

# Using and marketing firewood from tree prunings on farmlands: a viable option for smallholder farmers in Lilongwe?



## A firewood value chain and market analysis in Lilongwe's southeast and west rural areas

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Over the past decades, forests in Malawi have been under massive anthropogenic pressure. Tree cover is disappearing to make way for cropland expansion and human settlement to sustain a population growing at a rate of 2.3% per year.

Alternatives for energy supply are not affordable nor fully available to most people in Malawi, and 79.1% of the families have no choice but to rely on firewood for cooking and heating. In comparison, 18.5% of the families depend on charcoal, and only 1.2% of homes use electricity. Yet, demand for fuelwood varies: 75% of urban households use charcoal as the primary fuel for cooking, while 90.9% of rural homes rely on firewood<sup>1</sup>. In the Lilongwe district, the demand for fuelwood remains exceptionally high, given the capital's proximity.

While trees are getting scarcer in villages, rural areas are turning into eroded soils and degraded land. The lack of firewood pushes the rural communities to deplete wooden resources where any tree available, including species like mango trees, are potential firewood sources. Women walk longer distances to collect firewood and use crop residues, small branches, and stalks for cooking that are not ideal for the effective use of wood energy, have environmental impacts and cause health issues.

Agroforestry allows the production of wood products on a sustainable way, benefiting actors involved in the chain, particularly smallholder farmers, while contributing to preserve the environment.

Since July 2020, Inter Aide is implementing a specific agroforestry project to increase rural households' energy autonomy and contribute to generating additional income through marketing firewood or other wood products in the Lilongwe district. The project supports thus farming families in the plantation of a significant number of specific species of trees, in hedges around

the boundaries of the farmlands, that can then be pruned or coppiced in order to get a continuous and durable production of different wood products.

During the 2021-2022 agricultural season, Inter Aide has conducted a study to better understand the domestic demands in the rural areas, as well as the current firewood sector in Lilongwe's southeast and west rural areas and evaluate the potentialities for smallholder tree producers.

**The study estimates that a rural family of 4.4 members uses about 3,117 kg (708.4 kg per capita) of firewood annually, using 63 % of it during the rainy season.** Thus, all rural families in Lilongwe district would need about one million tonnes of firewood per year for cooking and heating water. This data feed our model to estimate communities' needs, considering a medium-sized village group (GVH) of 191 households, tearooms, bakeries, and small food businesses. It concluded that this community would need about 750,224 tonnes of firewood to cover their annual needs.



Picture: Wholesale firewood market in rural Lilongwe, 2021.

Calculations also showed that the purchases from local firewood sellers only cover between 8.5 % to 12.6 % of the community's firewood demand. This result coincides with Drigo 2019<sup>2</sup>, whose estimations consider that an area poor in wood resources, like the rural southwest and west of Lilongwe, can cover between 20% to 40% of its demand with local resources, out of which 16% comes from local purchases of firewood.

Table 1. Identified wood products with commercial potential in rural areas of Lilongwe district.

Wood products	Market	Demand period
Firewood	Households	Dec to Apr
Poles	Construction	May to Nov
Poles	Tobacco Barns	Mar—Apr
Logs	Brickmaking	Jun to Sep
Branches	Garden stacks	Spread out

<sup>1</sup> National Statistics Office (2020). The Fifth Integrated Household Survey (IHS5) 2020 Report  
<sup>2</sup> Drigo, R. (2019). Woodfuel Integrated Supply/Demand Overview Mapping (WISDOM) Malawi. Analysis of woodfuel demand, supply, and harvesting sustainability. With assistance of Winrock International, Tetra

« During the rainy season, people who don't have trees fail to cook. But not us. »

The firewood sector is a significant generator of self-employment and the only survival option for some people among the most vulnerable population. However, it remains informal, yet relatively organized and predominantly illegal, with indigenous tree species harvested from forests, without permit, dominating the market offer.

With a noticeable seasonal pattern in rural areas, the firewood source and accessibility determine the market channel and pace for actors to participate in the business. For example, some trees that grow in the farmlands cannot be cut during the rainy season as they could damage the crops. Besides, the bad road conditions during the rains make it difficult for bicycles and vehicles to transport heavy loads, stopping activities from December to April.

