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NATURAL FOREST MANAGEMENT

PROMOTING SUSTAINABLE USE IN MOZAMBIQUE

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Current natural forest management practices in Mozambique are largely unsustainable, leading to forest degradation and devaluation of the asset. Sustainable natural forest management for timber and other products, however, can be profitable forest businesses, provide benefits to local communities and generate income for the state.

Scenarios were modeled to analyze the impact of specific management practices on economic performance, with results showing that the combined implementation of practices can deliver a positive impact on net revenues, as well as other benefits.

Mozambique should pursue a long-term approach for forest management, to include measures to improve the enabling environment for sustainability, support improved management practices, and develop new markets and value chains. Mozambique is taking steps towards this, but much remains to be done.

This brief is based on a financial analysis of the natural forest management sector of Mozambique, prepared by UNIQUE (2016) for the World Bank. The findings, interpretations, and conclusions expressed do not necessarily reflect the views of the World Bank.

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Current Forest Management and Utilization Practices

Forest resource

More than half of Mozambique (approximately 40 million hectares, ha) is covered in forests, mostly miombo woodlands. Of these, approximately 27 million ha are categorized as production forests. Besides containing high value timber species (for export, construction, furniture, among others) and lower value timber (fuelwood), forests provide a variety of goods and ecosystem services, such as non-timber forest products (NTFPs), water regulation, carbon storage and biodiversity habitat. Despite the tremendous benefits to be realized, deforestation is high with over 140,000 ha converted into other land uses every year¹; forest degradation is also widespread albeit not measured.

Forest licensing system

Presently, two forms of commercial harvesting licenses exist for natural forests: simple license and forest concession, differing significantly in size, duration and requirements (Table 1). As a result, they provide different incentives for forest management. Both simple license and forest concessions only include the forest user rights but not the land use right, that is, resident communities retain the right to subsistence uses such as agriculture, charcoal, firewood and hunting, and forest land can be converted into other land uses by resident communities. The current licensing structure provides opportunity to legalize timber or charcoal sourced illegally, i.e. by producers without license or produced outside the license area.

Noncompliance with standards

For both simple licenses and forest concessions, a forest management plan (FMP) based on forest inventory and compliance with a minimum set of standards geared towards sustainable resource management is required. However, a recent evaluation² of forest operators conducted by the government demonstrated prevalent noncompliance with basic standards such as possession of a FMP, demarcation of the concession area, securing natural regeneration, reforestation in harvested areas, and a lack of saw mills.

Planning and utilization trends

Low FMP standards, including in inventory design and data, prohibit accurate spatial planning. Planned harvesting blocks often do not consider the resource distribution and rotation length. Lack of planning tends to result in inefficient use of equipment and personnel. Forest harvesting is selective, concentrated on a few species to supply market demand (mainly from Asian buyers), and not the consideration of existing forest stocks. The implementation of silvicultural practices is limited to enrichment planting, but few operators do so, partly due to poor training.

TABLE 1. FOREST LICENSES IN MOZAMBIQUE (2016)

TYPE	QUANTITY	DETAILS
Simple License	883	<p>Duration 5 years Area <10,000 ha Requirements</p> <ul style="list-style-type: none"> • Mozambican nationals only • Simple forest management plan <p>Production</p> <ul style="list-style-type: none"> • Timber: 500m³/yr • Charcoal: 1,000 bags/yr regardless of size
Forest Concession	198	<p>Duration 25–50 years, renewable Area >10,000 ha Requirements</p> <ul style="list-style-type: none"> • Management plan approved by the provincial governor (≤ 20,000ha) or National Forests Directorate (> 20,000) and periodically renewed • Proof of timber processing capacity (e.g. sawmill) <p>Production</p> <ul style="list-style-type: none"> • Timber as per Forest Management Plan (FMP) • Charcoal not allowed

Technical and governance capacity

The technical capacity to execute management activities is low. The evaluation of forest operators found that only around 20% of simple licensees and 70% of forest concessions in Zambezia complied with basic standards. Inefficient utilization of stem volume and machinery, low density and bad conditions of forest roads, as well as insufficient health and safety standards such as protective equipment for work crews were observed.

