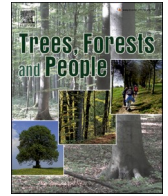




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## The rise and fall of plantation forestry in northern Mozambique

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## ABSTRACT

In the last two decades, Mozambique's plantation forestry has witnessed several twists, which were driven by domestic and global changes. However, empirical evidence on the governance issues that account for a bleak plantation forestry future in Mozambique are lacking. This paper explores the governance issues that militate for the rise and fall in plantation forestry in northern Mozambique. We conducted an online email, face-to-face or phone call interview with 20 forest experts deeply informed about a decade and a half of plantation development in northern Mozambique, using 2005 as the baseline year. We then proceed with an explorative case study of two operational companies in the Niassa province: The Florestas do Niassa (now, build it) and Green Resources. We found strong evidence of a decline in the forest sector in northern Mozambique, linked to the following governance issues: (i) lack of flexibility, clarity and delay on the part of Mozambican Government to issue the land title (DUAT's); (ii) Increase in forest fires, perpetrated by local communities who provided land for the plantations companies, but were dissatisfied with the unfair distribution of the benefits from afforestation projects; (iii) Poor infrastructures, especially road accessibility; (iv) lack of skilled labour as well as (v) political instability. Furthermore, the research illustrates how difficult it is to invest in forest plantations in Mozambique, despite its high potential and natural competitive advantages for the establishment of commercial plantations.

## 1. Introduction

Planted forest in northern Mozambique started flourishing in 2005 (JICA, 2010; Mbanze et al., 2013), but its booming dates as far back as 2009, when the Government of Mozambique (GoM) issued a National Reforestation Strategy (NRS) for the re-establishment of the commercial plantation sector (Blid, 2014; World Bank, 2016). According to the NRS, the agriculture and forest sectors are priority for the economic development in the county (Benfica et al., 2019; World Bank, 2011), and both have great potential to promote the growth of a forest-based economy and, thus contribute to economic development and the well-being of the poor and marginalized people in rural and peri-urban areas in Mozambique, and in so doing, reduce the pressure on the native forests.

The NRS plans sought to increase the commercial forest plantation area from 24,000 ha (Ministério da Agricultura, 2006) to 1 million hectares by 2030 (MITADER, 2016), which represents an increment of about 4166.7%. This ambitious target, requiring a massive external investment within the range of USD 2 to 4 billion (World Bank, 2016), that could only be achieved with significant private sector intervention. Thus, the GoM launched a large-scale campaign to attract international investors (Mbanze et al., 2018). The Malonda Foundation, a Non-Governmental entity, created from the cooperation of Swedish and Mozambican governments came into being (Lambert et al., 2013). The aim of the Foundation was to attract large scale agriculture and forest investments and foster business and job-related opportunities in rural areas of northern Mozambique (Lambert et al., 2013; World Bank,

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2016).

The appeal for international forest investors was answered by an injection of multinational private capital (Glover and Jones, 2019). From 2005 to 2013, several private forest companies were allocated land concessions for plantation projects in the Niassa province (Bleyer et al., 2016b; Blid, 2014; Mbanze et al., 2013), with a planned investment volume of approximately US\$ 70 million (Nhantumbo et al., 2013). These multinational corporations were attracted by the availability of extensive and unused land, suitable for the establishment of large-scale exotic and fast-growing monoculture tree plantations (Blid, 2014), especially for Pinus and Eucalyptus (Shimanikire, 2011), since Niassa is the largest province and the least densely populated in Mozambique. The Niassa Province, covers an area of about 129.061 km<sup>2</sup>, with a population density, of about 6,2 habitants per km<sup>2</sup>, (Blid, 2014; Instituto Nacional de Estatística (INE), 2019; Nhantumbo et al., 2013) and, an area of about 2,5 million hectares with reforestation potential (Ministério da Agricultura, 2006).

It is estimated that, since 2005, out of 1 million hectares of land that were allocated for foreign investments in Niassa, 73% were for forestry projects (Seufert, 2012). By 2010, the three major players: Chikweti Forest of Niassa, Floresta do Niassa, and the Lúrio Green Resources, held altogether approximately 30,000 hectares of planted area and planned to expand to cover more than 250.000 hectares, which represents 1.2% of the 2.5 million of potential forestry area in Niassa (Overbeek, 2010). With \$16 million to invest, the Chikweti Forest of Niassa was the largest forest company operating in Niassa province. The company had an estimated 140,000 hectares of the concession area, in which 10.000 hectares were planted (German and Wertz-Kanounnikoff, 2012), and more than 1000 local people employed in different rural districts were the company operated. Despite all existing advantages for establishing large-scale plantations forests (e.g., land availability, climate conditions and cheap labour) (Lambert et al., 2013; Serzedelo de Almeida and Delgado, 2019), early forest companies started facing challenges mainly related to lack of local and national skilled labour (Blid, 2014), weak or even lack of infrastructure, especially roads and railways that provide access to the markets within and outside Niassa province (World Bank, 2016), shortage of essential forestry inputs, spare parts, improved tree seeds, fertilizers, herbicides, and pesticides, among others; little information in relation to the best silviculture and management practice adequate for required growth and production of each exotic species and provenances in the Niassa context. In response to these challenges, the company managers decided to tackle labour issue by contracting skilled international technical and managerial staff, mostly from Brazil, South Africa, Zimbabwe, and Sweden. Besides, the companies launched massive research to deal with the current lack of silviculture information, especially related to site preparation, seed production, species and provenance trials as well as thinning and pruning practices (Dias and Mbanze, 2020; Mbanze et al., 2018). It was not until 2010 that standard guidance on silviculture procedures was drafted with relatively concise information regarding potential species, species-site matching, nursery production and seedling transportation, site preparation, best planting practices, fertilizer use, and weed control (Tham et al., 2010).

