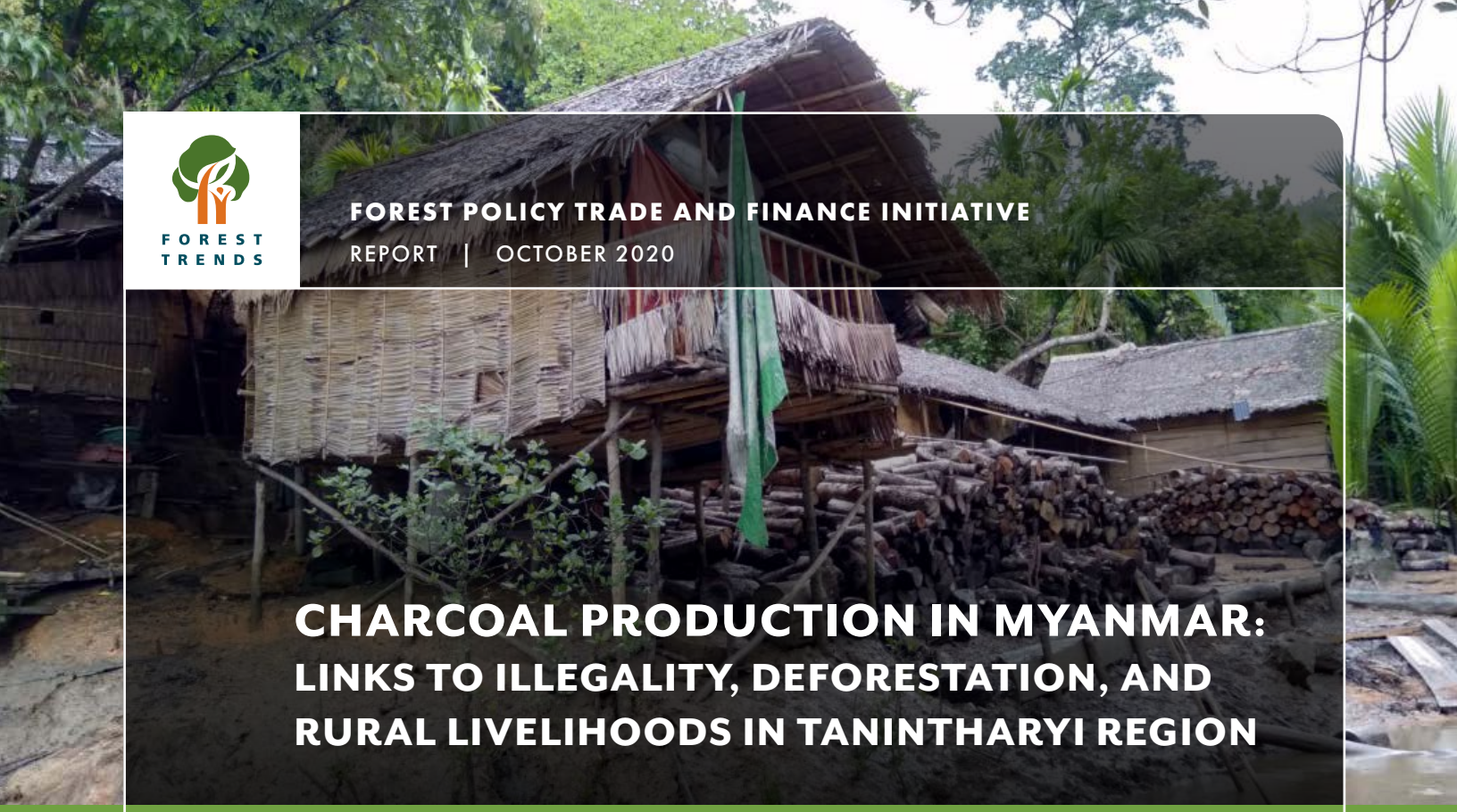


FOREST TRENDS

FOREST POLICY TRADE AND FINANCE INITIATIVE

REPORT | OCTOBER 2020

CHARCOAL PRODUCTION IN MYANMAR: LINKS TO ILLEGALITY, DEFORESTATION, AND RURAL LIVELIHOODS IN TANINTHARYI REGION

By **Kevin M. Woods**

INTRODUCTION

Forest Trends conducted field research in mid-2019 in seven villages in Kyunsu and Tanintharyi townships in Myeik District, Tanintharyi Region. Study sites are located in the center of the region's charcoal production industry, which is also the main hotspot in the country. Myeik District and its surrounding archipelago is renowned for its mangrove forests, fishing industry, and high rates of deforestation. Charcoal is made from burning firewood collected from nearby forests in homemade kilns. Mangrove tree species are the preferred wood, which is why the industry thrives along the Tanintharyi coast, the last frontier of the Mekong region's once extensive mangrove forests. Charcoal is used for cooking by households, restaurants, schools, and monasteries, as well as to run some factories. Domestic charcoal consumption is distributed across Myanmar, but is especially prevalent in urban areas. Charcoal is also exported, primarily to neighboring Thailand and China, despite being illegal.

In these seven study villages, researchers estimated the operations of 160 mostly medium-sized kilns, none of which had permits to legally operate. Myiek District is estimated to have approximately two hundred villages

similarly engaged in the illegal charcoal production business. This scale of charcoal production, and its associated firewood demand, is acknowledged as a major driver of mangrove deforestation (WWF 2020; Estoque *et al*. 2018; Yan 2019), but the lack of systematic data collection makes it difficult to monitor the economic and environmental dynamics of this sector, let alone to develop effective policies to ensure sustainability.

The findings of this report show that the Myanmar Forest Department (FD) significantly underestimates the volume of firewood harvested for charcoal production in the country. Despite government attempts since 2016 to curb charcoal production in Tanintharyi Region (Tanintharyi Weekly Journal 2016), field research shows most small-scale production continues illegally without permits, largely because poor villagers have few other viable livelihood opportunities. Policies to address deforestation will require complementary efforts in charcoal producing areas to also support sustainable energy production, alternative pro-poor livelihoods, and community-led mangrove forest conservation and management. Government support for sustainable household energy production and non-charcoal cooking alternatives is also needed, such as subsidies for cooking gas.

Background

