Data Collection Survey on Cooperation for REDD+ through Related Funds

Final Report

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Japan International Cooperation Agency (JICA)

Japan Forest Technology Association
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Abbreviation

ADI	Asociación de Desarrollo Indígena
AE	Accredited Entities
AFD	Agence Française de Développement
AFOLU	Agriculture, Forestry and Other Land Use
ALARM	Advancing Life and Regenerating Motherland
BDS	Benefit Distribution System
BNCC	Bureau National de Coordination du Changement Climatique
BNC-REDD	Bureau national de coordination REDD
BOP	Base of the Pyramid
BUR	Biennial Update Report
CCB	Certifcado para la Conservacion del Bosque
CCBA	The Climate, Community & Biodiversity Alliance
CCBS	The Climate, Community and Biodiversity Standards
CDM	Clean Development Mechanism
CI	Conservation International
CIME	Interministerial Committee on the Environment
CINDE	Coaliacion Costarricense de Iniciativas de Desarrollo
COP	Conference of the Parties
CSR	Corporate Social Responsibility
DCC	Climate Change Department / Dirección de Cambio Climático
DICA	Directorate of Investment and Company Administration
DREEF	Regional Directorate of Environment, Ecology, and Forestry
ECD	Environmental Conservation Department
EIB	European Investment Bank
ENCC	National Climate Change Strategy / Estratégia Nacional de Cambio Climático
ER-PA	'Emissions Reduction Purchase Agreement
ER-PD	Emission Reductions Program Document
ER-PIN	Emission Reductions Program Idea Note
ESMF	Environmental and Social Management Framework
FAO	Food and Agriculture Organization of the United Nations
FCPF	Forest Carbon Partnership Facilities
FGRM	Feedback and Grievance Redress Mechanism
FLEGT	Forest Law Enforcement Governance Trade
FONAFIO	National Fund for Forest Financing / Fondo Nacional de Financiamiento Forestal
FRA	Global Forest Resources Assessment
FREL	Forest Reference Emission Level(s)
FRI	Forest Research Institute
FRL	Forest Reference Level(s)

GCF	Green Climate Fund
GCS	Global Conservation Standard
GDP	Gross Domestic Product
GEF	Global Environment Facility
giz	Gesellschaft fur Internationale Zusammenarbeit
ICMOD	International Centre for Integrated Mountain Development
IMF	International Monetary Fund
IMN	Instituto Meteorológico Nacional
INDC	Intended Nationally Determined Contributions
IPCC	Intergovernmental Panel on Climate Change
JCM	Joint Crediting Mechanism
JETRO	Japan External Trade Organization
JICA	Japan International Cooperation Agency
KFS	Korean Forest Service
Kfw	Kreditanstalt für Wiederaufbau
LULUCF	Land Use, Land Use Change and Forestry
MAG	Ministry of Agriculture and Livestock
MCCSAP	Myanmar Climate Change Strategy and Action Plan
MFVP	Myanmar Fruit and Vegetable Producer and Exporter Association
MIC	Myanmar Investment Commission
MINAET	Ministry of Environment, Energy and Telecommunication / Ministerio de Ambiente, Energia y Telecomunicacion
MINAET	Ministry of Environment, Energy and Telecommunication / Ministerio de Ambiente, Energia y Telecomunicacion
MoNREC	Ministry of Natural Resources and Environmental Conservation
MRV	Measurement, Reporting and Verification
NAMA	Nationally Appropriate Mitigation Action
NAPA	Myanmar's National Adaptation Programme of Action
NAPA	Myanmar's National Adaptation Programme of Action to Climate Change
NC	National Communication
NECC	The National Environmental Conservation Committee
NECCC	National Environmental Conservation and Climate Change Committee
NFMS	National Forest Monitoring System
ONE	Office National pour l'Environnement
ONF	Oficina Nacional Forestal
PAPRIZ	Projet d'Amélioration de la Productivité Rizicole sur les Hautes Terres Centrales
PDD	Project Desing Document
PFE	Permanent Forest Estate
PND	Plan National de développement

PNDF	National Forestry Development Plan / Plan Nacional de Desarrollo Forestal
PNLCC	la Politique Nationale de Lutte contre le Changement Climatique
PROCOMER	Promotora de Comercio Exterior de Costa Rica
PSA	Payment for Environmental Services / Pago de Servicios Ambientales
REDD+	Reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries
R-PP	Readiness Preparation Proposal
SESA	Strategic Environmental and Social Assessment
SINAC	Sistema Nacional de Areas de Conservacion
SINAC	Sistema Nacional de Areas de Conservacion
SIS	Safeguard Information System
UCC	Unidades Costariccences de Carbono
UNDP	The United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
USFS	The United States Forest Service
VCS	Verified Carbon Standards
WCS	World Conservation Society
WWF	World Wildlife Fund

I. An Overview of the Study

1. Background

1.1 REDD＋ negotiations under the UNFCCC (overview)

Papua New Guinea and Cost Rica proposed ideas to incentivize developing countries to reduce deforestation and forest degradation at the COP11 meeting in 2005. In the years since, policy and technical issues pertaining to REDD+ have been deliberated under the UNFCCC. As a result, the Warsaw Framework for REDD+[1] was adopted at COP19 in 2013. The Paris Agreement, which encourages the implementation and support of REDD+ (Article 5, paragraph 2), was adopted at COP21 in 2015, along with a document to decide remaining technical issues.

The UNFCCC continues to deliberate the reference-level technical evaluation process and support coordination efforts. There is little chance, however, that new rules will be added, and the main deliberations on REDD+ are generally thought to have been finalized at COP21. REDD+ is likely to be implemented based on the Paris Agreement and the INDCs and national strategies of each state.

Table Ⅰ-1 History of REDD+ negotiations under the UNFCCC

Year	Progress
2005 (COP11)	Papua New Guinea and Costa Rica propose deliberations on ways to incentivize developing countries to reduce deforestation and forest degradation.
↓	The Stern Review (Economics of Climate Change) (October 2006) and IPCC fourth assessment report (November 2007) estimate the potential for reduction of deforestation and conducted a cost-benefit analysis.
2007 (COP13)	REDD＋ is regarded as the principal mitigation measure under the next framework.
2010 (COP16)	The basic direction for REDD+ (national, sub-national level, stepwise approach, safeguards, etc.) is decided. Technical issues to be deliberated are specified. The work schedule is proposed.
2013 (COP19)	The Warsaw Framework for REDD+ is adopted to decide technical issues specified in COP16.
2015 (COP21)	The Paris Agreement on REDD＋ is adopted. Decisions on remaining technical issues (safeguards, non-market approach, non-carbon benefit) are adopted.

[1] Seven REDD+-related decisions (Decisions 9/CP.19 to 15/CP.19) out of the COP19 decisions.

1.2 Decisions on REDD＋ finance

The parties to COP17 in 2011 confirmed that developing nations should fully measure, report, and verify (MRV) the results from REDD+ activities and obtain results-based finance. They further decided that the results-based finance was to be provided by public, private, bilateral, and multilateral sources. The following decisions were adopted at COP19.

- Entities that finance REDD+ activities should provide adequate and predictable results-based finance in a fair and balanced manner.
- Financing entities should apply methodological guidance consistent with past COP decisions in order to improve the effectiveness and coordination of results-based finance.
- Developing countries seeking to obtain and receive results-based payments should provide the most recent summaries of information on safeguards.

There are no UNFCCC regulations on specific methods for results-based payments management or advance payments, including approaches for introduction in the readiness phase. These issues are likely to be examined under each REDD+ scheme. There are no adequate cases of results-based payments[2], and the GCF or FCPF methods will largely influence the future of the REDD+ finance.

2. Objectives and Workflow of the Study

The survey consists of two phases. Four countries—Myanmar, Madagascar, Democratic Republic of the Congo and Costa Rica—are studied in Phase 1. Three of the four countries, including Myanmar, are studied in Phase 2.

The first phase summarizes the MRV mechanism, forest dynamics, and socioeconomic conditions of the target countries as REDD+ readiness. Candidate areas under the REDD+ programme in the four countries are then selected, whereupon data on the current forest conditions and historical processes of deforestation and forest degradation or forest increase in the areas are gathered and analyzed. Based on the results, candidate project sites are decided upon discussions with JICA.

The Phase 1 study results are summarized in a fixed template form for comparison. (Details are described in basic technical policy.) In parallel, the feasibility of mobilizing external funds from sources such as the GCF, JCM, and private sector is studied and sorted out with clarification of various conditions and barriers. In the first phase, fund “providers” are mainly sorted out and “recipients” are summarized. In-depth surveys are then conducted in the second phase, mainly through discussions with concerned entities in the potential countries.

[2] There has been a case of REDD+-derived VCS credit trade in the past.

Forest dynamics are quantified in Tier 1, 2, and 3 countries: those that have data on forest dynamics analysis compiled in relation with the selection of candidate project sites are regarded as Tier 3; those that have data compiled on both themselves and surrounding regions are regarded as Tier 2; those with only global data, that is, those lacking country- or region-specific data, are regarded as Tier 1. (Details of the tier approach are described in Table 2-9, Study Implementation Methods.)
Based on Phase 1 study results, the candidate countries are narrowed down to Myanmar and two other countries in consideration of the REDD+ feasibility, scale of emission reduction, and capacity of the country as a "recipient" of fund mobilization.

In Phase 2, REDD+ activities against deforestation and forest degradation in the candidate countries are planned. Socioeconomic data and information on safeguards are additionally gathered in the planning so that the plan will be feasible in full consideration of co-benefits such as livelihood improvement and natural and social environments. The results are used to deepen and revise the Project Overview compiled in Phase 1 and then prepared as project idea notes.

The fund recipient mechanism in the target countries is clarified based on the fund mobilization method identified in Phase 1 in order to assume the scheme for the actual project launch.
A fund mobilization handbook that contains fund sources and conditions and systems for fund access is compiled to develop resources useful for the REDD+ strategies of each country.