The governance issues with respect to afforestation that Chikweti and other forest companies faced were: (i) acquisition and problems related to delay in the allocation of land titles (DUAT's) (DNTF, 2013); (ii) uncertainties related to the lack of clarity and transparency from the governmental authorities regarding land tenure (Serzedelo de Almeida and Delgado, 2019); (iii) conflict with local people due to lack of clarity in the land allocation for forestry (Calengo et al., 2016), and inequitable sharing of the benefits arising from the establishment of plantations stand in the lands provided local communities; (iv) risks and uncertainty of recommencing a civil war and later the rumours of jihadi insurgency in the Cabo Delgado Province (Morier-Genoud, 2020).

Despite these twists, there are only few, if any studies dealing with governance issues from the introduction of planted forest in Mozambique to the rise and fall. From the best of our knowledge, the few

existing studies are more focused on assessing the potential for establishing commercial plantations in Niassa province; the business environment for such establishment (Nhantumbo et al., 2013; Serzedelo de Almeida and Delgado, 2019; UNIQUE, 2016), and the socio-economic impacts of the investments in forest plantations (Bleyer et al., 2016a). Others studies have focused on understanding how local and rural communities benefitted from the establishment of forest plantations in rural areas of northern Mozambique (Landry and Chirwa, 2011; Nube et al., 2016; Serzedelo de Almeida and Delgado, 2019).

The research draws information from the available technical reports, published and unpublished literature, and crosschecked with forest experts views to: (i) provide evidence of the pathways of plantation forestry in northern Mozambique; (ii) explore the reasons behind the fall of plantations forest development in the Niassa Provinces; and (iii) more importantly, examine the actions and policies that can be implemented to retain the few remaining forest companies and regain investors' confidence in the future.

The article is divided into five main sections: (i) Introduction, where the contextualization of the paper is given; (ii) a brief literature review on the governance issues related to land title and tenure (DUAT); (iii) The applied methodology, (iv) Results and discussion, where the main finds are exposed and, (v) conclusions.

## 2. Forest legislation and land policy

There are silvicultural, economic, and environmental benefits that make plantation forestry more attractive in Niassa Province (Dias and Mbanze, 2020; Mbanze et al., 2018; Serzedelo de Almeida and Delgado, 2019). For instance, the province has the largest area (2.5 million hectares), with reforestation potential in Mozambique (Ministério da Agricultura, 2006; Overbeek, 2010). Nonetheless, the province held the largest area (44.9%) under protection in the country (Mbanze et al., 2020). Much of the land is not suitable for agriculture but is potentially available for forest plantations establishment (Blid, 2014; INDE, 2009). In addition, Niassa is the least densely populated province, with large areas of unused land (Blid, 2014).

In most developing countries such as Mozambique, land either belongs to the government or is collectively owned by the rural peasants who only hold user rights and not tenure to land and forest resources (Gao et al., 2017; Han et al., 2019). In Mozambique since the first constitution, after the colonial independence in 1975, the land has always been the property of the state (Funada-Classen, 2012). Currently, the Government has the exclusive property right over land, and the local population has only the right to use. The state has the responsibility of Public Administration of national land, including approving requests for authorization for land use, planning, zoning, redistribution, and management (Calengo, 2005). Land cannot be sold or used as collateral, a situation that has a significant limitation for obtaining credit to agriculture and afforestation (Holtzman et al., 2012). According to the Mozambican Forestry and Wildlife Regulation (decree N° 30/2012 of 1 August), the requirements for the establishment of commercial plantations are as follows:

- (a) Obtaining the Land Use title (DUAT), from the local authorities.
- (b) Have an approved environmental impact assessment and.
- (c) Have an approved investment project.

To have access to the DUAT title, the investor must negotiate with local landowners (rural people), to concede the land, before receiving the land use title (DUAT) from the GoM. However, the negotiation process follows very long steps (Calengo, 2005; Holtzman et al., 2012; World Bank, 2016), which slows the plantation establishment process, hence pushes the return on the investment further more into the future (Blid, 2014; Hua et al., 2018).

### 3. Methodology

#### 3.1. Characterisation of the study area

The Niassa province is located in the northern Mozambique, 12°51'29.8"S and 36°36'33.8"E. It is the largest province in the country, covering an area of about 129, 056 km<sup>2</sup> (INDE, 2009). The population is of about 1,810,794 inhabitants (Instituto Nacional de Estatística (INE), 2019), being the most sparsely populated province in Mozambique. The study is focussed in three districts in the Niassa Province (Lago, Lichinga and Sanga). We deliberately selected these potential districts, because they were more affected by the afforestation projects and land conflict between local communities and forest companies (Fig. 1).

Until 2013, there were seven forest companies operating in Niassa province, attracted by favourable growth conditions for pines and eucalyptus species in terms of climate and soils (Mbanze et al., 2013). Most of the planted areas had been established in areas severely and negatively impacted by shifting cultivation. The plantation concession areas were delineated on common lands particularly used for shifting agriculture (Landry and Chirwa, 2011).

#### 3.2. Research design and sampling

The study targeted only plantation experts, mostly current and former workers because: (i) they are better informed about a decade and half of plantation development in northern Mozambique, since most of them were directly involved in the establishment of plantation forests; (ii) The few existing studies have been based on interviews with local communities (land owners), or key informants, (Bleyer et al., 2016a; Landry and Chirwa, 2011; Nube et al., 2016); but not with plantation experts who are deeply informed about the governance issues related to the plantation establishment in northern Mozambique and, (iii) we had budgetary constraints to conduct fieldwork in the villages where the two companies (Green Resources and Florestas do Niassa) are operational,

since our study was not funded. Potential experts were identified through two methods: (i) from the available searched internet material (books, scientific papers, governmental and private organizations reports and technical documents); and (ii) through referrals from the researchers' and networks. This methodology of searching for the target group has been used in several scientific articles, see for instance (Mbanze et al., 2019, 2020; Müller et al., 2018). From the 27 potential experts who meets the above criteria that were identified to be part of the interview, only 12 answered positively to the interview. The other 8 were indicated by the experts themselves who initially answered positively to attend the interview. Thus, a total of 20 experts were interviewed. Because most of experts interested to attend the interviews were former workers located through different provinces in the country and abroad, the interviews were conducted face-to-face, through mobile call or via email, depending on the most convenient channel to reach the expert. Other experts were working for public and private forest related institutions in the different provinces of the country. The experts' profile (the institutions where they come from, and their education background are given in the Table 1.