In addition, Mozambique's forest sector suffers from chronically weak governance. A recent forest governance assessment³ identified issues of widespread illegality, lack of transparency, low institutional capacity, limited trust among stakeholders, and limited benefit sharing with local communities in the sector.

Benefit sharing mechanism

A benefit sharing mechanism for communities living within licensed areas exists. By law, the state should share 20% of the logging taxes paid to the government by the forest operators. Similarly, a share of 50% of the value of fines collected from forest law enforcement should be given to community members who participate in enforcement activities. In practice, however, these benefits rarely reach communities due to weak enforcement, while widespread unlicensed wood harvesting reduces the amount that communities could receive. Some operators do provide assistance to communities by constructing schools or supporting community events.

1 Figures from the National REDD+ Strategy (2016), under revision through the national forest inventory currently being updated.

2 The evaluation was conducted in 2016 with the involvement of local academia and civil society.

3 The assessment was conducted in 2016 in the Zambezia and Cabo Delgado provinces.

Markets, Timber Value Chains and Product Prices

Mozambique's forestry sector benefits from high acceptance of some of its premium and first class timber species in overseas markets. However, the export market is dominated by China and is highly selective. Non-Chinese forest operators rarely, if at all, export directly to China. Rather, operators sell logs to Chinese owned companies who mill (in case of first class species) and export. Decisions by producers on what and when to harvest are driven solely by the customer requirements and do not take into account the actual production capacity of their forests. Little effort is made by the forest operators to develop new markets, which would allow them a more balanced approach to forest utilization, and higher prices.

Illegal timber harvest and trade has negative implications for revenue collection and competitiveness of operators complying with the regulations. Annually harvested timber (comprising formal and informal production for national consumption and export) exceeds the annual allowable cut by approximately 40% and around 60% of timber is harvested without license.⁴ Value addition by the forest concessionaires is largely limited to conversion of logs to sawn timber; and frequently the quality of the sawn timber is not suitable for the export market. In very few cases, companies engage in value addition such as carpentry or production of veneer. Simple licenses usually trade unprocessed logs. Figure 1 illustrates the primary value chains.

Timber prices vary according to the product and point of sale (Table 2). These differences are likely related to the quality required by the customer (less vs. more selective) and marketing skill of the operator. In terms of utilized wood volume, charcoal is the most important product of Mozambique's miombo forests. However, charcoal production is not yet an integrated part of most forest operation models.