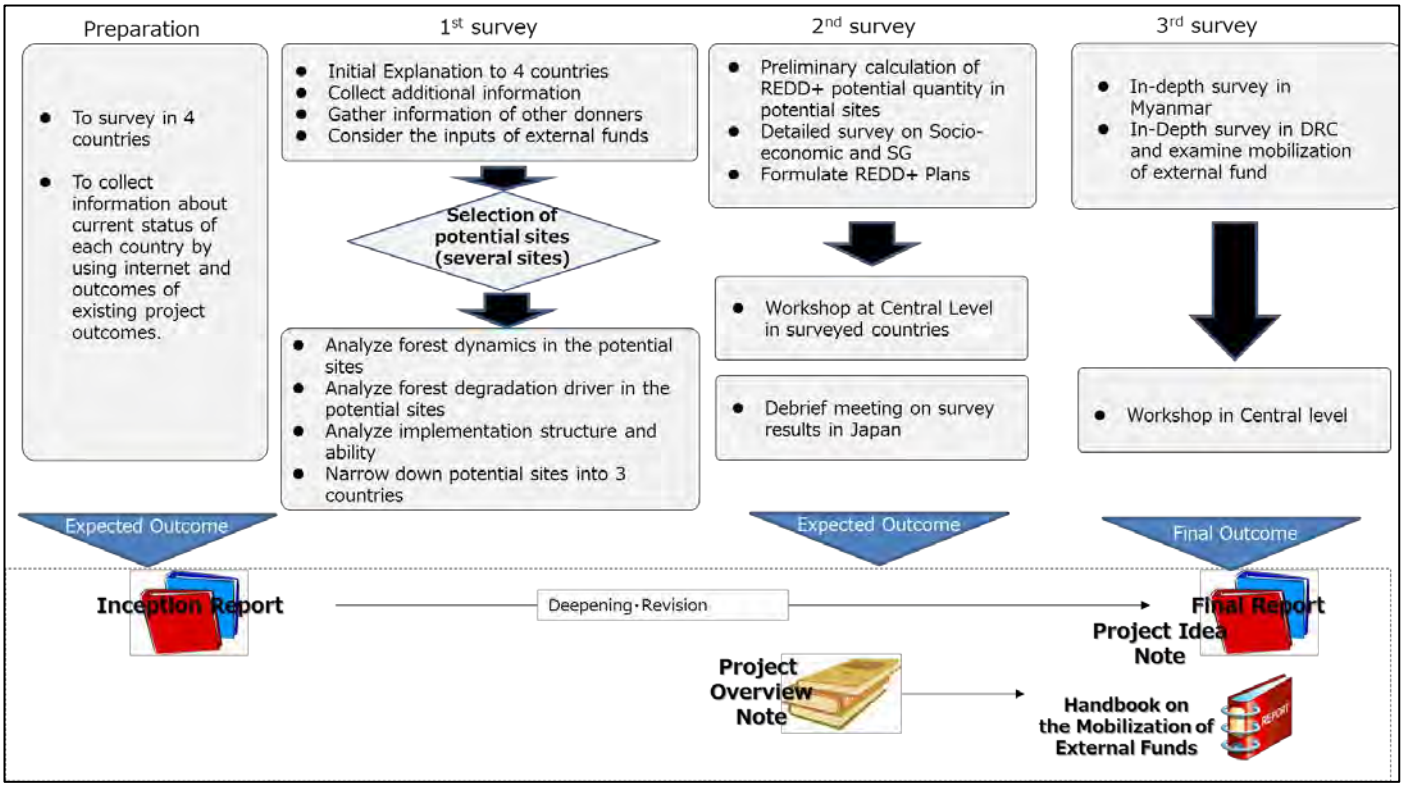

Figure I -1 Overall Work Structure

3. Results of the Study

As a result of initial survey in the Republic of Costa Rica, the possibility of new project formulation by inputting additional external funds is not high. Hence, secondary survey was not implemented. In line with this circumstance and as draft REDD+ project formulation, two potential projects would be proposed; 1) the installation of grazing forest in pasture land and low carbon livestock farming management and 2) the transformation of land usage from pasture land to low density secondary forest and its management.

In the case of Republic of Madagascar, surveys were done until secondary survey. 1) a model employing BOP (Base of the Pyramid) under FCPF, 2) a model to incorporate CSR (Corporate Social Responsibility) of a company, and 3) a model for non-REDD+ climate change mitigation are proposed.

A survey in Republic of the Union of Myanmar was implemented until secondary survey. The survey team chose five potential project sites. Detail survey was also conducted in two sites, including Shan state and BagoYoma region, out of these five sites. In these two sites, potentials and challenges to formulate a project were researched.
On a survey in Democratic Republic of the Congo, Kwilu state was selected as a potential project site due to safety matters and JICA's cooperation experience and cooperated achievements.

Detail report on the survey in Republic of the Union of Myanmar is as follow.

In addition, "fund mobilization handbook" may useful in consideration of REDD+ strategies in each country.

II. Results of the Study

1. Country Profile

1.1 Natural Conditions

Myanmar shares borders with 5 countries - China to the northeast, Laos to the east, Thailand to the southeast, Bangladesh to the west, and India to the northwest. Myanmar has a land area of 672,560 km2, which makes it the largest country in the Indochina region and approximately 1.8 times larger than Japan. Myanmar has several climate zones. The coastal areas with high precipitation fall within a tropical monsoon climate zone. The dry inland areas, some of which have annual precipitation of less than 1000 mm, fall within a tropical savanna zone. The mountain areas in the Shan, Kachin, and Chin states, some of which have average temperatures of no higher 18 degree centigrade in the cold months, fall within a Warm Winter, Light Rain Climate zone.

1.2 Major Industries and Economic Development

1.2.1 Economic Situation

To begin, the major economic indicators of Myanmar are as follows.

Table Ⅱ-1 Economic Indices of Myanmar[3]

Indicator	Value
Per capita GDP	US$ 1,212 (IMF, 2015)
Rate of economic growth	8.5% (IMF, 2015)
Poverty rate	No data available

Myanmar is designated by the United Nations as a Least Developed Country. Its 2015 GDP was the second lowest among the Southeast Asian countries, as shown in Figure xx. Recent economic development, however, has been remarkable, with GDP growth rates for 2013, 2014 and 2015 reaching 8.4%, 8.7% and 7%, respectively.

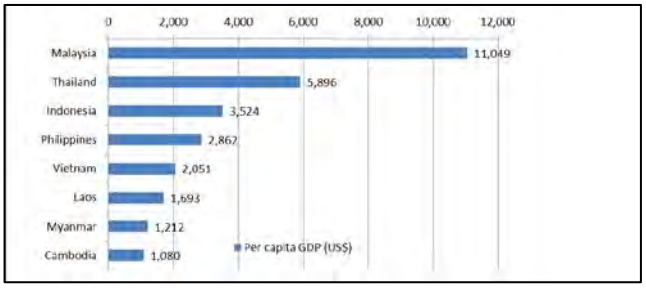

Figure Ⅱ-1 Comparison of per capita GDPs in 2015[4]

[3] CIA, 2016 https://www.cia.gov/library/publications/the-world-factbook/geos/bm.html (2016/11/06 Accessed)

1.2.2 Industries

The major export commodities of Myanmar are as listed in Table Ⅱ-2. Natural gas, which is thought to be exported to China and Thailand, accounts for more than 40% of total exports. The major agriculture, forestry, and fishery exports, i.e., beans, rice, fish, crab, prawn, shrimp, maze, timber, and sesame seeds, account for approximately 26%. Jade, base metal, and ore account for 9%.

Table Ⅱ-2 Major export commodities of Myanmar[5]

Commodity	FY 2014	FY 2015	
	Amount (Mil US$)	Amount (Mil US$)	Ratio (%)
Natural gas	4,178	4,774	41.8%
Beans	908	1,297	11.3%
Sewn products	982	835	7.3%
Rice	613	606	5.3%
Jade	1,075	602	5.3%
Base metal and ore	356	409	3.6%
Fish, prawn, shrimp and crab	365	388	3.4%
Maize	355	341	3.0%
Timber and wood products	397	165	1.4%
Sesame seeds	182	146	1.3%
Other	1,620	1,869	16.3%
Total	11,031	11,432	100

As for the contribution to GDP, agriculture was the largest in the past. The ratio of service industries, however, has been expanding in step with economic development.

Table Ⅱ-3　Change of contribution of each industry to GDP[6]

Year	2000	2004	2015
Agriculture	57.2	48.4	27.4
Manufacturing	9.7	16.2	26.5
Service industry	33.1	35.4	46.0

1.3 Ethnicity and Culture

In 2016, the Myanmar population was approximately 54 million (UNDP, 2016) and increasing at an annual rate of 1%. The literacy rate is as high as 91.7%. Myanmar is a multi-ethnic country. The

[4] Note) Singapore is not listed because its per capita GDP, US$56,286, was very large compared to the other countries.

[5] Source: Myanmar Central Statistical Office

[6] Source: Year 2000 and 2004 data from the World Bank, 2016[6]; Year 2015 data from the CIA, 2016)

Burmese account for 60% of the total population and the remaining 40% consist of Karen, Kachin, Shan, etc.

The country consists of 7 states, 7 regions, 1 Union Territory, 5 Self-Administered Zones, and 1 Self-Administered Division. Basically, the Burmese are dominant in all of the regions.
As for religion, 90% of the population is Theravada Buddhist. The remaining are Christian (4%), Islam (4%), and Hindu. In general, people in Myanmar do not have family names. If necessary, a person may append his or her father's or mother's name to his or her first name.

1.4 Security Situation

Since the start of the new regime in April 2016, the Myanmar government has adopted a cooperative policy to improve its unstable national security environment and held a series of dialogues with minority ethnic groups and rebels. And after the end of August 2016, a large-scale national peace talk was held in Nay Pyi Taw. Some ethnic groups, however, refused to participate, while others left in the middle of the talk. This demonstrates the ongoing instability of security conditions in some areas.

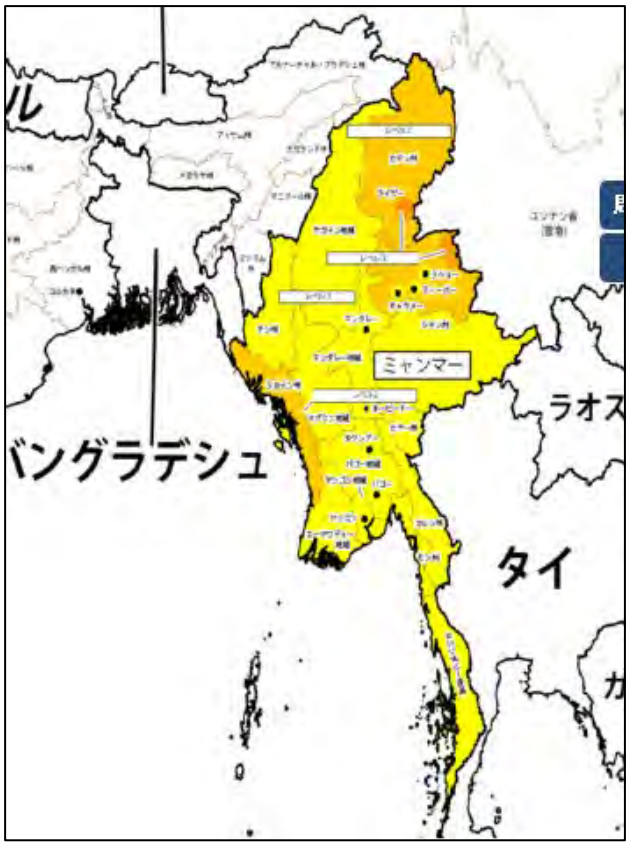

Figure Ⅱ-2 Security information page from the MoFA website (As of 2017/02/09)

According to the information provided on the Japanese Ministry of Foreign Affairs website, most of Myanmar is rated as Level 1 (yellow area; see Figure Ⅱ-2), while the Kachin, Shan, and Rakhine states are rated as Level 2 (Orange) and Level 3 (dark orange).

The four security levels used by the Ministry of Foreign Affairs, Japan are as follows:
Level 1: Pay due attention to the security situation.
Level 2: Visits to the designated area are not recommended unless urgently required.
Level 3: Visits to the designated area are not recommended.
Level 4: Evacuation from the designated area is recommended.

2. National Development Policy and Forestry Sector

2.1 Outline of National Development Plan

Myanmar has three types of national land development plans: the National Comprehensive Development Plan (30 year long term plan), 5-year Short-Term Plan, and National Spatial Development Plan.