Charcoal production is a significant under-reported driver of mangrove deforestation in Myanmar. The country has the highest rate of mangrove loss in Southeast Asia, yet still holds some of the world's largest existing mangrove forest cover. Upwards of 90 percent of charcoal production in the region is sourced from coastal mangrove forests, according to the Myanmar FD. Remote sensing analysis published in 2020 indicates that over 50 percent of Myanmar's mangrove forests have been permanently or temporarily converted to other uses in the past two decades, far more than previously estimated (De Alban *et al*. 2020). Tanintharyi Region had the second highest total extent of mangrove forest loss in the country from 2007 to 2016, losing an estimated 500 square kilometers (km^2) (ibid). However, this remote sensing study only considered conversion to agriculture and urbanization, and does not account for deforestation and forest degradation from harvesting fuelwood, including for charcoal production, or other drivers, such as shrimp farming.

Mangrove deforestation in Myanmar has resulted in the loss of several billions of USD every year in mangrove ecosystem service value (a decrease of nearly 30 percent since 2000) through drastic declines in coastal fisheries, lost protection against coastal surges from cyclones and tsunamis, the loss of carbon sequestration and storage (mangrove forests normally do so at far higher rates than other tropical rainforests), and other factors (Estoque *et al*. 2018).

Mangrove ecosystems also provide fisheries livelihoods for nearby villagers, an economic lifeline among coastal villages. With increasing rates of mangrove deforestation and expanding industrial fishing operations, ex-fishermen are turning to unsustainable levels of charcoal production to meet their livelihood needs.

Findings

1 **Four out of five households in Myanmar rely on fuelwood or charcoal as main sources of energy for cooking. Charcoal-cooking households consume at least an estimated 572,000 metric tons of charcoal per year.** According to the most recent national census in 2014, 1.3 million households (12 percent of the country's total) use charcoal as their primary cooking fuel, predominately in urban environments further from forests. According to the county's main agricultural university, an average of 0.44 metric tons of charcoal is consumed per household per year for those reliant on charcoal for cooking.[1]

This estimate does not account for volumes of firewood harvested as fuelwood, a practice more common for rural residents (86 percent) living closer to remaining forests, according to the national census (2014 MPHC).

2 **The Myanmar FD significantly under-reports charcoal production and associated firewood harvest volumes due to inaccurate data collection, which results in an inaccurate conversion factor.** Officially reported charcoal use through census data does not account for non-household users, such as schools, restaurants, factories, and monasteries, which individually consume higher annual volumes of charcoal than households. Nor does it include those households unreported in the census, such as those that are very remote and those that are beyond government administration. If these different types of unaccounted charcoal users were included, total actual volumes consumed in the country would be considerably higher.

