Drivers of deforestation and forest degradation in Myanmar

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Acknowledgements

Executive summary

Much has been written about the direct and indirect drivers of deforestation and forest degradation in Myanmar in recent years. An overview of what is known was commissioned by the UN-REDD Programme and prepared in 2016. This current document presents the previous information in a condensed format and fills some gaps, although numerous gaps remain, which is addressed at the beginning (see section on *Limitations*) and again at the end of the report.

The report focusses on:

- the direct and indirect drivers;
- their impacts, especially related to areal extent;
- key spatial location of particularly the direct drivers; and
- potential future trends in extent, intensity and spatial location of drivers.

The reader will notice many guestimates and best guesses, especially in sections discussing the future and locations. Such *information* should therefore be understood as food for thought and expected to stimulate further discussions and additional research.

Direct drivers of deforestation in Myanmar

The most important driver of deforestation has been clearing for farming. Conversion for agricultural use have occurred in and outside of the Permanent Forest Estate (PFE), although there are differences of opinion as to the relative losses in the different forest categories. According to one estimate, agricultural expansion was responsible for approximately 1 million hectares of forest conversion between 2002 and 2014, with rubber and oil palm plantation establishment being the major drivers. The area allocated for agricultural development is more than twice the size, but many areas have not been planted and/or converted.

Current crop production is largely focused on rice (ca. 7 million hectares), although little is known about its impact on forests. Other important crops include pulses and beans (4.3 million hectares), and maize (530,000 hectares), a crop that has seen significant increases in production, largely in response to demand from China. Rubber (ca. 652,000 hectares) and oil palm (ca. 400,000 hectares, only in Tanintharyi) are other common crops.

The goal of the Master Plan for the Agriculture Sector (2000-2001 to 2030-2031) is to convert about 4 million hectares of *wasteland* for private industrial crop production, with rubber, oil palm, paddy, pulses, and sugarcane for export particularly encouraged. Based on the new Economic Policy that seeks *to establish an economic model that balances agriculture and industry and supports the holistic development of agriculture, livestock and industrial sectors so as to enable rounded development, food security and increased exports*, the general trajectory of increases in exports of major agricultural commodities and the development of transportation networks, forest conversion for agricultural production (especially corn and rubber) is expected to increase. In terms of area affected, direct drivers like mining and hydropower development will play a minor role. The shifting cultivation area has decreased since 2000 and is expected to decrease further. A recent spatial assessment found that only 1.6% of mangrove deforestation between 2000 and 2012 could be attributed to aquaculture. But interest in developing Myanmar's coastal aquaculture industry has emerged, particularly cultured shrimp for export, and supported by infrastructure development negative impacts on mangroves should not be discarded.

Direct drivers of forest degradation in Myanmar

While the impacts, locations and trends for the direct drivers of deforestation could be determined to some extent, this is virtually impossible for the direct drivers of forest degradation.

The Government of Myanmar (GoM), research and CSO/NGO sources concur that forest degradation has occurred for decades due to harvesting volumes for teak exceeding the annual allowable cut (AAC). The recorded harvest of other hardwoods, mostly dipterocarps, stayed well below the AAC until 2003. Since then, harvests of this category started to exceed the downwardly regulated AAC. There is no indication in the literature that legal logging is causing less damages to the remaining forests in some states and/or regions than in others.

Myanmar's illegal wood flow includes timber, fuelwood and charcoal. Between 2001-13, 10.2 million m^3 of Myanmar logs imported into global markets were not authorised for harvest. This equates to a 47.7% illegal logging rate. Illegal logging is taking place in many states and/or regions. The hotspot appears to be Kachin state, as timber (and charcoal) are from here easily exported to China. Fuelwood collection, forest fires and forest grazing are happening throughout the country, with the highest negative impacts in the Dry Zone.

Contrasting trends exacerbate composing a widely acceptable picture of the future. On one hand, the GoM has committed to improving the country's timber legality assurance system, especially since timber exports have dropped significantly to some European countries. The Myanma Timber Enterprise (MTE) recently issued a document to satisfy the demands of importers especially those in the EU who are required to satisfy the EU Timber Regulation.

The forest sector will also be covered independently by Extractive Industries Transparency Initiative (EITI). Myanmar is in the early stages of pursuing a Voluntary Partnership Agreement under the EU Forest Law Enforcement Governance and Trade (FLEGT) Action Plan and is seeking membership of the Programme for the Endorsement of Forest Certification Schemes (PEFC).

Reducing harvesting intensities and not exceeding the AAC for teak and other hardwoods will take time. Without increasing capacity to seriously address corruption and bribery, it is likely that many of the illegal activities will continue, as experiences from other countries indicate. A growing population – 85% of the population depends on solid fuels for cooking – will also require more energy, and fuelwood (and other biomass) will continue to be a major contributor to energy regeneration.

Overgrazing of forests by domestic livestock, is likely to be an issue in the future, especially in the Dry Zone. The increased purchasing power of Myanmar's population is increasing demand for animal products, including dairy products. The GoM has prioritized the support of dairy farming and would like to see the number of dairy cows increase significantly from just 500,000 in 2017. If the present rate of increase is maintained than the stock of ruminant animals will rise from 26 million in 2015 to 44 million in 2025, which will further degrade forests.

Numerous organizations are up-scaling improved cookstove dissemination. GoM policy is to achieve 100% electrification by 2030, which should lead to a reduction in biomass use (e.g. fuelwood and charcoal) for cooking. However, demand for charcoal from China may rather increase than decrease. There are two unknows here. First, there is a lack of clarity on the sources of fuelwood and its composition for domestic consumption. Second, considerable volumes of biomass are also used in industrial processes, such as in the garment sector. In Myanmar, it is flourishing as the last low-cost production frontier for factory relocation and diversification in Southeast Asia and rapidly expanding, similarly to other low-cost industries. Data on fuelwood

use by industries is extremely limited and it can be assumed that its contribution to forest degradation is significantly underestimated.

Indirect drivers of deforestation and forest degradation

Political and economic transitions can have substantial impacts on forests. Myanmar is transitioning from an authoritarian, centralized state with a highly regulated economy to a more decentralized and economically liberal democracy, which will affect the landscape.

The centrality of agriculture to the Myanmar economy indicates that emerging policies and strategies, and improved market access and technologies will lead to potentially greater rates of deforestation due to the introduction of well-funded investors, weak land-tenure arrangements, low governance effectiveness and overlapping and conflicting priorities of the forestry and agricultural sectors. A favorable investment climate, will also increase foreign direct investment in manufacturing, which will lead in the short and medium term to increases in the use of fuelwood.

Seven indirect drivers of deforestation and forests degradation were identified in the 2013 REDD+ Readiness Roadmap. Since then other publications have added to the list. But there is no prioritization, and addressing all the drivers would be overwhelming.

This report has therefore not touched on the obvious indirect drivers, such as inadequate enforcement of the law and safeguards, weak governance fostering corruption, illegality and organized crime and syndicates in many economic sectors, long-running internal conflicts and/or poverty and inequality. Instead, it focusses on the following three drivers that need to be addressed to generate sufficiently sizeable results through REDD+ implementation:

- overlapping and conflicting priorities and agendas by the forestry and agriculture sectors;
- legal frameworks governing decisions on land and its management; and
- land-tenure insecurity, which affects levels in investments in sustainable management of natural resources.

Overlapping and conflicting priorities and agendas by the forestry and agriculture sectors are a major concern. The significant shift from forest to non-forest uses, particularly agriculture, has been the largest driver of deforestation. With higher agricultural production goals, increased foreign investment, and increased exports, these historical patterns will only increase. The Ministry of Agriculture, Livestock and Irrigation (MoALI) and Forest Department are targeting the same lands to achieve their future goals and mandates. This creates an inherent and untenable conflict. There is still no process for tackling this conflict, which include the targets of the 30-year Master Plan for the Agriculture Sector (2000-01 to 2030-31). They clash with the planned increase of Reserved Forest (RF) and Protected Public Forest (PPF) by roughly 4 million hectares. In addition, land administration is fraught with overlaps in jurisdictional authority and bureaucratic inefficiency.

The lack of a land-use policy and related land-use law was a key driver of deforestation and forest degradation in the past. It led to many land-use conflicts and weak governance of tenure of land, aquatic resources and forests. It did not support inclusive public participation and consultation in decision-making processes related to land use and land resource management. The 2016 Land Use Policy (LUP) addresses these issues, especially by decentralizing some decision making to district levels. But capacity to bring environmental and social considerations into development decisions and to organize inclusive processes is still poor. Capacity of lincensing permitting

authority is also weak, which has been recognized in the draft of the National Environmental Policy.

To bring about a change will take time, require availability and accessibility of suitable information, and stronger capacities. Furthermore, it necessitates the willingness to implement policies and seriously enforce the law, which until now has been frequently undermined by influential people and condoned by people at all levels. It will also require transparent and inclusive processes that engage all relevant stakeholders. If such steps will not be taken, the *uncontrolled* allocation of agricultural concessions can be expected to continue to be a major driver of future forest loss. Land-use conflicts will also exacerbate.

Tenure security is weak in Myanmar. The state retains ultimate ownership of all land and the right to withdraw land-use rights if certain conditions are unmet. The 2012 Farmland Law allows farmland cultivation rights to be attained and traded through land-use certificates (LUC). However, the costs of obtaining LUCs effectively limited the acquisition of LUCs to only about 15% of farm households. Farmers without LUCs remain vulnerable to land confiscations. The vague definitions of land use in this law have enabled forested land and land occupied by farmers lacking LUCs to be legally designated as Vacant, Fallow and Virgin Lands and therefore eligible for allocation as an agricultural concession. Consequently, some lands have been confiscated from smallholder farmers, allocated as land concessions for activities by investors, and subsequently deforested.

Recognized tenure, equal and secure access to land, and control over land, are prerequisites for any kind of investment, economic development and sustainable management of natural resources. However, strengthening tenure is not a *panacea* for sustainable forest management, as it can result in an increase in commercial farming. But no tenure or rights usually results in the mismanagement of natural resources.

Barriers to the "+" activities

Barriers to conservation of forest carbon stocks can be assumed to be similar to barriers to biodiversity conservation, and include:

- weak systematic and institutional capacity to plan and manage the expanded national PA system,
- insufficient management capacity,
- insufficient motivation at the PA level to manage local threats and achieve conservation outcomes, and
- lack of sustainable financing mechanisms.

Barriers to afforestation/reforestation include:

- Fragmented and unclear land ownership, increasing the unit costs of plantation establishment,
- A high rate of plantation failure, due to an absence of a plantation policy (specifying, for example, species selection and scheduled maintenance activities), combined with human resource and financial constraints,
- Unclear and variable demand for forest plantation products, which undermines private sector interest in investment, and
- Constraints on community marketing of plantation products (this barrier has been removed through the revised Community Forestry Instructions (2016).

Barriers to rehabilitation of degraded forests and to sustainable management of forests are actually the same as the indirect drivers that lead to the causes of degradation and non-sustainable management.

Remaining gaps in the current knowledge

Much of what we know about the drivers of deforestation and forest degradation in Myanmar is based on case studies, outdated and/or poor statistics and/or conventional wisdom, which often leads to pointing fingers at the poorer segments of society. In addition, while we know that the future will be very different to the past, we do not know what the future might look like. In general, there is optimism about future prospects of Myanmar's economy and its population. But how this will translate into land-use change is open to speculation.

Filling knowledge gaps in several areas, would significantly help to more confidently develop measures and policies for a national REDD+ strategy. Household and industrial fuelwood use is almost certainly under-estimated. The extent to which agricultural expansion is happening in non-forest areas, or leads to the clearance of fairly intact natural forests is unknown. Additional spatial analyses and consultations are required at sub-national levels to refine assessments of deforestation rates. The data are even less clear for forest degradation. Finally, the actual land cover of VFV land is unclear. How much of it is forested, and especially the quality of this forest, is unknown.

