YANGON UNIVERSITY OF ECONOMICS
DEPARTMENT OF ECONOMICS
MASTER OF DEVELOPMENT STUDIES PROGRAMME

OPPORTUNITIES AND CHALLENGES OF SUSTAINABLE LOGGING SYSTEM IN MYANMAR

(Case Study: Thandwe District, Rakhine State)

OO KYAW WIN
EMDevS - 36 (17th BATCH)

OCTOBER , 2022

YANGON UNIVERSITY OF ECONOMICS
DEPARTMENT OF ECONOMICS
MASTER OF DEVELOPMENT STUDIES PROGRAMME

OPPORTUNITIES AND CHALLENGES OF SUSTAINABLE LOGGING SYSTEM IN MYANMAR

(Case Study: Thandwe District, Rakhine State)

A thesis submitted in partial fulfillment of the requirements for the
Master of Development Studies (MDevS) Degree

Supervised by:

Dr. Thuzar Lin
Professor
Department of Economics
Pakokku University

Submitted by:

Oo Kyaw Win
Roll No. 36
EMDevS (17th Batch)

October, 2022

ABSTRACT

All native forests need to be actively managed for environmental reasons. Sustainable logging Which means Myanmar Selection System (MSS) of logging promotes good forest productivity in affecting low-impact production logging. This study aims to examine the sustainable logging system of Myanmar and to identify the opportunities and challenges of sustainable logging system in Myanmar. The SWOT analysis method is used to achieve the research objectives. The opportunities of the sustainable logging system of Myanmar are sustainable job creation, maintaining the diversity of plants, monopoly power for log extraction and marketing. The challenges of the sustainable logging system are deforesting, illegal logging and global warming. Although Myanmar is rich in forest resource, there is a lack of wood-based industry policy in Myanmar and is also a gap of wood-based technology. It is recommended that the government needs to focus on the effective reform of the forestry sector, beginning with the need for more transparent information for decision-making and holding officials. Weak governance in the forest sector remains a major obstacle to implementing SFM in Myanmar.

ACKNOWLEDGEMENTS

There are many honorable and respectful people to whom my sincere gratitude should be given for doing this research. First, I would like to state my heartfelt gratitude to Professor Dr. Tin Tin Htwe, Rector of Yangon University of Economics; Professor Dr. Khin Thidar Nyein, Pro-rector (Academic affairs); and Professor Dr. Daw Cho Cho Thein, Pro-Rector (Administration), for their permission to conduct this study.

Moreover, my special thanks go to Dr. Kyaw Min Htun Pro-rector (Retired) and members of the Research Ethical Committee of Yangon University of Economics for their approval and kind guidance in conducting this study.

I would also like to acknowledge Dr. Daw Naw Htee Mue Loe Htoo, Professor and Head, Department of Economics, and the lecturers and tutors from the Department of Economics of Yangon University of Economics for their lectures, advice, guidance, and encouragement during my study period.

I am grateful to my supervisor, Dr. Thuzar Lin, Professor, Department of Economics, Pakokku University, for her tireless support, continuous guidance, direction, and valuable advice and technical guidance throughout the research process. Without her encouragement patience, this study would not have been completed.

I also thank the Assistant Director and staff of the Forest Department and the Regional Manager of the Extraction Department from Thandwe District, Rakhine State for getting the necessary data and information.

Finally, I would like to express my deepest admiration and gratitude to my family members who always encourage me to concentrate on my studies.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

MONREC	Ministry of Natural Resources and Environmental Conservation
MTE	Myanma Timber Enterprise
FD	Forest Department
SFM	Sustainable forest management
MSS	Myanmar Selection System
AAC	Annual Allowable Cut
CoC	Chain of custody
EUTR	European Union Timber Regulation
FAO	United Nations Food and Agriculture Organization
FLEGT	Forest Law Enforcement, Governance, and Trade
ITTO	International Tropical Timber Organization
MEITI	Myanmar Extractive Industries Transparency Initiative
MFPMF	Myanmar Forest Products Merchants Federation
MoU	Memorandum of understanding
MTMA	Myanmar Timber Merchants Association
SoE	State-owned economic enterprise
UGoM	Union Government of Myanmar
ASEAN	Association of Southeast Asian Nations
UNFCCC	UN Framework Convention on Climate Change

CHAPTER I
INTRODUCTION

1.1 Rationale of the Study

The forest sector has taken a center stage as one of the most important sectors of the economy of Myanmar since the ancient Myanmar kings. Myanmar teak is the most famous timber in the world. Not only teak, but also other hard-wood timbers such as Pinkado, Padauk and Tamalam are well-known and valuable timbers in Myanmar till present time. Myanmar earns a lot of foreign and local income from its valuable timber. Myanma Timber Enterprise (MTE) is one of the main departments in Myanmar's forest sector.

Nowadays, all of the natural resources of Myanmar are conserved and administrated by the Ministry of Natural Resources and Environmental Conservation (MONREC). Under this Ministry, two main forestry-related organizations are the Forest Department (FD) and Myanma Timber Enterprise (MTE). The Forest Department (FD) is mainly responsible for the conservation and management of forests by developing Forest Management Plans, formulating Forest Policy and Laws, and so on. Myanma Timber Enterprise (MTE) is responsible for log extracting (logging) and marketing.

The logging system used in Myanma Timber Enterprise is called the Myanmar Selected System (MSS). It is a unit logging system by elephants, only used in Myanmar. This logging system is one of the best logging systems for sustainable forest management. MTE has not to always follow the Myanmar Selection System (MSS) and has often to operate in violation of national policies due to the dynamic between the Forest Department and the MTE is often tense. In Myanmar, timber is often extracted depending on current need instead of AAC limit at time of extraction and the felling cycle limit of 30-year designated by AAC has been neglected.

The historical marginalization of famous forest management methods and practitioners.

In the early 20th century, the MSS was renowned for its scientific management of Myanmar's natural forests. In the 1970s, this system started to fail, and today, scientific forestry is sidelined due to a lack of ability and appropriate

incentives. International cooperation is minimal, and the sector of forestry needs enough finance, a conducive research climate, and strong leadership. Myanmar has one of the lowest public sector spending levels in the world (about 4% of GDP).The scientific modeling of the yearly authorized cut is the greatest indicator of controlled, sustainable logging, and it is what first made Myanmar's forestry methods renowned (AAC). The AAC has decreased over time, suggesting that there are less mature trees accessible for harvest. The AAC has limited bearing on logging quotas, since the former governing authority did not adhere to AAC procedures when setting output objectives on behalf of government organizations. All sources show that the actual total amount harvested and exported has exceeded AAC standards, indicating unsustainable practices and/or large-scale illegal logging, with new, less sustainable tree felling methods influencing AAC levels. Historically, teak trees were girdled before to harvesting in order to avoid environmental harm, and were then transported by elephants and floated downriver to mills. Now, more mechanical and less sustainable "green tree" falling methods are used. The hostile relationship between the Forest Department of MONREC and the MTE is a result of the MTE's inability to constantly adhere to the Myanmar Selection System (MSS) and its frequent violation of national rules. As the commercial arm of the Ministry of Natural Resources and Environmental Conservation (MONREC), the MTE has more political sway and resources than the Forest Department.

Since the year 2000, the pace of deforestation in Myanmar has been among the fastest in the world (FAO 2020). At least a third of this loss was directly attributable to logging (Global Forest Watch 2020). Commercial logging, both officially and illegally, has been a significant contributor to deforestation in Myanmar, which has lost 27% of its forest since 1990.According to an FAO study, Myanmar lost 19% of its forest, or 7,445,000 hectares (28,750 sq mi), between 1990 and 2010. As much as 70% of Myanmar was covered by forest at the time of independence, but just 42.92 percent of the country's total land was covered by forest in 2020. Therefore, it is important to examine the main causes of deforestation in Myanmar even those Myanmar has used the sustainable timber logging system called MSS and is also vital to demonstrate opportunities and challenges of timber logging system of Myanmar for sustainable forest management.

1.2 Objectives of the Study

The specific objectives of this study are as follows:

(1) To examine the sustainable logging system of Myanmar,

(2) To identify the opportunities and challenges of the sustainable logging system of Myanmar in Thandwe District.

1.3 Method of Study

A descriptive method was used in this study to determine the sustainable logging system of Myanmar. The SWOT analysis method is used to achieve the research objectives. Secondary data was used for research purposes. The data and reports of Myanma Timber Enterprise (MTE), Forest Department (FD), FAO, ITTO, forest trends, various books, research articles, dissertations, newspaper reports, various documents, and websites have all been used to gather information and data.

1.4 Scope and Limitations of the Study

This study focuses on the sustainable logging system in Myanmar, specifically the Myanmar Timber Enterprise in Thandwe District, Rakhine State. The data is collected from forestry reports, Myanmar Timber Enterprise, and Forest Department which includes the whole MTE data and Thadwe District MTE data and also from Thandwe District Forest Department. The study period for data collecting is from 2011–2020.

1.5 Organization of the Study

This study consists of five chapters. The first chapter focuses on the introduction, which includes the introduction, research rationale, and objectives of the study; the method of the study; the scope and limitations of the study; and study organization. After that, the literature review is clarified in chapter 2. Chapter 3 describes background history, including policy analysis and secondary data. In Chapter 4, the data analysis is described, including general description of study area, sustainable logging system of Myanmar (including Thandwe district), opportunities of sustainable logging system in Myanmar, challenges of sustainable logging system in Myanmar, SWOT analysis of Myanmar timber logging system of Myanmar and Thandwe District. Finally, the last chapter, Chapter 5, concludes with findings and recommendations.

CHAPTER II
LITERATURE REVIEW

2.1 The Meaning of Logging and It's Importance

The process of felling and removing trees from a forest called logging. In forestry, this term is used to describe the process of producing logs, which involves removing tree branches and bark and chopping trees into sections. In some instances, logging may refer to the whole logistical operation of felling, processing, removing, and transporting trees from the forest to the sawmill. In the past, logging was performed using conventional methods, but technological advancements have led to significant changes in the sector today. In many nations, logging is governed by government rules and occurs at specified periods for a variety of reasons. Forests are so essential to human life that they cannot be overexploited or mismanaged in order to maintain the proper balance. Kathy Abusow, president and chief executive officer of the Sustainable Forestry Initiative, asserts that well-managed forests produce goods and advantages that benefit society as a whole. In this address, she emphasizes that the use of wood products originating from well-managed forests may simultaneously conserve our forests and enhance our quality of life. Responsible wood harvesting protects animals and gives several other advantages. The following are reasons why logging is essential:

(1) Minimizes Competition for Resources

Logging is essential because it decreases forest density. Trees in close proximity must fight for sunshine and water. Younger and shorter trees may not get sufficient sunlight due to the overcrowding of older trees. If trees are planted too closely together, their roots and leaves can inhibit the establishment of other valuable species, such as grass, shrubs, and ferns that are vital to wildlife. These plants have a shorter life cycle than bigger trees, so they develop and disintegrate rapidly, enriching the soil with nutrients

(2) Boosts the Health of the Trees

Logging can preserve the health of trees. For example, when trees grow too close together, it facilitates the introduction of microorganisms that cause illnesses, and due to their closeness, every tree might end up contracting the disease,

putting the whole forest at risk. The diseased portions of trees are removed during logging, allowing the other trees to grow disease-free. Moreover, too many trees produce severe congestion, and the majority of little trees lack the necessary light and air. These two components are essential to the entire development of trees and other creatures. In reality, trees employ photosynthesis to convert solar energy into chemical energy, which is essential for the overwhelming majority of life on earth.

(3) Provides necessary raw materials

Through logging, trees are collected for usage. Trees are an essential raw element for human life. They offer fuel for dwellings, are excellent for producing furniture, provide resources for constructing buildings, and may be used to create a variety of common products. All of these activities must be recorded. The population and demand for wood and forest products continue to rise, while forest growth is decreasing. In order to fulfill market demand and support the health and development of forests, forest management via sustainable logging has become more vital.

(4) **Increased Safety**

Older trees are more susceptible to environmental harm because they are more frail (e.g., wind and rain). It implies that they are more prone to fall, even in locations such as roadways, sidewalks, and driveways, posing a danger to others. Furthermore, because logging necessitates the felling of trees, fires caused by natural causes will not spread swiftly. In order to fulfill market demand and support the health and development of forests, forest management via sustainable logging has become more vital.

(5) Reduces forest fires

The practice of logging helps prevent forest fires. If lightning starts a fire in a dense forest, the fire will spread quickly, as opposed to when the trees have been cleared.

(6) Enhances undergrowth

Important because it enables more light and air to reach the forest floor, so promoting the development of flora under bigger trees. This vegetation consists of ferns, grass, and shrubs, which are vital to animals. When plants die, they give nutrients to the earth, enabling other plants to thrive.

2.2 Types of Logging

Logging is generally categorized into two categories: selective and clear-cutting. Here are ten different types of log:

(a) Selective Logging

Selective logging is selective because loggers chose only highly valuable wood, such as teak, and is the act of harvesting high-risk trees to provide younger trees with a greater chance of survival a chance to develop. When a forest is too thick, trees have grown too close together, preventing light from penetrating. This is detrimental to the health of trees. In such situations, it is recommended to remove high-risk trees so that younger, healthier plants may thrive. The canopy's transparency enables the sun's rays to penetrate, allowing other trees to flourish with less competition. However, this kind of logging requires extreme care in order to save the most valuable trees. Important to note is that selective logging only entails the removal of selected tree species, qualities, and ages.