According to the most recent national census in 2014, 1.3 million households (12 percent of the country's total) use charcoal as their primary cooking fuel.

The FD uses a conversion rate of 1.52 for volume of firewood burned for each unit of charcoal produced, which was estimated to be 60 percent below field research findings (conversion rate of 2.43).[2] This results in large divergences in calculated volumes of harvested firewood for charcoal production. For example, based on the country's total annual household charcoal consumption, the FD reports about 869,000 metric tons of firewood required per year, whereas Forest Trends' ground-truthed conversion rate estimates nearly 1.4 million metric tons – a difference of over half a million metric tons.

The lack of standardization for units of measurement and production techniques across the country and among different types of producers presents challenges for accurate reporting.

3 **Charcoal production in Myanmar is concentrated in Tanintharyi Region.** The preferred wood for charcoal production comes from mangrove tree species, which the FD estimates are the source for 90 percent of charcoal produced. The Ayeyarwady River Delta near the urban center of Yangon has been the historic center of Myanmar's charcoal production.

[1] Interview with retired rector, 2019.

[2] Forest Trends calculated this rate as an estimated average based on what villagers in field study sites reported in producing charcoal from their medium-sized kilns. There is significant variation in this rate, however, based on size of kiln, wood species used, production techniques, skill level, and type of charcoal produced.

However, the expansion of rice, shrimp, and charcoal production in this region has resulted in massive mangrove deforestation and coastal damage, and is widely cited as a factor that increased the number of lives lost from flooding during Cyclone Nargis in 2008. Since then, Myanmar's charcoal production hotspot has shifted to coastal areas of Tanintharyi Region, where plentiful mangroves remained at the time (along with Rakhine State). Thailand's charcoal ban in the late 1990s only further increased the demand from Tanintharyi Region across the border.

Charcoal produced in Tanintharyi Region is used for urban and rural household energy within the region, is distributed across Myanmar's urban centers, and is illegally exported by boat to Thailand, and perhaps as far as China overland.

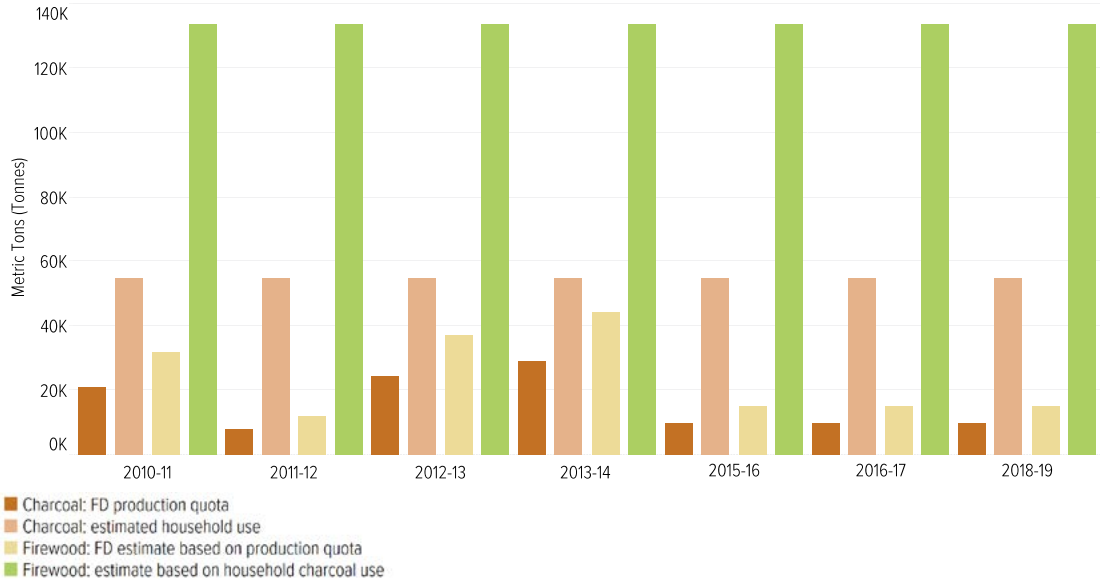
4 **Households in Tanintharyi Region consume nearly 85 percent more charcoal and harvest almost 200 percent more firewood than what the FD officially reported.** While the FD reported 30,000 metric tons of charcoal officially produced in Tanintharyi Region (2014), census data from the same year shows that Tanintharyi Region households consume over 55,000 metric tons of charcoal per year (MPHC 2014) – another example of FD significantly under-reporting actual charcoal use.