The National Comprehensive Development Plan was created in 2001, and a plan for the remaining 20 years was reviewed and revised a decade later. The plan effective today covers the period between 2010 and 2031. The main theme of the 20-year plan is "People Centered Development." The plan is expected to boost GDP to US$18 billion by 2030-31, which will correspond to a per capita GDP of US$3,000.

The current 5-year plan[7] covering the period between 2016/17 and 2021/22 aims to promote public and private investments to increase productivity through industrialization and to promote economic development.

2.2 The Japanese Government's Policy of Cooperation

The Japanese government sets out three policies for economic cooperation with Myanmar[8].

i) Support to improve living conditions for Myanmar citizens (including support to minorities and the poor, agricultural development, and regional development)
ii) Support to increase the capacity of those who play vital roles in socio-economic activities (including support to promote democratization)
iii) Support to develop infrastructure required for sustainable economic development.

JICA's cooperation programs for Myanmar were planned out based on the three policies of the Japanese government. Table Ⅱ-4 summarizes JICA's cooperative programs for Myanmar.

Table Ⅱ-4 JICA programs in Myanmar[9]

Japanese government policy	Sector where JICA provide assistance
I. Support to improve living conditions for Myanmar citizens	Agriculture and rural development; Support to areas inhabited by minority ethnic groups; Basic education; Insurance and medical care; Disaster prevention

[7] Source: http://www.moi.gov.mm/moi:eng/?q=news/17/12/2015/id-6098

[8] Source: MoFA Japan (http://www.mofa.go.jp/mofai/area/myanmar/data.html#section5)

[9] Source: JICA website: Outline of JICA programs for each sector

Japanese government policy	Sector where JICA provide assistance
II. Support to increase the capacity of those who play vital role in socio-economic activities.	Higher education; Human capacity-building for industries; Finance and banking system; Legal framework; Trade and investment; Industrial development; Tourism
III. Support to develop infrastructure required for sustainable economic development.	Urban development; Thilawa SEZ development; Transportation (railways, roads, and water transport); Electricity and energy; Water supply and sewerage; Information, communication and postal services.

REDD+ has close relation with poverty eradication, agricultural development, and regional development, as well as disaster prevention through proper forest and land use management. Support for Myanmar's REDD+ therefore suits JICA's cooperation policy.

2.3 Outline of INDC and Place of REDD+

Myanmar submitted its INDC on September 28, 2015. Myanmar's forestry and energy sectors were expected to contribute to the mitigation of the impacts on climate change in the INDC submitted. The contribution of REDD+ was stated in a section on the forestry sector. More precisely, an increase in the area of Reserved Forest and Protected Public Forest to 30% of the national land and an increase in the area of Protected Areas to 10% are set as targets for 2030.

The following actions are arranged in the INDC action plan.

- Participation in the UN-REDD program
- Establishment of a REDD+ core unit in MONREC
- Preparation of a REDD+ readiness roadmap

Based on this plan, Myanmar participated in the UN-REDD program and established a REDD+ core unit in 2011. A REDD+ readiness roadmap was prepared in 2013 and Myanmar participated in the Forest Law Enforcement Governance Trade (FLEGT) program of the EU in 2014.

The following actions for the energy sector were listed in the plan:

- Increase the share of hydroelectric power
- Increase access to clean energy for areas and households that lack access to electricity
- Improve energy efficiency and the energy management system for control of GHG emission in industries
- Increase energy efficiency and reduce the consumption of firewood and charcoal by promoting the use of cooking stoves

The INDC clearly states that a total of 286,000 cooking stoves are to be provided between 2001 and 2015 and an additional 260,000 stoves are to be provided by 2031.

2.4 Submission of National Communication and the Status of REDD+

Myanmar submitted its Initial National Communication to UNFCCC on December 26, 2012. As of December 2016, the NC has not yet been updated. In the NC, the REDD+ mechanism is regarded as a measure to protect natural forests for the mitigation of deforestation and to implement sustainable forest management together with activities based on the CDM and LULUCF projects.

3. Forest Management Policy and Current Status of the Forests

3.1 Forest Policy and Law

3.1.1 Forest Law[10]

The Forest Law of Myanmar enacted in 1992 replaced the Burma Forest Act enacted in 1902. The basic purposes of the Forest Law are as follows.

- to implement the government's forestry policy;
- to implement the government's environmental conservation policy;
- to promote public co-operation in implementing the government's forestry policy and environmental conservation policy;
- to develop Myanmar's economy, satisfy the population's needs for food, clothing, and shelter, and ensure enjoyment of the forests;
- to carry out forestry in accordance with international agreements relating to the conservation of forests and of the environment;
- to prevent the dangers of forest destruction and biodiversity loss, outbreaks of fire, insect infestations, and plant disease
- to simultaneously carry out natural forest conservation and forest plantations development; and
- to contribute towards the fuel requirements of the country.

3.1.2 Forestry Policy

Policies in the following areas were determined in the Myanmar Forest Policy established in 1995.

- Land use
- Protection and management
- Forest Regeneration and Afforestation
- Forest industry, marketing, and trade
- Forest research

[10] Source: Website of the Forest Legality Initiative, http://www.forestlegality.org/risk-tool/country/myanmar

- Forestry planning
- Inter-sector coordination
- Institutional strengthening
- Budget and finance
- Public awareness and participation of the people

According to materials issued by the Myanmar government, the purposes of the Myanmar Forest Policy are as follows.

- PROTECTION of soil, water, wildlife, biodiversity, and the environment
- SUSTAINABILITY of forest resources to ensure a perpetual supply of both tangible and intangible benefits
- BASIC NEEDS of the people for fuel, shelter, food, and recreation;
- EFFICIENCY to harness, in a socio-environmentally friendly manner, the full economic potential of the forest resources);
- PARTICIPATION of the people in the conservation and utilization of the forests;
- PUBLIC AWARENESS about the vital role of forests in the wellbeing and socio-economic development of the nation.

Instruments to implement the policy are as listed below.

- Forest Law (1992)
- Forest Rules (1995)
- Protection of Wildlife and Wild Plants and Conservation of Natural Areas Law (1994)
- Community Forestry Instructions (1995)
- Myanmar Agenda 21 together with Environmental Policy
- National Forestry Action Plan (1995)
- Criteria and indicators for sustainable forest management (1999)
- Format and guidelines for district forest management plans (1996)
- National Code of Practice for Forest Harvesting (2000)
- National Framework for Environmental Law

3.1.3 Forestry Plans

Following is an outline of the Forestry Planning under the Myanmar Forest Policy.

Policy Measure

- Establish an adequate system for planning and policy analyses in the Ministry and Department of Forestry and prepare a 10-year perspective plan for providing general guidelines and broad targets for sector development.

Strategies

- Prepare a national forestry action plan for forestry sector development on a rolling format to fully integrate forest development programmes with the national planning processes; and
- Strengthen the planning division of the Forest Development and the Ministry of Forestry in order to prepare strategic plans and monitor and evaluate plan implementation and results.

Action

Intermediate and short term

- Prepare a 10-year comprehensive development plan for the forest sector, including administrative arrangements and a financial plan.
- Prepare a mid-term plan designed to achieve the objectives of the sector plan schedule planned out by the government.
- Analyze economic multiplier effects of forestry activities to influence decision making and win support of the national planning bodies and other related institutions
- Prepare an annual plan of operations for achieving the targets proposed in the mid-term plan
- Secure an effective level of staffing and expertise within the Forest Department and the Ministry of Forestry to prepare sector plans and a sector policy; and
- Undertake training of senior staff of the Forest Department in forest economics, forestry sector planning, and forest policy analysis.

Medium term

- Establish an information management system to provide qualitative and quantitative, socio-economic, and resource data to facilitate the identification of policy options, planning and decision-making; upgrade national capacity in the fields of forest policy formulation, analysis, impact assessment, and sector planning on a continuous basis.

Long term

- Evaluate plan implementation results and update strategic plans to keep pace with national development plans

The Myanmar government has established a National Comprehensive Development Plan. The most recent plan covers the 20-year period of 2011-2012 to 2030-2031. A forestry plan scheduled for the same period covered by the most recent national plan is also in place. The figure below plots out the relation between the national plan, forestry sector plan, and other relevant plans.

Figure Ⅱ-3 Relation of national plans of Myanmar[11]

The English-language title of the plan, the "Forestry Sector Comprehensive Development Plan," is alternately translated in several ways (e.g., the "Comprehensive Economic Development Plan of the Forestry Sector").

Following are the goals listed in the Forest Master Plan covering the 30-year period from 2001 to 2030:

- Decrease the area of annual deforestation to 220,178 ha /year[12] under the leadership of the Forest Department
- Increase the area of community forest from 0.06% to 1% (919,000 ha) of the country by 2023.
- Produce 4.13 million m^3 of wood for firewood and charcoal, enough to satisfy about 25% of the total demand
- Increase Reserved Forest (RF) and Protected Public Forest (PPF) areas to 30% of the national land.
- Increase Protected Area Systems (PAS) to 10% of the national land.
- Increase the total forest area to 51%[13] of the national land

[11] (Source: "Challenges of National Level Forest Cover Change Assessment in Myanmar," Aung Aung Myint, January 2016)

[12] According to FRA2015, the average annual deforestation between 2010 and 2015 was 546,400 ha/year (220,178 ha/year is about 40.3% of the 2015 rate).

[13] According to FRA2015, forest occupies about 42.92% of the national land.

Based on this master plan, a 10-year forest management plan was drawn up for 64 forest management units in 63 districts.

3.1.4 Community Forest Instruction

Community Forest Instruction, a policy document originally produced in 1995, was revised in 2016. This instruction sets forth parameters for the establishment of community forest, methods for managing established community forest, and the role of government. The revised version advocates the promotion of the commercial use of forests.

3.1.5 Land Ownership in Forested Areas

According to the Land Nationalization Act of 1953, the government is the sole owner of land in Myanmar. Forests are also national property, but the right to use forests can be granted to private entities. National forest areas are called Permanent Forest Estates (PFEs) and consist of Reserved Forest and Public Forest (Unclassified forest) areas. Land covered by forests is administered by the Forest Department, Ministry of Agriculture, or General Administration Department (GAD).

3.2 Current Status of the Forests

3.2.1 Forest Definition

To qualify as forest according to the Myanmar definition, an area needs to have trees of more than 5 meters in height covering a minimum area of 0.5 ha. A forest is defined as a Closed Forest if the crown coverage exceeds 40% and Open Forest if the crown coverage falls between 10% and 40%. Vegetation judged to be growing according to the forest definition is also considered forest.

3.2.2 Forest Type

The Myanmar government classifies land use/cover into 11 classes, as listed in Table Ⅱ-5 below.

Table Ⅱ-5 Land use/cover classes of the Myanmar government[14]

Code	Class	Definition
1	Closed forest	An area used for forestry or left unused, spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy cover of more than 40 percent, or trees able to reach these thresholds in situ.
2	Open forest	An area used for forestry or left unused, spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy cover between 10 and 40 percent, or trees able to reach these thresholds in situ.
3	Other wooded land	Areas mostly covered by grassland and stunted trees, shrub forests, with a crown density of less than 10%.