(b) Clear-cut Logging

In clear-cut logging, all trees in a certain area are felled. Certain seedlings and sprouts need complete illumination to flourish. Certain species, such as aspen and paper birch, cannot thrive at all without enough sunshine. The majority of logging companies use clear-cut logging techniques because they have been demonstrated to be more efficient and cost-effective than the selective approach, in which the chopped trees are scattered throughout the forest. However, this form of harvesting is controversial, since many environmental experts contend that it displaces species from their habitats. Others contend that before the introduction of chainsaws and other tree-harvesting tools, natural calamities such as wildfires maintained the health of the forest. The overarching compromise is to establish a regeneration strategy before to clear-cutting. In certain instances, according to Ashton, clear-cutting a forest is preferable than selective logging. With selective logging, only the biggest trees are removed, resulting in a seed supply loss. The existing trees often obstruct the sunlight required for the growth of seedlings (small plants) that will ultimately become trees. Clear-cutting is more effective when the soil contains seeds. All seedlings are exposed to an equal and consistent quantity of light after clear-cutting. This same quantity of sunshine enables the young plants to mature into trees (Ashton lecture, 2005).

(c) Reduced-Impact Logging

Reduced impact logging (RIL) refers to the meticulous planning and execution of wood harvesting operations in order to reduce environmental consequences on forest stands and soils. It incorporates a variety of practical techniques, including pre-harvest forest surveys and mapping of individual crop trees. "Reduced-impact logging" (RIL) practices are a collection of wood harvesting principles meant to decrease the negative environmental effects of tree cutting, yarding, and transport during the previous two decades. Concerns about damaging logging techniques and worker safety in the tropics have prompted the recent growth of semi-coordinated research and training efforts connected to wood harvesting, but none of the RIL components are novel. Studies conducted in Southeast Asia, Africa, and South and Central America have conclusively demonstrated that the unintended effects of selective logging on residual stands and soils can be substantially mitigated by implementing a series of recommended logging practices by crews that are appropriately trained, supervised, and compensated. The degree to which economic calculations are conducted seems to rely on site circumstances, whether unlawful activity revenues are included in the baseline, and the viewpoint from which economic calculations are made.

(d) Shelter wood Logging

There are features of both selective and clear-cut logging in shelter wood logging. Before elder trees are taken down, sprouts, seedlings, and reasonably young trees have the opportunity to thrive. As soon as the youngest generation of trees has achieved optimal environmental conditions for good development, the parent trees are cut down. Thus, no big areas of the forest are left barren, but adequate thinning is achieved.

(e) Variable Retention Harvest

In variable retention harvesting, trees of varying sizes are taken in areas, while others are left standing to maintain animal habitats. Southwest Oregon has adopted this kind of logging that seeks to strike a balance between environmental concerns and economic goals. In Oregon, the Bureau of Land Management intends to cut trees in order to generate cash from wood sales while maintaining habitat for endangered species. It entails logging carefully in areas similar to those left by wildfires. The clearings create sanctuaries for insects, elk, deer, and songbirds.

(f) Strip Logging

In strip logging, a group of trees are felled in a narrow strip parallel to a river or along a slope. The trees bordering a river are excluded, while the desired trees are felled up the hill. After being chopped down, the trees are hauled up the hill on a route that borders the river. Years later, a second thin part is felled and transported up the hill away from the river, above the slope where the first strip was removed. When this occurs, nutrients from the decomposed, new cuts are washed down to the initial strip, giving nutrients for accelerated regeneration. This practice also benefits in reducing soil erosion, since the remaining trees prevent bare ground dirt from being swept downstream.

(g) Tree-length Logging

Tree-length logging entails felling trees, removing their limbs, and removing their crowns. Therefore, just the trunk is cut down, removed, and placed into a truck. The branches and all of their nutrients remain in the region where they were cut.

(h) Whole-tree Logging

In whole-tree harvesting, the whole tree is cut down. That is, the branches and crown are not severed. After a tree is felled, it is carried to its final destination, where all of its components, including its branches, are used. This strategy exposes the ground to erosion since the branches will no longer offer protection.

(i) Logging to length

Cut-to-length logging involves falling trees, removing limbs, bucking and sorting logs at the stump area, and leaving limbs and tree tops at the felling site. In this technique, motorized harvesters do logging by using GPS to set harvesting regions. This kind of logging targets trees with a 35-inch diameter. Typically, the harvesters stack the logs in bunks, where a skidder transports them to a landing.

(j) Manual Logging

In manual logging, trees are hacked down using a chainsaw or an ax. They are fitted with specific levers to control the tree's fall in the desired direction. However, they must first evaluate the tree's size, length, and any other elements that

may impede its fall in the desired direction. As the activity is risky, only people with expertise in manual logging are permitted to conduct it.

(k) Mechanized Logging

Mechanized logging includes the use of specialized machinery and equipment to down trees. When a significant number of trees must be felled, as in clear-cut logging, machines are often used. With advancements in technology, certain machines can chop down trees, remove branches, split logs, and stack the logs. This procedure is quick, inexpensive, safer, and more effective.

2.3 Effects of Logging

Logging eliminates huge trees that would typically fall into streams and offer shelter and thermal protection, elevates water temperatures and pH, and damages the chemical and biological conditions and food webs that fish need for survival. In addition to being poor public policy, irresponsible and incorrect logging prescriptions are likely to harm the ecological services of our national forests, hence raising the chance of future devastating fires, boosting greenhouse gas emissions, and affecting other resource values. The following are some of the harmful effects that logging may have on forests.

(A) Impacts of Road Building

The construction of roads during logging operations has direct detrimental effects on wildlife, water health, and the ecological integrity of the forest. Roads break and divide the forest, hence impeding the spread and movement of species. Numerous species are unable to traverse these barriers, and as a result, their range and distribution are changed, often resulting in severe local repercussions. Our national forest system has more kilometers of roads than the rest of the continent combined. The development of logging roads has a significant influence on the forest's water ecosystems by increasing erosion and sedimentation. Roads destabilize the existing soil and eliminate the ground cover that aids in the natural distribution of precipitation and drainage. Roads direct and accelerate the flow of soil into local streams and rivers, so introducing a substantial amount of debris and contaminants into these watersheds.

(B) **Watersheds and aquatic environments**

There are several implications of logging on aquatic ecosystems. The final outcome of logging is a forest system that is significantly changed, causing severe difficulties with erosion, sedimentation, and altered stream flow patterns. Logging eliminates huge trees that would typically fall into streams and offer shelter and thermal protection, elevates water temperatures and pH, and damages the chemical and biological conditions and food webs that fish need for survival. Logging and the roads built to assist logging dramatically damage stream ecosystems by adding large quantities of silt into streams, disrupting natural streamflow patterns, and modifying the architecture of stream channels. Significantly more landslides and erosion events that dump unusually large volumes of silt into nearby streams are expected to occur in logged areas. On the terrain, roads, ditches, and freshly constructed gullies form new, extensive networks of flow pathways. After a storm, these logged regions see far greater discharge volumes than they ever did while the forest was intact. This rise in sediment loads has a profound impact on the health of aquatic animals by altering the stream ecosystem.

2.4 Unlawful Logging and It's Causes

Illegal logging is the unlawful practice of felling trees, transporting them, or exploiting their products such as lumber for commercial advantage. It includes the employment of unscrupulous means to gain access to forests or protected areas, the illegal harvesting or felling of trees, and their sale on black markets or elsewhere as lumber. Equally egregious as illegal logging is the excessive exploitation of wood above the prescribed boundaries. As the worldwide demand for commodities such as paper, wood, and palm oil surges, firms and individuals continue to advance further into forests, hence increasing the illegal logging issue. These are the reasons of illegal logging:

(1) Rural Poverty

There is usually a rural community or indigenous population residing in the forest zones. In most instances, these groups or tribes are very impoverished and rely solely on the forest for their subsistence. From food to shelter to fuel, the forest provides everything. As a result, people are forced to get fuel for cooking and heating

from the forest, which fosters the practice of continuous illegal logging. Additionally, the majority of their shelter building materials come from the forest, resulting in the frequent unlawful felling of trees to gain wood. Moreover, as a result of their dire economic circumstances and the fact that the forest is their main source of revenue, such communities often join with illegal loggers for financial benefit. Some may even illegally acquire forest timber and sell it to lumber companies.

(2) Cheaper Products in Black Markets

The economics of the markets globally equally plays a role in promoting illegal logging. The reason for this is that illegal timber is normally cheaper compared to legal timber in black markets thereby denying legal operators competitive advantage. To a great extent, this is fueling the demand for illegal timber which means more illegal logging. Importers of illegal logs and the dependency of black wood in countries such as Japan, China, the US, and the EU make the problem even worse.

(3) Illegal Charcoal, Furniture and Timber Trade

Globally, there is a growing dependence for charcoal, furniture, and lumber. In the majority of poor nations, charcoal is utilized for heating and cooking, and individuals involved in the trade illegally chop down trees to create charcoal. High-quality charcoal is often made from dense wood, which necessitates the unlawful felling of hardwood trees. Illegal logging is a multi-billion dollar industry in which some of the highest-ranking government officials and corporate executives, as well as wealthy company owners, are involved for their own personal financial benefit.

(4) Weaknesses and Laxity in Forest Governance

The forest governance in producing nations is abysmal, and the rules governing illicit logging are inadequate. Insufficient law enforcement and improper land use management are the result of limited resources, weak institutions, and lenient legislation. Moreover, many nations have ambiguous and inadequate legal frameworks. Some are even inconsistent. The combination of these problems creates so many gaps in forest management and administration that it is difficult for formal institutions to properly enforce laws against illicit logging. It allows firms and individuals to intentionally overharvest or take advantage of legal loopholes.

2.5 Shocking Effects of Illegal Logging

(1) Poor living standards for indigenous populations

Illegal logging often wreaks havoc on the lives of forest-dwelling indigenous tribes and villages in a multitude of ways. The illegal logging destroys their traditional way of life and means of subsistence. Specifically, their tribal customs will be lost if the forest disappears, and their ability to forage will be hampered, posing a danger to their existence. Some also rely on forest resources for money; thus, illegal logging removes their sole source of revenue, turning them into modern-day slaves and shadows of their true civilizations.

(2) Global Warming and Climate Change

Illegal logging damages trees that serve as carbon sinks and climate regulators, so contributing substantially to global warming and climate change. In addition to rising global temperatures, the practice reduces the overall forest cover area, exposing the majority of land to high temperatures and adverse weather conditions. Approximately 11 percent of carbon emissions that continue to harm global climates are attributable to the illicit destruction of forests for wood.

(3) Loss of Biodiversity

The loss of forest ecosystems due to illicit logging poses a danger to biodiversity. Since a result of the technique, an increasing number of species are unable to thrive, as the ecosystem loses its vital natural interconnection. More animal and plant species are on the edge of extinction due to the massive fragmentation and degradation of the forest. It is estimated that between one and ten species each year go extinct yearly in the contemporary era. According to research, this pace is comparable only to the past biodiversity loss caused by cataclysmic events such as enormous volcanic eruptions.

(4) Economic Losses

Illegal logging has several negative effects on the environment, but it may also harm the economies of developing nations. Illegal logging is estimated to reduce worldwide wood prices by 7% to 16% yearly, resulting in a global revenue loss of around $15 billion per year. In underdeveloped nations, governments lose income from customs and taxes and other expenses associated with illegal logging

management. As a result of the deterioration of important natural resources, the losses may potentially have significant long-term economic repercussions.

(5) All Countries will Feel the Combined Problems in the Long-term

Illegal logging will eventually harm the whole globe, despite the fact that large corporations, high-ranking government officials, and corporate executives may take the issue less seriously for their own self-serving advantages and wealth creation.

2.6 Deforestation and It's Effects

Deforestation refers to the widespread felling of trees or the destruction of forests by humans. Deforestation refers to the loss of forest areas around the globe due to conversion to other uses, such as agriculture, urbanization, or mining. Since 1960, human activities have greatly increased deforestation, significantly impacting natural ecosystems, biodiversity, and the climate. The Food and Agriculture Organization of the United Nations estimates that the yearly rate of deforestation is around 1,300,000 km2 per decade. Deforestation is most prevalent in the tropics, where there are a variety of forest types, ranging from wet and steamy rainforests to deciduous woods. Some regions of the globe have been able to keep their woods against deforestation, while others have seen a loss in their forest cover. The following are some harmful outcomes of deforestation:

The negative effects of deforestation are as follows;

1. Climate Imbalance and Climate Change

In several ways, deforestation also influences the climate. Forests are the planet's lungs. Due to the fact that trees absorb carbon dioxide and emit oxygen and water vapor, tropical rainforests are exceedingly humid. Additionally, trees offer shade that maintains soil moisture. All of these are affected by the absence of trees. It causes an imbalance in air temperature and a drier environment, which further complicates ecological circumstances and contributes to climate change. Numerous animal and plant species that comprise the flora and fauna of the whole planet are very adapted to their native environment. Therefore, indiscriminate forest clearing would make it very difficult for them to live, relocate from their home environment, and adapt to new environments. When a forest is cleared, the relative humidity decreases, causing the surviving plants to dry up. The dehydration of tropical rainforests accelerates the

destruction of forests by fire, endangering both wild animals and people. Forests and climate are intricately intertwined. In addition, the loss of trees accelerates and multiplies floods, soil erosion, desertification, and temperature increases.

2. Increase in Global Warming

Trees have a significant part in combating global warming. The trees consume greenhouse gases, maintaining the atmosphere's equilibrium. As a result of ongoing deforestation, the proportion of greenhouse gases in the atmosphere has grown, contributing to our problems with global warming.

3. Increase in Greenhouse Gas Emissions

Forests decrease emissions of carbon dioxide and other greenhouse gases. However, once they are chopped, burnt, or removed in any manner, they become carbon sources. An estimated 20 percent of greenhouse gas emissions are attributed to deforestation, and tropical deforestation releases 1.5 billion tons of carbon annually into the atmosphere.