Over 40 percent of households (approx. 125,000) in Tanintharyi Region rely on charcoal for their primary energy source. Over 60 percent of those households are rural residents. Based on these conservative 2014 consensus figures of 125,000 households, each using 0.44 metric tons of charcoal annually, and using Forest Trends' field calculated conversion rate of 2.43, this would translate to an annual consumption of nearly 135,000 metric tons of firewood to meet household charcoal use in Tanintharyi Region alone.[3] Using the FD's official charcoal production figure and conversion rate amounts to only 45,600 metric tons of firewood, a gap of nearly 90,000 tons.

5 **The Myanmar government's recent charcoal production quota for Tanintharyi Region is 5.5 times lower than the local demand for household energy use.** In 2016, in response to rampant charcoal production in the region, the National League for Democracy (NLD)-led government imposed an annual charcoal production quota up to 10,000 metric tons per year for Tanintharyi Region (half of which is marked for Myeik Township, where the industry is centered). This quota was an attempt to not only control deforestation rates by controlling the volumes of charcoal production in the region, but also to try to formalize – and therefore legalize – the thousands of unregulated small producers and their trade. However, the charcoal production quota is five and a half times lower than the local demand of 55,000 metric tons for household energy use in the largely rural region. This discrepancy does not take into account non-household use in the region, or transport outside Tanintharyi Region in Myanmar and to bordering countries (Figure 1).

[3] The actual figure is expected to be significantly higher if non-household users (commercial, religious, and education facilities) and those households not counted in the census are taken into account.

FIGURE 1 **Official production vs. estimated household use of charcoal and associated firewood requirements**



6 **Laws and policies to regulate charcoal in Myanmar have been ineffective, largely ignored by small-scale producers and traders, and counterproductive to poverty eradication, sustainable forestry, and rural livelihood goals. Charcoal production actually expanded with the introduction of a quota and associated permitting process.** While national and regional government officials interpret regulations differently, it is very clear that it is illegal throughout Myanmar to produce and trade charcoal without a permit. It is also illegal to export wood charcoal, regardless of origin or permit, according to forest policies and the updated Forest Law (UGoM 2018).

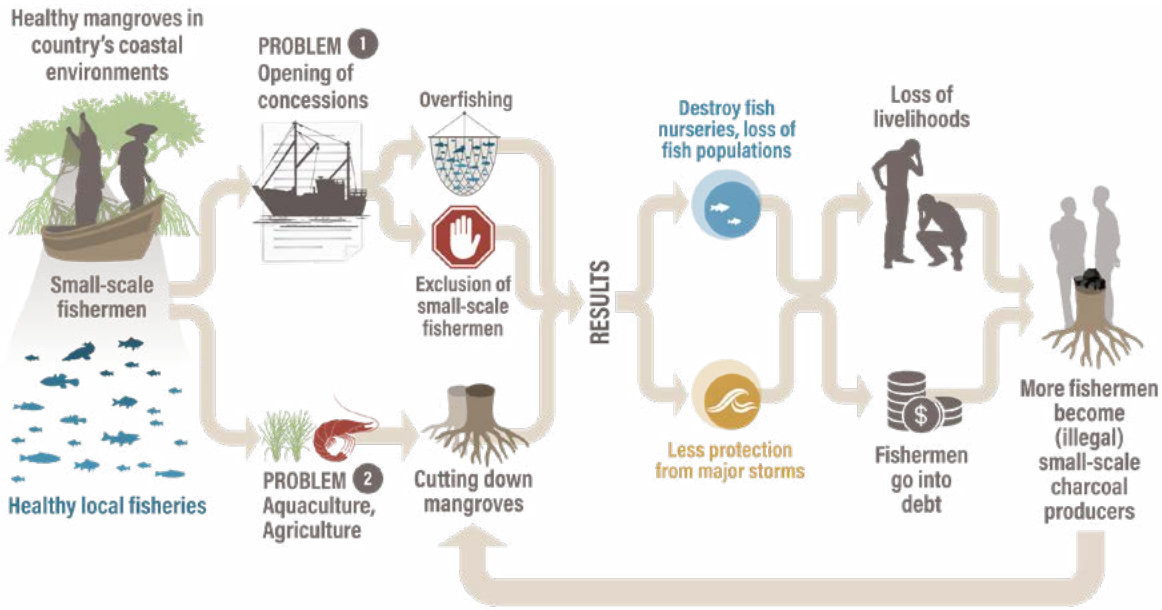
Small-scale impoverished producers, which are the majority of the country's charcoal producers, have been unable or unwilling to obtain permits due to efforts needed to comply with bureaucratic requirements, or beliefs that they would not qualify due to their low socioeconomic status and/or inability to pay bribes and permit fees. Continued illegal status leaves these producers susceptible to fines, bribes, arrests, and/or confiscations. They also continue to be unaccounted for in government statistics and planning.