[14] Source: "Strengthening Myanmar's National Forest Monitoring System – Land Use Assessment and Capacity Building," Myanmar Govt., 2016)

Code	Class	Definition
4	Crop land	Permanent agriculture areas, mostly in plains and valleys. In some cases these areas are mixed with shifting cultivation.
5	Other lands	Other areas (rock, bare land, sandbanks).
6	Settlements	This category includes all developed land, including transportation infrastructure and human settlements of any size, unless they are already included under other categories.
7	Wetland	This category includes areas of peat extraction and land that is covered or saturated by water for all or part of the year.
8	Mangrove	Area covered by Mangrove tree species as interpreted from satellite imagery and aerial photographs.
9	Snow	Lands covered by snow, especially snow-capped mountain areas.
10	Water	Inland water bodies, lakes, reservoirs, large streams and rivers.
11	Grassland	Land covered by herbaceous vegetation with <10% of tree cover and <10% of shrub cover.

FAO publishes a Forest Resources Assessment report using its own land use/cover classification. In case of REDD+ land use/cover needs to be classified according to the rules of the Inter-governmental Panel for Climate Change (IPCC).

The table below summarizes the relation between the land use/cover classification used by the Myanmar government, FAO's Forest Resources Assessment (FRA), and the Inter-governmental Panel of Climate Change (IPCC).

Table Ⅱ-6 Comparison of land use/cover classification[15]

Code	Classification by Myanmar government	Classification by FAO FRA	Classification by IPCC
1	Closed forest	Forest (including primary forest, other naturally regenerated forest, and planted forest)	Forest land
8	Mangrove		
2	Open forest		
3	Other wooded land	Other wooded land	
11	Grassland		Grassland
4	Cropland	Other land with tree cover	Cropland
5	Other lands		Other lands
9	Snow		
6	Settlements		Settlements

[15] Source: "Strengthening Myanmar's National Forest Monitoring System – Land Use Assessment and Capacity Building," Myanmar Government, 2016)

Code	Classification by Myanmar government	Classification by FAO FRA	Classification by IPCC
7	Wetland		Wetlands
10	Water	Inland water bodies	

The types of land use/cover maps were compiled with support from UN-REDD in 2015 – one with 7 land use/cover classes based on 11 classes of the Myanmar government and another with 6 classes from IPCC.

3.2.3 Forest Resources

Figure Ⅱ-4 is 2016 land use/cover map compiled according to IPCC the classification. As no digital map data on Myanmar have yet been published, this figure was copied from a report issued by the Forest Department titled “Strengthening Myanmar’s National Forest Monitoring System – Land Use Assessment and Capacity Building." Green colored area is forest.

According to FRA 2015 from FAO, the total forest area, the sum of Closed Forest and Open Forest areas, was 30,472,530 ha, or approximately 45% of the country.

Again according to FRA 2015, managed forests accounted for approximately 78% of the entire forest area as of 2010. According to a material produced by the Forest Department in 2016, Reserved Forest, Protected Public Forest, and Protected Area Systems cover 17.82%, 6.97%, and 5.75% of the country, respectively.

The ratios of the respective forest types against the total forest area are shown in the table below (also based on the same material).

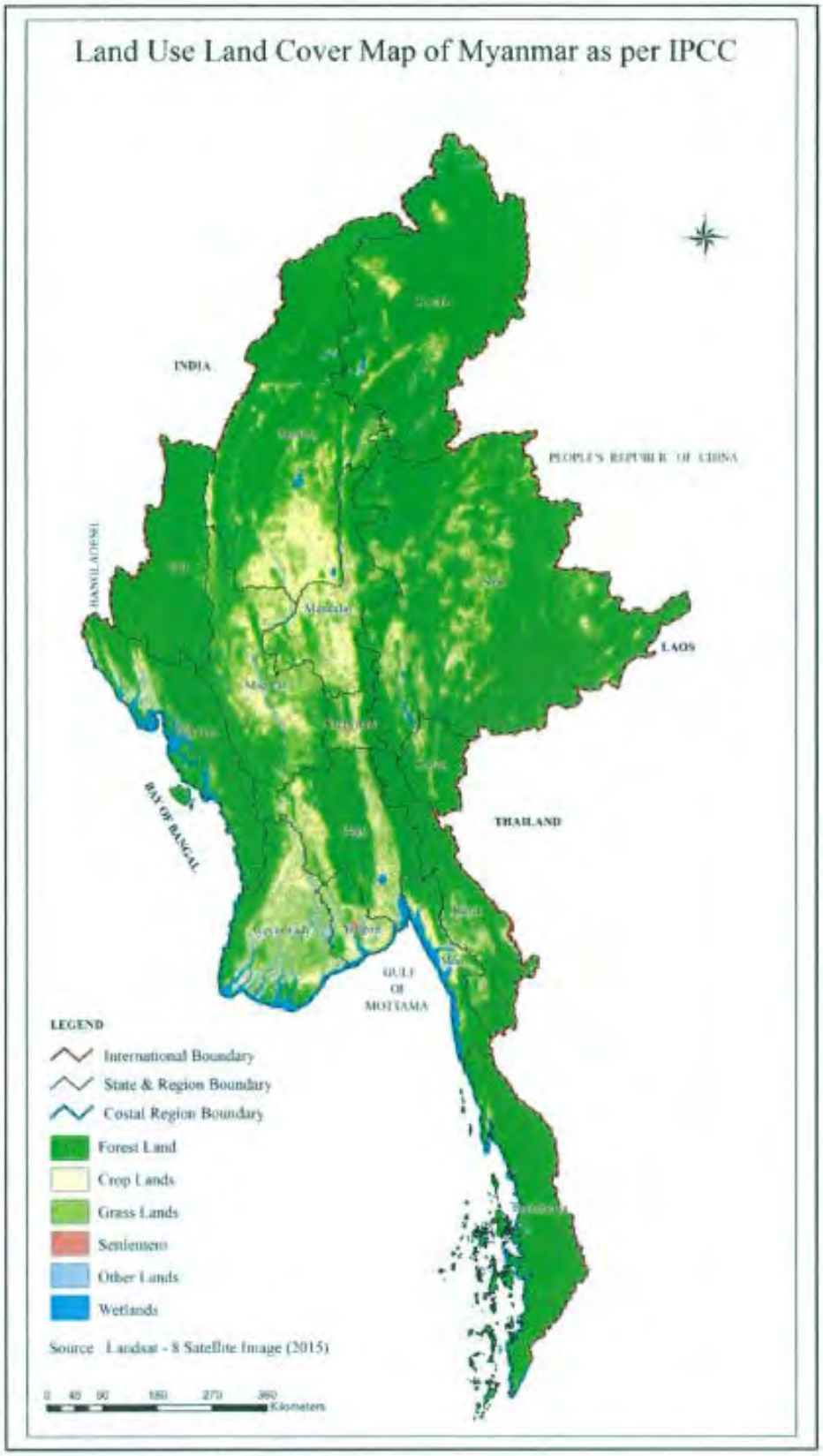

Figure Ⅱ-4 Forest area of Myanmar (IPCC classification)

Table Ⅱ-7 Forest type and ratio

Forest type	Ratio
Tropical Evergreen Forest	17.30%
Mixed Deciduous Forest	38.20%
Dry Forest	10.00%
Deciduous Indaing Dipterocarp	4.26%
Hill and Temperate Evergreen	26.92%
Scrub land	2.20%
Mangrove Forest	1.12%

3.2.4 Forest Dynamics

The table below shows temporal changes of forest areas in Myanmar according to FRA 2015.

Table Ⅱ-8 Changes of forest area (Unit: 1000 ha)

		1990	2000	2005	2010	2015
	Forest	39218	34868	33321	31773	29041
	Other wooded land	19498	19703	19908	20113	15080
	Other land	7039	11184	12526	13869	21634
	... of which with tree cover	N/A	N/A	N/A	N/A	N/A
	Inland water bodies	1903	1903	1903	1903	1903
	TOTAL	67658.00	67658.00	67658.00	67658.00	67658.00

Although the 2015 figure in FRA 2015 is an estimate based on historical data, the average reduction in forest was 546,400 ha per year between 2010 and 2015.

The temporal change in the forest area has also been analyzed by various researchers and NGOs, including the University of Maryland. UN-REDD compared the results of the following seven kinds of analysis in “Development of National Forest Monitoring System for Myanmar - Draft” prepared in September 2015:

- 2000 data on Forest Department
- FRA2010
- Draft of FRA2015
- GMS project
- University of Maryland
- Data from Leimgruber et al., 2005
- Data from Kim et al., 2015

Table Ⅱ-9 shows a comparison of the aforesaid analysis types.

Table Ⅱ-9 Comparison of forest area estimates by different sources[16]

Forest area at beginning of the period (A_{t1})	Area unit	Forest area at the end of the period (A_{t2})	Year 1 (t_1)	Year 2 (t_2)	Period (n), years	Deforestation rate: r in % annualised (Pyravaud, 2003)	Deforestation rate: q in % annualised (FAO, 1995)	Annual average deforestation	Area unit	Sources
34554000	ha	31773000	2000	2010	10	0,84	0,84	278100	ha	(1), (2)
31773000	ha	30473000	2010	2015	5	0,84	0,83	260000	ha	(2), (3)
35072320	ha	30148190	2005	2010	5	3,03	2,98	984826	ha	(4)
43500000	ha	42300000	2000	2012	12	0,23	0,23	100000	ha	(5)
39218000	ha	34868000	1990	2000	10	1,18	1,17	435000	ha	(2)
44200000	ha	43000000	1990	2000	10	0,28	0,27	120000	ha	(6)
40120000	ha	39290000	1990	2000	10	0,21	0,21	83000	ha	(7)
39290000	ha	37500000	2000	2010	10	0.47	0,47	179000	ha	(7)

Sources: (1) Planning and Statistics Division, FD, 2000; (2) FRA 2010; (3) draft FRA 2015; (4) GMS+ project Myanmar; (5) Hansen *et al*, 2013; (6) Leimgruber *et al*, 2005; (7) Kim *et al*, 2015

Table Ⅱ-10 is a graph made based on the data of Table Ⅱ-9.

Table Ⅱ-10 Comparison of forest area estimates by different sources – Type B (Unit: ha)

	1990	1995	2000	2005	2010	2015
1. FRA 2010	435,000/year					
2. Leimgruber et al., 2005	120,000/year					
3. Kim et al., 2015	83,000/year					
4. FD; FRA 2010			278,100/year			
5. Kim et al., 2015			179,000/year			
6. Hansen et al., 2013			100,000/year			
7. GMS+ project Myanmar				984,826/year		
8. FRA 2010; draft FRA 2015					260,000/year	

As no land use/cover maps have been provided by the Myanmar government for the years 2005, 2010, and 2015, the forest dynamics of Myanmar need to be assessed based on data prepared by multiple third parties. The real dynamics of Myanmar's forest areas are difficult to understand from these third party assessments, as the assessments are inconsistent and the most recent data are still unavailable.

Two types of information exist on deforestation and forest degradation at the state level. One is an analysis done by the Asia Air Survey using unpublished map data from 2005 and 2010. The other is an

[16] (Source: MOECAF/UN-REDD (2015) "Development of a National Forest Monitoring System for Myanmar, September Draft")

assessment carried out by Advancing Life and Regenerating Motherland (ALARM) and compiled by the Smithsonian Institute as a report titled "Myanmar Forest Cover Change 2002-2014."