#### 3.3. Data collection

The qualitative interview designed to collect the data was composed of six open-ended questions (Table 2), which were constructed after an in-depth literature review. Essentially, thorough scientific and peer reviewed papers published in the topic, especially about the proposed study area (Adalima, 2020; Bleyer et al., 2016a; Dias and Mbanze, 2020), technical reports (Blid, 2014; Calengo et al., 2016; Tham et al., 2010) were prioritized and accomplished. We also visited some related websites and had informal conversations with former plantation employees in addition to the experience of the authors with the subject. At the end of the interview, we requested, experts, to provide any additional information (reports, scientific and non-scientific articles, research theses, consulting works, etc.), that covers a specific topic of

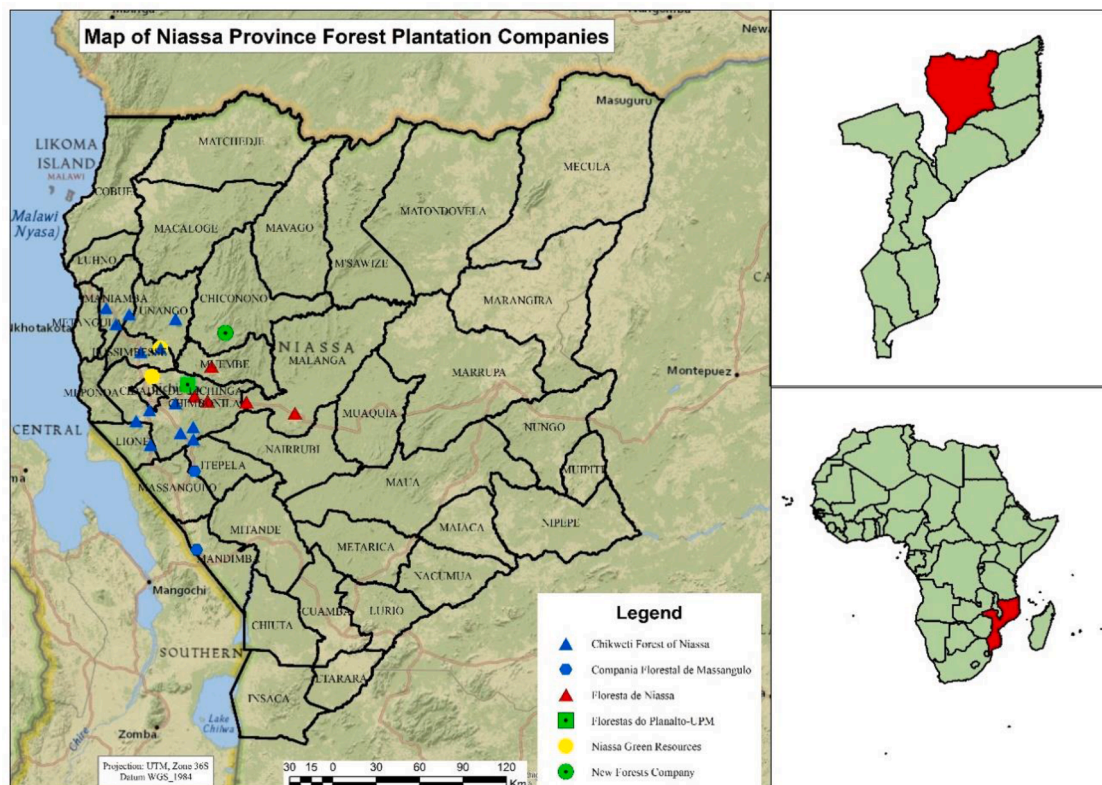


Fig. 1. Location of planted forest in the Niassa province.



**Table 1**  
Organisations from which the respondents worked or still work and their major field of specialization.

Institutions	N° of respondents	Education and major field
Chikweti Forest of Niassa	2	Ph.D. in Plant breeding and Ph.D. Silviculture
	2	M.Sc. in Forest biotechnology and M.Sc. in Agronomy
	1	B.Sc. in Forest Engineering
	1	B.Sc. in Law
Florestas do Niassa (now build it)	1	M.Sc. in Nature conservation
	3	B.Sc. in Forest Engineering
Green Resources	3	B.Sc. in Forest Engineering
Malonda Tree Farming	1	M.Sc. in Crop protection
The Navigator company/Portucel Ltd	1	M.Sc. in Environmental Management
Universities and Research Institutions	2	M.Sc. in Nature Conservation and Forest harvesting
	1	B.Sc. in Forest Engineering
National Direction of Land and Forest	1	M.Sc. in Forest Economics
Minister of Agriculture and Food security	1	B.Sc. in Forest Engineering