Charcoal permits have mainly been allocated to local businessmen, rather than to small-scale producers. These businessmen are mostly based in towns with regional government connections, and have the ability to pay necessary bribes and navigate red tape. While illegal small-scale charcoal production continues, the government now provides new incentives for local businessmen to initiate large kiln production. The quota may actually have inadvertently expanded charcoal production volumes, rather than decreasing it, by creating a permit system that entices new merchants into the charcoal business, but does not sufficiently police existing producers, or support alternative pro-poor livelihoods.

7 **Small-scale charcoal production is one of the only revenue sources available to poor villagers living near mangrove forests who have been pushed out of the fisheries sector.** Several factors have incentivized fishermen in Tanintharyi Region to transition to charcoal production over the past two decades: declining near-shore fish stocks from industrial-scale overfishing, loss of coastal fish habitat and nurseries due to mangrove deforestation, high entry costs for deep sea fishing, and government formalization measures that are difficult, if not impossible, for small fishermen to comply with (e.g., onerous registration, bribes, and lack of relations with government officials). Charcoal production is often one of the only other income earning opportunities for villagers in coastal mangrove environments. Indebted fishermen are also often drawn into charcoal production in hopes of paying off debts from fishing, school education fees, and other unexpected household costs.

There is increasing local awareness, however, that charcoal production is causing environmental problems that also negatively impact them – their livelihoods and food security are reliant upon the forests and fisheries that are being overharvested (Figure 2).

FIGURE 2 Charcoal production, local livelihoods, and mangrove ecosystems



8 **Despite charcoal production offering an alternative livelihood to ex-fishermen, production costs and associated risk remain substantial.** According to Forest Trends field research, a villager can earn an annual profit of USD $2,000 operating a medium-sized kiln with five firings per year (averaged over five years) (see Table 1). The cost of building a medium-sized kiln (that lasts for up to 5 years) is approximately USD $355 for materials and labor, USD $565 to hire the skilled laborer to slowly burn the wood to make the charcoal over the course of a month, and

over USD $450 to transport the charcoal to the city for purchase. Villagers mostly use their own household labor to collect firewood from forests as a free input. In the few reported cases of local forest depletion or increased risk of enforcement, the need to purchase firewood from afar caused charcoal production costs to increase by at least 15 percent. Additional substantial costs arise from purchase of permits, and the need to pay bribes to evade enforcement (including when sourcing firewood from state protected forests).

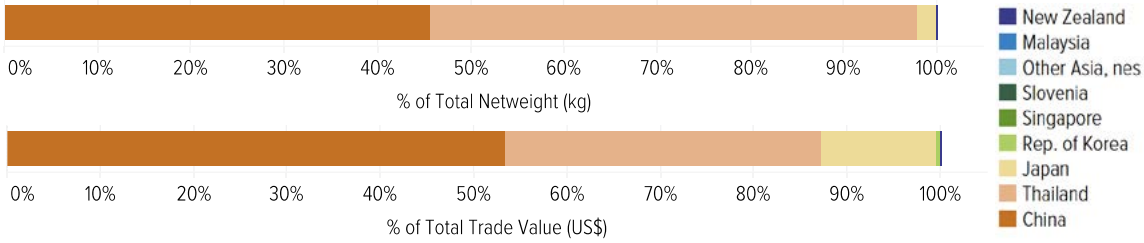
Based on these costs, one metric ton of firewood freely collected by households for charcoal production is valued at just over USD $50 at the producer level, a value which would significantly increase up the commodity chain.