4. Soil Erosion

As they continually return water vapor to the sky, trees are also critical to our local water cycles. As precipitation percolates through the soil, the earth stays damp. The soil is kept in place by the complex root systems of several layers of trees. With the removal of tree cover, the land is now fully exposed to the sun, causing it to become parched. Without trees, the area is often eroded and swept into surrounding rivers and streams. Forests are the water purifying plants of nature. Soil erosion exposes soil to toxins that drain into the water supply, so compromising the quality of our drinking water.

5. Floods

With the assistance of their roots, trees absorb and store a substantial quantity of water when it rains. When they are chopped down, water flow is impeded and the earth loses its capacity to hold water. It causes flooding in some regions and drought in others.

6. Wildlife Extinction & Habitat Loss

Numerous animal species perish as a result of the extensive felling of trees. They are deprived of their environment and forced to relocate. Many of them are driven to the brink of extinction. In the previous several decades, many plant and animal

species have become extinct. According to a study of the Brazilian Amazon, up to 90 percent of anticipated extinctions would occur over the next 40 years.

7. Acidic Oceans

The rising quantities of carbon dioxide in the atmosphere as a result of deforestation and the combustion of fossil fuels acidify our seas. Since the Industrial Revolution, beaches have become 30 percent more acidic, endangering marine life and ecosystems.

8. The Decline in Life Quality of People

Millions of people worldwide rely on woods for hunting, small-scale agriculture, collecting, and medicinal purposes. The tropical woods include useful products such as latex, cork, fruit, nuts, natural oils, and resins. Deforestation impacts the lives of many individuals.

9. Food Insecurity in The Future

Future food insecurity may be caused by deforestation for food production. 52% of all agricultural land is moderately or severely affected by soil erosion at present. Lack of rich soil might result in poor yields and food insecurity over the long run.

10. Loss of Biodiversity

Deforestation causes a significant decline in biodiversity. About eighty percent of the world's biodiversity is found in tropical rainforests. In addition to providing homes for species, forests promote medicinal conservation. The forest serves as a vital habitat for a vast array of creatures. In addition, it damages the microbial population essential for producing clean water, removing contaminants, and recycling nutrients.

The positive effects of deforestation are as follows;

(1) It makes more area available for the development of other plants.

(2) It produces more usable material.

(3) It generates more useful stuff.

(4) It makes civilization and industrialization possible.

(5) It generates additional work opportunities.

(6) It provides the possibility for animals to graze.

(7) It affords us the opportunity to create more food.

(8) It helps individuals to produce more income.

2.7 Overview of SWOT Analysis

Albert Humphrey established the SWOT Analysis in the 1960s. By identifying a company's strengths, weaknesses, opportunities, and threats, this technique may be seen as a beneficial tool for ensuring the efficacy of its operations. By doing a SWOT analysis during the planning phase, a firm is able to identify many elements that may influence its future growth. Specifically, SWOT analysis may be used to analyze the present state of a firm, therefore highlighting the aspects that are operating well and those that want improvement. The primary objective of a SWOT analysis is to maximize the potential of the strengths and opportunities while limiting the impact of the weaknesses and threats (Schall, 2014).

The internal and exterior aspects of a SWOT analysis are referred to as internal and external, respectively. Internal considerations include organizational strengths and limitations. Opportunities and threats are environmental aspects that comprise the external dimension.

Strength refers to a resource, skill, or other advantage compared to rivals or a particular competency that provides the business with a competitive advantage in the market. It might include solid financial resources, a positive public image, market leadership, buyer/supplier connections, and other variables (Pearce, 1991).

A weakness is anything an organization lacks or does badly relative to its competitors, or a circumstance that puts it at a disadvantage (Thompson, A.A., 1989). It may be a lack of resources, skills, facilities, financial resources, managerial talents, marketing skills, or brand image (Pearce, 1991). The primary shortcoming of this study is not its theoretical foundation, but rather its applicability to the real world. In particular, it is difficult and complicated to determine which variables might be regarded strengths or weaknesses, since these factors can be interchanged depending on context and viewpoint.

Opportunity refers to external situations that enable an organization to capitalize on its strengths, overcome its deficiencies, or neutralize environmental dangers (Harrison, 2004). It might be a benefit, a driving force, a setting, or a favorable circumstance for an action to occur.

A threats is an unfavorable circumstance or factor that makes fulfilling organizational objectives difficult or impossible. Various environmental conditions may hamper the efficiency and effectiveness of an organization (Ülgen, 2010). Economic, social, cultural, demographic, environmental, political, legal, governmental, technical, and competitive developments and events that might greatly help or hurt an organization in the future are examples of external variables.

Opportunities and threats are sometimes beyond a single organization's control. The activities of management, marketing, finance/accounting, production/operations, research and development, and management information systems that are executed exceptionally effectively or badly are internal variables. Weaknesses and strengths are actions that an organization can manage (David, 2003). Since 1980, SWOT analysis has been used in the formation of small and medium-sized businesses and the establishment of business and marketing strategy. It is often used in the examination of internal and external environments to facilitate strategic decision scenarios. The SWOT analysis provides the chance to concentrate on the organization's internal and external strengths and weaknesses. SWOT Analysis is described by the 'Two-by-Two Matrix' (Emet Gürel, 2017). However, some critiques of SWOT Analytical assert that it is a flawed analysis approach in terms of quality and quantity. Using SWOT analysis, several elements may be uncovered, but number does not equal quality. It is hard to prioritize detected components in a SWOT analysis that takes into consideration developments and conflicts in many dimensions, viewpoints and recommendations based on diverse facts and studies.

Classifying variables into one of the four SWOT quadrants is difficult. The same element fits into two distinct groups. A component may simultaneously be a strength and a weakness. For instance, strengths that aren't maintained might deteriorate into weaknesses. Unutilized opportunities that are seized by rivals may become dangers. According to Emet Gürel (2017), the classification of a variable relies on the objective of the activity. In spite of its detractors, SWOT analysis has become a popular tool for corporate management and marketing. It might expose the existing position, assist in eliminating weaknesses and maximizing chances to establish future action plans, and provide light on the current scenario. Utilized appropriately, the approach may give a solid foundation for plan creation (Pahl, 2009). In order to create awareness and make it helpful for the future growth of Myanmar's wood industry, a SWOT analysis was

utilized in this research to compare the present obstacles encountered by MTE members with the available possibilities in the forestry sector.

2.8 Reviews on Previous Studies

Over the course of forest history, several systems for assessing the cut have been established across the globe (Davis et al. 2001). These strategies are designed to establish a harvest schedule with yields that are stable or below their long-term production capability. In this context, sustained yield referred to preserving wood resources by restricting harvesting to a level that could be maintained over time. According to Luckert and Williamson (2005), sustained yield principles are not necessary.

According to Deten (2011), forest planning experts cannot adequately incorporate the numerous and intangible relevant factors from nature (e.g., climate and its change, natural hazards, changing site factors) and society (e.g., global market development, social changes, political environment rearrangements) into forest management plans that shape forests sustainably.

Van Gardingen et al. (2006) acknowledge that yield control must be flexible to the many settings (social, biological, environmental, and economic) and forest management goals. However, according to Elbakidze et al. (2013), the notion of maintained yield in forestry alone may no longer exist as a standalone concept, and sustainable wood output would be assessed with other criteria in Sustained Forest Management.

Tint Htoo Han argued in his master's thesis on forest resources conservation in Myanmar (July 2009) that forest development activities must be reviewed in a local socio-economic context, which necessitates encouraging local participation in the planning, planting, management, and ownership of forestry and related activities. The legislation gives separate municipalities, private organizations, and local communities the ability to construct commercial and local forest plantations, however private sector norms and regulations must be amended as necessary. In addition, the watershed region should be properly maintained by conserving forests where dams and reservoirs are being built.

Tin Tin Myint (2012) explored in his master's thesis on the sustainable management of natural teak forests in Myanmar that MSS is too ideal to use in reality since both represented departments lack monitoring of forest conditions before, during, and after harvest. As reported by MSS. AAC for the chosen stand was calculated more than thirty years ago, and some trees may have died or been taken in the meanwhile. Before the second harvesting, the girth distribution of teak revealed that the silvicultural management of natural teak-bearing woods was poor. Therefore, maintenance against disruptions is essential. Monitoring and securing the remaining trees on the ground should be repeated again, and a longer felling cycle must be implemented. During harvest, it became apparent that harvesting was conducted independently of AAC setting. Therefore, even if we provided some new ideas or models for sustaining the existing forest state in a sustainable manner, our efforts would be in naught if operational difficulties are flawed.

Khaing Thandar Soe (2018) concluded in his doctoral dissertation on people's dependency on forests and their engagement in forest conservation in Myanmar that deforestation and forest degradation are one of the greatest risks to forests and people globally. In Myanmar, inadequate regulation and unsustainable extraction of non-timber forest products (NTFPs) are damaging millions of hectares of natural forests; over exploitation of forest resources is one of the primary causes of forest degradation. Myanmar's forestry industry continues to encounter several obstacles in terms of sustainable forest management. Even though engagement of local people is a major tenet of Myanmar's forest policy, there is much room for improvement in this area.

Between 1990 and 2010, Myanmar lost 19%, or 7,445,000 hectares (28,750 square miles), of forest, according to a study by FAO. At the time of independence, forests covered as much as 70% of Myanmar, but as of 2014, just little more than 48% remained. The pace of deforestation in Myanmar has decreased from 0.95 percent per year between 1990 and 2010 to roughly 0.3 percent per year. Deforestation in Myanmar is considerably less than in neighboring countries such as Indonesia and Vietnam, but it remains a significant environmental concern. Continued deforestation is primarily caused by three factors: illegal and unsustainable logging, unresolved land rights and land conflicts, and substantial agricultural growth. Myanmar has the greatest swath of tropical forest on the ASEAN mainland, with a richness much

beyond that of temperate forests. As of 2010, the live forest biomass of Myanmar contained 1,654 million metric tons of carbon and was home to more than eighty indigenous species. Despite the complexity and quantity of Myanmar's forests, only 6.3% of the land is protected, and a large portion of the remaining forest is threatened by destruction. (From the free encyclopedia Wikipedia)

CHAPTER III
BACKGROUND HISTORY OF THE SUSTAINABLE LOGGING SYSTEM IN MYANMAR

3.1 Overview of the Logging System in Myanmar

Beginning in the mid-1800s, large-scale commercial logging began in Myanmar during the British colonial era. The immense teak woods were the origin of early forestry activity. Large sections of the nation, notably the Tenasserim (present-day Tanintharyi Division) teak woods near the present-day Thailand border, were already severely logged when the British started to more successfully employ scientific forestry. In response, the British government began commercial forest management in Bago Yoma, central Myanmar, in 1856, the same year the Myanmar Forest Department was founded. The 'taungya' system, a globally renowned agro-forestry approach based on agro-forest intercropping, is an additional land management strategy established in Myanmar. Initial teak plantings by the British in Karen-populated portions of the Tenasserim hills (now Tanintharyi Division) at the middle of the 19th century was a forceful arrangement, but still marked the beginning of a teak plantation management program in Myanmar. The systematic development of teak plantations did not begin until the 1970s and continues to the current day. The communist period in Myanmar (1962–1988) significantly altered forest management. Under the state-socialist system, growth-oriented objectives were established without regard to local conditions or edaphic characteristics, with predicted increases in yearly export revenues.

As a result of the centralization of Myanmar's forestry management system, each divisional forestry department was required to raise its wood output in order to meet its allotted goals. The woods were logged irresponsibly because the established objectives were not based on the actual productivity of the forests as measured by MSS. This included disregarding the 30-year wood harvesting cycles and substituting them with much shorter rotations. Upon the demise of socialism in the 1970s, wood swiftly became the primary source of national income. The State Wood Board (STB), the predecessor of the Myanmar Timber Enterprise (MTE), was the only state organization permitted to harvest and sell timber. Thus, the STB (and now the MTE) directly attacked the Forest Department's institutional authority, compelling foresters

to approve over-cutting to satisfy the government's desire for foreign money. Supported by the FAO, the creation of forest plantations rose in favor.

After the government of Myanmar adopted a quasi-private market economy in 1988, the forestry industry once again saw significant transformations. In the 1990s, Thailand's industry played a significant role in the overexploitation of Myanmar's border forests. In the 2000s, heavy wood exploitation relocated to the Yunnan province (China) border. Involvement of the private sector in the forestry industry, as well as changes in regional politics and economics, have consequently impacted Myanmar's forest management. In response to these new factors, the Forestry Department has developed new policies and efforts over the last decade to safeguard and sustainably manage one of Asia's biggest remaining tracts of tropical forests and the world's most valuable teak stands. Following cease-fire agreements along the Sino-Myanmar border, Chinese loggers and timber dealers targeted the northern forests along the China border from the late 1990s to the mid-2000s for its valued old-growth rich hardwoods (Global Witness 2005). Early in 2006, the governments of China and Myanmar reached a bilateral agreement to prohibit illicit cross-border wood trafficking, which was in part sponsored by ethnic political organizations. Immediately after the bilateral cross-border wood trade crackdown, timber flows were curtailed and continue to stay at the same levels as before (upwards of 1 million cubic meters in the early 2000s). Despite diminishing levels, cross-border wood trafficking persists (Global Witness 2009). Since the mid-2000s, about the same time as the government started to crack down on illicit Sino-Myanmar wood traffic, the government has progressively encouraged the local business community to engage in different sectors of resource extraction.

Along with foreign investors, the Myanmar private sector has become increasingly involved in timber trade, which is primarily coordinated by the Myanmar Timber Merchants Association (MTMA) and carried out in collaboration with the Myanmar Timber Enterprise (MTE) of the Ministry of Environmental Conservation and Forestry. Influential and well-known Myanmar corporations have also began investing in agriculture in response to government incentives to enhance the export of agricultural products.