As both the 2005 and 2010 maps have yet to be verified for accuracy, the reliability of the results of the forest change analysis are still in doubt. The ALARM and Forest Department assessments are also difficult to directly compare, as each relies upon a slightly different definition for forest.

Despite these problems, their assessments can be used to at least generally understand the areas with high rates of deforestation. Following are the high-deforestation areas selected based on the two analysis types.

＜Asia Air Survey analysis＞

- Kachin state: Severe deforestation in the western part of the state.
- Sagain region: Deforestation in the central part of the state. A change from sparse forest to closed forest is concurrently observed.
- Kayin state: Severe deforestation. Problems from the Karen conflict may be involved.
- Shan state: Severe deforestation, second only to that in Kayin state. Mine development and ethnic problems in the northern part of the state contribute.
- Rakhine state: Severe forest degradation.

＜ALARM analysis＞

"Myanmar Forest Cover Change 2002-2014" from ALARM summarizes forest cover change over the 12 years from 2002 to 2014. Forest is stratified into 3 classes in their analysis: Intact Forest, Degraded Forest, and New Degraded Forest. Plantation is excluded. Their definitions are as follows.

- Intact Forest: >80% canopy cover in evergreen & mixed deciduous forests; >60% canopy cover in dry deciduous forests
- Degraded Forest: 10-80% canopy cover in evergreen and mixed deciduous forests; 10-60% canopy cover in dry deciduous forests
- New Degraded Forest: Intact forest in 2002 to degraded forest in 2014

According to the ALARM assessment, the loss of intact forest over the 12-year period exceeded 100,000 ha in Shan, Sagain, Kachin, Tanintharyi, Kayin, Rakhine and Bago. The rates of deforestation were high in Shan, Bago, Mon, Magwe, Ayeyarwardy, and Mandalay.

Except for Bago and Chin, high deforestation states identified by ALARM are also listed as high deforestation states as the result of the assessment based on unpublished 2005 and 2010 maps. The size and rate of deforestation are both high in the Shan state.

3.2.5 Status of Protected Areas

The table below lists three types of protected forest areas in Myanmar. As mentioned earlier, the Forest Master Plan sets the following targets for the protected areas.

- Increase Reserved Forest (RF) and Protected Pubic Forest (PPF) to 30% of the country by 2030.
- Increase Protected Area Systems (PAS) to 10% of the country.

Table Ⅱ-11 Protected forest areas[17]

Type	Quantity	Area (Acre)	Ratio to the country (%)
Reserve Forests	789	28,123,634	16.82
Protected Public Forests	345	11,718,129	7.01
Total		**39,841,763**	**23.83**
Protected Areas	39	9,607,490	5.75

The boundaries of the protected areas can be found on an NGO website but are not published by the Forest Department.

4. Status of REDD+ Preparation and REDD+ Activities

4.1 REDD+-Related Activities at the Central Level

4.1.1 Offices and Organizations Responsible for Climate Change

In Myanmar, the focal point for international conventions related to the environment, including UNFCCC, is the Director General of the Environmental Conservation Department (ECD) of the Ministry of Natural Resources and Environmental Conservation.

On the other hand, Myanmar established a National Environmental Conservation Committee (NECC) in April of 2011 by restructuring its National Commission for Environmental Affairs (NCEA). The NECC has now changed its name to the National Environmental Conservation and Climate Change Committee (NECCC) and takes on the role of guiding Myanmar's measures to deal with climate change issues and manage and coordinate every related type of activity, including the establishment of policies, strategies, and relevant plans related to climate change.

[17] Source: Material of Myanmar Forest Department (2016)

The members of the NECCC are:

■ Chairman: Union Minister, MONREC

■ Vice Chairman: Union Minister, President Office

Members:

- Deputy Minister, Ministry of Interior
- Deputy Minister, Ministry of Foreign Affairs
- Deputy Minister, Ministry of Agriculture and Irrigation
- Deputy Minister, Ministry of Construction
- Deputy Minister, Ministry of Hotel and Tourism
- Deputy Minister, Ministry of Industry
- Deputy Minister, Ministry of Rail Transport
- Deputy Minister, Ministry of Electricity and Energy
- Deputy Minister, Ministry of Education
- Deputy Minister, Ministry of Health
- Director General, General Administrative Dept., Ministry of Home Affairs
- Director General, Dept. of Development Affairs, Ministry of National Planning and Economic Development
- Director General, Directorate of Water Resources & Improvement of River Systems, Ministry of Transport

Secretary:

- Director General, Planning and Statistic Department, MONRE

Joint Secretary:

- Director of the President's Office

In addition to the members of the NECCC, the Myanmar organizations involved in climate-change-related programs in the country include the Department of Meteorology and Hydrology under the Ministry of Transport (the designated Executing Agency for NAPA), as well as the following organizations listed in the NAPA working group:

- Ecosystem Conservation and Community Development Initiative
- Myanmar Maternal and Child Care Association
- Myanmar RED Cross Society
- Myanmar Seafarer's Association
- Ministry of Livestock, Fisheries and Rural Development
- BANCA (Biodiversity and Nature Conservation Association)
- Myanmar Engineering Society
- Myanmar Fishery Federation

REDD+ also operates under the scope of the NECCC's responsibility. And as Figure Ⅱ-5 shows, a REDD+ taskforce is organized under the NECCC.

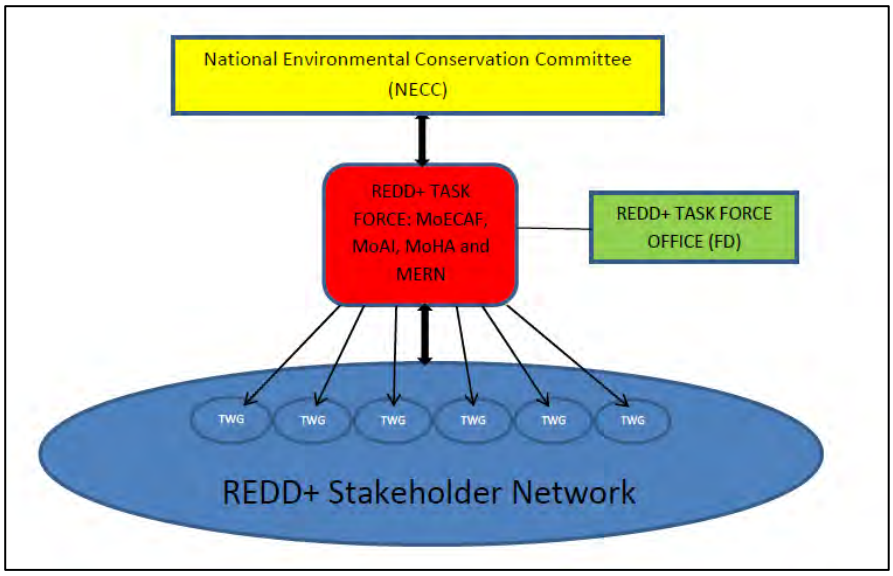

Figure Ⅱ-5　NECCC and REDD＋　Taskforce

The REDD+ Taskforce is composed of the following members:

- MoECAF (Currently re-organized as MoNREC)
- MoAI: Ministry of Agriculture and Irrigation
- MoHA: Ministry of Home Affairs
- MERN: Myanmar Environment Rehabilitation-conservation Network

Meanwhile, the REDD+ Readiness Roadmap of Myanmar identifies the following as members of a technical working group tasked to analyze the drivers of deforestation and forest degradation and contribute to the formulation of REDD+ strategy.

- MONREC
- Ministry of Agriculture and Irrigation
- Union Attorney General Office
- Ministry of National Planning and Economic Development
- Ministry of Home Affairs
- Myanmar Environment Rehabilitation-conservation Network (MERN)
- EcoDev (Ecology and Economic Development Company Limited)
- SPECTRUM (Sustainable Development Knowledge Network)
- UNDP

Figure Ⅱ-6 is an organogram of MONREC, an entity that plays and important role in climate change and REDD+ related activities.

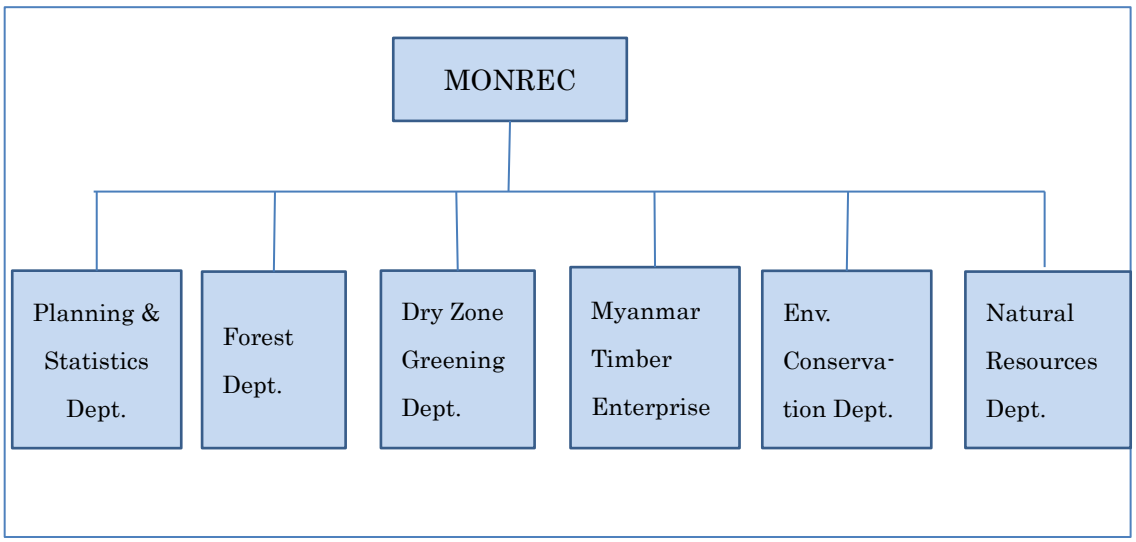

Figure Ⅱ-6　MONREC organization chart

4.1.2 Major National Plans related to climate change

Myanmar has formulated two major plans for climate change countermeasures:

- Myanmar's National Adaptation Programme of Action to Climate Change (NAPA) (2012)
- Myanmar Climate Change Strategy and Action Plan (MCCSAP) 2016-2030 Ver.1 (2016)

NAPA lists the agriculture sector, early warning system, and forestry sector as priority sectors. The priority programs for the forestry sector are as follows.

■ First Priority

Building the resilience of degraded/sensitive forest areas to climate change impacts through reforestation

■ Second Priority

Community based reforestation for climate-resilient ecosystems and rural livelihoods in degraded watershed areas of the Central Dry Zone.

■ Third Priority

Community-based mangrove restoration for climate-resilient ecosystems and rural livelihoods in vulnerable and degraded coastal regions.

■ Fourth Priority

Enhancing the climate change resilience of rural livelihoods through community-based restoration in the Indawgyi and Inle Lake watershed areas in the Northern Hilly Region.

Although MCCSAP is still in NAPA's draft, its basic principles, vision, goal, objectives, priority sectors, and tools to support activities for the priority sectors are laid out as follows.

＜Four principles＞

- Inclusive development (development to support the vulnerable)
- Resource-efficient development
- Integrated development
- Results-based development

＜Strategic Vision＞

To develop Myanmar as a nation that is resilient to the impacts of climate change and is able to harness the benefits of low carbon development for present and future generations in an inclusive manner.