TABLE 1 **Cost, revenue, and profit for charcoal production with medium kiln with five firings/year with no permit over five years**

COST TYPE	Cost (USD)	Unit	Cost Per Firing	Total Cost Year 1 (5 Firings)	Avg. / Year over 5 Years
***Make Kiln**	355	Once every 5 years	355	355	
****Firewood (freely collected)**	0	0	0	0	
Charcoal bag	0.16	210 bags	34	168	
Transport from kiln to boat	0.13	210 bags	27	137	
Transport to Myeik by boat	0.3	210 bags	63	315	
Bribes	13	1 time	13	65	
TOTAL COST			605	1605	1,321
REVENUE	Per Viss	Per Bag	Per Firing	Year 1	3,319
	0.23	3.16	664		
PROFIT				1,715	1,999

Note: Large variation exists among type of kilns (size and style), which significantly alters these estimated figures.
Based on field research, figures presented here are based on each firing producing 210 bags of charcoal at 14 viss each, sold for 0.23/viss
*Kilns last up to five years, which is the main cost of the operation.
**Most households use their own labor to freely collect firewood (which these figures reflect), but for the few who purchased their costs increased by about $90 USD/firing.

FIGURE 3 **Global imports of charcoal from Myanmar by reporting country by net weight (kg) and trade value (USD), 2010-2019**



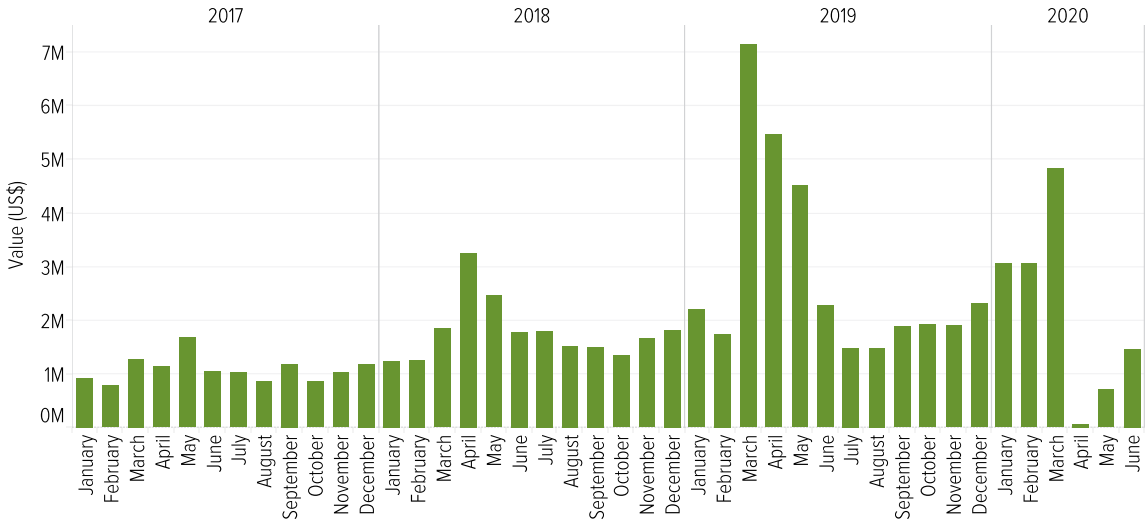
9 **Despite national laws prohibiting the export of charcoal, Myanmar is one of the world's largest exporters of charcoal.** Roughly 50 percent of charcoal produced in Tanintharyi Region is traded domestically, largely supplying national urban centers. Large volumes are also exported outside the country (see Figure 3), all of which is illegal according to Myanmar law. Trading partners reported the import of more than USD $30.5 million of charcoal from Myanmar, although the Myanmar government reports exports at much lower values. Charcoal that is mostly produced in the north (Sagaing Region and Kachin State) is exported overland to China. The initial charcoal export boom in the north occurred in the mid to late-2000s at the height of the cross-border timber trade, but leveled off to an estimated 0.5 million cubic meters (m^3) in the early to mid-2010s (UN Comtrade 2020).

Thai traders actively facilitate production in Tanintharyi Region by providing credit and technical training to producers. As a result, Thai Customs reports thousands of tons of charcoal annually imported from Tanintharyi Region.