Actors participating in the firewood value chain includes producers; collectors; transporters (bicycle, oxcart, vehicle); traders (bicycle, oxcart, vehicle); retailers; and consumers (households and businesses). Figure 1 below categorizes those actors according to their business practices, even though some participants have overlapping functions.

Men dominate the collection and trading of firewood from forest reserves, using a bicycle for transporting the firewood to trading centers, wholesale outlets or villages. These men spend about eleven hours to complete one trip and get a profit of 2.5 USD per firewood load, doing between two and three trips weekly.

« I am doing this to survive, but I am also a farmer. »

Man firewood collector and trader, 2021



## Sources of firewood

Rural southwest and west of Lilongwe have four primary sources of firewood: Dzalanyama forest Reserve (DFR) (left up), standing trees (left down), tree producers (right up), and community forests (right down). All sources serve diverse needs and markets. For example, families and businesses prefer trees from forests for long-time cooking. In contrast, tearooms, some bakeries, and brickmakers use standing trees in both urban and rural markets.

Figure 1. Actors involved in the firewood value chain of Lilongwe district and their characteristics.

Sources (production)	Collectors (processing)	Transporters	Traders	Retailers	Consumers
Men and women	Men	Men	Women and men	Mostly women	Women and men
Plant and manage trees.	Collect dry wood from the forest by bicycle, sell in trading centers. Seldom purchase planted trees.	Own transport means and offer transport service. Transport any tree species.	Buy and sell firewood from indigenous or exotic tree species at wholesale or retail price.	Buy at wholesale price and sell in smaller quantities (bundles) to end-users (consumers).	Select and purchase firewood according to their needs.
Smallholder farmers with average landholding of 0.6 hectares (1.5 acres).	Mostly men farmers; young men without land. Their main asset is the bicycle (0.5 m <sup>3</sup> firewood capacity).	Oxcart owners from/to rural areas. Vehicle owners from/to urban areas	Have own transport (men) or hire transporters (men and women). Move larger volumes of firewood to the urban areas (5m <sup>3</sup> to 32m <sup>3</sup> ).	Women living in Lilongwe city; groceries shops in trading centers (men and women).	Households: women; Food businesses (bakeries, tearooms): women & men.

## Legal framework

Malawi has several legal instruments relevant to agroforestry. For example, the **article 37 of the Forestry Act 2017 recognizes the right to plant forest produces and to harvest and dispose of the resulting produce freely**. The challenge for farmers is traceability, especially for planted indigenous species like *Acacia polyacantha* or *Khaya nyasica*. To overcome this challenge, farmers shall inform the Department of Forestry (DoF) representative in the community to validate, together

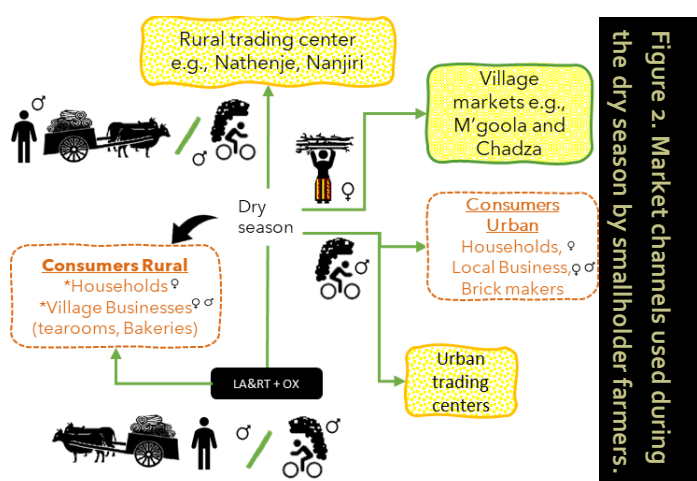
with customary authorities, the woods' origin and issue a transit permit when transporting the wood by vehicle. While this solution is at the local level, the most challenging constraint concerns the limited knowledge of Forestry laws from the police officers, and from the farmers, and poor enforcement practices. This situation makes access to the urban market difficult for smallholder tree producers of sustainable firewood, even from non-indigenous species such as *Senna spectabilis*.