3.2 The Roles of Myanmar Timber Enterprise and It's Reforms

Myanma Timber Corporation (MTE) is a state-owned enterprise with the legal authority to collect timber for commercial purposes. Additionally, MTE is responsible for the processing, marketing, and export of timber and its products. The primary duties of MTE are harvesting, log distribution, and sale of raw material and sawn wood to the private sector. MTE's policies are as follows: (1) To collect and use wood and timber products in a sustainable manner and to meet the local demand for timber. (2) Develop and enhance the wood-based industries sector to maximize forest resource usage. MTE's goals are as follows: (1) To collect the optimal quantity of wood that the forest can provide. (2) To ensure forest preservation by promoting efficient wood consumption. (3) To stimulate private sector involvement in adding value to wood. (4) Improve the nation's and its people's socioeconomic growth through advancing the wood-based industry.

MTE consists of 8 Departments: I Extraction, (ii) Export Milling and Marketing, (iii) Domestic Milling and Marketing, (iv) Wood-based Industries, (v) Planning and Statistic, (vi) Engineering, (vii) Budget and Accounting, and (viii) Administration. Myanmar Timber Enterprise (MTE) was founded on 4 April 1948 under the name STB (State Timber Board) in order to do business in the forest resources sector. In line with the Forest Law (1992), the Extraction Department of MTE is responsible for harvesting activities in accordance with the operational harvesting plan, while the Forest Department is responsible for Control Check (FD). Currently, there are 25 Extraction Agency Offices around the nation, which are administered by the Region/State Office responsible for the Extraction Department. The Myanmar Timber Enterprise (MTE) is the Ministry of Natural Resources and Environmental Conservation's revenue-generating logging arm (MONREC). The MTE owns and operates between 81 and 91 sawmills (9 for teak and the remainder for various hardwoods), 4-5 plywood factories, 1 block board factory, 5 to 8 furniture manufacturers, 2-3 moulding factories, 2 veneer factories, and 1 flooring and moulding factory. Except for one MTE sawmill, which uses 54,070 cubic meters of wood annually, the yearly input capacity of every mill does not exceed 21,600 cubic meters (Daw Khin May Lwin et al., 2009).

Myanmar Timber Enterprise practiced following reform activities;

(1) reduce the harvesting amount to be within the limit of AAC prescriptions set by Forest Department about 55% of AAC in Teak and only about 33% of AAC in Hard wood since 2013.

(2) Log Export is banned in 2014April 1st to promote wood-based industry sector.

(3) Cease of Modified Procedure System (MP) since 2015 & only practicing Normal extraction system.

(4) Cease of Harvesting Permit to the private by giving Timber Share in 2015.

(5) One Year logging Ban over the whole country while ten years ban for the Bago Yoma Region since 2016.

(6) Introduction of Plantation and Elephant Conservation based Tourism-ECBT apart from the Harvesting Operation.

(7) Restructuring organization such as Decommission/Combination of some MTE extraction agencies and some MTE mills.

(8) Transfer of working Elephants, Vehicles and Machines to the remaining MTE extraction agencies, including Staffs.

(9) Reviewing the Operational Harvesting Plan to analyze the internal capacity of MTE.

(10) Since the preparation stage of FLEGT VPA Process is initiating, MTE, as the one of the main stakeholders, actively involve with the coordination of Forest Department and other lines departments.

(11) Moreover, MTE has been reforming and improving its performance on Chain of Custody- CoC by revising and issuing sales documents and by negotiating with other line departments to support Myanmar Timber Legality Assurance System-MTLAS developed and reviewed by Myanmar Forest Certification Committee-MFCC.

(Source; Myanma Timber Enterprise)

3.3 Logging Processes in Myanmar

Myanmar Timber Enterprise is the single entity in charge of the harvest and export of teak and other hardwood species. In accordance with forest management and harvesting plans, both teak and non-teak hardwoods are harvested using production working rings. Generally, harvesting plans stipulate a "two pass method" in which teak is picked first, followed by other species. Teak is first girdled and then harvested according to the Myanmar Selection System's specifications for diameter

limitations for cutting and post-harvest inventory. Historically, teak logs were floated down rivers to rafting stations, where they remained for years before being transported to mills. The use of a trucking system has generated considerable time savings. Additionally, transit volume loss is reduced. Myanmar has created a national code of conduct for forest harvesting based on the regional FAO/Asia-Pacific Forestry Commission Code of Practice for Forest Harvesting in the Asia-Pacific. The Code was finalized in 2000 and is now being sent to territory personnel for implementation. Reviews are often conducted for more pragmatic purposes. (FAO 2022)

Elephants and, to a lesser degree, water buffaloes are mostly used for stump removal and log dragging. The employment of animals for log extraction has been shown to have the least negative effect on the environment and biodiversity. The Myanmar Wood Enterprise employs over three thousand elephants for timber exploitation. Under the Myanmar Selection System, mechanical extraction is not deemed economically viable and is used in just a few locations. Road building, the loading and unloading of logs, and transportation are the three primary applications for heavy equipment. Myanmar's wood harvest occurs in three stages: (Mar, 2007; Zaw, 1997);

(1) 1st stage involves felling trees and dragging logs from the stump of felled trees to the measuring points.
(2) 2nd stage involves transportation of logs from the measuring points to the river depot, railing sidings, and log yards.
(3) 3nd stage involves transportation of logs from the river depots, railing sidings and log yards to Yangon which is the main port for timber export, by means of rafting, railing and trucking.

Elephants are required in the first step of extraction, which is known as "Stumping." They are also required in the second stage of transportation, when floating is used to convey logs from the measurement stations to the river rafting depot. Using animal power is claimed to be the cheapest and most ecologically friendly option. In Myanmar, heavy machinery is mostly utilized for road building and transporting logs, although elephants continue to do stumping and skidding tasks that no machine can replace in such a complicated natural forest. As a result, wood extraction in Myanmar is sometimes referred to as "elephant logging." Since elephants are vital to the Myanmar timber business, the Myanmar Timber Enterprise

takes excellent care of their health. It was said that a completely trained elephant in Myanmar costs between $6,000 and $10,000. (Zaw, 1997).

3.4 Myanmar Selection System for Logging and AAC

The Myanmar (Burma) Selection System (MSS), formerly called as the Brandis System, was created between 1880 and 1920 as a mix of Brandis method yield control and periodic improvement felling to promote teak. Following the German model, the scientific management of natural forests in Myanmar was based on the Brandis Selection System. During the subsequent fifty years, the colonial forest management system was replaced by the Burma (now Myanmar) Selection System (BSS, now MSS). The MSS was created to preserve a high output of high-quality wood and to promote the natural regeneration of economically significant trees. In both theory and practice, MSS was acknowledged globally as an example of world-class scientific forest management by the early 1920s. In the early 20th century, the Myanmar Selection System (MSS) was renowned for its scientific management of Myanmar's natural forests. In the 1970s, MSS started to deteriorate. The application of scientific forestry in the nation is neglected at now. Although "clean cutting" is still the most frequent type of logging, "selective logging" has gained favor in recent years since it lacks some of the disadvantages associated with other methods.

The Annual Allowable Cut (AAC) is the maximum number of trees and volume that may be cut in a given logging season, as determined by the 10-year District Forest Management Plan, growing stock inventories, and 30-year falling cycle. The AACs were changed twice between the 1990s and early 2000s. Prior to the first AAC adjustments in the 1990s, the values for teak and other hardwoods had not altered for over three decades. They were based on partial surveys conducted in the early 1960s, which were then extrapolated to the full country and set at a level that would theoretically assure sustainable wood output over the entire nation's territory. However, since many regions of the nation were inaccessible owing to insurgency and civil conflict (as is the case now, although to a lesser extent), the AAC for the whole country was collected only in those regions where the government had access. This resulted in inevitable overexploitation and is a key fault of the standard AAC statistics, even if they are followed exactly. The forest inventories that are used to establish the local AAC are extrapolations based on samples rather than a complete

"contouring" effort, resulting in less accurate AAC numbers even if all procedures are followed precisely. Forest planning, including the assessment of the AAC, must include the risk of forest damage due to natural catastrophes and its disturbance agent (i.e. illegal logging, forest fire, grazing, fuelwood collecting, and encroachment) for each period. The overstated AAC value contributed to the escalating stock drop.

3.5 Deforestation in Myanmar

According to a study by the Food and Agriculture Organization of the United Nations, between 1990 and 2010, Myanmar (formerly known as Burma) lost 19%, or 7,445,000 hectares (28,750 square miles), of forest. As much as 70% of Myanmar was covered by forest at the time of independence, but as of 2014, just slightly more than 48% remained. The pace of deforestation in Myanmar has decreased from 0.95 percent per year between 1990 and 2010 to roughly 0.3 percent per year. Deforestation in Myanmar is considerably less than in countries such as Indonesia and Vietnam, but it remains a major environmental concern. Continued deforestation is primarily caused by three factors: illegal and unsustainable logging, unresolved land rights and land conflicts, and substantial agricultural growth. Myanmar has the biggest swath of tropical forest on the continent of Southeast Asia, with a richness much beyond that of temperate forests. As of 2010, the live forest biomass of Myanmar contained 1.65 billion metric tons of carbon and was home to more than 80 indigenous species.

Despite the extent and complexity of Myanmar's forests, only 6.3% of the land is protected, and a large portion of the remaining forest is threatened by destruction. Agricultural development, wood extraction (e.g., logging or wood collection for home fuel or charcoal), and infrastructural growth (e.g., road construction and urbanization) are the direct drivers of deforestation. Myanmar is facing a deforestation crisis due to natural disasters (hurricanes, floods, drought, and fires), human activities (logging, slash-and-burn agriculture, cutting trees for fuel, mining operations, dam construction, clearing land for livestock grazing, and oil extraction), and overpopulation, according to the Yangon-based Biodiversity and Nature Conservation Association (BANCA). If the government cannot regulate deforestation, the consequences might be catastrophic. It causes environmental

deterioration and direct biodiversity loss. Human population and wood export are the primary drivers of deforestation in Myanmar. The non-governmental organization (NGO) Global Witness reported that Myanmar exported at least one million cubic meters of wood to China in 2002. Between 2010 and 2011, the government exported 864 million metric tons of wood and earned $600 million. Moreover, according to a 2009 UN FAO estimate, around 70 percent of Burma's rural population, or at least 30 million people, depend on forests for their fundamental necessities.

3.6 Forest Law and Policy in Myanmar

The original Forest Act was passed in 1902, and it was revised in 1992 as the Forest Law. The legislation from 1992 promotes conservation, sustainable forestry, and socioeconomic advantages. In addition, the 1992 legislation promotes private sector and community engagement in forest management and somewhat decentralizes forest management. Myanmar Forest Policy has assisted the implementation of the Forest Law of 1992. (1995). Following other international policies on sustainable development and forestry, this policy focuses on boosting national socioeconomic growth while simultaneously guaranteeing ecological equilibrium and environmental stability. The Forest Policy encompasses sustainable production, meeting fundamental requirements, institutional strengthening and efficiency improvements, forest and biodiversity conservation, and participatory forestry. According to the policy, a participatory approach to forest management is required, with a focus on people's participation in forestry, wildlife and nature conservation activities, as well as in establishing plantations and increasing incomes through the application of community and agroforestry systems.

3.7 Log Extraction and Income of Myanmar

Ten years log extractions and ten years incomes of Myanmar Timber Enterprise and Thandwe District are illustrated as follows**;**

Table (3.1) Log Extractions in Myanmar (From 2012 to 2021)

No.	Year	Plan(Ton)		Performance (Ton)	
		Teak	**Hard Wood**	**Teak**	**Hard Wood**
1	2012-2013	232986	1400415	269516	1597798
2	2013-2014	200000	1200000	180751	846248
3	2014-2015	60000	670000	72736	670722
4	2015-2016	60000	670000	79366	658055
5	2016-2017	60000	670000	6159	13154
6	2017-2018	15000	350000	14655	321686
7	2018 (April to September)	-	-	284	3931
8	2018-2019	15000	350000	12569	305115
9	2019-2020	10000	30000	8043	276702
10	2020-2021	8000	250000	8847	177829

(Source: Myanma Timber Enterprise)

According to ten years log extraction of Myanmar **as** shown in Table (3.1), it is found that extracted ton is gradually decreasing due to the scarcity of timber and reform activity of MTE that MTE reduces the harvesting amount to be within the limit of AAC prescriptions set by Forest Department about 55% of AAC in Teak and only about 33% of AAC in Hard wood since 2013.