<Goal＞

Myanmar achieved climate-resilient development and pursued a low-carbon development pathway by 2030 to support inclusive and sustainable development.

<Objectives＞

- To increase the adaptive capacity of vulnerable communities and sectors so that they are resilient to the adverse impacts of climate change.
- To create and maximize the use of opportunities for potential sectors to pursue a low carbon development pathway by ensuring development benefits to communities and all economic sectors.

＜Priority Sector＞

- Agriculture, Fisheries and Livestock
- Environment and Natural Resources
- Energy, Transport and Industry
- Cities, Towns and Human Settlements
- Climate Hazards and Health
- Education

＜Enabling and supporting instruments＞

- Enabling the policy environment
- Coordination and implementation mechanism
- Strategic framework for financing
- Capacity building
- Progress monitoring and feedback

4.1.3 Availability of the REDD+ Action Plan

In July 2013, the REDD+ Readiness Roadmap was completed with support from UNDP. A total of US$ 22 million is allocated for a four-year period starting from 2016. The REDD+ strategy is now being prepared.

4.1.4 Preparation for the MRV Mechanism

(1) NFMS

An Action Plan has been drafted. A design for the National Forest Inventory has also been prepared with support from Helsinki University of Finland.
As for Activity Data, the FAO (UN-REDD) supported 2015 mapping using TCP budget. Forests have been mapped several times in the past, but their legends (land use/cover class) are inconsistent with each other. While the land use/cover classes from the 2005 and 2010 maps are consistent, they are unusable for forest reference level calculations because the accuracy of the maps has yet to be verified and the geometric correction methods applied differ between 2005 and 2010.

(2) NFI

Under financial assistance from the Finish government (9.5 million euros) and technical support from FAO, a trial national forest inventory survey started from January 2017 for 667 plots in 8 sites in the country. The eight sites are shown in the figure below.

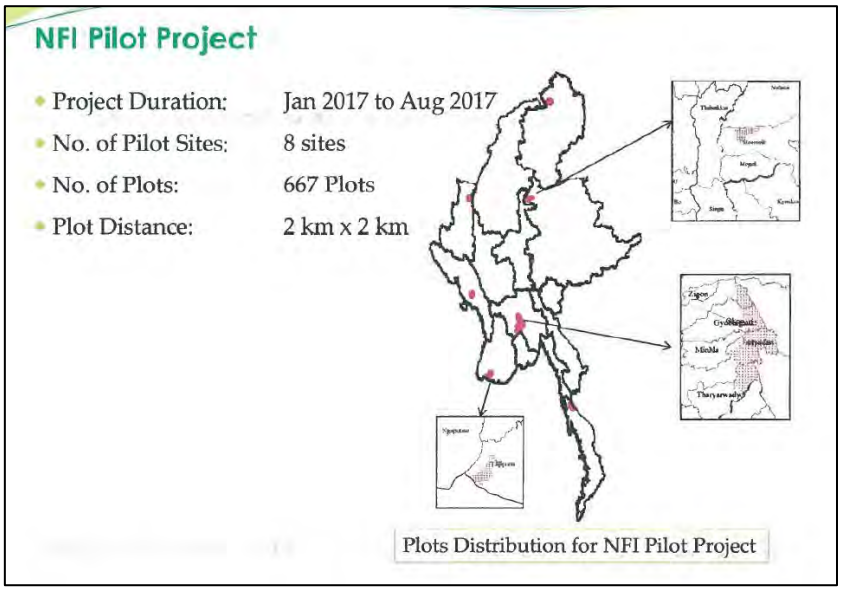

Figure Ⅱ-7 Location of trial NFI[18]

[18] Source: FD(2017) Introduction of the National Forest Inventory

A cluster system is used for the plot deign. Four plots per point are to be surveyed. There were plans to collect grasses, litter, and soil samples from one plot located 20 meters from the plot at the southwest corner. Three plot sizes could be selected: 0.06 ha, 0.07 ha, or 0.08 ha. As of this writing, it is unclear which size was chosen.

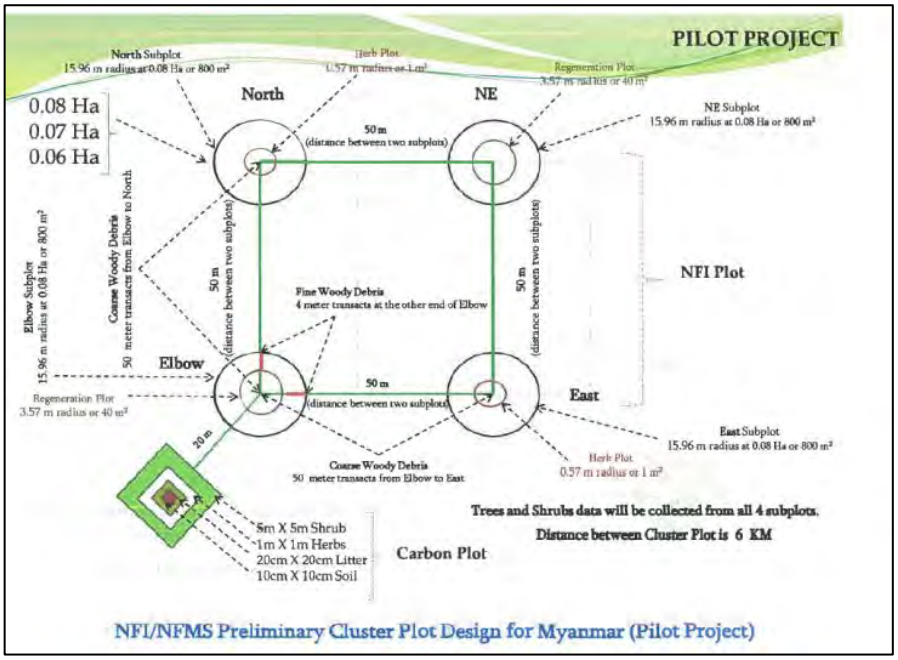

Figure Ⅱ-8 Design of the trial NFI

The interval between points in the NFI design, which consists of 4 plots, is 2 km in Closed Forest and 3 km in Open Forest. Plans call for completion of the NFI by 2021. The following types of information are to be collected by the NFI:

- Above-ground biomass: DBH, tree height, species, existence of saplings, etc.)
- Volume of deadwood
- Volume of litter
- Soil (at depths of 0－10 cm, 10-20 cm, 20-30 cm)
- Forest structure
- Coverage of woody vegetation
- Coverage of herbaceous plants
- Coverage of bamboo
- Existence of wildlife
- Land disturbance
- Land use
- Health condition of trees
- Forest type

4.1.5 FRL/FREL

Just like NFMS, a draft of an Action Plan for FREL/FRL was made under the support from UN-REDD. According to this action plan, Myanmar intends to establish a sub-national FREL/FRL first and then go on to establish a national-level FREL/FRL. The Forest Department plan, in contrast, calls for the establishment of a national FREL/FRL first. The plan is to establish a draft national FREL/FRL by the end of 2017 using newly available activity data and emission factors.

4.1.6 Safeguards

(1) Safeguard Measures

A safeguard mechanism for Myanmar is being developed with UN-REDD support based on the Cancun agreements. Among six components of the UN-REDD program, safeguards are being designed under Component 2 "Stakeholder Consultation and Participation" and Component 4 "Implementation Framework and Safeguards."

The contents of Component 2 and 4 described in the REDD+ Readiness Roadmap[19] are outlined below.

- Component 2: Stakeholder Consultation and Participation

Budget for 4 years	US$ 700,000
Outcome	・Identification of stakeholders and strengthening of consultation ・Development of guidelines for national FPIC

- Component 4: Implementation Framework and Safeguards

Budget for 4 years	US$ 1,880,000
Outcome	・Construction of a management framework ・Adaptation and strengthening of the legal system and framework ・Construction of a fund mechanism ・Construction of a REDD+ socioeconomic safeguarding system

Multiple Technical Working Groups (TWGs) have been established In the UN-REDD program. The three TWGs[20] listed in the table below are examining FPIC, benefit-sharing, and the legal system in relation to the safeguards.

[19] UN-REDD Programme " Myanmar REDD+ Readiness Roadmap" (2013)

Table Ⅱ-12 Working groups and their activities

TWG	Activities	Relevant Cancun safeguards※
Stakeholder engagement and safeguard (Component2,4)	・ Undertake annual stakeholder reviews to update and strengthen the membership of the National REDD+ Network ・ Develop National REDD+ Readiness Stakeholder Consultation Guidelines and Consultation Plans ・ Stakeholder analysis and needs assessment for capacity building ・ Develop FPIC guidelines and trial implementation ・ Establish standards for socioeconomic safeguard performance ・ Establish a national safeguard information system, grievance mechanism, etc.	(c),(d),(e)
Fund and benefit-sharing (Component 4)	・ Review existing REDD+ related funding mechanisms ・ Support the establishment of fund management and benefit-sharing mechanisms ・ Promote consultation related to fund management and benefit-sharing mechanisms, etc.	(b)
Legal system (Component 4)	・ Review the legal system contributing to the development of the REDD+ strategy and support the construction of a REDD+ related legal framework ・ Support the revision of existing laws or the creation of new laws ・ Promote consultation for the establishment of the REDD+ related legal system ・ Support the construction of a national safeguard information system (SIS) ・ Support the construction of a grievance mechanism, etc.	(a),(b),(c),(d)

※Cancun Safeguards:

(a) That actions complement or are consistent with the objectives of national forest programmes and relevant international conventions and agreements;

(b) Transparent and effective national forest governance structures, taking into account national legislation and sovereignty;

(c) Respect for the knowledge and rights of indigenous peoples and members of local communities, by taking into account relevant international obligations and national circumstances and laws, and noting that the United Nations General Assembly has adopted the United Nations Declaration on the Rights of Indigenous Peoples;

(d) The full and effective participation of relevant stakeholders, in particular indigenous peoples and local communities, in the actions referred to in paragraphs 70 and 72 of this decision;

(e) That actions are consistent with the conservation of natural forests and biological diversity, ensuring that the actions referred to in paragraph 70 of this decision are not used for the conversion

[20] Three TWGs exist as of this writing: "Drivers and Strategy Development," "Stakeholder Engagement and Safeguards," and the "National Forest Monitoring System (NFMS) and REL/RL." Another three TWGs are to be established: "REDD+ Project," "Finance and Benefit-sharing," and "Legal."

of natural forests but are instead used to incentivize the protection and conservation of natural forests and their ecosystem services, and to enhance other social and environmental benefits;

(f) Actions to address the risks of reversals;

(g) Actions to reduce displacement of emissions.

Among the seven safeguards listed above, (f) and (g) are to be examined in the process of constructing the MRV mechanism, under current plans.

(2) Status of the Construction of a System Related to the Safeguards

In order to construct a national system for REDD+ safeguards, the following tasks will be carried out in coming four years.

- Review of the overriding legal system
- Gap analysis of policies, laws, and regulations (PLRs)
- Review of stakeholder engagement
- Construction of a safeguard information system (SIS)
- A series of studies related to safeguards such as methods for fund management and benefit-sharing.