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Acronyms

AAC	Annual Allowable Cut
ADB	Asian Development Bank
ASEAN	Association of Southeast Asian Nations
CSO	Civil Society Organization
DALMS	Department of Agricultural Land Management and Statistics
ECD	Environmental Conservation Department
EcoDev	Ecologically Progressive Ecosystem Development
EIA	Environmental Impact Assessment
EITI	Extractives Industry Transparency Initiative
ESIA	Environmental and Social Impact Assessment
EU	European Union
FD	Forest Department (MoNREC)
FDI	Foreign Direct Investment
FFI	Fauna & Flora International
FLEGT	Forest Law Enforcement, Governance and Trade
GDP	Gross Domestic Product
GHG	Greenhouse gas
GoM	Government of Myanmar
HCV	High Conservation Value
IFPRI	International Food Policy Research Institute
IFC	International Finance Corporation
INDC	Intended Nationally Determined Contribution
IPPC	Intergovernmental Panel on Climate Change
ITTO	International Tropical Timber Organization
JICA	Japan International Cooperation Agency
LUC	Land Use Certificate
LUP	Land Use Policy
MADB	Myanmar Agricultural Development Bank
MOAI	Ministry of Agriculture and Irrigation
MoALI	Ministry of Agriculture, Livestock and Irrigation
MOEE	Ministry of Electricity and Energy
MoNREC	Ministry of Natural Resources and Environmental Conservation
MRPPA	Myanmar Rubber Producers and Production Association
MRSDS	Myanmar Rice Sector Development Strategy
MTE	Myanma Timber Enterprise
NGO	Non-Governmental Organization
PA	Protected Area
PAM	Policy and Measure
PEFC	Programme for the Endorsement of Forest Certification Schemes
PFE	Permanent Forest Estate
PPF	Protected Public Forest
RECOFTC	The Center for People and Forests
RF	Reserved Forest
REDD+	Reducing Emissions from Deforestation and Forest Degradation, Conservation, Sustainable Management of Forests and Enhancement of Forest Carbon Stocks
SME	Small and Medium Sized Enterprise
USDA	United States Department of Agriculture
VFV	Vacant, Fallow and Virgin
VFVLM	Law Vacant, Fallow and Virgin Lands Management Law of 2012

Background

This report provides a review of the current knowledge of key direct and indirect drivers of deforestation and forest degradation in Myanmar, and barriers to the "+" activities[1]. The findings in this report are largely based on a report entitled *Identifying drivers of deforestation and forest degradation in Myanmar* prepared by an international consultant in 2016. This previous report was discussed during a national consultation workshop in February 2017, involving stakeholders from each of the 15 states/regions of Myanmar, which generated additional information. The result was a lengthy document (164 pages) with a wealth of information.

The current document presents this information in a condensed format with a focus on key *direct and indirect drivers*. It also fills some gaps of the previous report (and provides some updates) – for example, the previous report did not cover barriers to the "+" activities. Numerous information gaps, some of them major ones, remain.

The focus on the report is on:

- the direct and indirect drivers;
- their impacts, especially related to areal extent;
- barriers to the "+" activities
- key spatial location of particularly the direct drivers; and
- potential future trends in extent, intensity and spatial location of drivers.[2]

Limitations of the report

In reading this report, it will become quickly clear that quite sizeable knowledge gaps remain, that some data and information are questionable (or outdated) and that there are significant inconsistencies among data sources. Figure 1 may serve as an apt example. For the same landscape in Myanmar, very contrasting information is presented in the two pie charts.[3]
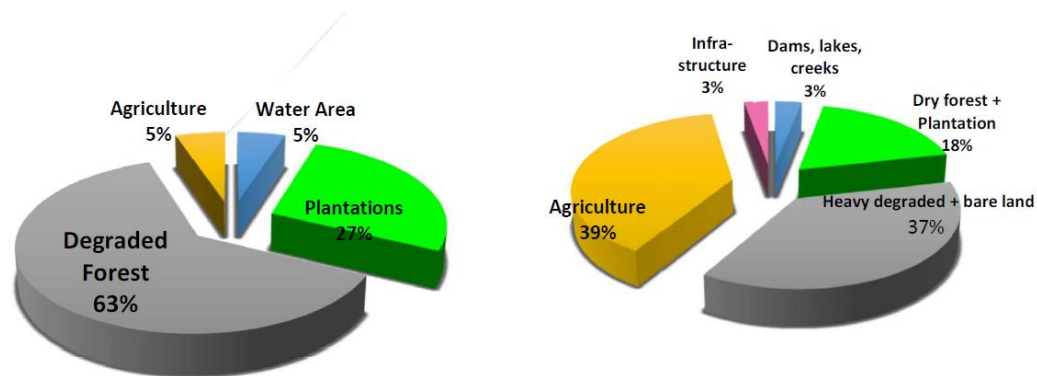
Figure 1: Land uses based on official (left figure) versus Google Earth data (right figure).

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[1] The "+" activities refer to conservation, sustainable management of forests, and enhancement of forest carbon stocks – three of the five REDD+ activities that conserve carbon stocks or enhance removals.

[2] For information on *Forest Cover Change* and *Regional, Forest Type Patterns of Note* and *Recommendations for Options and Pathways to Address Direct and Indirect Drivers* please refer to the previous report.

[3] Source: ADB, 2017. *Ecosystem services and sustainable livelihoods in the Central Dry Zone, Myanmar.* Asian Development Bank, Manila.

Much of what is known, or what is thought to be known, about land-use changes and their drivers is derived from case studies, with probably the best example from Tanintharyi districts in relation to oil palm production. For oil palm the limited geographic scope of the case study is not problematic as oil palm is only grown in Tanintharyi. But the same is not the case for other products and other direct drivers.

Also, in many cases shifts in land use remain unclear, i.e. does a particular industrial crop replace a dense-canopy natural forest, a degraded forest, another industrial crop or shifting cultivation areas? Or does a reservoir for a hydro-electricity facility inundate what used to be a natural forests or agricultural areas and human settlements.

In addition, and that is the case for deforestation and forest degradation alike, many issues are politically sensitive, as some agents of land-use change and forest harvesting are acting outside the law.

The rates of change between forests and non-forest differ at sub-national levels. Based on the latest Forest Department data, Ayeyarwady, Kayah and Mandalay had the highest relative rates of deforestation, while Yangon, Tanintharyi, Bago, Kachin and Shan states are least affected by deforestation. However, other forest cover assessments contain other findings for Tanintharyi, Kachin and Shan. Thus, it is recommended that additional spatial analysis and consultation occur at sub-national levels to refine the assessments.

Some definitions

Before exploring the concept of drivers, it is important to understand what is meant by the processes of deforestation and forest degradation. Deforestation is the process of converting forest land to another land use (as per the six land-use categories identified by the Intergovernmental Panel on Climate Change (IPCC): forest land, cropland, grassland, settlement, wetland and other land). In other words, the primary use of the land ceases to be forest and becomes one of the other land-use categories. Forest degradation is the process of losing carbon stock from forest land, i.e. the land use remains forest, but the amount of carbon stock in the forest is reduced.

There remains considerable confusion about direct and indirect drivers.

Drivers can be separated into:

- **'Direct drivers'** (also called 'proximate causes') i.e. human activities or immediate actions that directly impact forest cover and lead to the loss of forest carbon; and
- **'Indirect drivers'** (also called 'underlying causes' or 'driving forces') i.e. the complex interactions of social, economic, political, cultural and technological processes that bring about direct drivers.

Examples of drivers of deforestation and forest degradation are provided in Table 1.

Table 1: Examples of drivers of deforestation and forest degradation

Direct drivers	Indirect drivers
• Deforestation: subsistence and commercial agriculture, surface mining, infrastructure development and urban expansion • Forest degradation: legal and illegal timber harvesting, forest fires, livestock grazing in forests, fuelwood collection and charcoal production	• At the international level: market behaviour (supply and demand), fluctuation in commodity prices, fluctuation in currency exchange rates • At the national level: population growth, behaviour of domestic markets (particularly for agricultural goods), national policies that favour non-forest land uses, poor governance, fiscal incentives and subsidies (e.g. government subsidies for production of certain agricultural crops) • At the local level: poverty, food insecurity, changes in household behaviour

In identifying drivers, it is critical to distinguish between deforestation and forest degradation as the direct drivers are often different and they also need to be addressed by different policies and measures (PAM) in most cases. However, it also needs to be recognized that some drivers can initially lead to forest degradation, which over time and in combination with other drivers can lead to deforestation. For example, fires, livestock-grazing and fuelwood collection can in extreme cases lead to deforestation. As can shifting cultivation, when fallow periods are reduced to such an extent that forests cannot recover.

Direct drivers of deforestation in Myanmar
Agriculture

The largest impacts on forests have historically come from clearing for agriculture or for potential use for agriculture. Clearings for agriculture have occurred inside and outside of the PFE, although there are differences of opinion as to the relative losses in the different forest categories.

Agricultural expansion was responsible for approximately 988,000 hectares of forest conversion between 2002 and 2014 (Treue *et al.,* 2016), with agricultural plantation crop establishment being the major post-forest land use. A Forest Trends analysis found that between 2010 and 2013, land allocations for agribusiness concessions saw an increase of 170 % (from 809,371 hectares to 2,104,365 hectares). However, *allocation* does not necessarily translate into *planting* (Table 2). A 2013 review of Ministry of Agriculture and Irrigation agribusiness concession data around Myanmar found that despite the agreed development schedules, most concessions made little progress in implementing their development plans. Only 24% of the Vacant, Fallow Virgin land concessions and 27% of the forestland concessions were developed or planted, although most were granted over five years before the assessment and should have been fully developed according to the rules for concession grants (Byerlee *et al*., 2014).

After 2011, the transition towards democratic reform and the opening of the economy under former President U Thein Sein saw greater promotion of industrial crop development as an attractive sector for economic development, livelihoods and foreign investment. It was hoped that agricultural GDP would increase annually on average 1.8% in the Fifth Five-Year short-term plan (2011-2012 to 2015-2016) (JICA, 2013). The goal of the Ministry of Agriculture, Livestock and Irrigation's Master Plan for the Agriculture Sector (2000-2001 to 2030-2031) is to convert 400,000

hectares of *wasteland* for private industrial crop production, with rubber, oil palm, paddy, pulses, and sugarcane for export particularly encouraged. But a range of land governance issues related to lack of recognition of customary land tenure, lack of adequate redress and dispute resolution, weak investment climate, lack of strong producer organizations, weak extension services, poor access to technology, and a range of other issues has limited the intensification and increased production in the agricultural sector.

Table 2: Agribusiness Concessions by State and Region, 2010-2013 (cumulative in hectares)

State/Region	Allocated	Allocated	Allocated	Planted	% Planted
	2010-2011	2011-2012	2012-2013	2012-2013	
Ayeyarwady	78,247	115,677	135,704	86,186	64%
Bago	8,001	21,140	80,998	36,856	46%
Chin	0	624	705	48	7%
Kachin	241,266	565,174	558,938	69,747	12%
Kayah	0	0	0	0	0%
Kayin	875	1,623	14,142	6,421	45%
Magwe	81,946	85,507	88,860	38,829	44%
Mandalay	4,168	2,534	22,681	5,867	26%
Mon	0	0	0	0	0%
Nay Pyi Taw	0	2,998	7,104	2,111	30%
Rakhine	0	3,167	53,284	5,332	10%
Sagaing	40,492	104,924	215,862	7,909	4%
Shan	47,387	65,003	131,051	48,725	37%
Tanintharyi	271,785	402,212	767,677	145,466	19%
Yangon	12,536	12,537	32,459	30,854	95%
Total	786,703	1,383,121	2,109,465	484,352	23%

Source: Woods (2015)

Between 2002 and 2014, new large-scale plantations for agricultural crops (e.g. rubber, palm oil and betel nut) occurred in Kachin, Sagaing and Tanintharyi. Kachin's plantation area (mostly rubber) increased by 74,000 hectares, primarily as extensions of existing agriculture and plantations along rivers on the edge of degraded and intact forest areas. Sagaing had a modest (3.5%) expansion of the already large agricultural area, while plantations expanded by 75.6%. In Tanintharyi, new non-forest and new non-oil palm plantations (e.g. rubber, betel nut) tend to be extensions of existing agricultural and plantation areas along rivers and main roads (Treue *et al*., 2016).

Although currently crop production at the national level is largely focused on rice, the impact on forests is not known. Other important crops include pulses, maize and sesame. Maize has seen significant increases in production, largely related to Chinese demand, although pulses continue to account for the largest export quantities and value (Table 3), with India being the dominant importer. Aquaculture, rubber and oil palm are other common crops on formerly forested land.

The agriculture sector suffers from low productivity and yields. It contributed roughly 10-15% to annual real GDP growth over the past four years, yet employed over half of the country's labor force (Rab *et al.,* 2015). The new Economic Policy seeks *to establish an economic model that balances agriculture and industry and supports the holistic development of agriculture, livestock and industrial sectors so as to enable rounded development, food security and increased exports* (Republic of the Union of Myanmar, 2016[g]). How the Economic Policy will achieve such balance, and how it will influence the sector goals is not yet clear. However, the intention of promoting 'holistic development,' mention of a financial system that provides sustained capital to farmers,

households and businesses, strengthened property rights, and promotion of SMEs, all in the context of balanced development between the regions, offers hope that economic growth will seek to benefit all people.

Based on the general trajectory of increases in exports of major agricultural commodities (Table 3), and the priority the GoM is giving to agricultural development and exports, such increases are expected to continue.