Charcoal exports to Thailand follow similar trends. Thailand's government banned charcoal making in the late 1990s in response to their own dwindling mangrove forests. Thailand's unmet demand for charcoal thus shifted production to Tanintharyi Region, which is easily accessible by boat from Thailand's border port town of Ranong. Thai traders actively facilitate production in Tanintharyi Region by providing credit and technical training to producers. As a result, Thai Customs reports thousands of tons of charcoal annually imported from Tanintharyi Region, possibly with much higher imported volumes that escape Thai Customs.

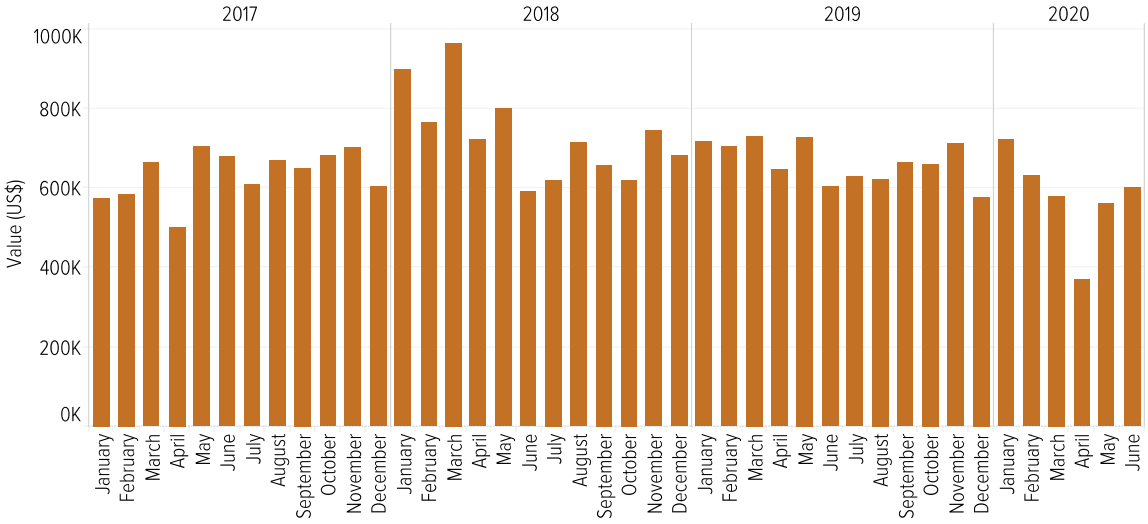
Since 2017, there has been a significant upsurge in cross-border charcoal trade with China and Thailand, the latter of which is supplied completely by Tanintharyi Region, with a peak in both net weight and value reported in early 2019, according to trade data and field interviews (see Figure 4 and Figure 5).

FIGURE 4 Chinese imports of charcoal from Myanmar by value (2017-June 2020)



Source: Data from the General Administration of Customs, P.R. China, 2020. Compiled and analyzed by Forest Trends.
Note: China Customs reported aggregate figures for January-February 2020; we have used an average of this amount for each month.

FIGURE 5 Thai imports of charcoal from Myanmar by value (2017-June 2020)



Source: Data from Thailand Forest Statistics Database, 2020. Compiled and analyzed by Forest Trends.
Note: Values were reported in Thai Baht and converted to USD using month-end historical exchange rate averages.

Recommendations

To the research community:

1 **Collect and publish more data on charcoal production and trade and associated firewood collection in Myanmar.** The Government of Myanmar does not collect data on firewood extraction, charcoal production, or domestic trade. The volume of charcoal production data is limited to sub-national government permit quotas, and charcoal consumption is recorded only in decennial national census data for households, missing large gaps in actual production and consumption. Sparse data availability is in part due to the fact that most of the sector is operating illegally. Nonetheless, baseline data that more accurately reflects the entirety of the charcoal industry is needed to make better informed policy decisions and increase sustainability. More research is needed to better account for firewood extraction for charcoal production as a driver of mangrove deforestation and as a livelihood response by coastal villagers, especially by those indebted to and pushed out of the artisanal fisheries sector.

To the Union Government of Myanmar:

2 **Enforce against the illegal export of charcoal.** It is illegal to export charcoal, yet Myanmar is one of the world's largest charcoal exporters. Demand for charcoal production in Myanmar could be significantly reduced if the country's ban on charcoal export is effectively enforced. Although rampant corruption, low human capacity, and lack of political will present major challenges, a direct order from Naypyitaw to clamp down on the illegal export of charcoal, matched by more strict compliance among border trade officials in Tanintharyi Region, could drastically decrease export flows.