On the other hand, according to the results of a hearing with FAO experts held in December 2012, the budget allocation and assignment of an expert on safeguards have yet to be implemented and lag well behind the schedules of the other TWGs. The activities related to the safeguards are expected to get into full swing after a UNEP expert is assigned in February 2017[21].

According to the REDD+ Readiness Roadmap, activities related to the safeguards are to be implemented in three fields, namely, the 1) Establishment of standards for environment and social performance, 2) Construction of a mechanism for policies, laws, and regulations (PLRs) and 3) Grievance mechanism.

The process for construction of the safeguard information system and establishment of the framework for safeguards laid out in the roadmap are as shown in Figure Ⅱ-9 below.

[21] Based on the results of a hearing held in February 2017 with UN-REDD experts and officials from the Forest Department.

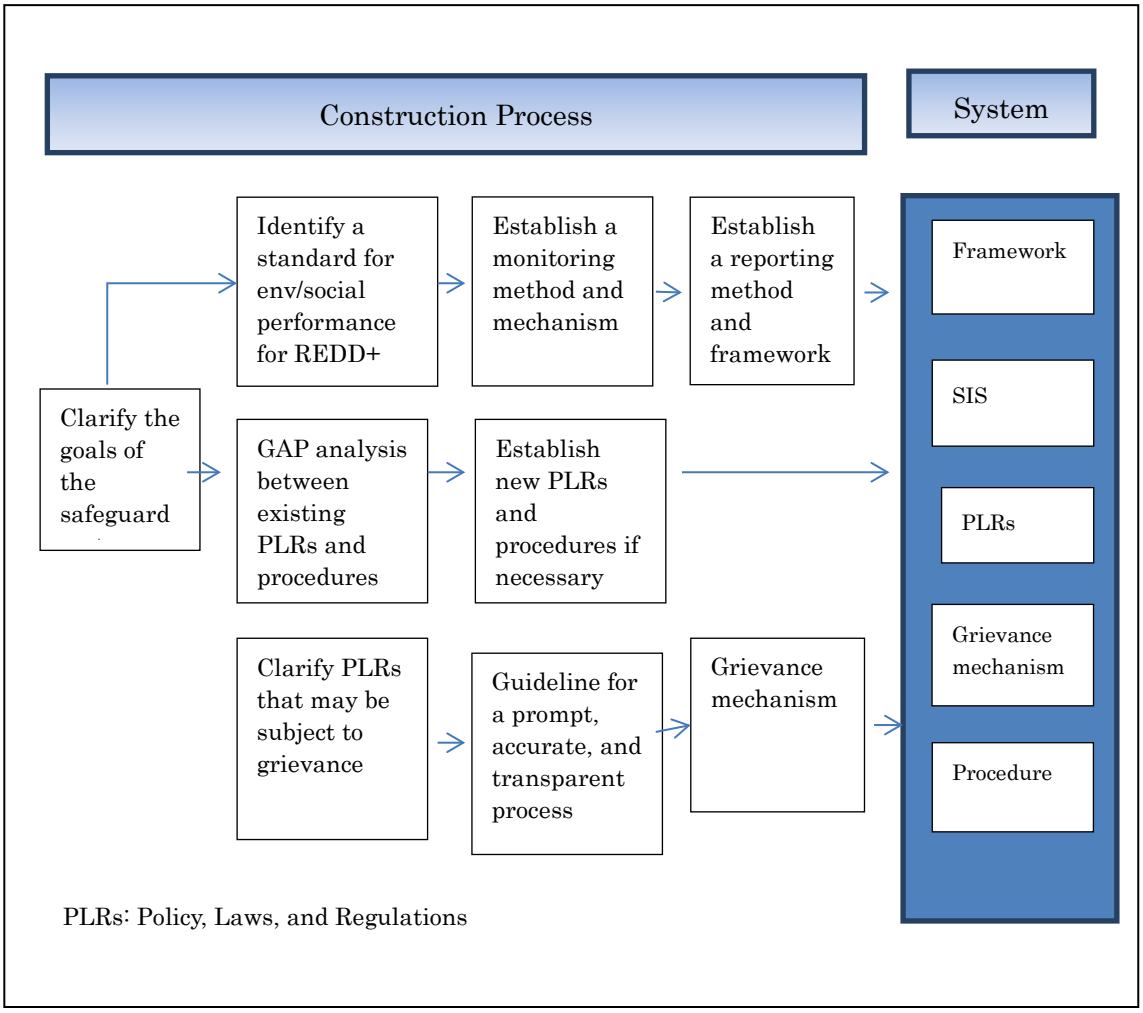

Figure Ⅱ-9 Steps to construct a national level safeguards system[22]

(3) Legal Systems and Issues Associated with Safeguards

The legal systems associated with safeguards include the "Forest Law (1992)," "Protection of Wildlife and Conservation of Natural Areas Law (1994)," "Land Acquisition Act (1894)," "Farmland Law (2012)," "Management of Vacant, Fallow and Virgin Land Law (2012)" and "Environmental Conservation Law (2012, mainly related to EIA)." The policies associated with safeguards include the "Forest Policy (1995)," "Community Forestry Instructions (version 1995 was revised in 2016)" and "National Land Use Policy (2016)." Although the legal systems associated with forest management, resource utilization, and land use are established, those associated with social considerations, particularly for consideration of the rights of indigenous peoples, are insufficient.

Issues associated with these legal systems include inconsistencies between the legal systems, inconsistencies with current conditions due to old existing laws, and insufficient enforcement of legal systems. These legal systems and policies also tend not to be designed down to the local resident level.

[22] Source: REDD+ Readiness Roadmap

Those related to land use are not disseminated, and indigenous peoples have their own rules on land use and natural resource management.

Specifically, multiple legal systems and policies related to land use rights formulated by different ministries and agencies are overlapping each other. This is an issue[23] affecting the implementation of REDD+. The Land Core Group, an entity composed of multiple ministries, agencies, and donors, is working to tackle this issue related to land use rights.

The "National Land Use Policy" was established in 2016 by the Land Core Group. USAID, the Swiss Agency for Development and Cooperation (SDC), and the European Commission supported the establishment of this policy. USAID has been supporting part of the activities for "Tenure and Global Climate Change[24]" since 2013. The USAID project will be continued up to 2018 and will support needs analysis for government personnel and activities for local communities in the pilot sites of Shan state and Bago. The activities include baseline analyses of the areas, including their land use systems, boundary surveys on forests and agricultural fields, and support on activity management through local consultation.

From now on, the activities related to REDD+ must be designed in consideration of the issues associated with the legal systems and policies on safeguards, as well as the conditions of the target areas themselves.

■ Issues related to the safeguards on the front line

The NGOs carrying out REDD+ related activities in Myanmar were interviewed to gain a fuller understanding of their activities. Some of the NGOs contacted are members of the Myanmar REDD+ taskforce. The results of the hearings are summarized below.

- NGOs interviewed
  - FREDA (Forest Resource Environment Development and Conservation Association: Local NGO for environmental programs)
  - BANCA (Biodiversity and Nature Conservation Association: Local NGO for environmental programs)
  - POINT (Promotion of Indigenous and Nature Together: Local NGO pursuing social objectives such as the protection of the rights of indigenous groups)
  - MIID (Myanmar Institute for Integrated Development: Local NGO for social and environmental programs)
  - SPECTRUM (Local NGO for social activities)
  - WWF (International NGO)

[23] Based on interviews with the person responsible for safeguards in the Forest Department and a USAID expert in September 2016.

[24] USAID website (https://www.land-links.org/project/tenure-and-global-climate-change-global/A)

- WCS (Wildlife Conservation Society: International NGO)

- Consideration of the rights of local communities
  - One of the factors impeding the REDD+ activities is the existence of 10 ethnic groups in Myanmar facing different priority issues. Consensus among them is difficult to reach. There are cases where REDD+ activities suitable for one ethnic group infringe the rights of another group.
  - Another issue impeding the implementation of the REDD+ program by the government is a lack of confidence in the government in local communities.
  - Programs related to ICCAs (indigenous community conserved areas) are being implemented under the direction of the central government. Some areas for biodiversity conservation overlap with ICCA areas, but there are no policies or laws to coordinate these two types of programs. The NGOs want more flexible programs, while the central government puts priority on the community forestry program.
  - While it is difficult to acquire customary land use rights, local communities wish to demand such rights. Since local communities wish to make and implement forest management plan by themselves, instructions from third parties such as the central government tend not to work. Local communities, meanwhile, lack sufficient technical capacity, and technical support requires the assistance of NGOs and other external bodies.
  - Sufficient time to build consensus with local communities must be expended, especially with indigenous people. Sufficient time should be spent to identify causes of deforestation and forest degradation and to plan countermeasures in close communication with local communities.
  - The relationships between local communities and governments vary from area to area. Meetings with Civil Society Organizations (CSOs) before the start of discussions with the governments on REDD+ programs are recommended, as the local communities generally have better knowledge of local issues than the governments.
  - Under the international trend for REDD+, the government is now studying how to involve local communities. In Myanmar, on the other hand, the land available for use by citizens is very limited. In order to promote the involvement of citizens in REDD+ activities in the future, it will be necessary to continue discussion between the governments and CSOs on the sustainable use of forests, forest resources, and associated rights.
  - Understand that an international standard for safeguards in REDD+ has been established, but that a lack of local experience will make it challenging to apply such a standard in Myanmar.

- Rights to use land and resources
  - Although a new national land use policy was established, its implementation has yet to be initiated.
  - The new regime pays close attention to multiple ethnic groups. And ethnic groups understand the importance of the sustainable use of natural resources. While community forest instruction is used in designing local activities, there are no other legal systems guaranteeing the use of natural resources by ethnic groups.
  - If a person uses land for cultivation, the Department of Agriculture approves the person's right to use the land and the person pays tax as a land user. Once the right to use the land is obtained, that land cannot be sold. The demarcation between the Forest Department and Department of Agriculture is unclear.
  - People live and use lands categorized as protected areas on government maps. Such people are unaware of the new government policies on land use and continue traditional use of lands.
  - If Forest Law is strictly obeyed, local communities may often lack a place to live. This poses a problem to forest protection. The government and local communities have a confrontational relationship. Logging, for example, is considered illegal by the government but is a vital resource for livelihood in some communities. The government's understanding of the situation of local communities is improving, but the level of mutual understanding is still too low. Local people are unaware of the laws and the government still lacks a full understanding of the situations of the local people.
  - As consensus is very important to reach for clarifying the rights to use land, a team consisting of multiple stakeholders such as the land-titling office, local CSO, Forest Department, and General Administration Department is formed for village consultation.
  - Under the Community Forestry Instruction, people can get approval from the Forestry Department to use land for 30 years. The rights of the people are thus protected.

- Issues associated with the implementation of REDD+ and environmental protection
  - The Forest Department issues concession licenses to forest plantation companies. Single species afforestation, however, is degrading the natural environment in some forest areas. In the case of teak plantation, understory vegetation often grows too poorly to prevent soil erosion. The effects on the environment may not become visible in short periods of time. In some instances, the effects of the single species afforestation now practiced could conceivably appear up to 30 years in the future. The government should take measures to protect existing natural forests and promote the natural regeneration of the forests.