**Table 2**  
Expert open-ended questions interview.

Introductory section - From 2005 to 2014, there has been an unrestrained rush to acquire land title (DUAT) for establishment of plantations forest in Mozambique. Niassa province was the preferable destination for most of investor, due to it favourable climate conditions and abundance of unused land. Thus, receiving the heights number of requests of DUATs and foreign investment for the establishment of plantation forest. Given your knowledge on the subject, we would be grateful if you could please spend 20 - 30 min of your time to answer six open-ended questions. This interview is only for research purposes, and all the answers will be treated confidentially	
Question	
Q1	Do you agree that planted forest in Niassa province are declining and fell (e.g., investment and land acquisition etc.)? If you agree, why are plantation forests development decline and fell?
Q2	If the decline is truth, who are the losers and winners among the government authorities, the companies, or Mozambicans citizen in general, and others?
Q3	What was the main constraints for companies, in Niassa, regarding the following issues - land acquisition and tenure (DUATs), labour, taxations/royalty, importation and exportation of inputs (e.g., equipment and goods)?
Q4	Do you agree that there was an evolution in the forest research and silviculture in the implementation of planted stands. Who were the main actors?
Q5	What are the positive and negative lessons that can be learned from the process of establishment of planted forest in the Niassa Province?
Q6	What can be done by the government in particular and Mozambicans in general, to retain forest investments that remain in Niassa province and attract new investors

**Note** - If you have any reports, scientific and non-scientific articles, research theses, consulting works etc. that can cover the topic, we would be very grateful if you could share to us. We will guarantee a fully confidentiality of the material, if needed.

the interview that he/she might think to be interesting for the research.

### 3.4. Data analysis

This study applied content-based analysis to address its objectives. This is a common and straightforward method used to evaluate patterns across multiple pieces of information (e.g., interviews, comments or focus groups discussion, reports and other documents) (Müller et al., 2018; Rocio et al., 2022; Song and Oh, 2016). All 20 interviews were carefully transcribed into an excel spreadsheet. Each expert was assigned and numbered in the line, while experts' answers were assigned in the column, to allow comparisons. Two of the author(s) were responsible with carefully reading through the framework of the

interview based on the research questions and interview guide for discover a frequency in which an idea (words or phrases), is shared and the emergence of key topics. For each question, similar responses were shortened and grouped in a table line. Additionally, similar responses were transformed into percentage for better comparison. This step consisted of the exploration of paragraphs and sentences in which the collection of similar terms appears in the experts' answers for each question in the interview. According to Rocio et al. (2022) a qualitative content-based analysis is adequate for a small sample size. For convenience, we have defined a similar response, when ten or more experts ( $\geq 50\%$ ), provide roughly equivalent responses, based on the content's analyses. It should be highlighted that this criterion was defined by authors, due to the diversity of answers found during the revision of the transcripts. The authors also judged those statements that could complement the common speeches as one of the inclusion criteria

### 3.5. Ethical considerations

All experts were informed about the purpose of the study and assured its confidentiality. A consent to interview the experts was also given before the interviews. All interviews were stored on the hard drive of a password-protected files and shared only among authors.

## 4. Results

Table 3 summarizes the 20 forests experts' views about the six questions that they were interviewed. It can be observed that 15 (75%) of the respondents agree that plantations forest development in Niassa province declined and fell. While the others 5 (25%) believe that it is just a momentary stagnation. The detailed information regarding the reason why most of experts believe that plantation development in Niassa Province declined and fell, are as follows:

### 4.1. Decline and fell of plantation forests development in Niassa province

Respondents reported many reasons for the decline and fell of planted forest in Niassa Province, and the widely agreed by experts are in the Table 3. The majority of experts 12 (58%), believes that planted forest declined and fell, because most of the plantation companies are closing and transfer their assets to other countries. There are only two companies left in Niassa, but none is planning to expand for more areas. In Addition, more than 13 ( $> 64\%$ ), believe that reasons why plantations forests are decline and fell in Niassa is the higher investment risks and uncertainty. Because the investors did not make a thorough assessment about the viability of plantation establishment in Niassa Province, and they now realize that the investment risk of establishing planted forest in Niassa is too high.

"Now they understand that the better solution is to sell their shares (added experts R4 and R13)".

The reported risk and uncertainty, include: (i) the prevailing higher plantations fires hazard; (ii) difficulties to have land DUAT with legal procedures; (iii) difficulty of getting land agreements enforced; (iv) land conflicts between forest companies and local communities; (v) difficulty to obtain large and extensive areas for plantations; (vi) emergence of pests and diseases; (vii) poor transportation infrastructures and accessibility.

Concerning to the roads and infrastructure, experts agree that the Niassa province is far away from the port, even if the railway would be working it is costly to move the timber to Nacala port. It is not viable to sell woodchips for paper at such long distances. Wood for paper is a commodity with high competition from Latin America. In Niassa it is feasible to produce pine for sawn timber and poles from eucalyptus. One expert added that:

"One forestry company that had plans to establish a paper and pulp mill has since abandoned the project for reasons discussed in the paper. Since the hopes of a papermill have vanished, there will be no market for wood for

**Table 3**

Summarization of experts' views in relation to the six questions they were requested to answer as regard the development of planted forest in Niassa Province