FIGURE 1. PRIMARY TIMBER VALUE CHAINS

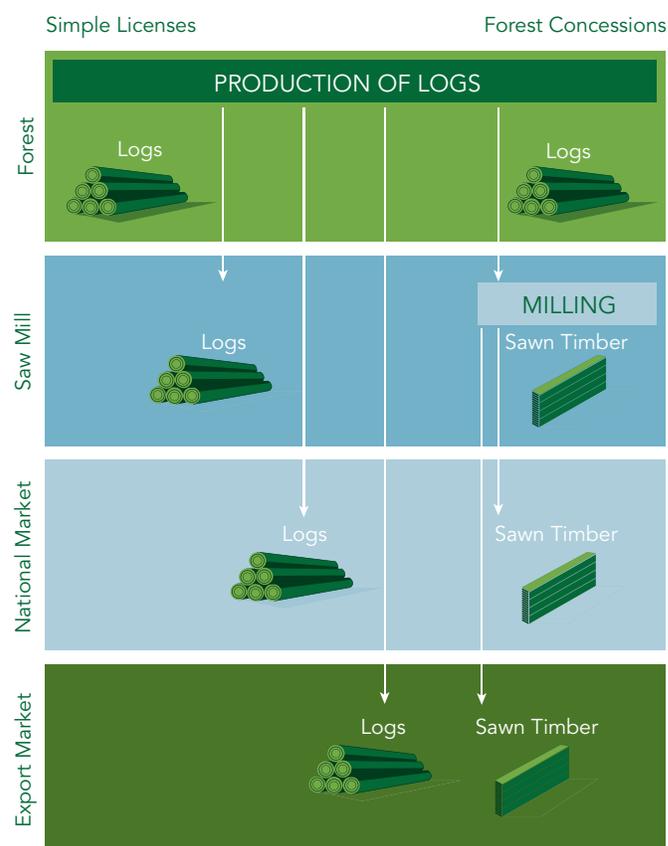


TABLE 2. LOGS AND SAWN TIMBER PRICES

PRODUCT	TYPE OF WOOD	SELLING POINT	PRICE OBSERVED (USD/M ³ COMMERCIAL)	MOST PLAUSIBLE VALUE ³ (USD/M ³ COMMERCIAL)
Logs	1st Class ¹	Forest road	110	110
	Premium ² 1st Class	Customer gate	325–600 140–300	535 220
Sawn Timber	1st Class	Export (FOB)	900–1,300	900
		National market	345–900	500

1 Chanfuta (*Azelia quazensis*), Jambirre (*Millettia stuhlmannii*), Umbila (*Pterocarpus angolensis*)

2 Pau preto (*Dalbergia melanoxylon*)

3 Value used for economic calculations and scenario modelling

4 FAEF (2013): Assessment of harvested volume and illegal logging in Mozambican natural forest. Faculty of Agronomy and Forestry Engineering, Eduardo Mondlane University.

Financial Analysis of Management Scenarios of the Miombo Forest

To get a better understanding of the trade-offs and potential impacts of switching from current to sustainable practices, UNIQUE (2016) analyzed several miombo forest management scenarios in two regions, Cabo Delgado and Zambezia.

Methodology

Scenarios were developed for a timeframe of 51 years, and assume a model company with 50,000 ha net-production area implementing harvesting cycles of 10 years.⁵ The baseline scenario assumed harvesting of only premium and first class species, where the harvesting of commercial species exceeds the growth rate.

The sustainable forest management scenarios assume **introducing silviculture** to enhance productivity and rebuild forest stock in degraded forests as a basic measure that must be conducted, combined with different options:

- A. *Integrated with charcoal production*, utilizing all available species when having reached maturity
- B. *With use of secondary species* for timber products
- C. *Improved technology and leveraging economy of scale effects*
- D. *With forest certification*

Findings

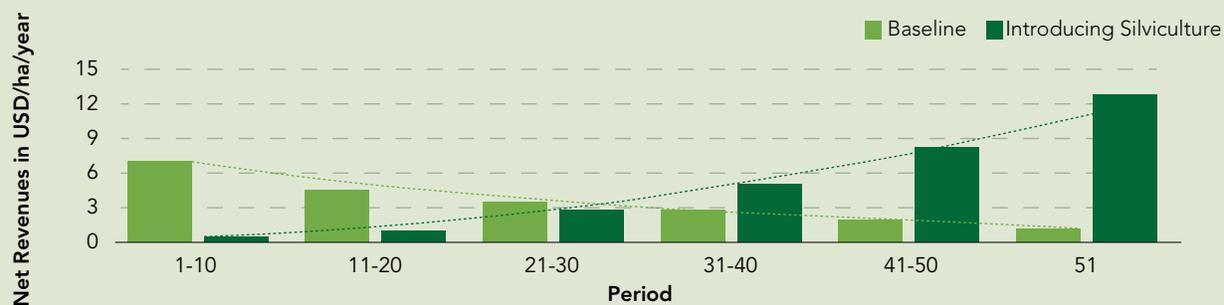
Current forest operations lead to continuous resource degradation. The business is not sustainable and will have substantially reduced revenues, stock and harvestable volume of premium and first class species over time compared to the scenarios that involve silviculture (Figure 2).

The performance of the scenarios are as follows:

Introducing silviculture +

- A. *Integration of charcoal production* has little impact on economic performance on top of introducing silviculture
 - Represents a source of additional income on top of logs and sawn timber, by utilizing a large share of wood that is not suited for other uses
- B. *Use of secondary species* has a negative impact on economic performance
 - Viable only when combined with improvements in technology resulting in more cost efficient operations

FIGURE 2. Net revenue resulting from silviculture management compared to baseline (values not discounted). The baseline scenario assumes timber stocks and harvest volumes over time on a selective harvesting scheme with a 10-year harvesting cycle. Estimated simulation data was used for harvesting rates ($0.16\text{m}^3/\text{ha}/\text{year}$) and growth rates ($0.11\text{m}^3/\text{ha}/\text{year}$).