Table 3: Exports of Major Agricultural Commodities from 1996-97 to 2013-14

	Categories	1996-97		2011-2012		2012-2013		2013-2014	
		Qty (000 MT)	Ks. (Mil)	Qty (000 MT)	Ks. (Mil)	Qty (000 MT)	Ks. (Mil)	Qty (000 MT)	Ks. (Mil)
1	Rice	93.1	125.8	707.2	267.2	1396.8	544.1	1192.3	460.1
2	Maize	102.5	107.2	166.5	46.6	566.2	200.1	933.6	285.8
3	Pulses	594.8	1272.1	1296.4	986.1	1483.7	961.7	1300.9	896.3
4	Sesame	52.5	191.0	35.5	57.9	182.8	278.3	172.3	340.6
5	Others	33.0	175.0	52.1	139.8	92.7	228.5	156.3	231.5

Source: Ministry of Agriculture and Irrigation, 2014: Country Statement of Myanmar

Rice

The majority of Myanmar's farmers grow rice, which accounts for about 64% of total arable land. The Ayeyarwaddy delta (Ayeyarwaddy, Yangon, and Bago) produces around 50% of the total. The central dry zone (southern part of Sagaing, the middle and western part of Mandalay Region, and most parts of Magway), and Rakhine coastal areas are other major rice producing regions.[4] In 2000, rice was grown on 6.3 million hectares, which increased to 6.9 million hectares in 2013.

The Myanmar Agricultural Development Bank (MADB), a government enterprise, currently provides seasonal crop production loans to farmers. The MADB provides 247,000 Kyat (Ks) (US$210) credit per hectare to paddy farmers with an interest rate of 5%. However, there is a 4-hectare limit. Seasonal loans provided by MADB in 2014/15 totaled US$960 million. The government also rents farm machinery to farmers for a nominal fee.

Rice production is the most significant driver of mangrove loss, accounting for 87.6% of mangrove deforestation between 2000 and 2012 (Richards and Friess, 2016). Of particular concern is the Ayeyarwady Delta. Almost all deforestation in the Delta has been for rice cultivation. A 2014 assessment found that the Ayeyarwady Delta mangroves shrank by 64.2% between 1978 and 2011, from 262,300 to just 93,800 hectares, with much converted to smallholder rice production. An average of 5,100 hectares, or more than 3% of the forest was lost every year during this period (Webb *et al.*, 2014).

According to the targets of the Myanmar Rice Sector Development Strategy (MRSDS), by *2030, milled rice production must reach 10.13 million mt for local food consumption and at least 6 million mt for international trade[5]. This will be achieved by maintaining 7.70 million hectares of rice area, with an average yield of at least 4.20 mt/ha per cropping season.* It is unclear whether this means an expansion of the area under rice, but the MRSDS foresees most production

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[4] MOAI, 2015. Myanmar Rice Sector Development Strategy. Ministry of Agriculture and Irrigation, Nay Pyi Taw.
[5] This means a production increase from about 10.7 million mt in 2013 to 16.13 million mt by 2030.

increases through enhancement of rice productivity and efficiency in the rice value chain, and reduced postharvest losses.

Corn

Corn production has played a role in deforestation, although its impacts have not been studied. Myanmar's major maize production area (530,000 hectares in 2016)[6] is in the central part of the country, particularly in Shan State, which accounts for about 52% of total production. The Ayeyarwady (delta regions), Magwe, and Sagaing regions make up the balance. Most farmers use high-yielding hybrid seeds provided by or purchased from foreign entities. In Marketing Year 2016/17, total corn production is estimated to increase by 6% due to the expansion of rain-fed corn growing areas and increased demand from neighboring countries (see also Figure 2).

Corn is increasingly farmed through contract farming. Seventy-five percent of production is exported to China. In Shan State, corn is now the second largest crop by area planted and volume produced, after rice. Despite the lack of government data, trade sources report that the corn planted area has steadily increased in recent years due mainly to lower production costs and higher relative profitability. Domestic corn consumption is also expected to grow in line with the growth of Myanmar's livestock sector, especially poultry and swine. According to another report, *despite unrealistic and contradictory official statistics, even by conservative estimates, feed demand has risen by 14% annually since 2012 and will keep rising by 10% through 2025*.[7]
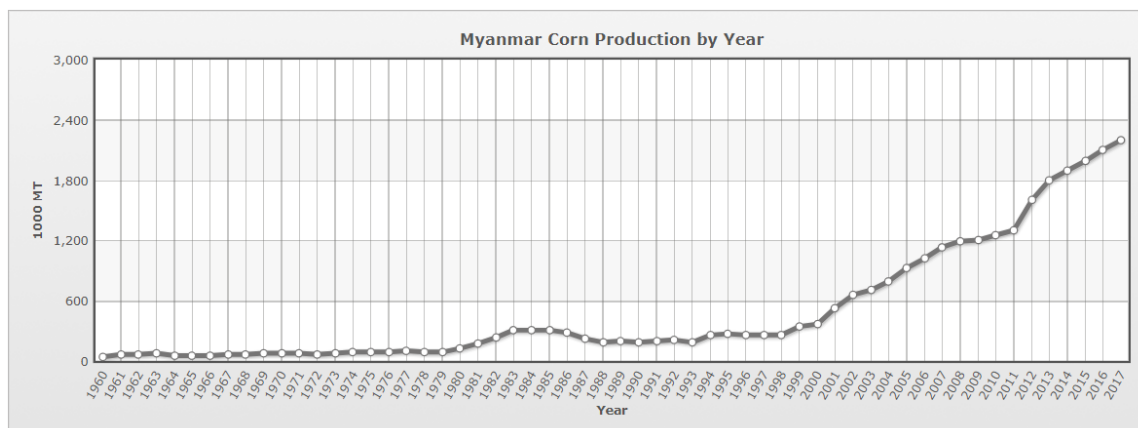
Figure 2: Corn production[8]

The GoM provides technical assistance to maize farmers, but no subsidies. There are no trade restrictions for corn exports; however, permits are required for the import of corn.

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[6] See: https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Grain%20and%20Feed%20Annual_Rangoon_ Burma%20-%20Union%20of_4-29-2016.pdf

[7] http://www.efeedlink.com/contents/09-09-2016/37483f80-264f-4cc9-95d4-888bde01d133-d006.html

[8] https://www.indexmundi.com/agriculture/?country=mm&commodity=corn&graph=production

An increase in corn production can be expected to be partially achieved through the expansion of the cultivated area. If developments are similar to other Southeast Asian countries (e.g. Philippines, Thailand, Viet Nam) some deforestation can be expected).[9]

Pulses and beans

In 2016/17, the area planted to pulses was estimated at 4.3 million hectares.[10] They are sown mainly in the central dry zone, but are also found in the delta, hilly, and coastal zones (Raitzer *et al.*, 2015). Beans and pulses are normally grown immediately after the harvest of the main rice paddy crop in the delta region. They are also grown as a monsoon crops in the central plains. India's demand accounts for 80% of Myanmar's pulse and bean exports (USDA, 2016). A recent bumper harvest of pulses and beans in India drove down import demands, forcing New Delhi to impose restrictions on imports from Myanmar. Unless this situation is reversed and there is no significant increase in pulse and bean production, impacts on forests will likely be negligible in the future.

Aquaculture

Mangrove loss is often attributed to aquaculture (mainly shrimp) production, although a recent spatial assessment found that only 1.6% of mangrove deforestation between 2000 and 2012 could be attributed to aquaculture in Myanmar (Richards and Friess, 2016). Similarly, another spatial analysis attributes most mangrove losses between 2000 and 2013 to agricultural expansion and large-scale deforestation (Webb *et al.*, 2014).

There is emerging interest in developing Myanmar's coastal aquaculture industry, particularly cultured shrimp for export (Fabrikant, 2013). Pond aquaculture represents major future potential for both small-scale and commercial income generation. Both small- and industrial-scale agriculture and aquaculture remain heavily limited by infrastructure constraints (Dapice *et al.*, 2010; Ministry of Agriculture and Irrigation, 2010; Asian Development Bank, 2012), but infrastructure development is a domestic priority (Webb *et al.*, 2014). Hence, it is likely that there will be further impacts on Myanmar's mangroves.

Rubber

MOAI estimates that in 2015-2016 total rubber planted area was 652,105 hectares and rubber was harvested from 297,216 hectares.[11] Total production was estimated at 227,533 tons. These figures show a huge gap between planted area and harvested area. In the past decade, the percentage of trees tapped did not rise above 50% of the total trees planted. In 2005-2006, 48% of trees planted were tapped; in 2008-2009 during the rubber price spike, only 34% of the trees planted were tapped; and in 2015-2016, as a result of the steady rubber price drop, 46% of the rubber trees planted were tapped. The difference between planted and harvested area is likely

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[9] See e.g.: https://www.bangkokpost.com/learning/learning-news/912868/hit-by-bald-mountain-claims-cp-vows-to-make-everything-right-.
[10] https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Grain%20and%20Feed%20Annual_Rangoon_Burma%20-%20Union%20of_4-29-2016.pdf
[11] See also figures by the Myanmar Rubber Planters and Producers Association (MRPPA) at http://www.thaiembassy.org/yangon/th/business/5949/65287-News-Review-of-Rubber-Industry-in-Myanmar.html

due to rubber plantation expansion. The low percentage of trees in production implies that the rubber sector will continue to expand (Van Asselt *et al.*, 2017).

Historically, rubber was produced only in the south of Myanmar. Although the south continues to account for the major share of production, planting has increased in the northern and central regions. In 2014-2015, Mon, Tanintharyi, and Kayin accounted for 68% of planted rubber area and 87% of the harvested area (Figure 3). The more northern states and regions of Shan, Bago, and Kachin accounted for 24% of planted area, but only 10% of production.

In the past decade, rubber planting has increased across Myanmar. Rubber production expanded the fastest in Ayeyarwady Region, where planted area increased from only 400 hectares in 2004-2005 to 13,600 hectares in 2014-2015. Kachin and Shan states experienced similar levels of growth, from 1,200 and 4,000 hectares to 31,000 and 74,200 hectares, respectively. Further, in historical rubber production areas, although growth was comparatively slower, the planted area still doubled over the same period. In all regions, the price spike from 2006 to 2008 drove rubber expansion, with the greatest growth taking place in Shan, Kachin, and Ayeyarwady.
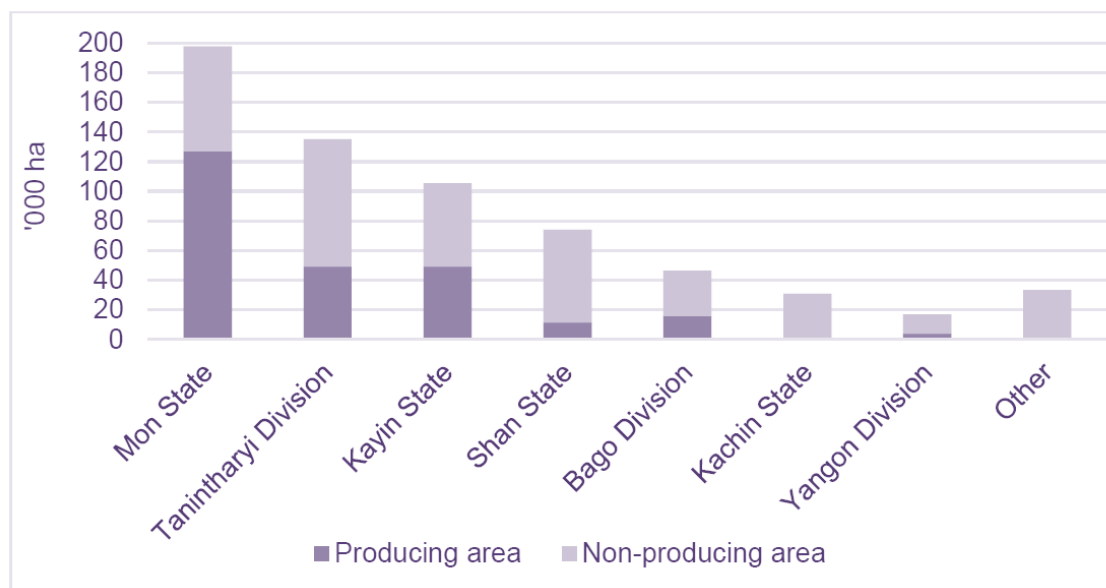
Source: Calculations based on *Myanmar Agriculture Statistics 1998-2010* (MOAI 2010).
Note: Producing area is land that is planted with mature rubber trees that are producing rubber. Non-producing area is land that is planted to rubber, but the trees are not yet mature (non-producing) or are mature but are not being tapped.

Figure 3: Myanmar total rubber producing and nonproducing area

The GoM has established a 30-year rubber development plan, and set the goal of reaching 607,000 hectares (but compare with MOAI figure on the previous page) and an annual production of 300,000 mt by 2030 (Kramer and Woods, 2012). Although the National Expert Strategy produced by the Ministry of Commerce suggests that production increases are more likely from area expansion than from yield increases on existing plantations, the Myanmar Rubber Producers and Planters Association observes that, increasingly, new rubber plantations are established on old plantation land or land previously used for other agricultural crops[12].

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[12] U Myo Thant, Vice President, Myanmar Rubber Producers and Planters Association, *pers comm*.