# Smallholder farmers and agroforestry

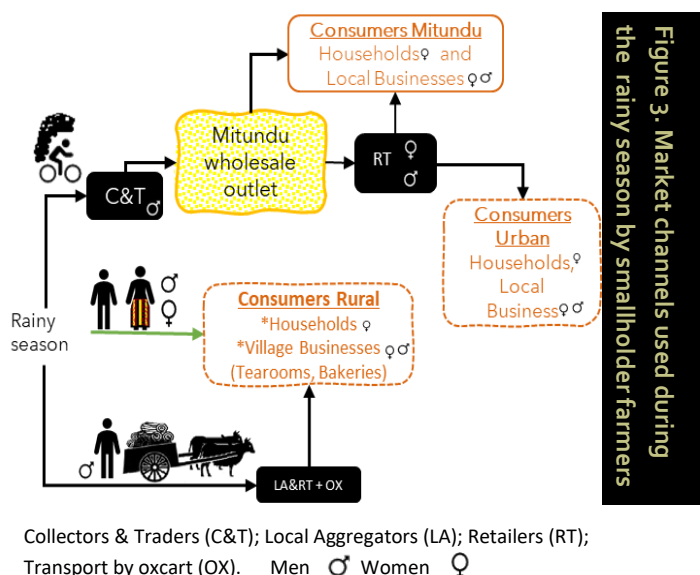
Men and women venturing into tree production require access to secure land, seeds/planting material, polytubes (for species sown in nurseries), water, and labor.

Depending on the species, farmers plant their trees in the field, on field boundaries, as woodlots, or at homesteads. Before being sold as firewood, harvested trees or pruned branches go over a cutting and drying process that requires from one to two weeks in dry season and up to one month during the rainy season, depending on the tree specie.

Smallholder farmers adapt their strategies based on the season. For example, during the **dry season** (May to November), the demand for firewood in the villages is low, so producers must sell their firewood in other markets like nearby and urban trading centers (see Figure 2).



During the **rainy season**, the demand for firewood increases, but the conditions to reach markets worsen while the planting season starts, increasing the farm labor demand. As a result, men and women shift from targeting trading centers and village markets to selling firewood to households and businesses (bakeries, tearooms) in their surrounding areas (see Figure 3).



To assess the different strategies, the study builds on a theoretical model farm of 50 *Senna spectabilis* trees that farmers could prune annually and use entirely for commercial purposes. Results showed that during the dry season and depending on the channel used, farmers could make a profit between 19.5 USD and 97.6 USD. Likewise, during the rainy season, the potential income ranges between 56 USD and 146 USD. The diverse strategies vary in terms of economic benefits and the time needed to sell all firewood, ranging from two weeks to five months. For example, during the dry season, women selling firewood in village markets would need about 6.25 months to sell all firewood from the 50 trees, earning a margin of 52 USD (if they hire labor to prune trees); while men going by bicycle to a nearby trading center to sell the firewood could gain 78 USD in only four weeks.

## Price structure

Firewood prices vary according to the season, presentation, source, and market, increasing according to the distance from the source. Traders sell either full bicycle firewood loads from the forest or offer bundles of three or four pieces as the most common practice when selling retail. The firewood sold nearby forests or close to the farms has the minimum value, following village markets, wholesale outlets, and urban trading centers as the most expensive market (see Table 2).

Table 2. Price of firewood bundles during the dry and rainy season in different locations, regardless the species.

	Near forest (Rural areas)	Village mar- kets (Rural areas)	Wholesale outlets (Rural areas)	Urban trad- ing centers
<b>Dry Season</b>	3 pieces @ 30 MK (0.03 USD)	3-4 pieces @ 50 MK (0.05 USD)	3 pieces @ 50 MK (0.05 USD)	3 pieces @ 100 MK (0.1 USD)
<b>Rainy Season</b>	---	3-4 pieces @ 100MK (0.1 USD)	3 pieces @ 60 MK (0.05 USD)	3-4 pieces @ 100 – 200MK (0.1–0.2 USD)

Firewood from tree species used in agroforestry, like *Senna spectabilis*, has the same market value as indigenous species when sold in retail (see Table 3).

Table 3. Price per kilogram of dry matter of *Senna spectabilis* sold as firewood.