Table (3.2) Incomes of Myanmar Timber Enterprise (From 2011 to 2020)

No	YEARS	Income (million kyat)		Expenditure (million kyat)	Total Sales (million kyat)
		Export Sale	Local Sale		
1	2011-2012	2,964.340	35,474.894	5,072.991	33,366.243
2	2012-2013	555,164.253	45,492.840	201,183.089	399,474.004
3	2013-2014	665,988.011	72,304.644	280,766.320	457,526.335
4	2014-2015	263,262.436	106,797.301	73,732.782	296,326.955
5	2015-2016	298,314.299	127,467.977	87,313.994	338,468.281
6	2016-2017	161,092.657	190,699.080	77,557.525	274,234.211
7	2017-2018	19,183.192	273,852.449	26,509.388	266,526.252
8	2018 (Apr; to Sept)	8,103.092	132,818.768	12,419.416	128,502.444
9	2018-2019	20,763.511	281,284.285	27,151.653	274,896.143
10	2019-2020	10,258.149	150,538.368	14,249.442	146,547.093
	Total Sale	**2,005,093.945**	**1,416,730.627**	**805,956.606**	**2,615,867.966**

Source: Myanma Timber Enterprise

According to ten years log sale of Myanmar **as** shown in Table (3.2), it is found that log sale income of Myanmar is gradually increasing due to selling price of log is eventually increasing and increasing market demand of Myanmar wood- based industry

Table (3.3) Log Extractions in Thandwe District (From 2012 to 2020)

No.	Year	Plan Ton	Felling		Out		(Arrival)	
			No	Ton	No	Ton	No	Ton
1	2012-2013	8000	6254	6186.6940	6947	7153.6180	5908	6676.4830
2	2013-1014	8000	-	-	-	-	19679	19386.2340
3	2014-2015	4500	3245	3015.8760	3245	3006.6860	4754	3843.1000
4	2015-2016	8000	7827	8752.1940	7827	8752.1940	4322	4143.4490
5	2016-2017	20000	-	-	-	-	7177	7749.3050
6	2017-2018	10000	9244	10018.8200	8636	9314.5380	994	924.1240
7	2018-2019	10000	9667	10005.4060	10275	10660.6800	14567	15712.3600
8	2019-2020	10000	-	-	-	-	3350	3310.5380

Source: Myanma Timber Enterprise

According to eight years log extraction of Thandwe District from 2012 to 2020 **as** shown in Table (3.3), it is found that log arrival is the largest in 2013- 2014 fiscal year and the smallest in 2017-2018 fiscal year due to political instability in 2017, although log extraction plan is the largest in 2016- 2017 fiscal year and the smallest in 2014-2015 fiscal year. There is no log extraction by MTE in 2020-2021 fiscal year and 2021-2022 fiscal year in Thandwe District because of political instability.

Table (3.4) Timber Sale Incomes of Thandwe District / Rakhine State (2012 - 2022)

No.	(Year)	(Plan)	(Income)
1	2012-2013	150.0	817.829
2	2013-2014	-	1758.816
3	2014-2015	-	1166.292
4	2015-2016	-	1042.372
5	2016-2017	1073.0	2448.182
6	2017-2018	350.0	470.774
7	2018 (June)	175.0	358.415
8	2018-2019	4000.0	4003.039
9	2019-2020	700.0	705.953
10	2020-2021	100.0	774.616
11	2021-2022	500.0	651.792

Source: Myanma Timber Enterprise

According to eleven years timber sale income of Thandwe District from 2012 to 2022 **as** shown in Table (3.4), it is found that timber sale income is the largest in 2018-2019 fiscal year and the smallest in 2018 fiscal year due to six months minimum budget in this year, Although there is no log extraction by MTE in 2020-2021 fiscal year and 2021-2022 fiscal year in Thandwe District because of political instability, MTE earned timber sale income in these years from open tenders of timbers that were originally illegal timbers caught by Forest Department.

3.8 Value-Added Product Industry and Income

According to official figures published by the Myanmar Timber Merchants Association (MTMA), Myanmar manufactures and sells around 0.8 million tons of teak and hardwood yearly, generating $400 million. Comparatively, Malaysia produces 0.3 million tons of lumber and earns $6 billion from wood-product exports in 2006. Myanmar receives US$500 per ton, but Malaysia receives an average of US$20,000 per ton (FAO 2009). Interview with MTMA in July 2010 in Yangon. The wood allocation mechanism in Myanmar creates a great deal of uncertainty for mills

seeking Myanmar wood resources. Local wood-based manufacturers confront a recurring monthly lack of raw materials (Interview with MTMA, Yangon, July 2010). A contributing factor is that MTE favors the export of Myanmar wood logs. This circumstance (among others, including lack of infrastructural development, high irregular taxes, limited and irregular power, high levels of corruption and government monitoring, etc.) discourages investors from entering the Myanmar wood processing business. While little FDI is drawn to Myanmar's wood-processing business, the majority of local investors lack the money necessary for large-scale manufacturing. To manufacture and export S4S, what little investment there is often goes to labor-intensive, low-tech sectors such as sawmills.

The country's tax regime further inhibits exports of completed goods, since all private exports are subject to a 10 percent tax (FAO, 2009:17). Myanmar's wood manufacturers produce, although in small quantities, furniture, decking, S4S, flooring, furniture components, parquet, finger joints, veneer, and plywood. The majority of these wood-based processed goods are headed for export, with the exception of parquet, doors and door frames, and S4S items. However, exports of teak goods are much broader: parquet, scantling, decking, furniture, garden furniture, board, door, figure joints, veneer, and plywood (DawKhin May Lwin et al., 2009). In an effort to reduce the forestry industry's dependence on log export, the MTE has lately implemented a variety of measures to encourage the export of high-quality lumber and other semi-finished and value-added wood products. Plywood Factory No. 1 of Myanmar's five plywood manufacturers produces teak and non-teak hardwood veneers for export primarily. Additionally, the MTE created five furniture manufacturers for local and international markets. No. 7 Furniture Factory is only exporting flooring boards, parquet, surfaced four sides lumber (S4S), scantling, and decking. Similarly, No. 6 Furniture Factory mostly exports the figure joint and laminated wood goods it manufactures. Outdated gear and unstable electrical supply continue to be an issue for wood-processing plants controlled by MTE.

CHAPTER IV
SUSTAINABLE LOGGING SYSTEM OF MYANMAR TIMBER ENTERPRISE IN THANDWE DISTRICT

4.1 General Description of Study Area

The Case Study was conducted in Thandwe District, Rakhine State by collecting secondary data from Myanma Timber Enterprise and Forest Department of Thandwe District. According to district forest-working plans, production working cycles (PWC) are formed in reserved and protected public forests in Thandwe District for the purpose of sustainable timber logging. There are seventeen forest lands in Thandwe District, including seven reserved forests of 297932 acres, nine protected public forests of 411515 acres, and one natural forest protected area of 433843 acres. The area of seventeen forest lands is 1143290 acres and covers 42.52% of the total land area of Thandwe District.

Table (4.1) Forest Covering Area in Thandwe District

No.	Major Forest Types	Area (ac)	% of Forest Area
1.	Closed Forest	1,034,069	38
2.	Open Forest	971,915	35
3.	Degraded Forest	348,620	13
4.	Mangrove Forest	67,303	2
5.	Non-Forest Area	272,799	10
6.	Water Bodies Area	58,908	2
	Total Forest Area	**2,753,614**	**100.00**

Source: FRA 2020 and Forest department of Thandwe District

4.2 Sustainable Logging System of Myanmar (Including Thandwe District)

Myanmar's sustainable logging method for the sustainable management of natural forests was based on the Brandis Selection System (BSS), which is now known as the Myanmar Selection System (MSS) and is still in use in Myanmar. The MSS runs according to 30-year felling cycles, with forest blocks divided into 30 plots of nearly equal yield potential. On one plot, selective felling is performed annually.

All marketable trees with girth at breast height (gbh) that meet the minimum girth standards for exploitation are chosen for felling. First, teak is harvested, followed by other hardwoods. The MSS is distinguished by the sustainable Annual Allowable Cut (AAC) standards for teak and other hardwoods. Since its inception, the Forest Department has undertaken forest-land inventories to define the AAC's underlying forest composition and the amount and quality of the trees. All marketable trees that meet the minimum girth standards for exploitation are chosen for felling. In most teak woods, the minimum diameter at breast height is 73 centimeters, but it is 63 centimeters in dry forests. The set diameter restrictions for other hardwoods vary per species.

Enriching natural forests and restoring and rehabilitating damaged forest areas with supplementary planting in order to improve the percentage of economically useful species. Selective logging is exactly what it sounds like: just some trees are felled, while the others are left standing. This process is also known as "selective thinning." Selective logging requires a highly skilled forester to create a thinning plan that takes into account tree health, tree spacing, and tree species, as well as the number of mature trees to leave behind and the most economically valuable trees to harvest. Although selective thinning may not generate the initial large-scale profit that other approaches such as clear-cutting provide, it can build a more productive and higher-yielding forest that delivers a harvest each season. In the operation of the MSS, all natural and planted forests are managed via the establishment of several working circles in accordance with forest working plans. Each working circle was designed to achieve its unique forest management objectives (Table 4.2). The extracted volume of AAC is established for each felling series based on the premise of sustained yield management (Dah, 2004).

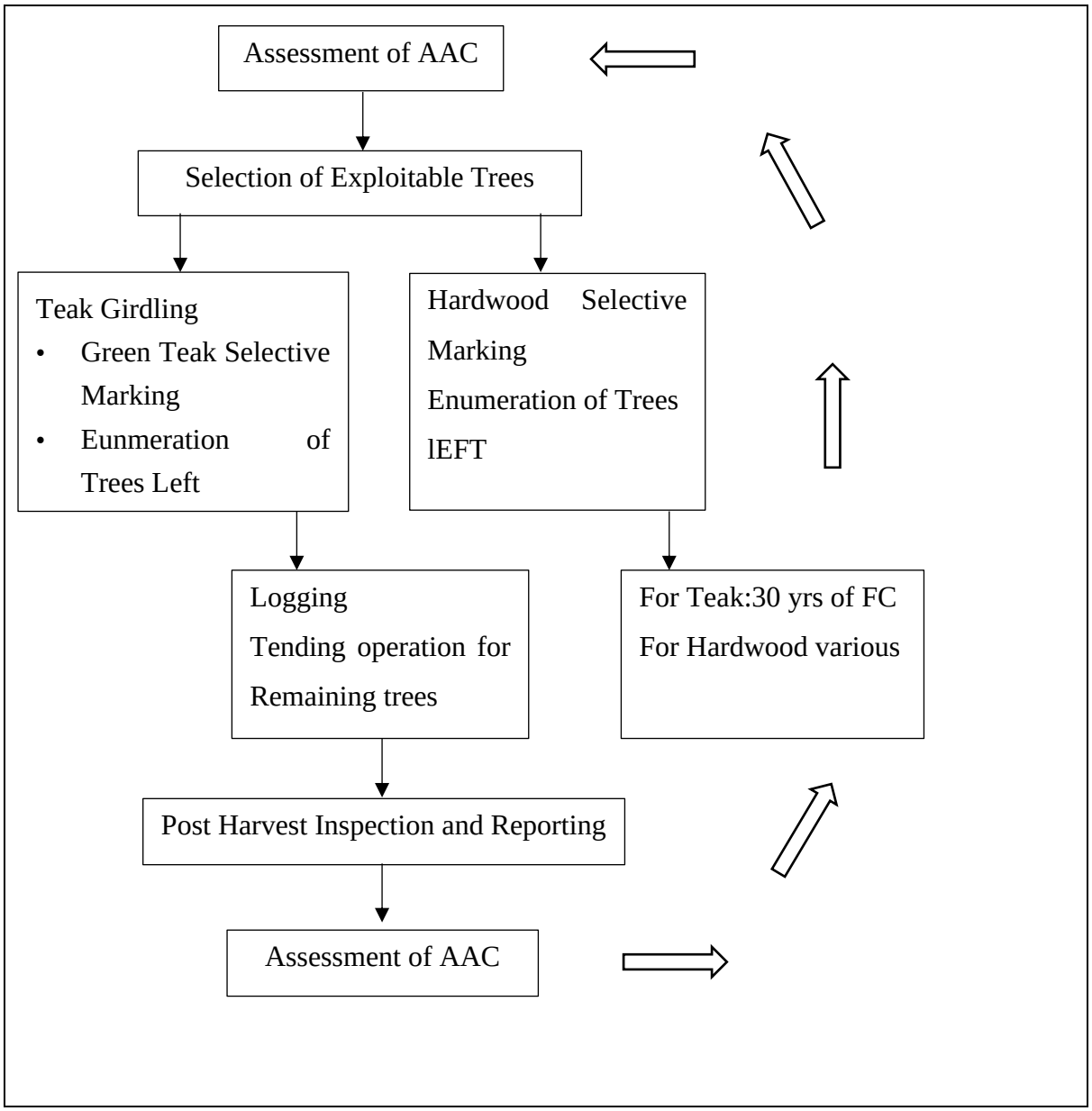
Table (4.2) Types of Working Circles of Forests in Myanmar

Working Circles (WC)	Purposes
1) Non wood forest products WC(NWFPWC)	For meeting non-wood forest product Requirement
2) Production WC(PWC)	For meeting timber (teak and other Hardwoods) requirement
3) Planted Forest WC(PFWC)	For meeting timber requirement Through artificial regeneration
4) Community Forestry WC (CFWC)	For meeting Fuel-wood and other minor Products for local community
5) Watershed Forest WC (MFWC)	For meeting conservation of soil and Water resources
6) Mangrove Forest WC (MFWC)	For utilizing and conservation of coastal Mangrove forests
7) Protected Area System WC (PASWC)	For conservation of National Parks and Sanctuaries

Source: Country Report, Myanmar (FRA, 2010)

As mentioned above, MSS was initially developed for the management of teak, which is the main species in the market demand. For teak-associated hardwood species, MSS was later modified to apply by defining related girth limits and cutting cycles. As shown in figure 4.1, the AAC application under MSS was not only intended for teak but also for other hardwood species.

Figure (4.1) Diagram of Myanmar Selection System (MSS)



Source: Forest Department

4.3 Opportunities of Sustainable Logging System in Myanmar

The major opportunities include:

• Political backing and commitment to sustainable forest management and environmental protection.

• Ten-year moratorium on wood harvesting in the Bago Yoma Region, the home of Teak *Tectona grandis* (area: 1.5 million hectares) beginning with the 2016-17 fiscal year.

• Prohibition on export of the seized timber.

• Export prohibition for all logs and wood collected in violation of sustainable practices (e,g., conversion timber is no longer allowed to export)

• Since April 1, 2014, the export of round logs has been prohibited not only to encourage the export of value-added goods, but also to meet the need for raw materials in the local wood-based industrial sector.

• Logging below the Annual Allowable Cut (AAC) (for teak, less than 55 percent of the AAC and for other hardwoods, less than 33 percent) to decrease deforestation and forest degradation.