3 **Address the link between the informal charcoal sector and illegality by supporting sustainable alternative livelihoods suitable to coastal village environments.** Biases in the permitting process, bribery, and lack of support for alternative sustainable livelihoods has perpetuated a cycle that leaves people and the environment vulnerable. Small-scale charcoal producers must be part of the solution to halting mangrove deforestation, rather than pushing them into illegality and promoting larger-scale producers. Possible solutions should start with extensive community consultations with small-scale charcoal producers and ex-fishermen on how best to foster alternative livelihoods less dependent on harvesting firewood from mangroves.

4 **Support more sustainable household wood-based energy production and non-charcoal cooking alternatives.** Energy policies in the country have not yet addressed economically viable alternatives to wood-based energy for cooking. Forestry reform should support more sustainable and pro-poor, small-scale charcoal production through established village firewood plantations and community forestry, instead of relying on mangroves to supply demand. Without innovative solutions to meet domestic energy cooking demand that can provide viable livelihood alternatives, impoverished villagers will have little choice but to continue to illegally and unsustainably produce wood-based energy. Targeted government support, such as subsidies for cooking gas, will help more effectively transition urban households away from wood-based cooking fuel in order to help relieve deforestation pressures.

Acknowledgments

The author of this report, Kevin Woods, is grateful to Forest Trends' field researcher in Tanintharyi, who wishes to remain anonymous. The author would also like to thank Kerstin Canby and Naomi Basik Treanor of Forest Trends for editing and review of the report, as well as Cheyenne Coxon for copy-editing, Grace Cook for data visualization and editing, and Eszter Bodnar for graphic design. Support for this publication came from the Norwegian Agency for Development Cooperation (Norad). The views expressed in this report reflect those of the author, and do not necessarily reflect the views of Forest Trends' donors or our external reviewers.

References

De Alban, J.D. *et al.* 2020. "Improved estimates of mangrove cover and change reveal catastrophic deforestation in Myanmar." *Environmental Research Letters* 15(3): 34034. https://iopscience.iop.org/article/10.1088/1748-9326/ab666d.

Estoque *et al.* 2018. "Assessing environmental impacts and change in Myanmar's mangrove ecosystem service value due to deforestation (2000-2014)." *Global Change Biology* 24(11): 5391-5410. https://pubmed.ncbi.nlm.nih.gov/30053344/; https://link.springer.com/article/10.1007/s10750-018-3673-1.

United Nations Statistics Division. 2020. "UN Comtrade." United Nations Statistics Division. Accessed June 30, 2020. https://comtrade.un.org/data/.

World Wildlife Fund (WWF). 2020. "Mangrove forests are one of the world's most threatened tropical ecosystems." World Wildlife Fund. https://wwf.panda.org/our_work/our_focus/oceans_practice/coasts/mangroves/mangrove_threats/.

Tanintharyi Weekly Journal. 2016. 4(18): 1, 18, 14-20.

Union Government of Myanmar Ministry of Labour, Immigration and Population. 2014. *The 2014 Myanmar Population and Housing Census (2014 MPHC)*. Naypyitaw: UGoM. https://reliefweb.int/sites/reliefweb.int/files/resources/Census%20Main%20Report%20%28UNION%29%20-%20ENGLISH_1.pdf.

Union Government of Myanmar (UGoM). 2018. *Pyidaungsu Hluttaw Law No. 29/2018: The Forest Law.* https://www.burmalibrary.org/en/pyidaungsu-hluttaw-law-no-292018-the-forest-law-sctteaaupde.

Yan, Wudan. 2019. "Illegal Charcoal trade threatens Myanmar's remaining mangroves." Mongabay. https://news.mongabay.com/2019/04/illegal-charcoal-trade-threatens-myanmars-remaining-mangroves/.

FOREST TRENDS

Forest Trends works to conserve forests and other ecosystems through the creation and wide adoption of a broad range of environmental finance, markets and other payment and incentive mechanisms. This brief was released by Forest Trends' Forest Policy, Trade, and Finance program, which seeks to create markets for legal forest products while supporting parallel transformations away from timber and other commodities sourced illegally and unsustainably from forest areas.

Other policy and information briefs can be found at www.forest-trends.org.

with support from:

NICFI
Norway's International Climate and Forest Initiative