The large-scale rubber concession model in border areas with China are part of an opium-substitution program in Kachin and Shan states. It is quite different from the state-backed, smallholder-driven rubber production programs along the border with Thailand in the south of the country, which have contributed to the livelihoods of smallholder farmers (Woods, 2012). The rubber concession model leads to deforestation, whereas in the south rubber is planted on areas that were previously used for agriculture, although there are exceptions to the rule. The area of rubber planted in Tanintharyi Region has increased 50% between 2008 and 2009 (80,000 hectares) and 2012-2013 (120,000 hectares), according to regional government data, and some of this planting can be attributed to land speculation.

While currently most rubber is exported to China, the increasing interest of, and investments by Malaysian and Thai companies in Myanmar indicates that the area under rubber will increase, especially if rubber wood will be used for producing furniture. To what extent this may lead to deforestation is not known.

Oil palm

In Tanintharyi, a 30-year plan was launched in 1999 to develop oil palm plantations to achieve cooking oil self-sufficiency. The aim was to develop 200,000 hectares as oil palm plantations, rising to 280,000 hectares by 2030 (Aye Nyein Win, 2016).

By now, about 400,000 hectares have been allocated by the GoM to 44 companies to develop plantations in the Kawthoung, Myeik and Dawei Districts in Tanintharyi.[13] Table 4 shows the area planted to oil palm in each of these districts in 2014 and deforestation in 2014 for oil palm and rubber combined (deforested area includes some high conservation value forests). Deforestation for oil palm and rubber increased significantly after 2011, reaching about 25,000 hectares in each district in 2013. As Table 4 shows, in 2014 rates increased to 35,000 hectares in Myeik, and 27,000 hectares in Kawthaung, and decreased to 20,000 hectares in Dawei in 2014. Across Thanintharyi, deforestation has been highest in districts with oil palm concessions. Of the 44 companies concerned, apparently 43 are Myanmar-owned (three foreign companies have Joint Venture Agreements with local companies), and one is the result of FDI (Baskett, 2015).

Assessments of land suitability for oil palm establishment have not been carried out, and field surveys have revealed significant logging and burning on steep slopes, and a lack of terracing, prior to planting (Baskett, 2015). Further, the social dimensions of oil palm production in Tanintharyi raise concerns, given the complexity of customary use of lands and ethnic Karen evictions over time. Land-use claims by Karen populations seeking to return to traditional territories since the tentative ceasefire with the Karen National Union (armed Karen ethnic organization) present new challenges to the legality and ethics of oil palm production, rezoning for conservation, and resettlement of Internal Displaced Persons and refugees (Woods, 2015).

Table 4: Tanintharyi districts with oil palm plantations

	Area planted in 2014 (hectares)	Area deforested for oil palm and rubber in 2014 (hectares)
Kawthoung District	114,646	27,000
Myeik District	18,721	35,000

[13] Woods (2015) refers to 770,000 hectares that have been allocated to the private sector for oil palm development in Myanmar.

Dawei District	6,880	20,000
Total area planted:	140,247	
Total area allocated:	405,000	

Source: Adapted from Baskett (2015)

The current business model of providing large concessions to mainly inexperienced domestic and foreign investors to produce oil palm has had limited success in substituting imports (Figure 4).
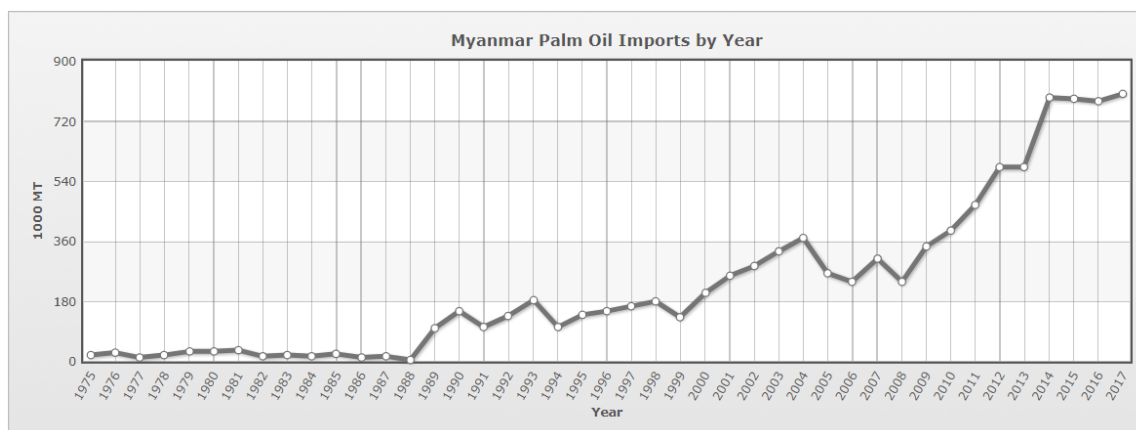

Figure 4: Myanmar palm oil imports (1975-2017)

The consumption of edible oils in Myanmar (currently well below the developing country average of 16.7 kg/capita/year) will grow rapidly. There is not yet any indication that domestic palm oil would be preferred in the market. Constraints to increasing production include poor roads and high transport costs, which may change with investments in the expanding road network. The lack of financing for investments in mill capacity, or in a systematic program to utilize suitable genetic stock, a lack of adaptive research and location-specific technical information on production practices, and high turnover for migrant labor recruited and housed by the plantations are all challenges to increasing production.

In 2015, inactive concessions on Forest Reserves with intact forest cover were cancelled under the Vacant, Fallow and Virgin Land Law (Baskett, 2015). Significant progress has been made on securing remaining HCV through Forest Department collaboration with FFI (in Myeik/Kawthoung Districts) and the Wildlife Conservation Society (in Dawei District) through a 10-year district forest management planning process. This process has ensured that large contiguous remaining old growth/primary forests remain within the Permanent Forest Estate.

The destruction of natural forests in Tanintharyi has been much criticized and publicized. Due to the attention it has received in recent years and an oil palm sector assessment, supported by the OneMap Myanmar Project, addressing land-use conflicts[14], it is likely that particularly in the short to medium term expansion of oil palm plantations will slow down or stop.

Shifting cultivation

As mentioned earlier, depending on population and land-use pressure, which affect the length of fallow periods, the impact of shifting cultivation can shift from forest degradation to

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[14] https://www.mmtimes.com/business/23014-tanintharyi-region-starts-palm-oil-sector-land-review.html

deforestation. As land-use pressure can be expected to increase in Myanmar's uplands, it is covered in this section of the report.

Shifting cultivation, called in Myanmar language "*shwe pyaung taung ya*" is the dominant agricultural system in Myanmar's upland areas. Shifting cultivation areas include a diverse mosaic agricultural land with many trees retained. Many shifting cultivation practices include setting aside areas from rotations to maintain as natural forest. About 42% of the country's population lives in upland areas and is likely to be practicing some form of shifting cultivation (Anderson, 2015). According to estimations by the Forest Department around 6-7 million hectares[15] are under shifting cultivation, with annual rotating cultivation areas of about 300,000 hectares[16]. The size of natural forests cleared every year for shifting cultivation is not clear. Chapter 3, GHG Inventory, INC Myanmar mentions the following: *Forest areas that were slashed and burnt for growing cash crop but left for natural regeneration after some years, and that do not change permanently to other land use (estimated 15,000ha/year).*

Recent research indicates that in Myanmar (as well as for other countries in Southeast Asia) shifting cultivation areas have decreased drastically since 2000. In Myanmar, it is estimated that shifting cultivation will mostly disappear sometime between 2060 and 2090, if conflicts between the Union Government and ethnic armed organizations are resolved.[17]

Mining and infrastructure development
Mining

The most relevant source of information on mining impacts on forests in Myanmar was recently completed by EcoDev[18], providing the first publicly-available, nation-wide inventory of existing and potential mining sites in Myanmar.

More than 46,000 hectares of mining areas were identified that are very likely to exist (Table 5). Including potential mine sites, the area increases to 83,600 hectares. About 88% of the mining areas are in Kachin, Sagaing and Mandalay.

Between 2002 and 2014, the area of mines increased by 141.7% in Kachin and 743.6% in Sagaing (Treue *et al.*, 2016). Most mines were established outside forest reserves and protected areas[19]. Mine establishment brings associated infrastructure development such as roads and settlement, and these are additional to the impacts of mines on forests. However, there are no data available on the matter.

The future of mining in Myanmar is currently unclear, as the former Ministry of Mines is now a Department under MoNREC and a new direction for the industry is being drafted. Based on interviews with representatives of the Mining Department, no new permits are being issued. Revisions of the Mining Rules (of 1996) are under discussion. Efforts are underway to address illegal extraction of minerals by improving collaboration between regional and state ministers and

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[15] However, based on Department of Agricultural Land Management and Statistics (DALMS), data shifting cultivation affects between 2-4 million hectares of mostly unclassified forested land areas.
[16] See Draft National REDD+ Strategy of May 2017 (p. 16).
[17] http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0184479
[18] https://www.researchgate.net/publication/301730995_Mining_in_Myanmar_Remote_sensing_of_mining_change_between_2002_and_2015
[19] Although representatives of the Mining Department also mentioned that most mining occurs on forestland.

authorities, and the mining staff in each state and region. Although no new licenses/permits are being granted, existing operations continue at a rapid pace.

Table 5: Mining area (in hectares) by state/region and certainty level in 2015

State/Region	Mine (high certainty)	Probable Mine (medium certainty)	Possible Mine (low certainty)	Total number of hectares
Ayeyarwady	21	94	5	120
Bago	1,706	560	279	2,545
Chin	12	-	10	22
Kachin	19,901	2,045	1,071	23,017
Kayah	625	2	-	627
Kayin	122	30	-	152
Magway	799	585	-	1,384
Mandalay	6,528	4,134	3,594	14,256
Mon	474	292	50	816
Naypyitaw	115	85	16	216
Rakhine	-	-	6	6
Sagaing	14,770	15,114	3,510	33,394
Shan	1,377	1,576	1,954	4,907
Tanintharyi	289	944	943	2,176
Yangon	-	32	4	36
Total	**46,739**	**25,493**	**11,442**	**83,674**

No projections on future mining were made for this study, as the government is revising its approach to mining, the Extractive Industries Transparency Initiative is underway in Myanmar, and foreign direct investment appears very unstable due to the conflicts in most regions with mineral deposits.

Hydropower

In Myanmar, the area of water bodies has grown mostly within Reserved Forests and Public Protected Forests, increasing 62% between 2002 and 2014. This amounts to an increase of 135,813 hectares (Treue *et al*., 2016). Only 20,466 hectares of water bodies occurred outside RFs, PPFs, and PAs (ibid), suggesting that hydropower development has overwhelmingly occurred within RFs and PPFs. Woods (2015) reported that between 2011 and 2012, 110,777 m^3 of timber was cleared for hydropower development.

A recent study funded by the International Finance Corporation probably provides the best update on area affected by reservoir development related to hydropower projects (Table 6). The inundated (or flooded) area of existing and under construction reservoirs is 139,000 hectares, with most reservoirs being located in the Ayeyarwady and Sittaung Basins. The planned projects would add another 252,300 hectares (mainly in the Ayeyarwady and Thanlwin Basins).

Table 6: Inundated area by basin (in hectares)[20]

Catchment	Existing and under construction	Planned	# of plants existing and under construction	# of plants planned	Remarks
Ayeyarwady	84,600	140,600	17	32	
Thanlwin Basin	1,000	108,800	6	15	
Sittaung Basin	53,800	2,900	9	2	
Mekong			1	3	All quite small reservoirs
Rakhine coastal basins			1	2	All quite small reservoirs
Tanintharyi Coastal Basins			1	0	All quite small reservoirs
Myit Ma Ka and Bago Basin			1	0	All quite small reservoirs
Bilin Basin			0	1	All quite small reservoirs
Total	**139,400**	**252,300**	**36**	**55**	

Missing values for some reservoirs in Ayeyarwaddy, Thanlwin and Sittaung

Hydropower development impacts forests in a variety of ways, including through reservoir flooding, river diversion, facility development, access roads and infrastructure as well as from transmission corridors and access roads to transmit power to markets. Hence, the figures in Table 6 should be viewed as very conservative.

Myanmar has among the largest technical potential for hydropower in Southeast Asia, and is the least developed. The country produces currently just under 5,000 MW from all sources of power. Of that, hydropower contributes 68% from 3,005 megawatts of currently installed capacity (Nam *et al.*, 2015). The Asian Development Bank and JICA have pledged to help implement hydropower projects within the next 5 to 10 years. The IFC estimates that hydropower potential is up to 100,000 megawatts, i.e. more than 30 times the current capacity.

Myanmar has the lowest grid-connected electrification rate in Southeast Asia at 38% in 2016-17, compared to only 16% in 1995. All 422 townships in the country have been electrified, while only 31,781 villages (49.8%) have access to electricity. The GoM policy is to achieve 100% electrification by 2030.