• Increasing number of qualified personnel in the forestry industry

• Budgeted implementation of the Myanmar Restoration and Rehabilitation Programme (MRRP) for a 10-year period (2017-2018 to 2025-2026).

• Increasing Construction of Wooden Buildings - The use of wood as a construction material is on the rise due to the various benefits wood buildings have over concrete buildings, hence pushing the market for forestry and logging producers. Presently, the building sector is responsible for 25% of the world's greenhouse gas emissions; thus, the idea of green building construction has arisen to minimize CO2 emissions and sequester carbon. In addition, construction with wood generates far less trash and may be completed faster than concrete structures.

• Stable work prospects in the logging and forest products sectors can provide economic advantages to rural towns.

(Source: Myanmar Forest 2020)

4.4 Challenges of Sustainable Logging System in Myanmar

Despite enormous contributions and significant attempts to ensure sustainable forest management, the Forestry Sector faces several obstacles.

The major Challenges are:

• Brandis' approach seems viable when there is a significant quantity of original C1 tree growth material.

• Rates of deforestation and forest degradation are high (i.e. annual deforestation rate of 1.7 percent during 2010-2015).

• Increasing the extent of reserved forest and protected public forest to 30 percent of the country's total area, as well as the coverage of protected areas to 10 percent of the country's entire area. Strong (political and commercial) interests may support deforestation and forest degradation.

• Incompatibility between sectoral policies, plans, and laws, which may increase deforestation and forest degradation.

• Many of the most important causes of deforestation and forest degradation are outside the forest sector (eg. related with agriculture, mining, infrastructure development etc.)

• Weak law enforcement and weak cooperation among line ministries in addressing illicit logging.

• Incorporation of criteria and indicators into national forest programs; despite several challenges, there are numerous potential to realize the objectives of the Forest Policy and sustainable forest management.

• Stringent restrictions have long been a significant obstacle for the forestry and logging industry. As a reaction to natural catastrophes considered to be caused by deforestation, a number of nations have implemented entire or partial logging bans in natural forests throughout the world. Thus, the prohibition or restriction of wood products is considered as a corrective action to enhance forest conservation and preservation.

• Forest ecosystems are crucial to the development of climate change mitigation measures because they may act as both sources and sinks for greenhouse gas emissions. Current estimates indicate that the world's forests are a net carbon source, mostly due to deforestation and forest degradation in the tropics. If incorrectly managed, logging has the potential to have severe environmental effects. Potentially,

logging eliminates habitat for birds and other species that utilize trees for shelter, breeding, or food. For instance, owls like older trees with a bigger diameter for nest chambers. Within communities, logging reduced phylogenetic diversity, increased overall phylogenetic clustering, and enhanced terminal phylogenetic evenness. Logging enhanced the evolutionary similarities of evergreen and deciduous plots between populations.

• As a result of extensive illegal activity and inadequate official reporting, the UGoM estimates grossly underestimate the unlawful but true significance of the forestry industry. This miscalculation causes the government to likely underinvest in the sector's sustainable management. If the UGoM fails to address this shadow economy, continuous illicit trafficking threatens not just Myanmar's forests and the millions of people who depend on these ecosystems, but also state revenues, the financing of government services, accountability, rule of law, and peacebuilding. Population growth has led to an increase in forest pressure, and population pressure is likely a primary cause of forest degradation (Widiaryanto 2012).

• The risk of forest damage due to natural catastrophes and disturbance agents (illegal logging, forest fire, grazing, fuelwood collecting, and encroachment) must be included into forest planning, including the assessment of the AAC, for each period. The overstated AAC value contributed to the escalating stock drop.

4.5 SWOT Analysis for the Sustainable Logging System of Myanmar and Thandwe District

Assessing a country's Strengths, Weaknesses, Opportunities, and Threats (SWOT) gives not only the capacity to capture future opportunities, but also the ability to counter or reduce pressure and limits. Creating and maintaining future potentials is only achievable if the country's capacity portfolio is progressing in the proper direction, given the increased interdependence and environment that is always changing. In order to anticipate the future of Myanmar's forestry industry, it is necessary to identify its most significant strengths, weaknesses, opportunities, and threats. Climate and soil conditions are favorable for the Myanmar forestry industry, as are the relative level of forest cover, the stated forest policy and legislation, and the underlying forest management techniques such as the MSS. Abundant precipitation

and river systems traversed by four main rivers contribute to the development of diverse forest types and the preservation of diverse forms of biodiversity.

The fact that forests comprise about half of the country's total land area demonstrates the importance of ensuring the sustainability of the forestry industry. In addition, Myanmar has the updated Forest Law 1992 and Forest Policy 1995. The legislation and policy both favor the reserve and protection of natural forests and forest planting. In addition, the MSS, which emphasizes the significance of harvesting the yearly produce in a sustainable manner, has been adopted since 1920 with the goal of achieving sustainable production. The MSS has been well-established in forest management, although total implementation, such as real teak harvesting over the AAC, has not occurred. Indeed, the MSS is insufficient for sustainable forest management as it is applied uniformly to all types of natural forests regardless of species composition, forest conditions, management objectives, etc. Other constraints facing the forestry sector include the absence of a proper land-use policy, the difficulty in implementing the management system due to a lack of law enforcement, inadequate resource statistics, budgetary constraints, and the inability to follow the Sustainable Forest Management Guidelines. Unless the government adopts a clear land-use strategy, tensions between forest protection and other diverse and unrestricted objectives will persist. Chapter XII of the Forest Law of 1992 said, "Whoever commits trespassing and encroachment in a restricted forest must be penalized... " In actuality, there are several infractions, including gardening, camping, and collecting firewood. For the timely change of plan schedules, not only forestry data but also reliable demographic, social, economic, and environmental data are required.

In Myanmar, there has been a failure to establish the appropriate data base, and the current data, excluding source data, are varied, limited, and insufficient for making useful recommendations. These data may only be used for preliminary estimations. Similarly, the financial allocation for the forestry industry is insufficient for the conservation and regeneration of forests. In 2006/2007, forestry was allocated 4.3% of current expenditures and 0.2% of capital expenditures. State investment in the forestry industry was assessed at 0.2% of the overall State investment (MNPED 2006). In addition to governmental, economic, budgetary, social, and environmental constraints, the MSS cannot be implemented. In the forestry industry, pre-harvesting,

harvesting, and post-harvesting technology continue to lag behind other emerging nations, such as Malaysia. This results in increased waste and less value-added manufacturing. This is a result of the lack of capital investment, especially foreign direct investment.

According to the foreign investment legislation, the total investment in the forestry industry by firms entitled to invest is almost nil. APFSOS II: Myanmar 43 Substantial worldwide markets to provide forest products, chances to attract FDI, and application to monopolistic practice represent significant opportunities for the forestry industry. Myanmar is situated between two rapidly expanding and massive markets, China and India. Both nations are log-hungry. China's massive demand for forest products is anticipated to continue. In addition, Thailand, the Republic of Korea, Australia, and Japan are important importers of solid wood forest products in the Asia-Pacific area (FAOSTAT). Myanmar has significant forest resources, but the sector's investments in cash and innovative technologies are rather modest. There is potential for foreign investment in the manufacture of products with added value. The practice of monopoly, particularly in teak export, might also be advantageous to the Myanmar forestry industry. Teak is acknowledged as one of the world's most precious woods, and Myanmar produces the highest-quality teak. Controlling the supply might maximize profits while minimizing resource use.

Threats to the sustainability of Myanmar's forestry industry include poverty, worldwide rivalry, present western economic sanctions, and both illegal and legal overexploitation. As previously indicated, the unit price of Myanmar's exports of teak and hardwoods is far cheaper than that of Malaysia. Such rivalry from technologically sophisticated nations hinders the development of (finished product) technology in natural resource-rich nations like Myanmar and supports solely the export of forest products in their raw form. Although economic sanctions implemented by the United States and certain western nations are unlikely to have a direct impact on wood exports, given the restricted availability to these nations, indirect pressure tends to depress export prices and encourage illicit operations. In addition, owing to economic restrictions, diminishing potential export industries, such as apparel, compel the forestry industry to increase its extraction and exports in order to generate foreign currency. Overexploitation is another barrier for sustainable forest management. Illegal logging and shifting farming in unmanageable regions are the primary causes

of deforestation. The fact that the authorities have little or no vision for the future is much worse. The old paradigm of top-down government should be replaced with fresh, forward-thinking principles. Otherwise, transformation will be impossible.

The SWOT analysis of the district of Thandwe's sustainable logging system is determined by gathering data from Myanma Timber Enterprise. References include the Forest Department, forestry reports, dissertations, theses, and forestry websites. According to the study, the opportunities and challenges of the Sustainable Logging System of Thandwe District are nearly the same except there are no wood- based industry and no extraction of Teak and Pyinkado during last five years due to scarcity of that timber species in Thandwe District, higher illegal logging including illegal export from the bay of bengal due to weaker forest law enforcement in Thandwe District, Therefore, the local prices of Teak and Pyinkado in Thandwe District is much higher than that of other region of Myanmar. The SWOT Analysis diagram of the Sustainable Logging System of Thandwe District can be identified as follows;

Figure (4.2) SWOT Analysis Diagram for Sustainable Logging System of Thandwe District

Strengths	**Weaknesses**
- well-established logging system - provide raw materials - rich in forest resources - long-standing departments - Well established forest law - monopoly power for logging - more profit and revenue - logging below AAC - reduce environmental impact - support sustainable development	- do not follow precise MSS procedures - overexploitation - high illegal logging - Weak Law enforcement - unstable government policy -low investment due to budget constraint - no clear strategy for log distribution - weak valued-added product technology - little valued-added product market and lower export price - take more time in extracting due to tree selection practice -little or no vision for future
Opportunities	**Threats**
- sustainable job creation - attracting valued-added product technology and factories - located near log-hungry countries - Political wills and supports - increase private sector plantation - maintain the diversity of plants and animals - export ban for round log, confiscated and incompliant timber - moratorium of timber harvesting - implementation of Myanmar Restoration and Rehabilitation programmes	- poor rural people and high poverty - deforestation and forest degradation - political instability - low FDI in forest sector -global competition in timber technology - low budget allocation for forest sector - global warming -poor coordination among line ministries in fighting against illegal logging - increasing rural population - inadequate or lack supply of electricity in rural areas - little or no factory in rural areas

Figure (4.2) SWOT analysis diagram; SWOT analysis is to find out internal and external factors that influence a situation. The internal factors are viewed as strengths or weaknesses and the external factors are viewed as opportunities or threats. In this research, the situation is defined opportunities and challenges of sustainable logging system in Myanmar which focuses on national economy and environmental conservation. To carry out SWOT analysis of this situation, it requires pointing out internal and external factors. Those determinants or factors of the logging system as pointed in various reports and websites are narrowed down for fitting with this situation. By combining the determinants or factors of the SFM and SWOT analysis diagram, SWOT analysis framework for this research is formed as follows:

Strengths and opportunities are encouragement or positive internal and external factors that support the logging system of Myanmar Timber Enterprise for SFM. On the other hand, weaknesses and threats are barriers or negative internal and external factors that limit or point out the logging system of Myanmar Timber Enterprise for SFM. Outcomes of this SWOT analysis will provide information that is helpful in implementation of timber logging system for SFM in Myanmar. Strengths and opportunities are to be maximized or further developed. Weaknesses and threats are to be minimized or overcome.

The strengths of sustainable forest management of MTE in Thandwe District are (1) MSS is also known as the scientific management of natural forests and was formulated to maintain a high yield of quality timber and enhances the natural regeneration of commercially valuable trees. (2) The round logs are important for raw materials of wood-based industries, for local use as sawn timber and cooking fuel in rural areas where there are lack of electricity. (3) Long-standing departments, FD and MTE, and well-established forest law are also strengths of using MSS. (4) Monopoly power in log extraction and marketing can create more profit and revenue. (5) Logging below AAC is maintained the forest resource development and support the sustainable development of related regions. (6) Myanmar is still relatively rich in forest resources in ASEAN, it is needed to maintain its forest resources by using precise procedures of MSS for sustainable forest management.

The weaknesses of sustainable forest management of MTE in Thandwe District are (1) MTE always does not follow precise procedures of MSS and AAC limitation that can cause overexploitation. The timber extraction in Myanmar is often

conducted depending on current need instead of AAC limit at time of extraction and the felling cycle limit of 30-year designated by AAC has been neglected. (2) MSS take more time in extraction due to tree selection procedure in MSS. (3) low capital investment due to budget constraint reduces replantation and forest conservation manuals. (4) Unstable government policy and high illegal logging can cause the negative effects in SFM. (5) No clear strategy for log distribution and marketing. (6) Weak valued-added product technology and factories. (7) little valued-added product market and lower export price of timber and valued-added products than that of most of the ASEAN countries,.

The opportunities of sustainable forest management of MTE in Thandwe District are (1) sustainable job creation due to MSS. (2) political will and support by government for environmental conservation. (3) Attraction for value-added product factory and technology. (4) Situation near the log hungry countries like China, India, and Bangladesh can create a very good timber market. (5) Increase in private sector plantation in deforested areas will provide forest products for next generation. (6) Maintain the diversity of plants and animals due to selective logging. (7) Export ban for round log, confiscated timber and timber extracted incompliant with sustainable manner.

The threats of sustainable forest management of MTE in Thandwe District are (1) Poor rural people and high poverty favor illegal logging and deforestation that reduce the forest resources. (2) Economic sanction by western countries can reduce timber price, can lower FDI and can decrease wood-based industry development. (3) Increase in rural population is needed more places, more houses, more income and more fuel for cooking that in term burden on forests because of little or no factory in rural areas. (4) Poor coordination among line ministries is also a problem in fighting against illegal logging. (5) Global competition in timber industry can be difficult for modernization of wood-based technology. (6) Global warming is also a very important thing to determine to continue logging or not in future.