Questions	Answers
Q1. Do you agree that planted forest in Niassa province are declining and fell?	15 (75%) agree that plantation forest is decline and fell; while 5 (25%), believes that it is just a momentary stagnation, but not a fall at all.
Q1.1. Why planted forest are decline and fell?	12 (58%), most of the plantation companies are closing and transfer their assets to other countries. There are only two companies left in Niassa, but none is planning to expand for more areas. 13 (64%), believes that the investment risk and uncertainty in Mozambique are higher than was expected.
Q2. Losers and winners	25 (100%) of experts agreed that there are no winners, all are losers, especially if we believe that plantation forests can added value creation for the Government, companies, and local people.
Q3. Main constraints for forest companies	Land issue - There are no large areas for plantations in Niassa Province. It is also challenging to get a land license (DUAT) from the Government. Labour constraint - Lack of skilled workers, low level of education, and lack of work culture. Taxes/royalties and fees are very high since plantations are high-risk investments, taxes should be reduced. Importations and exportation constraints - According to Mozambican legislation, agricultural and forest equipment have a higher discount rate, because of its higher risk activity. But the taxes we used to pay still significantly higher.
Q4. Evolution of research and silviculture	14 (71%), Yes there was an evolution. Especially in the areas of species site match identification, land preparation, which planting regime, fertilization, and tree nutrition, etc. 6 (29%), There are no bases for answering this question. Little or if nothing has been published concerning silviculture in Niassa
Q4.1. Who were the main actors?	Companies cooperated among them and with other national and international research institutions, such as universities and CAMCORE. Chikweti Forest of Niassa was undoubtedly the primary author because it had many research trials and invested a lot of money in research and cooperation. The companies were the main authors. Still, they failed in cooperate with Mozambican research institutions such as Universities, at least at that time. For instance, we had a well-established silviculture department at the Eduardo Mondlane University.
Q.5. Lessons	(1) The whole idea of establishing a business like a forest plantation is to make a profit. If the business does not make a profit it will close. There is no need to rely on native forests as a source of consumption and sale of forest products, especially wood. Companies should require a land guarantee (DUAT) before the implantation of plantations projects. There is an excellent potential for the establishment of plantations forest in Niassa, which can bring many benefits,
Q.5.1. Positive lessons	

**Table 3 (continued)**

Questions	Answers
Q.5.2. Negative lessons	including social, economic, and environmental benefits. Companies have planted very closer to the community's area without providing any legal compensation. Conflict intensification between community leaders and local people. In the future, local people will be more sceptical to accept projects that require large land acquisition. There was an increase in the number of arson fires in planted areas.
(vi) What can be done to retain the remain forest investment and attract a new investment	Protect the forests from fire hazards and destruction. Adjust the business climate so that it can be profitable to invest in forestry. Change the legislation to improve the DUAT attribution system. Make comprehensive land zoning and allocate areas for suitability agriculture, forestry, housing, and other infrastructure. Reduces all investment barriers and collaborating with investors so that they can feel encouraged to invest in plantations. Provide education for local people so that they can understand how plantations are essential. Besides, improve technical knowledge to have more forest professionals from Mozambique.

paper. What might be viable is the mix of sawn wood together with energy production. The business plan that attracted the investors of Global Solidarity Forest Fund (GSFF), was probably based on sawn pine, and treated eucalyptus poles, not on wood for pulp and paper”.

#### 4.2. Losers and winners

For sure, if plantations forest fall, there are no winners, but only losers. For instance, the companies that invested in Niassa Province undoubtedly lost money. But investors are cautious and smarter; they cannot put “all eggs in one basket”.

“Most investors invested only small fractions of their assets in Mozambique plantation projects, and they diversified their assets in other investments elsewhere (Expert R8 observed)”.

Local people lost their jobs opportunity; hence they probable lost the only opportunity to earning better wages; they lost business opportunities, and access to improved infrastructures; as well as an opportunity to improve their living standards. The Government lost tax revenues and, indeed, the confidence of any other investors. The fact of the matter is that the GoM will not be capable of employing all these people, especially those poorly educated in rural areas. This massive loss of employment will indeed add more pressure to the job market, which is already tight.

#### 4.3. Main constraints for forest companies

Land in Mozambique is relatively abundant if compared to other countries in Africa and all over the world, the main limitation is that population are dispersed in small villages, that influences the discontinuity of the land. Even in Niassa province, where the population density is lower, it still a great challenge to find larger uninhabited areas. It is also challenging to get a land license (DUAT) from the GoM. The whole process is time consuming, and it includes: (i) the delay in the part of the government authorities in issuing the land title (DUAT); (ii) the delay in the communities' consultancy process, (iii) delay in the negotiation between communities and companies, as well as negotiation among

community members.

Experts R9 and R18 added that, *“hold a DUAT is not significant deal, until you get the agreement between the village chairperson and the local populations, who requests money and other benefits. Until you get a land agreement with communities to establish plantations forest, it becomes extra time and money consuming, which in turn make the land become even more expensive than it is supposed to be. In addition, there is a more substantial influence of the Civil Society in the process of land acquisition, and it appears that the GoM does not want to be actively involved in the negotiations with local communities, which makes the whole process more difficult and delay”*.

In terms of labor, there are only a few skilled Mozambicans in the plantation sector, which is most likely the result of a low level of education and the reduced number of higher and technical schools offering forest courses. Unless the school system is improved, this will also be a risk. More than technically skilled labour, lack of organizational culture, professional loyalty, and values/ethics is an undeniable problem at the human resources level.

*“Adding to these factors, are the high levels of poverty, which lead to the creation of numerous problems in the management and control necessary to endow, said another expert”*.

According to Mozambican legislation, agriculture, and forests, equipment has a higher discount rate, since it is classified as higher risk activity, and the GoM wants to stimulate these sectors. However, importation taxes are high. Adding to that, the infrastructures and routes for the importation of machinery are in appalling condition, which increases the importation costs. Even if companies can acquire cheap equipment from neighboring countries like South Africa, importation taxes still significantly higher.

#### 4.4. Evolution of research and silviculture

Most of respondents 14 (71%), agree that there was an evolution especially in the areas of species site match identification, land preparation, planting regime, fertilization, and tree nutrition, etc. While those who do not agree 6 (29%), argued not to have bases for answering this question, as little or if nothing has been published concerning planted forests research and silviculture in Niassa province

Those who agrees, went further by pointing out that, all companies had a research unit. They all established trials, but there are no published results, or results were not yet publishable. The Chikweti Forest of Niassa was undoubtedly the leading company in silviculture research. The company established research trials throughout the Niassa and Zambezi provinces. But, since the plantations were insipient, most companies focused their attention on priority research such as land preparation techniques and soils and tree nutrition. This prioritisation was because, these research areas would guarantee success of the commercial afforestation.