In terms of per capita electricity consumption, Myanmar is ranked one of the lowest countries in the world, with 300 kilowatt-hours (kWh) per capita (2016-17). This was much lower than the 2014 world average of 3,128 kWh. Only Nepal has a lower per capita consumption in Asia.[21]

Keeping in mind the interest in and needs for rural electrification, the low per capita electricity consumption, the increasing energy demand in neighboring countries, and the interest of donors and the private sector to provide finance, there is no doubt that many of the current plans will be implemented and will contribute to further deforestation, although on a much smaller scale than agriculture.

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[20] Source: IFC, MOEE and MONREC, Strategic Environmental Assessment (SEA) of the Hydropower Sector: Baseline Assessment Reports. Yangon and Nay Pyi Taw, Myanmar, 2017 (September).
[21] IFC, MOEE and MONREC, Strategic Environmental Assessment (SEA) of the Hydropower Sector: Baseline Assessment Reports. Yangon and Nay Pyi Taw, Myanmar, 2017 (September).

Road and transportation networks

The current road network comprises 150,816 km, of which 33,014 km are paved. Myanmar shares borders with Bangladesh, China, India, Lao PDR and Thailand, and thus sits at the crossroads between China, South Asia and Southeast Asia. Existing cross-border road links with China, India and Thailand are limited and poor in quality (KPMG, 2013).

Under the Framework for Economic and Social Reforms, the GoM has indicated high priority for infrastructure projects to improve land connectivity and transportation links with regional economies to boost economic integration and fulfil the country's commitments under the Master Plan on ASEAN Connectivity. Also emphasized are rural-city connectivity and the maintenance and upgrading of existing road infrastructure. China's One-Belt-One-Road Initiative, funded by the China-initiated Asian Infrastructure Investment Bank, expects to deploy upwards of US$40 billion for a Silk Road infrastructure fund, to boost trade and connectivity across Asia, and Myanmar is a focus for investment.

New road links with key trading partners are expected given developments in Myanmar's commodities sector and growth in foreign trade. Future road construction will impact forests, particularly those being developed in border areas near more heavily forested areas. But the larger impacts will likely be from associated development along roads. The rapid establishment of rubber concessions in Kachin and Shan states along roads has been identified by Kramer and Woods (2012). In Kachin, every major road constructed since 2005 is now lined by rubber plantations. The same development can also be observed in neighboring countries (e.g. Thailand).

Summary table of direct drivers of deforestation[22]

Table 7, below, provides an overview of current direct drivers, their impacts, location and potential trends. Depending on the data sources, there can be substantial variations even for data for the same year. There are also different opinions on what is driving deforestation in a particular area. Hence the information below should be viewed as *generic information* that can be improved and should be further discussed. As the result, trends should also be treated as "educated guesses" only. Regardless of these limitations, the information below can and should be used for the development of policies and measures for REDD+ implementation. Perfect and reliable information will not become available in the short and medium term. The same holds for the direct drivers of forest degradation and the indirect drivers of deforestation and forest degradation (see below).

Table 7: Overview of current direct drivers, their impacts, location and potential trends

Driver	Impact areas	Location	Trend
Rice	ca. 7 million hectares significantly affecting mangroves	Ayeyarwaddy delta, central dry zone), Yangon deltaic and Rakhine coastal areas	Myanmar Rice Sector Development Strategy foresees 7.7 million hectares under rice by 2030.
Corn	530,000 hectares Replacing mainly other annual crops, but also some deforestation	Shan State about 52% of total production. The Ayeyarwady (delta	As the livestock sector is growing (also beyond Myanmar), demand for feedstock will continue to increase.

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[22] Special economic zones have not been covered by the review, as there are no data available on their direct and indirect impacts on forests of different types and degradation.

		regions), Magwe, and Sagaing regions make up the balance	Corn production will grow by at least 6%. **More deforestation should be expected.**
Pulses and beans	4.3 million hectares normally grown immediately after the harvest of the main rice paddy crop in the delta region; effects on forests negligible	Mainly in central dry zone, but are also found in the delta, hilly, and coastal zones	Stable with increases depending on demand from India.
Aquaculture	Areal extent not known 1.6% of mangrove deforestation between 2000 and 2012 could be; attributed to aquaculture mangroves also affected by fuelwood cutting for shrimp drying	Ayeyarwaddy delta	No information available.
Rubber	652,105 hectares Deforestation in the north and along new infrastructure corridors in the south;	Mon, Tanintharyi, and Kayin account for 68% of rubber area, Shan, Bago, and Kachin account for 24% of rubber area	Improvements in productivity and increasing interest and investments by Malaysian and Thai companies may lead to an expansion of the area under rubber and **further deforestation.**
Oil palm	Around 400,000 hectares Deforestation of pristine forests	Only Tanintharyi	In the short to medium term expansion of oil palm plantations will slow down.
Shifting cultivation	6-7 million hectares 15,000 hectares natural forests destroyed every year	Upland areas	Shifting cultivation area decreased since 2000; expected to decrease further, if conflicts can be resolved
Mining	46,000 hectares Inconclusive information on the effects on forests	Kachin, Sagaing and Mandalay	Due to investment risks, the area affected by mining is not expected to grow significantly in the short term.
Hydropower	139,400 hectares (existing and under construction) 252,300 hectares planned Figures exclude facility development and necessary infrastructure Hydropower development has overwhelmingly occurred within forest reserves	Ayeyarwady, Sittaung and Thanlwin Basin	Increasing energy demand in Myanmar and neighboring countries and the interest of donors and the private sector to provide finance for expansion will lead to **further deforestation**.
Road and transportation networks	No figure available	Across the country, but new developments particularly connecting to neighboring countries	Road network will expand and have direct and indirect **impacts on forests**, especially in border areas.

Direct drivers of forest degradation in Myanmar

It is not possible to discretely distinguish among direct drivers of degradation such as legal and illegal forest harvesting, the legal and illegal extraction of conversion timber; nor between fuelwood collection and collecting wood for charcoal production. There is also no clear-cut distinction between deforestation and forest degradation, as over-exploitation of timber often leads to forests becoming a major source of fuelwood and/or are opened for forest grazing. This may result in an increase in the occurrence of forest fires, and ultimately the conversion to other land uses. Suitable data for assessing the magnitude of forest degradation due to forest harvesting and/or other activities in different parts of the country do not exist, but like in many other countries in Southeast Asia there is a consensus that the quality of forests has decreased in recent decades and that large-diameter trees have become very rare, even in countries were the forest area has actually increased (e.g. Viet Nam).

Legal forest harvesting

Government, research and CSO/NGO sources concur that degradation of Myanmar's forests has occurred for decades due to overharvesting of teak, more recently overharvesting of other hardwoods, and allowing *conversion timber* to be marketed without proper monitoring, supplying the illegal timber trade.

As documented by Springate-Baginski *et al.* (2015) timber harvesting volumes for teak have, for decades, exceeded the estimated annual allowable cut (AAC). The recorded harvest of other hardwoods, mostly dipterocarps, stayed well below the AAC until 2003 after which harvest levels also began to increasingly exceed the downwardly regulated AAC (Figure 5).[23]

Previous governments focused heavily on timber exports to generate revenue (Springate-Baginsky *et al.*, 2015). As a result, harvested volume and sawlog grade qualities are far lower than they were in the 1980s. In addition, marketable species have become scarce. Based on field observations in Kachin and Sagaing, Treue *et al.* (2016) noted that natural teak logs were barely above the minimum girth of 200 cm at breast height (1.3m above ground level). Also, compartments were prematurely re-entered to extract other hardwood species, and were not allowed to recover for the prescribed 30 years. The over-extraction of timber is also closely tied to land-use change and shifts from forest to 'non-forest' land use cateogries. Remote sensing data and visual observations indicate a pattern of logged-over forests being used for unplanned and apparently uncontrollable commercial fuelwood collection, which appeared to be the final stage before permanent conversion to agriculture or plantations. There has been an abrupt decline of the 'growing stock' over the last 25 years, and recent reductions in the AAC indicate that this decline is widespread.
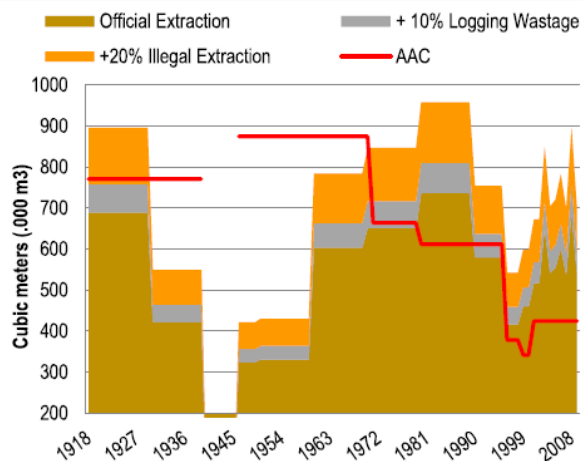
Domestic demand is a *major blind spot* in forest management, with domestic timber needs being largely illegal and *ad hoc*. Supply from reserved and unreserved forests is further undermining sustainability.

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[23] The 20% illegal extraction level Springate-Baginski *et al.* (2015) used likely varied in practice year to year, based on a range of factors, particularly related to policy and market changes (EIA, 2014(b)).
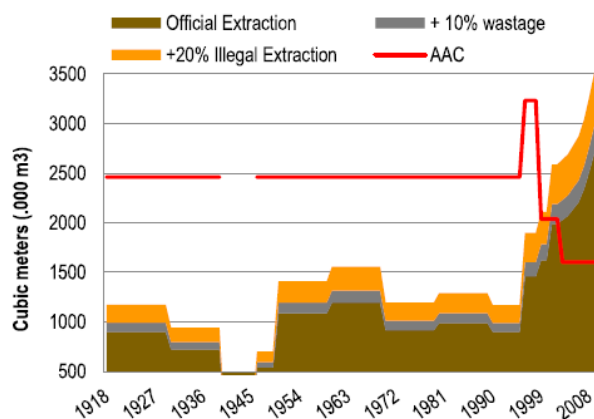
The Myanmar Timber Enterprise (MTE) is solely responsible for harvesting, processing and marketing of timber. Both the FD and MTE need to cooperate for the silvicultural activities prescribed by the FD to be followed by MTE. The FD sets the AAC and defines teak and hardwood felling marking. The FD and the MTE have taken the first steps, in 2016, to reduce the AAC. Since 2014-2015, the MTE has reduced the harvesting amount to be within the limit of AAC prescriptions (Table 8). It remains to be seen how the reductions will be implemented on the ground in the future.

Figure 5: Relationship between AAC and extraction volumes

Source: Springate-Baginski *et al.*, 2015

No legal forest harvesting occurred in the 2016-2017 season (until March 2017), under a temporary logging ban. Starting from the fiscal year of 2017-2018, as part of the 100-Day Plan of the new government, the AAC will be set at 19,210 teak trees and 593,330 other hardwood trees. The MTE plans to harvest only 15,280 tonnes of teak and 300,000 tonnes of other hardwoods which is below the AAC (MTE, 2016).

Table 8: AAC prescriptions and MTE actual extraction

Fiscal Year	Teak (tonne)		Hardwood (tonne)	
	Operation Plan	Actual Work done	Operation Plan	Actual Work done
2011-2012	371,000	246,755	1,789,400	1,636,155
2012-2013	269,800	247,989	1,391,600	1,642,235
2013-2014	186,650	151,101	787,600	800,028
2014-2015	60,000	44,361	670,000	627,652
2015-2016	60,000	59,640	670,000	616,310
*2016 (July)		18,337		108,891

Source: Myanmar Timber Enterprise, 2016, MTE Feednote

Illegal forest harvesting

Myanmar's illegal wood flow includes timber, fuelwood and charcoal. Between 2001 and 2013, 10.2 million m^3 of Myanmar logs exported to global markets were not authorized for harvest, which would equate to a 47.7% illegal logging rate[24]. Any exports of semi-processed or finished products, and any domestic consumption, would add to the illegally logged and traded timber (EIA, 2014a). Volumes may have decreased recently as Myanmar enacted a log export ban in 2014, and a one-year logging ban for most of the country and a ten-year logging ban in the Bago Yoma region in 2016. However, most illegally traded timber comes from border areas, where the MTE has no control.

Corruption and illegality complicate efforts to bring greater transparency and accountability to the forest sector. The International Tropical Timber Organization (ITTO) reported FD findings that between 2011-2016 of the more than 2,000 forest officials fired almost half were thought to be involved in the illegal timber trade (ITTO, 2016).

Myanmar has developed a legal framework and tracking system to control the timber trade, under which all wood is considered legal if it has the hammer stamps of the state-owned MTE. However, not all importing countries are satisfied with MTE's procedures and its documentation (Baker, 2016). Also, illegal cross-border trade of timber, particularly to China, is not only occurring in vast quantities, but has also continued for more than two decades (EIA, 2015). Demand from the wood-processing industries in China, Thailand and Viet Nam continues to exert pressure on Myanmar's forests, due to logging bans in these countries' natural forests.