CHAPTER V
CONCLUSION

5.1 Findings

Myanmar's forest management approaches are generally based on sustainable forest management principles, with a strong dedication to preserving the natural environment. This national conservation ethic is strongly supported by the performance of the Myanmar Selection System in influencing low-impact production logging and preserving biodiversity and environmental integrity in logged areas. Elephants and, to a lesser degree, water buffaloes are mostly responsible for stump removal and log dragging in Myanmar. The employment of animals for log extraction has been shown to have the least negative effect on the environment and biodiversity.

According to Myanmar Timber Enterprise's reform efforts, 4122 plants or 8,244 tons of hardwood round logs may be harvested from Thandwe District during the fiscal year 2023-2024, within the AAC prescriptions provided by the Forest Department. Essentially, forest management operations fall into three groups. These include conservation management, storage management, and substitute management. The employment options for these differ from location to region depending on natural resource and climatic variables as well as social, economic, and political factors. It is determined that MSS is the most ideal approach for sustainable logging in Myanmar, but its use in reality is limited by the inability of both represented departments to monitor forest conditions before, during, and after harvest. According to MSS, the AAC for a particular stand was calculated more than thirty years ago, and several threes may have died or been taken in the meanwhile. Before the second harvesting, the girth distribution of teak and hardwoods revealed insufficient silvicultural management for the care of natural timber-bearing forests. Therefore, maintenance against disruptions is essential. Monitoring and securing the remaining trees on the ground should be repeated again, and a longer felling cycle must be implemented. During harvest, it became apparent that harvesting was conducted independently of AAC setting. Moreover, the relationship between the Forest Department and the MTE is often strained, as a result of the MTE's inability to consistently adhere to the

Myanmar Selection System (MSS) and AAC limit, as well as its frequent need to operate in violation of national rules. The wood extraction in Myanmar is often based on the present demand rather than the AAC restriction at the time of extraction, and the 30-year felling cycle limit established by the AAC has been disregarded.

The government of the Union grossly underreports output and commerce. Actual harvests exceed official estimates. Thus, the status of forest management is far worse than suggested by official statistics. This explains why, for instance, teak harvests are dropping due to overexploitation of forests in Myanmar. This underreporting leads to an underestimation of the forestry sector's real significance, which has far-reaching ramifications for Myanmar's economy. For instance, forestry plays a far larger role in exports than suggested by official figures. If the government of the Union could catch this unrecorded commerce, it would collect far more money from the industry than is now declared. This income might be utilized to assist inhabitants of Myanmar with important services, such as better education or healthcare. Myanmar may be underinvesting in sustainable forest management due to the government's underestimation of the value of the forestry industry. In conclusion, the published evidence by the Union Government is ambiguous. There is evidence that government intervention may decrease unsustainable output and trade in the industry. However, there is significant evidence that the government has likely lost billions of dollars in income and permitted the unsustainable exploitation of the country's forests. The Union Government's poor reporting hampers attempts to draw additional conclusions. It is hard to assess the veracity of reports due to discrepancies across and within agencies. To remedy these weaknesses, the Union Government should continue to support the Myanmar Extractive Industries Transparency Initiative to ensure timely and accurate publication of statistics on Myanmar's wood industry.

The UGoM established a one-year ban on logging across Myanmar in 2016; the moratorium will remain until 2026 in the Bago Yoma region; these moratoriums are also referred to as MTE reforms. Although the ten-year moratorium on logging in the Bago Yoma (by MTE) is intended to increase AAC of natural forests and reduce deforestation in Myanmar, it has been discovered that this moratorium period has become an excellent opportunity for illegal loggers due to the fact that all officers and staffs of MTE in these moratorium forests had to be transferred to other regions. Agricultural activities, illicit logging, and urbanization have been identified as the

leading sources of deforestation in Myanmar. Because of impoverished rural population and increased unemployment rate of Myanmar, it is difficult to manage illicit logging that mostly causes deforestation. Since 2013, Myanmar authorities have considering reducing wood harvest below ACC levels in response to global warming and drought issues. MTE has exclusive control over the extraction and selling of round logs. Therefore, MTE consistently generates sufficient profits and income for the State in the form of domestic and international money. There is a paucity of wood-based industrial policy and technology in Myanmar, despite the country's abundance of forest resources. MTE must pay its whole revenue to the state and has no control over its income. MTE must operate under the constraints of the Union Budget. Therefore, despite the fact that MTE is a business, it is challenging to update, maintain, and alter its infrastructure, such as machinery, sawmills, and factories.

Additionally, it was determined that MTE is totally accountable for the pay of all of its present and former employees. Each year, around 52 billion kyats are required to pay for more over 30,000 employees, of whom approximately 15,000 are retirees. Furthermore, MTE has around 3000 captive elephants (Working Elephants, Elderly Elephants & Baby Elephants). MTE is responsible for their care and treatment till death. Since of 2016, the harvesting quantity has drastically fallen, making it very difficult for MTE to manage and reform its present workforce, as all of their lives are reliant on MTE.

5.2 Recommendations

There are several wood harvesting techniques, but Myanmar selected system (MSS) logging is the most environmentally friendly. MSS logging is an ecologically favorable approach that retains the variety of a forest, while clear-cut logging is the most common practice. However, the MSS approach seems viable when there is a substantial quantity of original tree material. MTE should follow the specific technique of MSS and AAC limit in order to collect and use wood and timber products in a sustainable manner and to meet the local demand for timber, despite the fact that it is sometimes required to operate in violation of national rules. Forest planning, including the assessment of the AAC, must include the risk of forest damage due to natural catastrophes and its disturbance agent (i.e. illegal logging,

forest fire, grazing, fuelwood collecting, and encroachment) for each period. The inflated AAC value had an effect on the stock drop that was accelerating.

Regular harvesting of round logs within a reasonable number is seen as preferable to a long-term embargo on logging in order to avoid massive illegal logging, preserve the revenue of the forest industry, and provide raw materials for wood-based enterprises. In order to find possibilities in forestry, it is necessary to study current goals outlined in national forestry plans and investigate priorities in plans and programs from other sectors that interact with forestry. Included in them are agriculture, energy, and the environment. Specifically, forestry mitigation measures must be considered in relation to the following: national forestry and land-use plans, which would establish geographic priorities for various types of land use as well as land ownership patterns; national environmental plans, which may establish priorities such as creating a system of forest reserves for biodiversity protection or restoring forests in critical watersheds; and economic development plans, which typically establish objectives for industrial wood utilization.

According to MTE policy, the government should attract FDI and provide sufficient capital and investment to develop and enhance the wood-based manufacturing sector in order to maximize the use of forest resources. To achieve the goals of MTE, it must harvest the maximum amount of timber that the forest can provide in accordance with the AAC, provide forest conservation by promoting effective timber utilization, encourage private sector participation in value-added timber for the development of wood-based technology, and improve the socioeconomic development of the nation and its people by realizing wood-based industry development.

Despite MTE's policy focusing primarily on local requirements, there is no defined plan for local log distribution. Current log distribution management is mostly centered on state-allocated revenue generating rather than local requirements. Even though MTE sells round logs openly to the private sector via the Monthly Tender, this is not a solution for areas where there is a lack of wood supply or natural disasters have occurred. There must be state- and region-specific log quotas based on regional requirements. MTE has no clear authority to harvest regularly and is forced to operate under the FD's dominance. Similar to a concession system, MTE should have the

exclusive right to manage, harvest, and conserve forest resources within a certain time span. Illegal logging is one of the greatest obstacles to the sustainable forest management methods of MSS. Therefore, illicit logging must be reduced in order to save natural forests and minimize deforestation. Best practices for reducing deforestation in Myanmar include implementing a set of norms and regulations governing tree felling, preventing illicit logging, prohibiting clear-cutting of forests, and encouraging replanting and afforestation.

Without correct data, Myanmar would be less able to enhance governance, implement sustainable forest management, and safeguard the 38 million people whose lives and livelihoods depend on forest ecosystems. It also prevents all people from holding their government responsible. It is evident that Myanmar's forests have been continuously overharvested. In reality, the harvest level is likely substantially higher than the official numbers indicate. However, the absence of comprehensive and trustworthy data makes it impossible to assess how unsustainable Myanmar's business is (and has been). Incomplete reporting has likely contributed to the Union Government underinvesting in the forestry industry by understating the value of the sector. This detracts from the need to democratize the industry and achieve a more fair distribution of gains from the forestry sector, particularly with communities impacted by commercial logging. The incoming administration is advised to prioritize the successful reform of the forestry industry, starting with the need for more open information for decision-making and holding authorities accountable. Weak governance in the forest sector continues to be a significant barrier to the implementation of SFM in Myanmar. Myanmar is still abundant in forest resources, and Thandwe District is no exception. Utilizing a well-executed and accurate sustainable wood logging technique is necessary to preserve forest resources for the sake of sustainable development.

In conclusion, this research would serve as a warning for the long-standing practice yield estimating model and the absence of exact MSS silvicultural activities. There are disadvantages to implementing MSS in the field, particularly in the harvesting process, which is dependent on current demand rather than AAC limit at the time of extraction, and the 30-year felling cycle limit established by AAC has been overlooked. A further problem of MSS is that it only selects the finest trees to be cut. For hardwood species in natural forests, the ideal method to use the maturity

index would be to examine the number of trees rather than their volume. This simplicity is one of the factors that makes the present forest management system practical, since enumeration data can be easily collected from each stand to be selected for harvest. Therefore, accurate MSS silvicultural activities are required for the success of sustainable logging systems and sustainable forest management.

REFERENCES

Forest Trends. (2020). How has the EU enforced the common position on teak imports from Myanmar? Washington, DC: Forest Trends. https://www.forest-trends.org/publications/how-has-the-eu-enforcedthe-common-position-on-teak-imports-from-myanmar/

Forest Trends. (2021). Illegal logging and associated trade in Myanmar: Impacts of government measures to address illegal logging. https://www.forest-trends.org/publications/illegal-logging-and-associated-tradein-myanmar/

Forest Trends. (2012). Forest Certification in Myanmar.

Forest Trends. (2015). Commercial Agriculture Expansion in Myanmar: Links to Deforestation, Conversion Timber, and Land Conflicts

Global Forest Resources Assessment (2015) (FRA)

Forest Policy Trade and Finance Initiative Report (2022)

David, F. R. (2003). Strategic Management-Concepts and Cases, (9th Edition). USA: Pearson Education

Emet, Gurel., M. T. (2017). SWOT Analysis: A Theoretical Review: vol(10). The Journal of International Social Research .

EFI. (2011). Myanmar: Overview of Forest Law Enforcement, Governance and Trade.

Buchanan, J., Kramer, T. and K. Woods.(2013). Developing Disparity: Regional investment in Burma's borderlands. TNI and BCN, Amsterdam, February.

Eleven News. (2012). “Myanmar to ban timber exports in 2014.” 29 October.

Forest Trends. (2013) (forthcoming) China-Myanmar timber trade update.

Policy Brief. Global Witness. (2005). A Choice for China: Ending the destruction of Burma’s northern frontierforests. London, UK.

Global Witness. (2009). A Disharmonious Trade: China and the continued destruction of Burma's northern frontier forests. London, UK.

International Tropical Timber Organization (ITTO).(2011). Tropical Timber Market Report, Market Information Service, Vol. 16, No. 14, July 16-31.

FAO. (2015). Global Forest Resources Assessment, 2015.

Forest Ecology and Management, Volume 352, 7 (2015).

Forest Policy Trade and Finance Initiative Report (2021).

Harrison, J. S. (2004). *Foundations in Strategic Management*, (3.Baskı) . USA: South
Western.

ITTO. (2011). *Status of tropical forest management* 2011 – Myanmar.

ITTO. (2015). Biennial review and assessment of the world timber situation 2013-2014.

Mary Adu-Sarpong. (2017). Analysing the Sources of Wood Supply to Sustain Domestic
Wood Demand: A Case Study of Selected Wood Markets in Kumasi Ghana.

MEITI. (2019). Myanmar Extractive Industries Transparency Initiative Forestry Sector, EITI Report (2019).

Myanmar Forest Department. (2014).

Myanmar Timber Chain of Custody Process Documents and Actors . (2017).

Myanmar's logging ban a major step towards forest sector reform by Environmental Investigation Agency, 05 August 2016,

NEPCon (2013). Myanmar forest sector legality analysis.

Pahl, N. &. (2009). *SWOT Analysis-Idea, Methodology and A Practical Approach,*. Germany: Grin Verlag .

Thompson, A. A. (1989). *Strategy Formulation and Implementation, (4th Edition*). USA: Irwin, Inc

Prospects for Sustainable Logging in Tropical Forests Barbara L. Zimmerman and Cyril F. Kormos.

Pearce, J. A. (1991). Strategic Management, (4th Edition). USA: Irwin, Inc

Tin Tin Myint. (2012). A Study on the sustainable management of natural teak forests in Myanmar.

Ülgen, H. &. (2010). İşletmelerde Stratejik Yönetim, (5. Baskı). İstanbul: Beta Basım Yayım

U Saw John Shwe Ba. (2017). MD of MTE, Myanmar Timber Enterprise.

Dawkins, H.C. (1958). The management of natural tropical high-forest with special reference to Uganda.155 pages.

Dawkins, H.C. and Philip, M.S.(1998). Tropical moist forest silviculture and management. A history of success and failure. 359 pages.

. FD. (2000). Historical review of teak forestry in Myanmar- A paper presented at the Third Regional Seminar on Teak held from 31 July- 5 August, 2000, Yogyakarta, Indonesia. 13 pages.