*“As a result, ripping was arguably the widely agreed form of land preparation for pines and eucalyptus in Niassa (one expert noticed)”*.

*“I believe that all efforts will be back to zero since investors are leaving the country. My only hope is that the few remain universities and technical institutes can take research very seriously (Expert R15 added)”*.

Brazil and South Africa are the great players in the world forest market. They have established all silvicultural procedures and tree breeding techniques, and, in this regard, Mozambique still lags far behind compared to the two countries (Brazil and South Africa).

#### 4.5. Important lessons

The positive lessons were that the Government and the Mozambique citizens understood the difference between aid from other countries, like what is given as budget support and through NGOs and money invested by private companies. If the government wants to improve the business environment, investments in the forest sector need to be attracted with a well-defined guideline and deeply studied plan and objectives, so that it can ensure both its sustainability and the credibility of the country as a

secure destination for investments.

The investors and companies' managers learned that they need to make a comprehensive assessment of economic, socio-political feasibility for the establishment of long-running projects that require acquisition of extensive land areas, instead of relying on mainstream media, before embarking on large scale land acquisition. We all learned that there is an excellent potential for plantation establishment in Niassa Province, and that plantation products have a great potential to replace the native forests under threats.

The negative lessons are that first, the Mozambican Government participated badly in all land acquisition processes, from community consultancy, DUAT attribution, monitoring the establishment of plantations forest in favour of both local communities and companies, to the protection of the rights and duties of the employees in the companies, which allowed companies to plant closer to the community's areas and trigger land conflict, hence the abusive use of plantation fire as retaliation measures for the injustices that were perpetrated by investors and local elites.

*“One respondent added that there was an increase in prostitution in the areas where the projects were established since women were mostly excluded from forest-related employment”*

#### 4.6. Retention of remaining forest and attraction of potential investment

The Mozambican Government needs to improve the business climate and create an environment that makes it easy for Mozambique citizens and foreign investors to invest in forestry. The measures include, but not only, to establish a fiscal incentive, such as reduction of importation taxes for forestry machinery, to develop a grant scheme for forest plantations to be more attractive for Mozambican and investors.

*“Why should companies from other countries invest in plantation forest, if wealthy Mozambique citizens and institutions choose not to do so? (Respondent R11 ask)”*.

The companies should also provide tangible benefits for the local communities and assist them in improving agriculture yield. So that, agriculture land cannot be overlapped to forestry land; define a clear employment policy and other incentives for Mozambican so that they cannot feel injustice when compare they benefit to the foreign employees.

## 5. Discussion

### 5.1. Reasons for plantation forest decline and fall in the Niassa Province

Overall, experts agree that the plantation forest development in Niassa province fell. One reason that was pointed out by experts, is because most forest companies are living or have left the country. Indeed, by 2021 only two companies: Green Resources that bought all assets from Chikweti Forest of Niassa and Florestas do Planalto (Rafael, 2018), and Florestas do Niassa that was acquired by build it (Construa), a South African company oriented on the selling of building material, remained operational in the Niassa province. The reasons for plantation forest fall, including high risk and uncertainty attached to the Mozambican market. For instance, the Mozambican legislation allows a maximum of 50 years of the renewable lease for implementation of large scale and long-term projects such as forest plantations (Calengo, 2005; German and Wertz-Kanounnikoff, 2012; Holtzman et al., 2012). But since the independence from the Portuguese's colonial rule in 1975, the sequence of political instability is of average 15 years. With a civil war that lasted 16 years, from 1976 to 1992, and the return of RENAMO (Mozambique National Resistance), guerrillas to the bush in 2013. Even after the signing of the new peace agreement in 2019, some RENAMO fighters did not agree to a cease-fire and continuing fight nowadays. According to Collier (2008), a typical low-income country like Mozambique, faces a risk of return civil war of about 14% in any five years and the likelihood of return in civil war increase, even more, when

GDP growth declines. The uncertainty has been further exacerbated by the disclosure of high levels of sovereign-guaranteed debts, which increased debt service obligations to over 100% of Mozambique's GDP (Bertelsmann Stiftung, 2018). The kidnapping of business people in the big cities, especially in the capital Maputo (Bertelsen and Chauque, 2015; Reisman and Lalá, 2012), as well as the jihadi insurgency in Cabo Delgado province, northern Mozambique (Morier-Genoud, 2020). Such instability hits even hard the forest sector considering its long-term rotation characteristics. The Mozambican currency volatility tied to the inflation rate, especially within the Covid-19 pandemic, is another challenge for investors, which can potentially affect the competitiveness of final products in the international market.

According to the experts' fire hazard was the other important reason why planted forest development fell. For instance, experts raised their concern about the higher risk of plantation fires in Niassa Province, which is more than the expected, thus making the investments less viable. In 2010 the CAMCORE trip report to Chikweti stated that damages from uncontrolled fires would be the biggest obstacle for successful plantation sector in Niassa Province (Espinoza, 2011). Indeed, only in just two years (2010–2011), more than 140 fire occurrences were reported in the Chikwet Forest of Niassa alone, which devastated approximately 2887.8 ha of planted *Pinus sp.* and *Eucalyptus sp.* area (Mbanze et al., 2013). While from June 2016 to July 2017, the company Green Resources reported having lost 2845 ha of the planted area (Rafael, 2018). Most of the fires were caused by local arsonists dissatisfied with the unevenness and lack of transparency in the allocation of plantation forest benefits (Mbanze et al., 2013).