The GoM has committed to improving the country's timber legality assurance system following the release of a report that analyzed the gaps in the system in the context of internationally recognized principles, requirements and best practices.[25] Myanmar was party to the decision taken at the 10th ASEAN Ministerial Meeting on Transnational Crime, to add *trafficking of wildlife and timber* to the list of regional priority transnational crime threats (ASEAN, 2015). This decision elevates the importance of wildlife and forest crime, and compels ASEAN Member States to implement stronger law enforcement and criminal justice responses. The forest sector will be covered independently in a report for the Extractive Industries Transparency Initiative (EITI) soon. This, it is hoped, will improve transparency and cooperation between the government, the private sector and civil society organizations, and build trust and improve Myanmar's forestry sector image internationally[26]. Myanmar enacted a logging ban for 2016/2017 and is in the early stages of pursuing a Voluntary Partnership Agreement under the EU Forest Law Enforcement Governance and Trade (FLEGT) Action Plan, which would sets out a series of steps toward demonstrating timber legality.

The above are very positive signs regarding curbing illegal logging. However, as long as demand for timber exceeds sustainable supply, illegal forest harvesting and charcoal making (see below) can be expected to continue contributing to forest degradation, especially if corruption is not being tackled seriously.

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[24] See: https://www.illegal-logging.info/sites/files/chlogging/EIA-Data-Corruption-FINAL.pdf

[25] http://www.flegt.org/news/content/viewItem/myanmar-commits-to-address-gaps-in-timber-legality-assurance-system-for-improved-forest-governance/14-06-2017/103

[26] https://www.mmtimes.com/news/eiti-report-include-forest-sector.html?utm_source=People+and+Forests+E-News&utm_campaign=49bdb2aa89-People_and_Forests_E_News_September17&utm_medium=email&utm_term=0_45977cdcf4-49bdb2aa89-266931365

Fuelwood collection

The majority of the population (85%) depends on solid fuels for cooking purposes. Fuelwood (59%) and charcoal (24%) are the most prevalent fuel sources followed by electricity (14%). Agricultural residues (rice husks) only account for 3%. There is divergence in fuel choice between rural and peri-urban areas. In rural areas, 80% of the population depends on fuelwood (Table 9), whereas in peri-urban areas, only 18% rely on fuelwood and 45% rely on charcoal (Emerging Markets Consulting, 2015). Access to modern fuels for cooking (such as liquefied petroleum gas) is limited to urban areas. Consequently, traditional biomass (wood and animal dung) is widely used and accounts for about 70% of primary energy consumption.

Fuelwood is mainly harvested from natural forests, and is used in both urban and rural areas. The average annual consumption of fuelwood per household is estimated to be roughly 2.5 cubic tons (4.5 m^3) for rural households and 1.4 cubic tons (2.5 m^3) for urban residents (ADB, 2012).

Table 9: Market segmentation by fuel type in rural areas

	Market segment – demand observations
LPG	Extremely low. Interviews indicated that LPG in rural areas is mostly reserved for restaurants rather than households.
Electricity	Quite low, only witnessed in ~3% of rural households interviewed.
Charcoal	Second most predominant type of fuel users in rural environments (13%).
Wood	Largely the most predominant rural group (~80% of rural households). The larges part of this group cooks on open fires, while a smaller part happens on stoves.
Agricultural residues	Quite low penetration, witnessed in ~4% of rural household. Usually these household would cook on stoves designed to use agricultural residues.

Source: Emerging Markets Consulting (2015), based on household market surveys.

The volume of fuelwood harvested has been steadily increasing and is many times higher than the commercial timber extraction. Annual fuelwood extraction between 2000/01 and 2012/13, in terms of fresh biomass, has been estimated at between 68 and 86 million m^3, of which 48-60 million m^3 comes from natural forests, 17-21 million m^3 from trees on farmland and only a minor amount with 3.4-4.3 million m^3 from fuelwood plantations (Table 10), although there are substantial variations across the country (Table 11). These figures compare with annual timber harvests in the order of 4 million m^3. Thus, fuelwood extraction, which is poorly regulated, is affecting millions of ha of natural forests throughout the country. It is therefore a very important driver of forest degradation, and ultimately, deforestation.

Table 10: Estimations of fuelwood harvest in Myanmar

Year	Energy ktoe	in tonnes (dry biomass)	in m³ (dry biomass)	in m³ (fresh biomass)	Estimated origin of fresh biomass in m³ [27]		
					Natural forests	Trees on farmland	Fuelwood plantations
2000	7,723	17,015,789	34,031,579	68,063,157	47,644,210	17,015,789	3,403,158
2001	7,912	17,432,206	34,864,412	69,728,823	48,810,176	17,432,206	3,486,441
2002	8,105	17,857,435	35,714,871	71,429,741	50,000,819	17,857,435	3,571,487

[27] Estimations by the FD: 70% from natural forests, 25% from trees on farmland outside of forests and 5% from fuelwood plantations.

2003	8,388	18,480,958	36,961,917	73,923,833	51,746,683	18,480,958	3,696,192
2004	8,401	18,509,601	37,019,201	74,038,403	51,826,882	18,509,601	3,701,920
2005	8,561	18,862,123	37,724,245	75,448,490	52,813,943	18,862,123	3,772,425
2006	8,879	19,562,760	39,125,519	78,251,039	54,775,727	19,562,760	3,912,552
2007	9,131	20,117,982	40,235,963	80,471,927	56,330,349	20,117,982	4,023,596
2008	9,401	20,712,862	41,425,725	82,851,449	57,996,014	20,712,862	4,142,572
2009	9,665	21,294,523	42,589,047	85,178,093	59,624,665	21,294,523	4,258,905
2010	9,993	22,017,193	44,034,386	88,068,773	61,648,141	22,017,193	4,403,439
2011	9,506	20,944,205	41,888,410	83,776,819	58,643,773	20,944,205	4,188,841
2012	9,708	21,389,264	42,778,527	85,557,054	59,889,938	21,389,264	4,277,853

Source: Data on primary energy consumption between 2000/01 and 2012/13 provided in Second Draft Renewable Energy Policy of Myanmar (2016)

Table 11: Sources of fuelwood in two Townships in the Central Dry Zone

Township	Source of fuelwood (% of households)		
	Forest reserve	Tree plots	Purchased
Mahlaing	21.3	72.8	4.8
Wundwin	12.8	53.5	43.0
Average	14.3	56.8	29.0

Source: Bann *et al.* (2017)

Overall, around 66% of the rural population lives in areas with fuelwood deficits. This may reflect that fuelwood from these areas has been over-harvested to satisfy demand in peri-urban and urban areas. At the national level, most households purchase their primary fuel from a market within their own village/town. Shan, Tanintharyi and Ayeyawaddy appear to have higher percentages of purchase from mobile sellers. Over 50% of households tend to purchase their firewood for consumption.

The FD has promoted fuelwood plantations to develop sustainable supplies of fuelwood, and decrease extraction from forest reserves. A total of 0.84 million hectares of forest plantations were established between 1981 and 2010, 20% of which were for fuelwood. Plantation establishment has since slowed (ADB, 2012). Further, community forests were also intended to increase fuelwood supplies.
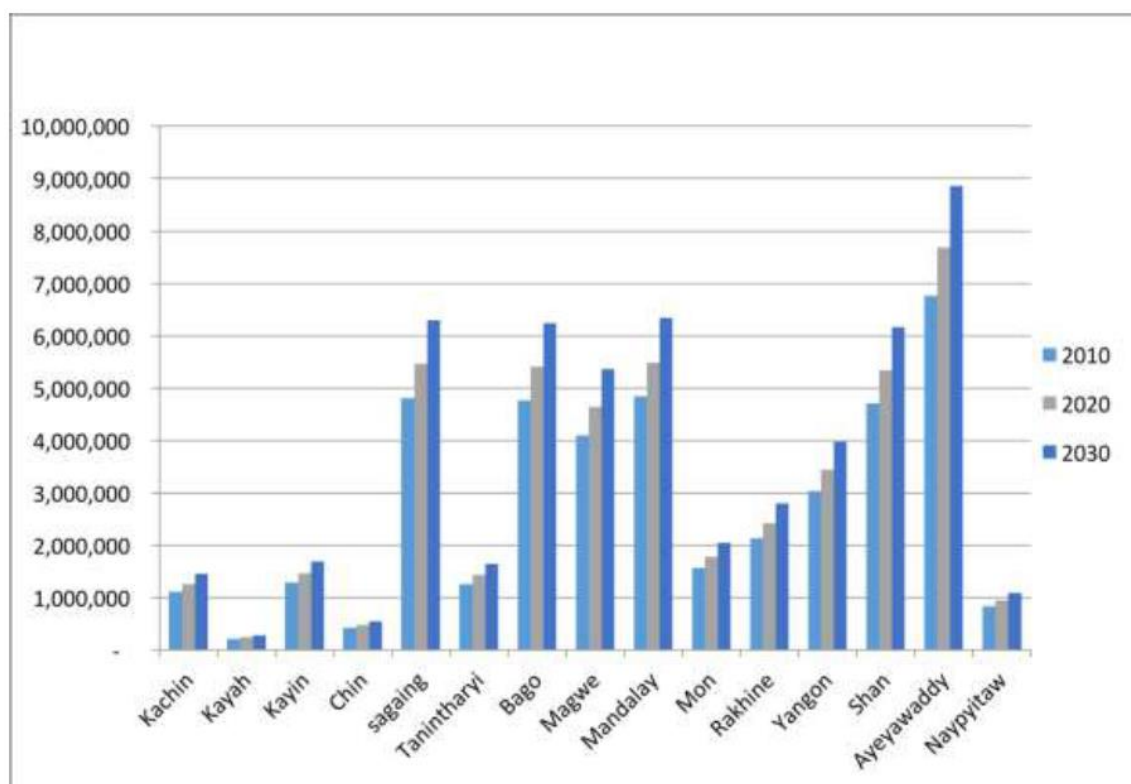
Figure 6: Projection of fuelwood demand by 2020-2030 based on 2010 (dry biomass, m^3)

The most common type of cook stove used across the country is the three-stone open fire (35%), followed by the charcoal/multipurpose stove (27%) and the electric stove (15%). Charcoal (46%) and electric stoves (35%) dominate in peri-urban environments, while the three-stone type is predominant in rural environments (50%). Urban households tend to own and use more stoves than rural households. Households using iron, three-stone fires and mud stoves are the most likely to only use one stove regularly. 95% of respondents indicated using the stove for water boiling, while only 18% for warmth, 7% for animal feeding, and 2% lighting.

With the increase of population from 53.9 million in 2015 to 60.2 million by 2030, demand for fuelwood and charcoal will continuously increase, reaching 55 million m^3 of dry biomass by the year 2030 from 32 million m^3 in 2000 and 42 million m^3 in 2010. The regions that will see the greatest increases include Ayayewaddy, Mandalay, Bago, Shan and Sagaing (Figure 6). It is obvious that without policies and measures that close the gap between supply and demand, the use of fuelwood and charcoal will increase pressure on forests and lead to further degradation.

Charcoal production

According to the UN Comtrade database, Myanmar is one of the world's largest exporters of fuelwood and wood charcoal, with an annual value of US$ 30.5 million, which forms 2.8% of the global share. According to the same database, China imported a total of over 330,000 tons of

charcoal from Myanmar. According to recent investigations by Mongabay the *real figure is likely much higher, given the extent of the smuggling*.[28]

Forest Trends (2014) reported that charcoal exports to China, which were almost non-existent in the early 2000s, boomed between 2006 and 2008, with volumes increasing by more than 2,500%. Overall volumes have stabilized around 0.5 million m^3, and charcoal now represents 32% of Myanmar's total wood product exports to China. Almost 100% of Myanmar's charcoal exports are registered in the Kunming customs district, indicating cross-border rather than overseas transport (Forest Trends, 2014), which means it is illegal according to Myanmar's laws. The FD information indicates that between April and June 2016, 1,053 tonnes of charcoal were seized at the border (Myanmar-Chinese Website, 2016), indicating that this is part of regular illegal wood product seizures. According to Mongabay's report, in Kachin State charcoal production will continue, as long as *more lands* (are) *given over to large-scale projects*, affecting the livelihoods of local people. Similar developments might continue in other states and regions.

Forest fires and forest grazing

Although forest fires and forest grazing are of a different nature they are treated together here, as very little information is currently available about both activities. Most of the information below is extracted from a technical background report for Myanmar's REDD+ Strategy.

The area affected by annual forest fires is unknown. The dynamics of fires and their underlying causes are not expected to change significantly, although the number of hotspots and area affected may increase as mean temperatures increase and drought periods are becoming more frequent and intense than in the past.