Gadow, K. von and Puumalainen, J. (2000). Scenario planning for sustainable forest management. pp. 319-356 in Sustainable Forest Management- K. von Gadow et al. (eds.).

. Kyaw Tint. (2002). a: The present state of growth, composition and structure of teak forests. AvH research paper, 21 pages (unpublished).

Cowan, Carolyn. (2021). a. "Deforestation surge continues amid deepening uncertainty in Myanmar". Mongabay, https://news.mongabay.com/2021/08/deforestation-surge-continues-amid-deepeninguncertainty-in-myanmar

Kyaw Tint. (2002). b: Standard types of forests in Myanmar. AvH research paper, 14 pages (unpublished).

EIA. (2021). a. "New EU sanctions target Myanmar timber and natural resources sector to choke off funds for the junta". Environmental Investigation Agency https://eia-international.org/news/new-eusanctions-target-myanmar-timber-and-natural-resources-sector-to-c

Lamprecht, H. (1989). Silviculture in the tropics. 296 pages.

MOF, Myanmar. (1995). Myanmar forest policy, 1995.

Seydack, H.W. (2000). Theory and practice of yield regulation systems for sustainable management of tropical and subtropical moist natural forests. pp. 257-317 in Sustainable Forest Management- K. von Gadow et al. (eds.).

Khaing Khaing Soe. (2018). The interaction of Community Forestry with rural livelihoods in Myanmar: Challenges and opportunities

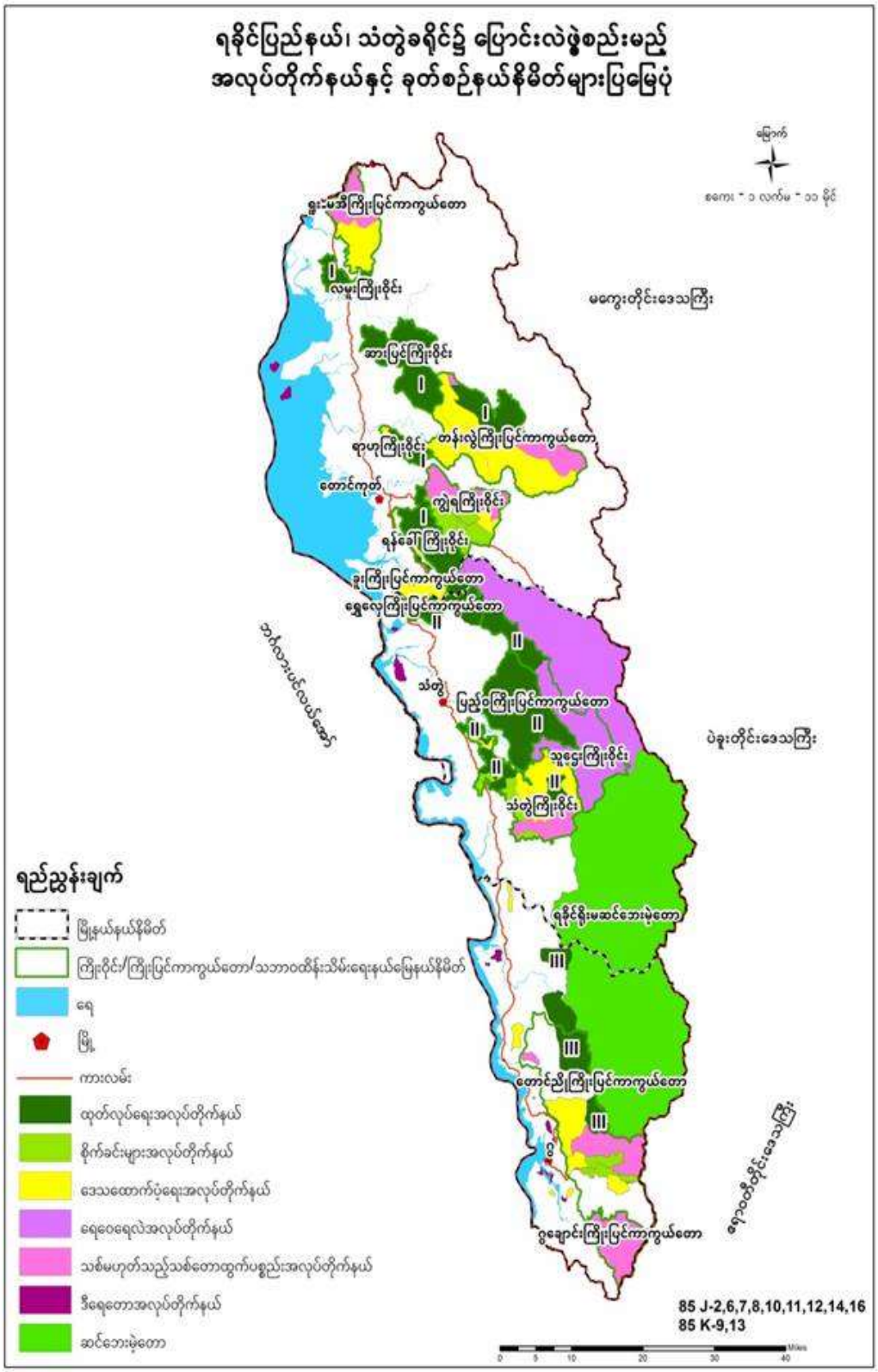
Khaing Thandar Soe. (2019), People's Dependence on Forests and their Participation in Forest Conservation in Myanmar

Rohman*, Sofyan P. Warsito , Nunuk Supriyatno, Evaluation of Annual Allowable Cut (AAC) Determination of Teak Forest Plantations in Perum Perhutani, Indonesia.

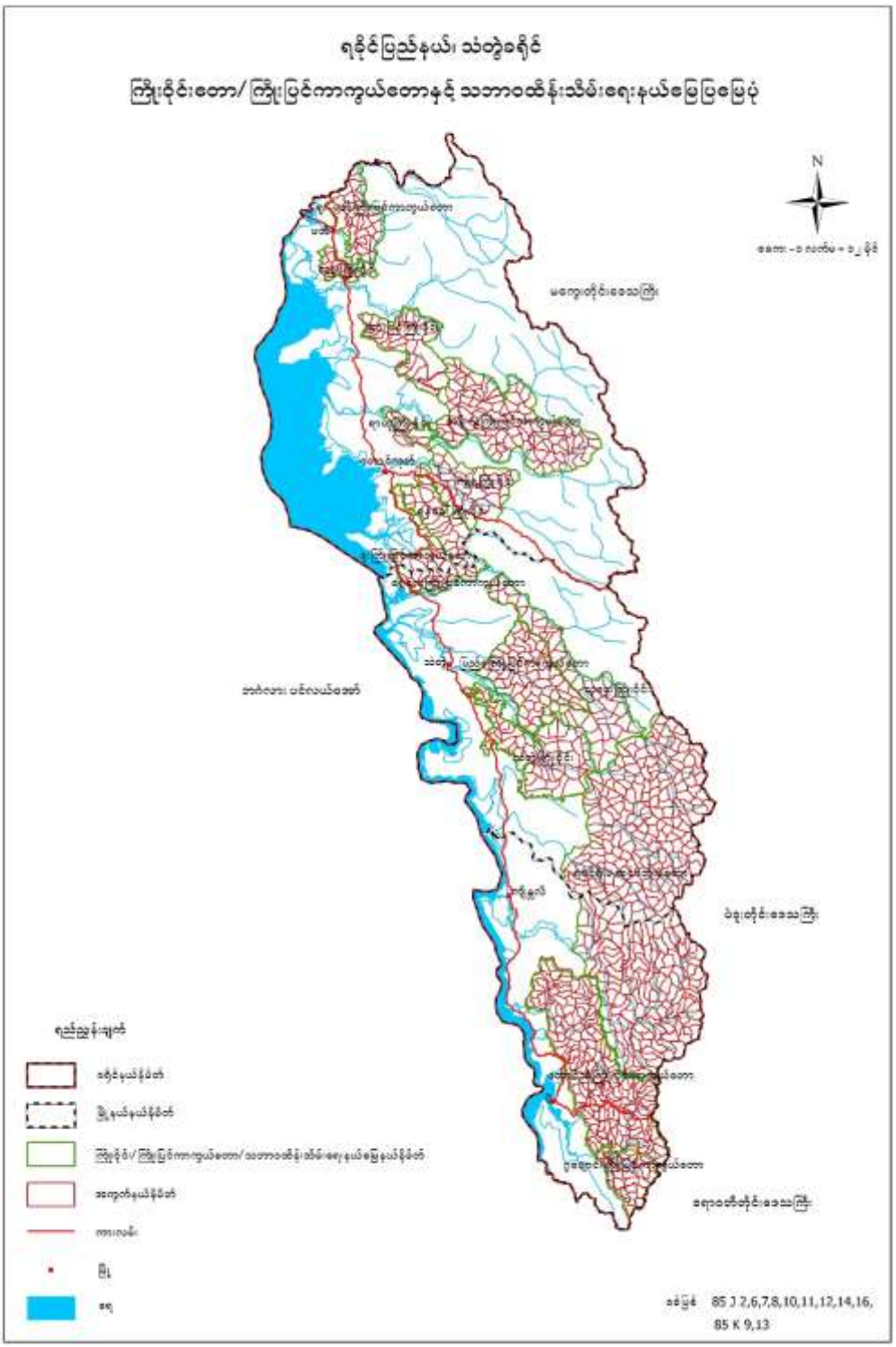
WEBSITES

- Forest Forward – WWF
- CITES database
- Fordaq - timber trade network
- World Port Source - Map of ports in Myanmar with container liner service.
- ITC (International Trade Centre) calculations based on UN Comtrade statistics
- https://yohta-blog.yokohama-oht.com/the-benefits-of-selective-logging#
- https://www.dictionary.com)(https://youmatter.world/en/defination

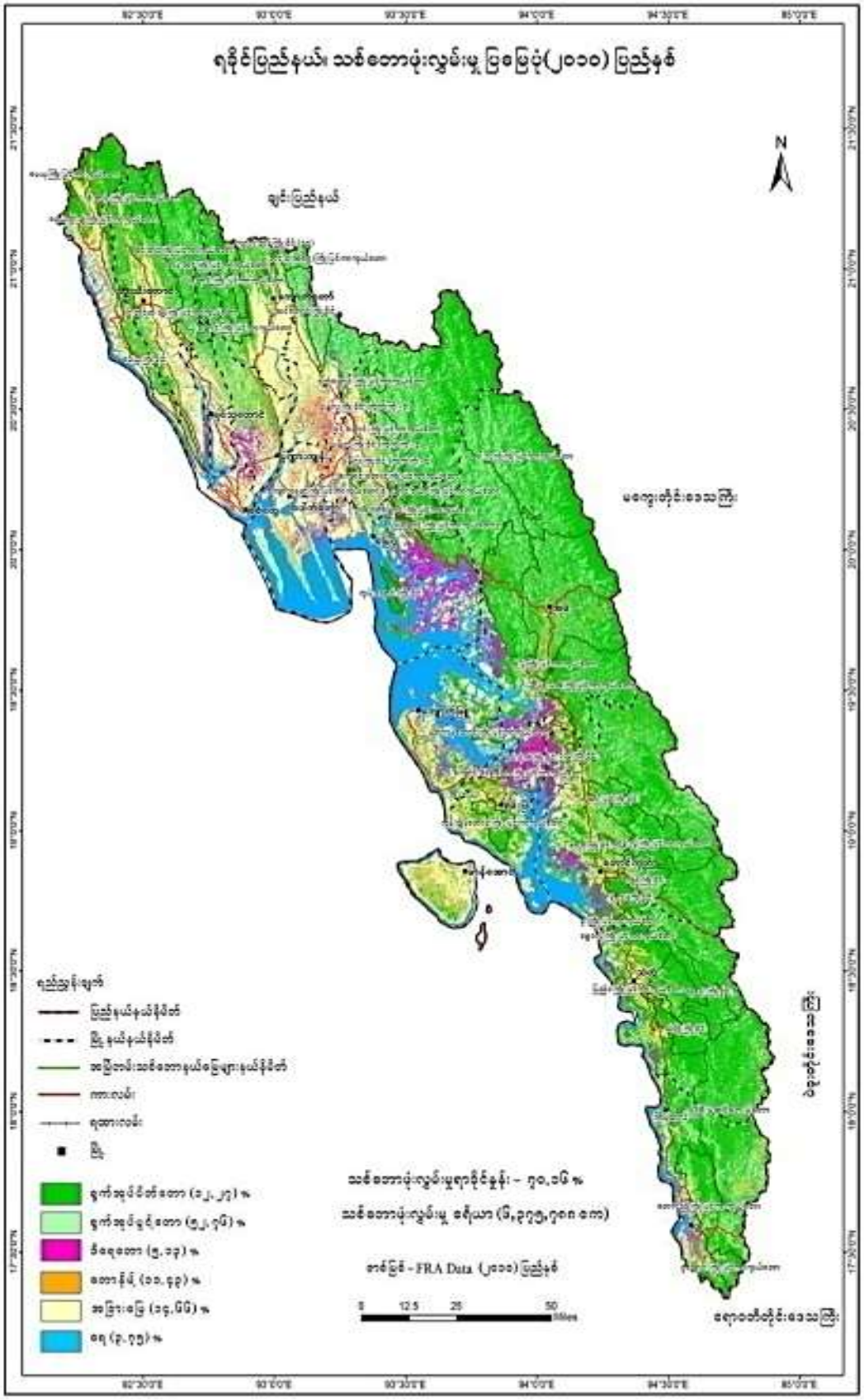
Reserved Forests and New Felling cycles Thandwe District



Reserved and Protected Public Forests in Thandwe District



Forest Cover of Rakhine State in 2010



Forest Cover of Rakhine State in 2020