	Tree producers (Farm gate)	Village markets	Wholesale outlets (Mitundu)	Urban trad- ing centers
<b>Dry Season</b>	89 MK (0.09 USD)	111-148 MK (0.1 - 0.14 USD)	148 MK (0.14 USD)	296 MK (0.3 USD)
<b>Rainy Season</b>	89 MK (0.09 USD)	222 – 296 MK (0.2 – 0.3 USD)	178 MK (0.17 USD)	296–444 MK (0.3–0.4 USD)

Malawi kwacha (MK); United States Dollars (USD)



However, the income for a bicycle firewood load of indigenous tree species, which is equivalent to 0.55 m<sup>3</sup> or 100kg, ranges between 3,000 and 7,000 Malawian kwacha (MK). In contrast, a load of *Senna spectabilis* is sold around 7,200 MK at farmgate, and between 5,000 and 12,000MK in trading centers (Table 4).

Table 4. Price of indigenous firewood bicycle loads according to the estimated distance between DFR and sales points; and *Senna spectabilis* load price from farms.

Sales location	Kilometers (km) between DFR and sales spot by road	Average selling price for 1 bicycle load (eq. ≈100kg firewood)
Surrounding area of DFR	30 km	3,000 – 3,000 MK (2.9 – 3.4 USD)
Wholesale outlet	53 km	3,800 – 5,000 MK (3.7 – 4.8 USD)
Urban trading centers	62 km	4,000 – 5,000 MK (3.9 – 4.8 USD)
Villages	65 – 75 km	5,000 – 7,000 MK (4.8 – 6.8 USD)
<i>Senna spectabilis</i> sold in trading centers	-	5,000 – 12,000 MK (4.8 – 11.6 USD)

## Conclusion and recommendations

A holistic approach is required to release the pressure on Malawi's forests and to find durable alternative solutions for rural and urban families. Agroforestry offers a promising option to produce fuelwood on a sustainable way by using adapted pruning practices, that could also support smallholder farmers from an economic and environmental point of view.

Already past experiences in wood fuel projects found it hard to compete with the “free” indigenous woodlands resources. However, effectively linking actions at the policy level to the rising price trend of indigenous trees could boost the competitive advantage for firewood from agroforestry over forest trees in a few years. **To encourage the firewood trade from agroforestry practices, part of the efforts should focus on supporting the legal instruments that backstop it and ensure its legality.**

Even though indigenous species currently dominate the firewood trade, other species that starts today to be known and used in rural areas, like *Senna spectabilis*, have market potential.



Collage: Dzalanyama Forest Reserve and firewood loads on sale at wholesale market, 2021.

### Why do firewood traders currently prefer sourcing firewood from natural forests rather than from agroforestry tree producers?

Forests offer dry wood and, with it, the opportunity of getting quick cash through a collecting-selling dynamic. On the other hand, farmers have trees to sell as firewood to traders, but still in small volumes. As a living capital, trees are cut or pruned only when cash is needed, limiting the capacity to offer trees for sale on a regular basis. In addition, greenwood requires several days to dry before being marketable. As a result, traders seldom buy firewood bicycle loads from farmers producing trees. The challenge is that even if traders purchase firewood from agroforestry, they must sell the load at a higher price than forest wood to make a profit. While farmers selling their produced firewood must decrease its value to the same price as forest wood to remain competitive in the market. This situation calls for urgent actions to enforce the policy on indigenous wood commerce to shift the preference toward sustainable and legal sources of firewood.

**Yet, considering the legal aspects before farmers plant trees is paramount to defining the market strategy and requirements for trade according to the species.** On paper, trading exotic species has different guidelines than indigenous ones.

The communities' firewood demand is currently not fulfilled with the existing local resources during the rainy season. Hence, smallholder farmers adopting agroforestry practices already have an active and available market for firewood at the village level. Nonetheless, generating income year-round only from firewood sales is a key challenge at village level. **Diversifying wood products** (i.e. garden stakes & poles for tobacco barn, timber, bigger poles...) **could open new market opportunities and help smallholder farmers to generate incomes when needed.**

Still, choosing a market strategy according to demand and seasonality requires **market information and planning skills** that are today not always accessible for smallholder farmers. Facilitating such access would help them not only to calculate the economic value of their trees and products but also to increase their negotiation skills, which is essential for women who face more difficulties in negotiating better prices than men.

Yet, not all current channels benefit women and men equally. Women's reduced mobility due to household responsibilities and the enormous physical effort required to transport firewood loads by bicycle limit their market opportunities. **Women need new approaches and opportunities to gain economic benefits, particularly during the dry season when the firewood demand in villages is low.**

Finally, **a tree management model compatible with the agricultural calendar is critical for smallholder farmers to choose the best market strategies for selling wood products and gain fair incomes from agroforestry.**

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