Overgrazing of forests by domestic livestock, is likely to be an issue in the future, especially in wood scarce areas such as the Dry Zone. The increased purchasing power of Myanmar's population has led to increased demand for animal products, including dairy products. The GoM has prioritized the support of dairy farming and would like to see the number of dairy cows increase significantly from just 500,000 in 2017.[29] If the present rate of increase of ruminant animal populations is maintained than their stock will rise from 26 million in 2015 to 44 million in 2025.[30]

In the Central Dry Zone, the Forest Reserve is an important source of forage and fodder (Bann *et al.*, 2017). If fodder sources remain mainly forests and woodlands, it can be expected that the pressure on forests will be at least maintained or even increase.

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[28] https://news.mongabay.com/2017/10/the-charcoal-hunters/?utm_source=spotim&utm_medium=spotim_recirculation&spotim_referrer=recirculation
[29] https://www.iaea.org/newscenter/news/myanmars-dairy-farmers-benefit-from-cattle-breeding-programme-using-nuclear-based-techniques
[30] Myanmar is planning to conduct a national livestock survey in January 2018, the first such survey in over 20 years.

Summary of direct drivers of forest degradation

While the impacts, locations and trends for the direct drivers of deforestation could be determined to some extent, this is virtually impossible for the direct drivers of forest degradation.

There is no indication in the available literature that legal logging is causing less damage to the remaining forests in some states and/or regions than in others. Illegal logging is taking place in many states and/or regions, although hotspots are likely to be Kachin and Shan states, as timber (and charcoal in Kachin) are exported to China illegally from these states.

Fuelwood collection, charcoal production, forest fires and forest grazing are happening throughout the country, with the highest negative impacts in the Dry Zone, and for fuelwood and charcoal, the Delta.

All drivers also contribute to degradation to such an extent that ultimately forests are converted to agricultural lands. This is also driven by the 30-year Master Plan for the Agriculture Sector (2000-01 to 2030-31), which aims to convert 4.05 million hectares of *wasteland*. Some of these areas contain forests with significant biodiversity. Others are presumably already quite degraded.

There are various contrasting trends, which obscure a widely acceptable picture of the future. On one hand, the GoM has committed to improving the country's timber legality assurance system.[31] Beyond the logging bans imposed in 2016, reforms are underway to improve legal logging, including the reduction of the annual allowable cut (AAC). Numerous organizations are also involved in up-scaling improved cookstove dissemination[32]. The GoM policy is to achieve 100% electrification by 2030, which should lead to a reduction in biomass use for cooking.

On the other hand, applying improved harvesting methods, reducing harvesting intensities and not exceeding the AAC for teak and other hardwoods, will take time. Without increasing capacity to seriously address corruption and bribery, it is likely that many of the illegal activities will continue, as experiences from other countries indicate. A growing population will also require more energy, and fuelwood (and other biomass) will continue to be a major contributor to energy generation, and thus to fuelwood use. Demand for charcoal from China may also rather increase than decrease.

As will be argued below, positive trends can only be expected, if indirect drivers are effectively addressed at national and sub-national levels.

Indirect drivers of deforestation and forest degradation

This assessment adds to and updates the 2013 REDD+ Readiness Roadmap. This is necessary given the significant economic and political changes Myanmar is experiencing. The Roadmap identified the following indirect drivers:

- Current institutional setup (Central Land Management Committee headed by the Ministry of Agriculture and Irrigation and sub-national Land Management Committees at township level headed by the Ministry of Home Affairs/General Administration Department) makes it easier to convert forests that are not included in the Permanent Forest Estate (non-reserved or un-classified forest);

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[31] http://www.flegt.org/news/content/viewItem/myanmar-commits-to-address-gaps-in-timber-legality-assurance-system-for-improved-forest-governance/14-06-2017/103
[32] http://www.switch-asia.eu/projects/myanmar-cook-stove/ and http://www.geres.eu/en/strengthening-improved-cookstove-access-myanmar

- Overlapping and conflicting mandates of different land management committees:
  - ➢ Central and sub-national Land Management Committees (based on Farm Land Law and headed by MoALI),
  - ➢ National Committee on Land Scrutinising and Land Allocation (created by Presidential Decision and headed by MONREC); and
  - ➢ Central Vacant, Fallow and Virgin Land Management Committee (based on the new VFVLM law and headed by MoALI) reduces efficiency of land management and land use planning.
- Weak enforcement of the law;
- Land grabbing facilitated by insufficient or ineffective protection of traditional land or forest tenure rights coupled with the lack of fair and transparent land conflict resolution mechanisms and structures;
- Poverty and lack of alternative livelihoods;
- Increasing demand for natural resources from growing middle class; and
- Ecosystem services of forest undervalued and/or not considered in policy and investment decisions.

In many countries, political and economic transitions have had substantial impacts on forest conservation. Myanmar is transitioning from an authoritarian, centralized state with a highly regulated economy to a more decentralized and economically liberal democracy, with greater access to international markets (see Box 1). Indirect drivers that are already affecting and will affect forests in the future include in no particular order:[33]

1. long-running internal conflicts, which the GoM has started to address, but which still affect the proper implementation of policies and the enforcement of laws, and continue to drive struggles over resource control;
2. land-tenure insecurity, which affects levels in investments in sustainable management of natural resources;
3. large-scale agro-industrial developments that may be fronts for land speculation and resource grabs;
4. weak enforcement of social and environmental safeguards for investments in the agricultural sector;
5. shortfalls in government revenue and capacity, and opening of new deforestation frontiers with new roads, mines, and hydroelectric dams;
6. weak governance fostering corruption, illegality and organized crime and syndicates in many economic sectors;
7. increasing rural and urban demand for energy;
8. increasing demand for natural resources and energy by Myanmar's trading partners;
9. expansion of road network, enhancing accessibility, and other infrastructural developments including Special Economic Zones;
10. uncertain future of state-run enterprises such at the MTE;
11. conflicting agendas among ministries and weak coordination of ministries hinder effective forest and land management;
12. poor quality of data on forests, production and trade and weak coordination of data collection, analysis and display among sections of the Government; and

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[33] The points below are adapted from Prescott, G.W. *et al.*, 2017. Political transition and emergent forest-conservation issues in Myanmar. Conservation Biology, Volume 00, No. 00, 1-14. DOI: 10.1111/cobi.13021

13. forest management constrained by insufficient government capacity and the underdeveloped participation of local people in natural resource management.

Box 1: Selected specific policies to improve access to international markets[34]

Myanmar is signatory to the China-ASEAN Free Trade Agreement that will remove tariffs on 90% of goods by 2015 (http://fta.mofcom.gov.cn/topic/chinaasean.shtml). Myanmar has also increased cooperation with Thailand, which plans to triple bilateral trade by 2015 (Pratruangkrai, 2012). The GoM has broadened the banking sector, increasing the number of sanctioned private banks, increasing local credit access, and introducing swift international monetary transfers that will facilitate remittances and investment (ADB, 2011, 2012; Kyaw, 2012a). Facilitated by these policies, Myanmar reported a 28% increase in foreign trade during the first nine months of the 2011-2012 fiscal year (Xinhua, 2012), as well as a substantial increase in Asian investment (Kate and Kubota, 2012) including plans for increased trade with India, Bangladesh and China (Mirdha, 2011; Te Te, 2011).

In general, the centrality of agriculture to the Myanmar economy, emerging policies and strategies, and improved market access and technologies will lead to potentially greater rates of deforestation due to the introduction of well-funded investors, weak land-tenure arrangements, low governance effectiveness and overlapping and conflicting priorities of the forestry and agricultural sectors. The broad national challenge of addressing the drivers of deforestation and forest degradation is to initiate environmental governance reforms in the face of significant pressures for land grabbing, opportunistic resource extraction and infrastructure development, clarify land-tenure arrangements and significantly strengthen the coordination of forestry and agriculture.

Considering the points listed above – and it is possible to identify more or rephrase these thirteen – tackling all the indirect drivers appears extremely challenging. However, while some indirect drivers require targeted interventions – for example, weak enforcement of the law; social and environmental safeguards; internal conflicts and/or poverty and inequality – many are intimately linked to a few fundamental issues:

- overlapping and conflicting priorities and agendas between the forestry and agriculture sectors;
- legal frameworks governing decisions on land and its management; and
- land-tenure insecurity, which affects levels in investments in sustainable management of natural resources.

To address many indirect drivers, it is important to generate an environment that allows action to be taken to tackle drivers. Also, and perhaps more important, it can be argued that without addressing the issues over coordination between sectors, legal matters related to lands and land tenure, REDD+ results will be negligible and/or non-sustainable.

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[34] Webb, E, N. Jachowski, D. Friess, J. Phelps, Maung Maung Than, A. Ziegler, 2014. Deforestation in the Ayeyarwady Delta and the conservation implications of an internationally-engaged Myanmar. Global Environmental Change, 24: 321-333. It is acknowledged that some of the information is outdated.

Overlapping and conflicting priorities and agendas

Overlapping and conflicting priorities and agendas between the forestry and agriculture sector are a long-standing issue. The significant shift in forest to non-forest uses, particularly agriculture, has been the largest driver of change in Myanmar's forests. With higher agricultural production goals, rising foreign investment and exports, these historical patterns will only increase. The visions of the Ministry of Agriculture, Livestock and Irrigation (MoALI) and the FD (for example, increasing the percentage of land within the Permanent Forest Estate) appear to conflict. Structures and processes to address conflicts and existing challenges are under-developed, as illustrated by:

- MoALI's 30-year Master Plan for the Agriculture Sector (2000-01 to 2030-31), which aims to convert 4.05 million hectares of *wasteland* for private industrial agricultural production, with rubber, oil palm, paddy, pulses, and sugarcane for export being particularly encouraged. Much of this land contains residents under customary use and unclarified tenure and also forests with significant biodiversity. The ADB estimates that the 12.8 million hectares of cultivated land holds the potential to be expanded by nearly 50%, by bringing 5.67 million hectares *virgin and fallow land* or *cultivable wasteland* into production.

- The Forest Law allows for management of trees outside the Permanent Forest Estate, including on land under the management of MoALI through the Vacant, Fallow and Virgin Lands Management Law (see Box 2). However, the high rates of deforestation on Vacant, Fallow and Virgin land demonstrates that these overlapping mandates do not conserve forested land outside the Permanent Forest Estate.

- Myanmar's Intended Nationally Determined Contribution to the UNFCCC (INDC) includes only two sectors for mitigation, forests and energy, reflecting the fact that 54% of the country's greenhouse gas emissions are from the forest sector. One of the targets in the INDC is an increase in land within Reserved Forest (RF) and Protected Public Forest (PPF) to 30% of total national land area by 2030 (up from 24.5%), and 10% of the land within protected areas. The increase in RF and PPF would be roughly 4 million hectares, which presumably would have to come from the *wasteland* and/or *other forest* category on which MoALI seeks to increase agricultural production. Given the scale of unresolved customary land rights issues on these lands, achieving these goals presents enormous challenges, but also opportunities, if resolving land-tenure conflicts is pursued as part of the solution.

> **Box 2: The Farmland Law and the Vacant, Fallow and Virgin Land Law of 2012** [35]
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> **Farmland Law** allows land to be bought, sold and transferred in a land market with land use certificates. In practice, there have been difficulties in farmers having what is necessary to show proof of title.
>
> **Vacant, Fallow and Virgin Land Law** defines *vacant and fallow* land as that which was used in the past, but the past tenant no longer uses it, and the land could have been abandoned for any reason. *Virgin land* is land which may be new land or other woodland that was never cultivated. It may or may not have forest, bamboo or bushes and can include land legally cancelled from Reserve Forest. It allows for the reallocation to domestic and foreign investors.
>
> Both laws fail to recognize customary and communal tenure systems in land, water, aquatic resources and forests. Millions of farmers, including most upland communities, do not have rights under these laws (although the recent Land Use Policy does acknowledge the validity of customary tenure).

Overlaps in jurisdictional authority and bureaucratic inefficiency in land administration are problematic. For example, the Department of Agricultural Land Management and Statistics or DALMS of MoALI administers and registers land classified as *farmland*, while the FD does the same for land designated as *forest*. Under the 2012 Farmland Law, the issuing of Land Use Certificates (LUC) only applies to land classified as *farmland*. Although *vacant* land and *other woodland* can be reclassified as *farmland* and be formally registered by DALMS, land classified as *forest* is not eligible and falls under the purview of FD/MoNREC. Most farmers may not know which ministry should make decisions on the land that they use. Based on research carried out in Chin and Shan states in 2014, farmers largely do not know what land is administrated by MOALI or MoNREC, as all the land they know is community/village ancestral land (Andersen, 2015).

Legal frameworks governing land decisions and sustainable use

The lack of a land-use policy and related land-use law was a key driver of deforestation and forest degradation in the past and led to many land-use conflicts. It led to weak governance of tenure of land, aquatic resources and forests, did not support inclusive public participation and consultation in decision-making processes related to land use and land resource management, the interest private companies over public citizens in land-use decision making and maintained centralized decision making related to land. The 2016 Land Use Policy (LUP) addresses these issues, especially by decentralizing decision making on land allocation and use to district levels.