⁵ Often much longer cycles (20 to 30 years) are promoted by NFM experts, but given the need to actively manage forests by applying silvicultural measures, more frequent but less intensive interventions will be necessary to achieve the targeted positive impacts. The 51-year timeframe allows analysis of the long-term impacts of applied practices.



C. Technology and leveraging economy of scale effects has significant positive impact on economic performance

- Requires some time and upfront investments and only make sense when large volumes of timber are harvested

D. Forest certification has little impact on economic performance

- Premium prices achieved in export markets compensate additional costs of certification, but not beyond that
- From an economic point of view, certification might be an interesting option for companies planning to increase their presence or enter export markets

An *integrated forestry* scenario (Introducing silviculture + A + B + C) was also modeled. Most improved scenarios show a positive impact on profitability and resource development, especially with the combination of practices. The synergies result in a strong positive impact on net revenues (Figure 3).

The utilization of a wider range of species helps to overcome upfront investments in technologies, while benefits from improved technologies and efficient costs increase with larger volumes of timber utilized. Analysis shows that there is a reduction in revenues in the first decade, but from the second decade onwards, the sustainability scenario is superior compared to the baseline.

Positive economic impacts of sustainable scenarios require time. Taking this into considering, the Net Present Value (NPV) of the multivariate scenario still keeps above the baseline scenario when applying a realistic commercial discount rate for Mozambique of around 12% (Figure 4). In other words, when starting integrated sustainable natural forest management, i.e. using also secondary and non-commercial species and leveraging economy of scale effects, miombo forest management can turn into an attractive long-term business. This is a motivating result; it shows that sustainable miombo forest management based on the assumptions and data used can compete financially with the destructive mining practices currently applied.

FIGURE 3. Net revenues resulting from selected scenarios (values not discounted)

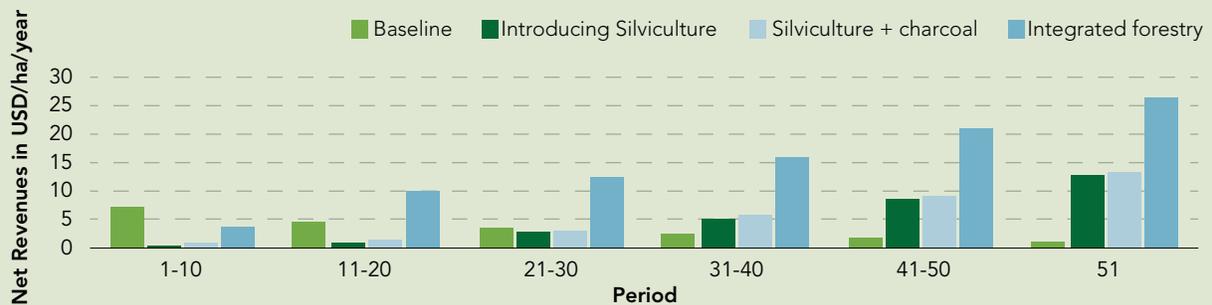
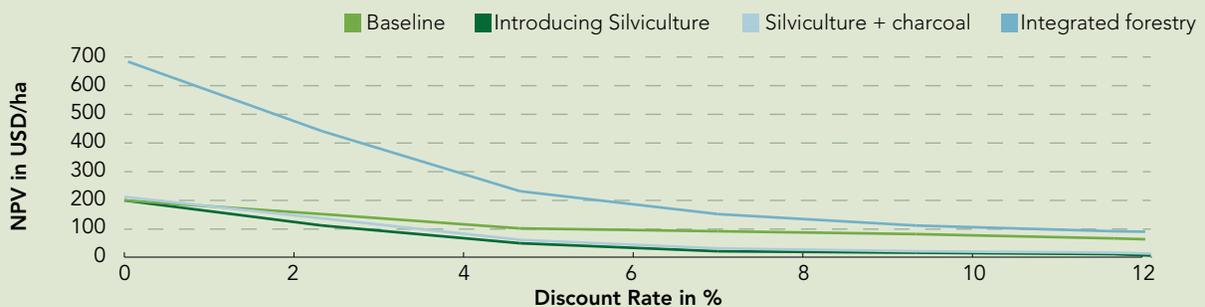