The Mozambican legislation allows the use of fire, provided that the following prerequisites are fulfilled: (i) surround the area to be burned with firebreaks before the controlled burning to prevent a fire from escaping; (ii) establish one firefighting team (including local people) to suppress the fire in case its goes out of control and, finally (iii) inventory the resources existing in the area for post-payment, in the possibility that a deliberate fire affects any property including a commercial plantation (Massuque et al., 2015). However, it is difficult to find and penalize offenders, since there is still some ambiguity concerning what can be considered deliberate fire. Besides, there is not a system in place to enforce and monitoring inappropriate use of fire, hence penalize the offenders. Added to that, there is lack of awareness campaigns to enhance the abilities of the local people on the proper use of fire. Unpublished study about the perception and attitude of the communities living around plantation areas in the Sanga district, where 185 households were sampled randomly, found that most of the households (60%), burn farms downwind, because it is speedy, even though they were aware of the associated hazards (Manteiga, 2014). This fact highlights the need for government authorities and other non-governmental institutions, including forest companies, to assist local people to use fire properly. As well as planning and punish the offenders when is necessary, as a way to reduce the fires occurrences, as was suggested by several authors (FAO, 2007; Heikkilä et al., 2010; Held, 2006; Mbanze et al., 2013).

## 5.2. Land title (DUAT) as one of the main constraints that undermined plantation forest investment in the Niassa Province

The main constraints reported by respondents was the delay in the whole process of attributing DUATs for plantation establishment. The three year (2011–2013), data from the Annual Reports of the National Direction of Land (Direcção Nacional de Terras e Florestas – DNTF), reported on average no less than 5% of delay in the DUAT issue, for all the country; and less than 35% for Niassa province (DNTF, 2013, 2011). The Niassa province had, on average, the record delay if compared to the whole country. The results from the DNTF appear to diverge to the experts' views, as they noticed that, although the issuing of DUATs permission from the GoM takes a long time, it is not wholly binding, because until one gets an agreement with the local management

committees, a process which is time consuming and costly. The negotiation process is led by a committee that is supposed to be democratically elected. Still, in most cases, those committees' leaders tend to negotiate based on the customary rules rather than the statutory rules, which only represent their interests and for their relatives. In some areas where the forestry investors promised to employ the local population, the job positions were first allocated to the relatives of local authorities, which lead to the outbreak of conflicts between communities and the forestry companies. An example of such a situation happened in Micucue forest plantation owned by Chikweti Forests of Niassa, where local people pulled out seedlings of 2 hectares of planted area to show their sadness against the unclear allocation of benefits, arising from the plantation projects, especially jobs.

The frequent land conflicts between communities and forest companies brought together a large part of the civil society, academia, and other NGOs to accuse forest companies of land grabbing (Adalima, 2020; Fairbairn, 2013; Monjane and Bruna, 2020; Porsani et al., 2017). This situation had garnered a mainstream international media attention, that forced many investors to retreat. As one expert noted:

*“Major forest investors do not want to be mixed in or accused of land-grabbing. Even if the policies of the Mozambique government change tomorrow to be the most plantation friendly policies, you can ever imagine, large investors do not want bad publicity.”*

We do not want to mean that there was no land grabbing, yes there was. But more than land grabbing, it was lack of land planning and organisation in part of all actors, especially of those who were responsible to insure good coexistence between forest companies and local communities.

Difficulties of getting extensive and continuous land areas were the other main constraint reported by the experts. The average plot area that was allocated for plantation forests ranged from 20 to 90 hectares, which results in high costs of establishing and maintain plantations forest. According to the World Bank (2016), the forestry production costs in Mozambique are up to 70% higher than in competing southern African and Latin American countries. The production cost can even skyrocket if added to the cost of harvesting spots of planted areas and unload the products to the closer Nacala port in the Nampula province. The problem could be mitigated by conducting thoroughly zoning and resettling affected villagers in larger clutters of fertile agriculture land. The resettlement plan would also facilitate the allocation of the companies' benefits to the communities (e.g., schools, roads, hospitals, water, and agricultural extension services). Using data from the 2017 national agricultural census, we found that an average family size of 6 members only requires 1.7 ha of agriculture land, which follows similar findings from Landry and Chirwa (2011). A good resettlement plan could mitigate the conflict between forestry companies and communities, hence allowing a sustainable intensification of agriculture production, especially for maize, the main and widely produced crop in Niassa province in a production system that is characterized by low productivity (Dixon, 2019).

Better land use and land planning require the active involvement of government authorities by creating policies and strategies to attract and retain investors in the long term. Otherwise, the availability of land in Mozambique will remain a history of unrealised potential. Effective land governance involves a holistic approach, including: (i) bringing all actors together; (ii) a coordinated policy; (iii) secure land tenure; (iv) effective law enforcement; (v) targeted economic incentives to promote sustainable forest management and social investment in rural areas; and (vi) strong stakeholder engagement and public-private partnerships. All these initiatives are meant for the GoM to promote long term forest investment by reducing the level of uncertainty and ensure political, economic, and social stability as a way of promoting sustainable development. Poor governance can undermine the trust of investors. Potential aspects of poor governance include: (i) inadequate land-use and resource planning and monitoring; (ii) inadequate capacity for enforcing forest policies and legislation as well as, (iii) weak



participation of local people and external stakeholders in decision-making processes (Agrawal, 2007). The success of plantation forest in Niassa, will depend on the GoM and forest companies embracing modern forestry practices, that require: (i) mechanisation; (ii) economies of scale; (iii) ensure the security of long-term land tenure for plantation projects, as well as local people, whether via leasehold or freehold and ultimately improve logistics by building governmental infrastructures and create incentives to attract private investors (Mills et al., 2017).

To make the matter even clear, one expert pointed out that: “*Most investors today do not invest in “Green Fields”. They want to invest in a company that already has the land rights and a plantation established*”.