In addition, environmental and social impact assessments (ESIA) required for projects that could cause harm, have not always been conducted, or not conducted properly. According to the Environmental Conservation Department (ECD) of MoNREC it was not general practice of earlier governments to bring environmental considerations into development decisions. Adequate information for decision making was often lacking (e.g. cumulate watershed impacts or geotechnical risks) when evaluating hydropower projects. Also, capacities in ESIA in the ECD and in key sectoral ministries that have permitting licensing authority is weak, which has now been recognized in the draft of the National Environmental Policy.

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[35] Adapted from Webb, E, N. Jachowski, D. Friess, J. Phelps, Maung Maung Than, A. Ziegler, 2014. Deforestation in the Ayeyarwady Delta and the conservation implications of an internationally-engaged Myanmar. Global Environmental Change, 24: 321-333. It is acknowledged that some of the information is outdated.

In summary, while environmental and social considerations were routinely overlooked in development decisions by previous governments, new policies, laws and guidelines are intended to change this. However, this will take time, require availability and accessibility of suitable information, and stronger capacities. Furthermore, it necessitates the willingness to implement policies and seriously enforce the law, which until now has been frequently undermined by influential people and condoned by people at all levels. Increasingly transparent and inclusive processes that engage all relevant stakeholders are also essential.

If such steps are not taken, the *uncontrolled* allocation of agricultural concessions will continue to be a major driver of future forest loss. Land-use conflicts will also exacerbate.[36]

Land-tenure insecurity

Tenure security is weak in Myanmar. Under the 2008 Constitution, the state retains ultimate ownership of all land and the right to withdraw land-use rights if use conditions are unmet. The 2012 Farmland Law allows farmland cultivation rights to be obtained and traded through LUCs. However, the bureaucratic and financial costs of obtaining LUCs have effectively limited their acquisition to approximately 15% of farmers (Displacement Solutions 2015; Scurrah *et al*., 2015). Farmers without LUCs remain effectively without statutory land-use rights and vulnerable to land confiscations. The 2012 Vacant, Fallow, and Virgin Land Management Law allows VFV lands of up to 20,234 hectares to be leased to public citizens, private-sector investors, government entities, and nongovernmental organizations for up to 30 years. The vague definitions of land use in this law have enabled forested land and land occupied by farmers lacking LUCs to be legally designated as VFV and therefore eligible for allocation as an agricultural concession. Consequently, some lands have been confiscated from smallholder farmers, allocated as land concessions for activities by investors, and subsequently deforested (Oberndorf, 2012; Scurrah *et al.,* 2015).[37]

RECOFTC notes the deficiencies in securing land tenure by local communities in all categories of land, with the possible exception of farmland in cases when records exist. The issue is urgent in view of the opening up of the economy for foreign (and domestic) investment, and one of the key challenges for Myanmar's transition.

Recognized tenure, equal and secure access to land, and control over land, are prerequisite for any kind of investment, economic development and sustainable management of natural resources. Hence, strengthening tenure is not a *panacea*, as it can result in an increase in commercial farming. But, as the charcoal example from Kachin indicates, no tenure or rights can result in the mismanagement of natural resources, in this case a decrease in forest quality.

Barriers to the "+" activities

The so-called "+ activities" refer to conservation, sustainable management of forests, and enhancement of forest carbon stocks. These are often viewed as "good" REDD+ activities since they remove CO_2 from the atmosphere, or at least avoid further emissions. The extent to which

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[36] Paralegals, dubbed *barefoot* advocates are now teaching community members with no prior legal training how to use the legal process when negotiating government processes around land rights forging a path for local communities when it comes to land conflict resolution (http://mrlg.org/resources/regional-perspectives-on-paralegal-models-for-land-conflict-resolution-in-myanmar/).
[37] Text above adapted from: Cheng Ling Lim, 2017. Untangling the proximate causes and underlying drivers of deforestation and forest degradation in Myanmar. Conservation Biology, Volume 00, No. 0, 1-11. DOI: 10.1111/cobi.12984

the scale of these activities is not more significant is the result of barriers that may need to be overcome. In general, there have been very few analyses of barriers to "+" activities.

In the case of conservation, there have been analyses of barriers to biodiversity conservation which, while not necessarily the same as barriers to conservation of forest carbon stocks, may nevertheless provide some valuable pointers, since there is a generally high correlation between high-biodiversity and high-carbon ecosystems. UNDP has identified the following barriers to biodiversity conservation[38]:

- weak systematic and institutional capacity to plan and manage the expanded national PA system,
- insufficient management capacity, and
- insufficient motivation at the PA level to manage local threats and achieve conservation outcomes

Instituto Oikos and BANCA (2011), as well as highlighting lack of capacities, further identified the lack of sustainable financing mechanisms as a barrier to more effective biodiversity conservation.

Enhancement of forest carbon stocks encompasses to sub-activities: afforestation/reforestation, and rehabilitation of degraded forests. Barriers to enhancement of degraded natural forest are, in fact, the same as the indirect drivers that lead to the direct drivers of degradation. As an example, some of the indirect drivers leading to over-harvesting of fuelwood are high demand and a lack of viable alternatives. These, then, are barriers to rehabilitation of forests that have been degraded due to fuelwood collection.

Barriers to afforestation/reforestation have been analyzed by the Forest Department. They include:

- Fragmented and unclear land ownership, increasing the unit costs of plantation establishment,
- A high rate of plantation failure, due to an absence of a plantation policy (specifying, for example, species selection and scheduled maintenance activities), combined with human resource and financial constraints,
- Unclear and variable demand for forest plantation products, which undermines private sector interest in investment, and
- Constraints on community marketing of plantation products (this barrier has been removed through the revised Community Forestry Instructions (2016).

Finally, in the case of sustainable management of forests, similarly to rehabilitation, the barriers are actually the same as the indirect drivers leading to over-harvesting of timber (and other forest products). So, for example, a historical lack of respect for AAC's was a barrier to sustainable management of forests.

Remaining gaps in the current knowledge

Much of what we know about the drivers of deforestation and forest degradation in Myanmar is based on case studies, outdated and/or poor statistics and/or conventional wisdom. In addition, while we know that the future will be very different to the past, we do not know what the future

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[38] https://www.thegef.org/project/strengthening-sustainability-protected-area-management

might look like. In general, there is optimism about future prospects of Myanmar's economy and its population. But how this will translate into land-use change is open to speculation.

Filling knowledge gaps in the following areas, would significantly help to more confidently develop measures and policies for a national REDD+ strategy.

1. Household and industrial fuelwood use is almost certainly underestimated, and sources and composition of fuelwood are often unknown. Although there have been several surveys of household fuelwood use, there is very little information on the industrial sector.

2. The agricultural area has considerably increased over the last 15 years and will increase even more so. But we know only to a limited extent whether the agricultural expansion is happening in non-forest areas, replaces degraded forests (and their degradation status) or leads to the clearance of fairly intact natural forests. In some cases, one crop may in fact replace another crop. Clarity is needed for rational decision making, to protect forests, but also encourage investments in agriculture and infrastructural development in the right places.

3. Given conflicting data on deforestation rates, additional spatial analyses and consultations are required at sub-national levels to refine the assessments.

4. The data are even less clear for forest degradation. A focus of further development of the National Forest Monitoring System should establish the capacity to measure and monitor forest degradation.

5. The actual land cover of VFV land is unclear. How much of it is forested, and especially the quality of this forest, is unknown.

References

Andersen, K., 2015. Study of Upland Customary Communal Tenure in Chin and Shan States: Outline of a Pilot Approach towards Cadastral Registration of Customary Communal Land Tenure in Myanmar. Land Core Group.

ASEAN, 2015. Joint statement of the 10th ASEAN Ministerial meeting on transnational crime. Available at: http://www.asean.org/wpcontent/ uploads/images/2015/October/ammtc/Adopted%20Joint%20Statement%20of%20the%2010 th%20AMMTC.PDF

Aye Nyein Win, 2016. Palm oil drive under review in Tanintharyi. Myanmar Times, 11 July 2016.

Baker, N., 2016. Swedish court rules against importer of Myanmar timber. Myanmar Times. 16 November 2016.

Bann, C., Linde, L., Pedersen, A, Camili, B. and Htein Lin, 2017. Ecosystem services and sustainable livelihoods in the Central Dry Zone, Myanmar. Technical Assistance Consultant's Report. Asian Development Bank, Manila.

Baskett, J.P.C. 2016. Myanmar oil palm plantations: A productivity and sustainability review Report no. 28 of the Tanintharyi Conservation Programme, a joint initiative of Fauna & Flora International and the Myanmar Forest Department.

Byerlee, D., D. Kyaw, U San Thein, and L Seng Kham, 2014. Agribusiness Models for Inclusive Growth in Myanmar: Diagnosis and Ways Forward. Michigan State University International Development Paper No. 133.

Unity. Harvard – Kennedy School Ash Centre and Rajawali Foundation, Institute for Asia.

Emerging Markets Consulting, 2015. Myanmar Cookstoves Market Assessment. http://themimu.info/sites/themimu.info/files/documents/Report_Myanmar_Cook stove_Market_Assessment_GERES_Jun2015.pdf

Environmental Investigation Agency, 2015. Organized Chaos: The Illicit overland timber trade between Myanmar and China. London.

Environmental Investigation Agency, 2014(a). Exposing the true scale of logging in Myanmar. London.

Environmental Investigation Agency, 2014(b). Myanmar's Rosewood Crisis - Why key species and forests must be protected through CITES. London.

Fabrikant, M., 2013. Huge potential for Myanmar Seafood Sector. The Paramus Post, January 30. http://www.paramuspost.com/article.php/201301300718385.

Forest Trends, 2014. Analysis of the China-Myanmar Timber Trade. Policy Brief.

Instituto Oikos and BANCA, 2011. Myanmar Protected Areas: Context, Current Status and Challenges. Milano, Italy: Ancora Libri.

International Tropical Timber Organization, 2016. Tropical Timber Market Report. Volume 20 Number 15, 1st-15th September 2016.

Kramer, T. and K. Woods, 2012. Financing Dispossession – China's Opium Substitution Programme in Northern Burma. Transnational Institute.

Myanmar Timber Enterprise, 2016. MTE Feednote (Powerpoint presentation)

Nam, K.-Y., M. Cham, P. Halili, 2015. Power Sector Development in Myanmar. ADB Economics Working Paper Series, No. 460.

Oberndorf, R., 2016. Myanmar Land Governance Issues Brief (*unpublished*), dated February 2016.

Rab, H.N., U. Zachau, A. Seck, M. Verghis, S. Mohib, 2016. All aboard!: Policies for shared prosperity in Myanmar. World Bank Group, Yangon.

Raitzer, D., J. N. Samson, K. Nam, 2015. Achieving Environmental Sustainability in Myanmar. Asian Development Bank. ADB Economics Working Paper Series, No. 467.

Raitzer, D., L. Wong, J. N. Samson, 2015. Myanmar's Agriculture Sector: Unlocking the Potential for Inclusive Growth. Asian Development Bank. ADB Economics Working Paper Series, No. 470.

Republic of the Union of Myanmar, 2016(g). Economic Policy of the Union of Myanmar.

Richards, D., D. Friess, 2016. Rates and drivers of mangrove deforestation in Southeast Asia, 2000-2012. PNAS January 12, 2016 vol. 113.

Scurrah, N., P. Hirsch, K. Woods, 2015. The Political Economy of Land Governance in Myanmar. Mekong Region Land Governance.

Springate-Baginski, O., T, Treue, Kyaw Htun, 2015. Beyond over-logging? From military era timber exploitation towards democratic and sustainable forest governance. EcoDev/ALARM.

Treue, T., O. Springate-Baginski, K. Htun, 2016. Legally and Illegally Logged out: Extent and Drivers of Deforestation & Forest Degradation in Myanmar. EcoDev/ALARM.

USDA, 2016. Grain and Feed Annual, 2016 Annual Report, Union of Burma. USDA Foreign Agricultural Service. 29 April 2016.

Van Asselt, J., Kyan Htoo and Dorosh, P.A. 2017. Prospects for the Myanmar Rubber Sector. An Analysis of the Viability of Smallholder Production in Mon State. Development Strategy and Governance Division. IFPRI Discussion Paper 01610. International Food Policy Research Institute, Washington, DC.

Webb, E, N. Jachowski, D. Friess, J. Phelps, Maung Maung Than, A. Ziegler, 2014. Deforestation in the Ayeyarwady Delta and the conservation implications of an internationally-engaged Myanmar. Global Environmental Change, 24: 321-333.

Woods, K., 2015. Commercial Agriculture Expansion in Myanmar: Links to Deforestation, Conversion Timber, and Land Conflicts. Forest Trade and Finance Report Series, Forest Trends.

Woods, K., 2012. The Political Economy of Rubber Production in Myanmar: An Overview, Yangon.