FIGURE 4. Net present value over 51 years of assessed scenarios by applying different discount rates



Recommendations

To incentivize long-term SNFM in Mozambique and economic viability of forest operations, interventions in three key areas are required:

1. Improve the enabling environment for SNFM

Resource security. Sector stakeholders must clearly define and negotiate user rights, location and management practices, informed by sound regional land use planning and supported by legal framework. Additionally, fire must be controlled.⁶

Concession types, forest resource and concession size. Concession size and duration must reflect minimum sustainable yield required/available to achieve economies of scale. The possibility of setting the value of a concession based on current/future timber stocks, or variable license fees according to the state of the forest resource at the end of the concession period should be explored.

Simple licenses should be abolished, except for charcoal making. Simple licenses for charcoal production must be redesigned to introduce the formal register of forest resources used for this purpose. Forest associations should be promoted to enable simple licensees involved in charcoal making to benefit from economy of scale effects and sustainable forest management.

Regulations. Adjustments of forest related policies, regulations and guidelines may include but are not limited to:

- Incentivize the application of silviculture
- Permit use of thinnings and harvesting residues from premium and first class species for charcoal
- Combine issuance of licenses for timber and charcoal
- Process logs into timber in forest using mobile mills
- Implement mechanisms to reduce illegal timber harvest (and trade), e.g. change license types from transport to harvesting; timber tracking systems. The use of technology is essential.
- Enforce FMPs through ground checks and involving independent bodies. These regulative measures should be accompanied by incentives.

Institutional capacity. MITADER and other relevant government institutions must be able to provide technical advisory services, monitor and control the implementation of forest management standards and regulations.

2. Support improved forest management practices

Planning and monitoring. Sound forest management planning and definition of appropriate silvicultural measures case by case, based on reliable inventories, and followed by proper monitoring of the forest resource should be conducted.

Forest management decisions are based on data assumptions (growth, forest structure dynamics) and theoretical models. Concessionaires and state officials should work closely to monitor the impact of silvicultural choices on reminiscent trees and forests.

Regulation of species composition and stand quality. This is done through the removal of mature trees of all species, selective thinning to favor high-quality commercial trees, and management of natural regeneration.

Fire management. Strategies should be developed with a focus on cooperation agreements with local communities.

Forest utilization. Efficient utilization will reduce cost per cubic meter wood extracted, reduce damage to the remaining trees and increase the commercial volume without a corresponding increase in trees harvested. Basic measures include: harvesting and registering at the appropriate time, using state-of-the-art technology, value adding to shorter stems and larger branches, coppice management, fire control for natural regeneration enhancement, and implementing basic health and safety standards. The integration of residues and non-commercial species for other products, such as charcoal, or parquet and handicrafts, can offset part of the additional cost of silvicultural management and provide additional employment and/or direct income for communities.

3. Develop value chains and markets for a broader range of products

Market development. A wider range of marketable species is deemed crucial for the long term. Accordingly, market development should be actively promoted by the forest enterprises with aid from government and research institutions, and in partnership with national industries. These could include procurement policies that incentive the domestic producer market, including for lesser known but suitable species for public works, and that specify minimum standards for timber products. Appropriate price and incentives for use of sawn timber from secondary species must be designed.

Investments in value addition and infrastructure. Investment into value addition can sustain and/or raise profitability despite additional costs. For such investments to be successful, technical know-how, marketing skills, access to technology and finance, and market development are often required.

Integrated forest management approach. All available resources (species and qualities) should be utilized through the diversification of products and markets.

⁶ Fire has to be controlled to allow natural regeneration of miombo forests.