### 5.3. Labour and infrastructure

The other important reason for the decline and fell of the plantation forest sector in Niassa province was deficiency and the poor quality of the infrastructure (especially roads). According to Moyo (2013), agriculture and forest development at its most basic level, depend on the quality of physical infrastructure (e.g., roads, machinery, and irrigation tools). Good infrastructure and markets proximity are generally correlated to the development of commercial farming (Glover and Jones, 2019). Lack of infrastructures, special roads accessibility, can hinder the development of forest-based sectors. No reasonable long-term investor is willing to invest in a place that lacks the necessary infrastructure or enforceable property regimes. To give one example, the Lichinga district is located 302 km away from Cuamba (JICA, 2010), which is the main entry point to supplies to Lichinga and other provincial communities. By 2005, when Forest companies started flourishing in Niassa, the existing roads were in fair to poor condition during the dry season. They became impassable during the rainy season due to the interaction between poor drainage and erodible soils (JICA, 2010). A travel from Lichinga to Nampula city (the most developed city in northern Mozambique, located 654 km away) could take more than one day. The port of Nacala, located on the east coast of the Nampula province, is the closest port from Lichinga city. Until 2013, there was no railway connecting both Nacala port and Lichinga city (ORGUT, 2016). However, the establishment of forestry projects in Niassa Province, resulted in the viability of paving the Niassa-Nampula road to improve access routes for transportation of forest products and inputs (JICA, 2010; Rafael, 2018).

Experts also highlighted the limited availability of forest skilled labour, as one of the main constraints for the development of plantation sector in Niassa Province. According to Serzedelo de Almeida and Delgado (2019), labour costs are three to four times lower in plantation forestry in Mozambique than in Brazil, South Africa, and Uganda. However, human capital is one of the main challenges the country faces, with an illiteracy rate close to 50% of the population. Yet, unit costs per cubic meter of eucalyptus timber produced in Mozambique are higher due to lower tree volume growth rates, skills gaps, and employee absenteeism up to 50%. Which is in accordance with the experts views who pointed that, there was only a few skilled Mozambicans in the plantation sector, which is most likely the result of a low level of education and the reduced number of higher and technical schools offering forest courses and lack of organizational culture, professional loyalty, and values/ethics.

### 5.4. Lessons learnt

For sustainable forest sector development in Mozambique, the Government needs first, to put in place new reforms that are forest investor friendly as well as to show its commitment to supporting research, innovation, and technology transfer. In this regard Brazil can be a good example to follow, for instance, Brazil's EMBRAP (Empresa Brasileira de Pesquisa Agropecuária), a governmental research institution on agriculture and livestock, is one of the world's leading research organisations, with remarkable progress on silviculture and genetic improvement. Brazil also achieved incredible results in the forestry

sector, especially in silviculture for Pinus and Eucalyptus. With 7.8 million hectares of planted forests and 3.2 million certified, the country has the world's most productive forest yield, being one of the most important global players in the forestry sector. The average annual increment is about 31 m<sup>3</sup> ha<sup>-1</sup> for Pinus and 36 m<sup>3</sup> ha<sup>-1</sup> for Eucalyptus stands (IBÁ, 2016). Thanks to its intensive silviculture and the introduction of new clones resistant to drought, fires, and frosts, which lead to greatly reduction on the harvest cycle, also reducing the market risks and uncertainty and become more attractive for investors. Mozambique has similar climate and soils as Brazil and it also has enough land available for forest plantation and food production, but it requires research and innovation investment to increase production and thus, reduce the harvesting cycle.

Forest plantation development is also growing worldwide in the recent years (Procter et al., 2015), which increases the competitiveness among countries as well, market consolidation will demand creativity, versatility and more importantly better incentives, transparency, and protection of investment. Most African countries already have competitive advantages of land abundance, better climate conditions for fast-growing exotic species, and cheap labour (Mills et al., 2017; Moyo, 2013). Whether this will be a new wave of “forest green revolution” for African countries, it is still doubtful, as Africa has a good track record on the vicious cycles of failures. For example, in Niassa, the GoM was unable to retain forestry investments due to lack of or poor forest investment policies. Most of the forest investors have pulled out, and those companies who remain are hesitating to expand their investments by planting new areas due to the political and economic instability and lack of clarity in the allocation of the land lease (DUAT). Fires will continue to be a menace to forest development mostly caused by discontented arsonists for having seen their contracts terminated by forest companies and often due to land use conflict with forest companies.

## 6. Conclusion

In this paper, we have encountered evidence that point for the rise and fall of planted forest in northern Mozambique. According to the forest experts, the main reasons that contributed to the fell of plantation forest in northern Mozambique were the lack of clarity and delay on the part of Mozambican Government to issue the land title (DUAT's); Increase in forest fires, perpetrated by local land owners who were dissatisfied with the unfair distribution of the benefits from afforestation projects; Poor infrastructures, especially road accessibility; lack of skilled labour as well as, political instability in the country. In order to retain the few remaining forest companies and gain investors' confidence in the future, the GoM need to improve the business environment that makes it easy for Mozambique citizens and foreign investors to invest in forestry. This require the establishment of fiscal incentive, such as reduction of importation taxes for forestry machinery; develop a grant scheme for forest plantations to be more attractive for Mozambican and investors and reduces the risk and uncertainties, especially those related to political instabilities. Transparency and flexibility in the negotiations of the land acquisition procedures are another critical issue to prioritise, which includes the prioritisation of the local landowners' rights and benefits. Furthermore, development of a long-term approach to creating infrastructures that support projects that may take many years to complete and maintain the confidence of investors. It is crucial to the Mozambican authorities and ordinary citizens to understand that profitability in forest plantations is not so high. Therefore, most investors today do not invest in “Green Fields,” they want to invest in a company that already has the land rights, and a plantation established, which makes Mozambique less and less attractive for forest investments unless the land legislation should be amended and, lower loans and better incentives scheme should be put in place.



## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Data availability

Data will be made available on request.

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