining independence, the country's constitution stated that all lands and forests in Angola belong to the state except the plantations which are under private companies (see Table 5) and the management of these forests is under the responsibility of the Ministry of Agriculture (MINADR) and Environment (MINAMB) through the IFD. The problem is that the IFD in Angola, which is the supreme organ for forest policies, has no sufficient qualified staff and financial resource to carry out the management practices in all country. Even the mills with an access to credit banks supported by the government that had the advantage of selling wood on the local market, have no access to international timber markets due to the lack of legal documents on management concern of the forest the wood comes from.

## CONCLUSION

The government is interested in supporting sawmills and wood processing and limiting exports of raw wood. The perception of the millers on the reduction and availability of logs after the independence of Angola was clear; even the Lumenye Company owning a majority of the eucalypt plantations in the Province of Bié certified this reduction. The production of timber in the country is generally lower today due to the utilization of old machineries to exploit timber and lack of capable human resources in the forest sector which contributes somehow to uncontrolled and unreported

Table 5. Plantation ownership in Angola

Species	Owner	Area (ha)
<i>Eucalyptus</i> sp.	CCPA (Companhia de Celulose e Papel de Angola)	60,000
	CFB (Caminhos de Ferro de Benguela)	38,000
	state	10,000
	other private companies	20,000
<i>Pinus patula</i>	CCPAA	8,000
	state	4,500
	other private companies	3,500
<i>Cupressus</i> sp.	CCPAA	2,000
	state	1,500
	other private companies	4,000

Source: Institute of Forestry Development MINADER (2013)

production of timber, therefore, the control over the mills is limited. The companies operating there just focus on exploitation under the regime of licences; therefore these companies only license themselves to exploit valuable timber. The actual production does not sustain the demand for wood on the local market mainly in terms of quality lumber.

The objectives of this paper were to review the historical production of timber in Angola and analyze the actual precarious situation. The government should realize that spending money in the forestry sector is not a cost but rather an investment. Timber pricing system has to be developed to promote good market competitiveness and avoid market speculation. All these processes that govern the legal production and commercialization of timber will only be possible with the approval of the new forestry law. The current regimes of licences for timber production do not allow the companies to design a forest management planning due to short timeframe.

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For this study, we used a combination of literature review of various scientific studies and annual reports from the IFD in Angola etc., see below Appendix 1. Appendix 1. Files and archives sources used as supported material for this paper

Title	Author	Year	Type of material	Main subjects
Annual report of activities in 2010	IFD/Bié	2011	report	records of data on timber and charcoal production
Annual report of activities in 2009	IFD/Bié	2010	report	records of data on charcoal production
Annual report of activities in 2008	IFD/Bié	2009	report	records of data on timber and charcoal production
Annual report of activities in 2011	IFD/Bié	2012	report	records of data on charcoal production
Angola: NEPAD-CAADP Bankable Investment project profile	FAO/NEPAD	2005	project report	revitalization of forestry sector
Forest profile of Angola	IFD/Luanda	2013	technical material	situation of the national forest
Forest profile of Angola	IFD/Luanda	2011	technical material	technical-scientific meetings on forests and food security in Angola
National policy and strategy for forest and wildlife development and conservation areas	IFD/Luanda	2011	report	technical-scientific meetings on forests and food security in Angola
Global forest resources assessment	FAO	2000	report	overview of forests in the world
Methodology of integrated production of fish and poultry (Angola, Bié Province)	Chaloupková	2009	publication	methodology

Added explanation: IFD = Institute of Forestry Development, FAO = Food and Agriculture Organization of the United Nations

The default research method was the questionnaire survey and respondents were asked the questions listed below in Appendix 2. Appendix 2. Questionnaire survey directed to the sawmills

1. Who is the owner of the forest you get timber from?

Your own forest		state	
Family forest		village	
Company		others _____	

2. How large is this forest?

Under 50 ha		1001–5000 ha	
51–200 ha		5001–10 000 ha	
201–500 ha		10 001–20 000 ha	
501–1000 ha		more than mentioned _____	

3. Do you receive any credit or funding from bank or government?

- Yes  
 No

4. How much wood do you sale (in m<sup>3</sup> per year)

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5. How far is your sawmill from your forest stand?

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6. Do you have any experience with timber commercialization from the period before Angola gained independence (before 1975)?

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7. What are the most preferred species in the timber market?

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8. From where you got the first incentive to introduce innovation? (you can select multiple answers)

Collaborator (s), management	
From the owners/co-owners	
From universities or other scientific institutions	
From seminars and excursions	
From advisor of regional development	
Others	

9. Your personal opinion on the development of selected market and forestry in general

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10. What is the highest level of education attained by you and your closest co-workers?

	Your education level	Education level of your co-workers
Elementary school		
Vocational school of forestry		
Secondary Forestry School		
High school graduation		
University of forestry or forestry focus		

11. What is your age and gender?

Age category				Gender	
< 30 years	31–40 years	41–50 years	> 60 years	male	female

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