- Environmental protection activities that disregard local communities cannot expect success. Measures such as agro-forestry to recover vegetation while improving the livelihood of local communities are important.
- Poor people in Myanmar often migrate, which makes it difficult to expect the continuity of any single activity. In one case, for example, the UNDP provided micro-finance but the debtors migrated to other regions without repaying the funds. Activities to change the thinking of such people should be planned out and commenced.

4.1.7 Analysis of Drivers

(1) Initial Analysis on Deforestation and Forest Degradation

An initial analysis on deforestation and forest degradation was implemented in the "existing Drivers and Strategy Development TWG" in the REDD+ readiness roadmap. The survey methods employed in the driver analysis include information-sharing in the working group, a literature review, and information collection through national and regional level consultation workshops.

Deforestation and forest degradation drivers are stratified by the Forest Department according to the forest types and the locations of the forests inside and outside of the management areas. The drivers with higher impacts inside the management areas include excessive legal and illegal logging for timber use, excessive fuel wood and charcoal extraction for energy, and unsustainable shifting cultivation linked to population growth. The drivers with higher impacts outside the management areas include agricultural land conversion and expansion linked to population growth and increased commercial crop production, mining, and hydropower development due to increased demand for electricity.

Table Ⅱ-13 Deforestation and forest degradation drivers inside management areas[25]

	Impact	Dry Forest	Coastal Forest	Tropical Evergreen Forest	Mixed Deciduous Forest	Hill and Temperate Evergreen Forest	Indaing Forest
Over-exploitation of forest timber (legal-illegal)	1			●	●		●
Over-harvesting of wood biomass for energy	2	●	●	●	●	●	●
Unstable or pioneering shifting cultivation (not permanent conversion of forest into agricultural land)	3	●		●	●	●	●

[25] Reference Myanmar REDD+ Readiness Roadmap (UN-REDD)

	Impact	Dry Forest	Coastal Forest	Tropical Evergreen Forest	Mixed Deciduous Forest	Hill and Temperate Evergreen Forest	Indaing Forest
Forest fires	4	●			●		●
Over-grazing	5	●					
Storms	6		●				
Pests	7				●		

Table Ⅱ-14 Deforestation and forest degradation drivers outside of management areas[26]

	Impact	Dry Forest	Coastal Forest	Tropical Evergreen Forest	Mixed Deciduous Forest	Hill and Temperate Evergreen Forest	Indaing Forest
Expansion of Agriculture (Subsistence and Commercial)	1	●	●	●	●		●
Mining	2	●	●	●	●	●	●
Hydro-power Development	3			●	●	●	
Infrastructure	4	●	●	●	●	●	●
Urbanization and resettlement	5	●	●				●
Development of aquaculture	6		●				

The deforestation and forest degradation driver analysis was implemented in the "Existing Drivers and Strategy Development TWG" under UN-REDD. The driver analysis for formulating national strategy was continuously implemented in 2016 and completed in February 2017[27]. The initial driver analysis listed in the roadmap will be updated based on the results of this study.

(2) Factors Underlying Deforestation and Forest Degradation

The factors underlying deforestation and forest degradation are also stratified in the roadmap based on their locations inside and outside of the management areas. The roadmap lists the following underlying factors.

- Deforestation and forest degradation drivers inside the management areas
- Lack of incentives for sustainable forest management
- Low capacity for organization

[26] Reference Myanmar REDD+ Readiness Roadmap (UN-REDD)

[27] Based on an interview with an FAO consultant held in February 2017

- Insufficient enforcement of legal systems and policies
- Insufficient distribution of funds and budgets for the related ministries and agencies, municipalities, and local communities
- Insufficient consultation in the establishment and adjustment of forest boundaries
- Insufficient involvement of local communities in land use planning

- Deforestation and forest degradation drivers outside the management areas

- Insufficient system for organizing forest jurisdiction (for unmanaged areas or forests converted to other land uses in non-forest specified area)
- Overlapping and conflicting mandates of different land management committees: 1. Central and sub-national Land Management Committees (based on the Farmland Law and headed by MoAI), 2. National Committee on Land Scrutinizing and Land Allocation (created by Presidential Decision and headed by MOECAF) and 3. Central Vacant, Fallow and Virgin Land Management Committee (based on the new VFVLM law and headed by MoAI)
- Weak enforcement of legal systems and policies
- Lack of impartiality and transparency on conflict resolution mechanisms and structures associated with traditional land use and the utilization of forest resources
- Poverty due to lack of alternative livelihoods
- Increasing demand for resources from the growing middle class
- Eco-system services and forest undervalued and/or not considered in policy and investment decisions

The planners of the REDD+ activities must design activities to tackle the drivers as well as the factors underlying deforestation and forest degradation.

4.2 Addressing REDD+ at the Regional Level

Although regional government and civil society organizations (CSOs) have attended consultation workshops on various REDD+ Readiness activities and opinions from citizens have been collected, an overall REDD+ implementation framework has not been established.

4.3 Other Donors and Private Organizations Addressing REDD+

4.3.1 The Forest Carbon Partnership Facility (FCPF)

Myanmar has yet to receive FCPF support, as the Readiness Plan Idea Note (R-PIN) could not be submitted by the deadline.

4.3.2 Joint Crediting Mechanism (JCM)

Myanmar and Japan signed a bilateral document on JCM on September 16, 2015, and the first Joint Committee (JC) was held on April 4, 2016. While a total of 19 projects have been implemented in

emission sources other than REDD+, including facility procurement, a feasibility study, and project funding for large-scale projects, no activity has been implemented for REDD+. Table Ⅱ-15 shows the sectors and expected GHG emission reductions from the selected facility procurement projects.

Table Ⅱ-15 Selected JCM projects[28]

Year	Sector	Implementing Body	Project title	Expected GHG emission reduction (tCO_2/yr)
2015	Waste handling and disposal	JFE Engineering Corporation	Introduction of Waste to an Energy Plant in Yangon City	2,358
2016	Energy efficiency	Kirin Holdings Company, Limited	Introduction of Energy-Saving Brewing Systems to a Beer Factory	2,841
2016	Energy efficiency	ACECOOK CO., LTD.	Introduction of a High-efficiency Once-through Boiler in an Instant Noodle Factory	674

4.3.3 Verified Carbon Standard (VCS)

Although there is no ongoing VCS registered project in Myanmar as of December 2016, the UN-REDD report (2016)[29] and interviews conducted in the field survey indicate that the Forest Department, Forest Research Institute (FRI), and Korean Forest Service (KFS) have planned a VSC project to be held in the south and north Zamari reserve forest and the Shwe Laung Kotukwe reserve forest in Bago state.

A capacity-building project for relevant stakeholders on the REDD+ readiness of Myanmar is being implemented from 2015 to 2018 to create a PDD for the registration of VCS. The following activities are to be implemented in the project period (2015-2018):

- Study on socio-economic and biodiversity conservation activities;
- Setting up activities contributing to the socio-economic development of local residents by following community needs;
- Capacity-building for local residents and stakeholders for the implementation of REDD+;

[28] Reference: The table was compiled using data from The Joint Crediting Mechanism website (gec.jp/jcm/index.html)

[29] UN-REDD+「EXISTING AND PLANNED ACTIVITIES COMPLETING REDD+ IN MYANMAR」(2016)

- Contribution to the development of REDD+ socio-environmental safeguards and benefit-sharing mechanisms;
- Preparation of PDD; and
- Implementation of project monitoring.

While 800,000 USD will be funded from KFS in order to implement these activities, the funds have not been disbursed as of 2016 according to the UN-REDD report. On the other hand, the interviews and field survey in Bago indicate that the activities are being implemented, as preparations for the socio-economic survey are underway.

4.3.4 Green Climate Fund (GCF)

Although no project has applied GCF as of December 2016, the interviews indicate that UNDP is currently preparing a GCF proposal for the sector of climate change mitigation and adaptation. Table Table Ⅱ-16 shows the findings from the interview with the UNDP representative.

Table Ⅱ-16 Findings from the interview with the UNDP representative (December 2016)

・ The GCF proposal being planned out by UNDP targets support for REDD+ implementation.
・ The GCF proposal will be compiled and submitted after the completion of National REDD+ Strategy (scheduled to be completed in March 2017) now being compiled by UN-REDD.
・ The GCF proposal is expected to be submitted from around August to October 2017.
・ The target areas are the priority areas nominated under the National REDD+ strategy.
・ Hired international consultants are collecting Information for forest, agriculture, and land use (the survey results will be prepared in January 2016).

In the further studies in Myanmar, it will be required to continuously collect information on the locations and scales of the project areas.

4.4 Project Level REDD+ Activities

4.4.1 The United Nations Development Programme (UNDP)

A community-based REDD+ Readiness project (Naga Youth Join Forces to Protect Forest[30]) was implemented in the north Naga region using funds from Norway. Furthermore, a climate change adaptation project targeting five cities of Mandalay in the central dry region will be commenced with a budget of 7.9 million USD of climate change adaptation funds from UNDP[31]. The main purpose will be to address the adaptation of farmers to climate change.

[30] UNDP website (http://www.mm.undp.org/content/myanmar/en/home/ourwork/environmentandenergy/successstories/Naga_Youth_Join_Forces_to_Protect_Forests.html)

[31] UNDP website (http://www.mm.undp.org/content/myanmar/en/home/presscenter/events/2015/february/Launch_Adaptation_Fund_Project.html)

4.4.2 Korean Forest Service (KFS)

A VCS (VM0007)/CCBS project is being formulated for 7,000 ha of the Bago Yoma region using funds from KFS. Terra Global (an American consulting company) is heading a study on the preparation of a Project Document (PD). According to an interview with the Forest Research Institute (FRI) of Myanmar, the handling of the credit is still unclear.

4.4.3 International Centre for Integrated Mountain Development (ICIMOD)

A project will be implemented from 2016 to 2019 as a part of REDD+ Himalaya Initiative funded by ICIMOD. Activities related to safeguards (carrying out FPIC and consideration of SESA), biodiversity, driver analysis, demonstration activities, and the capacity-building and training of personnel will be implemented in a target area in Shan province.

4.4.4 The United Nations Programme on Reducing Emissions from Deforestation and Forest Degradation (UN-REDD)

The three technical working groups (TWG) listed below were established to support National level REDD+ Readiness phase.

- Development of strategy and driver analysis
- MRV
- Stakeholder engagement and safeguards

In the National Forest Monitoring System (NFMS) and FRL/FREL, an action plan document was created and a trial implementation was carried out. UN-REDD has also supported 2015 land use/cover mapping.

5. Opportunities to Leverage Private Funds

The Thein Sein civilian administration was established in Myanmar in 2011 and economic reforms such as deregulation for foreign capital have been proceeding since. This policy was succeeded by the new administration led by State Counsellor Aung San Suu Kyi established in March 2016. The government has sought to attract foreign capital by reforming related laws.

The number of Japanese companies entering the Myanmar market has rapidly increased in recent years. A total of 330 companies had joined the Japan Chamber of Commerce and Industry of Myanmar as of November 30, 2016, representing a six-fold or greater increase from the 54 member companies at the end of 2011. Compared with neighboring countries such as Cambodia (177 companies, 2.1 times increased from 2011) and Laos (62 companies, 1.6 times increased from 2011), this increase in member companies is a remarkable testament to the high interest of Japanese companies in the Myanmar market.

On the other hand, there are several issues to note in terms of REDD+. The entry of foreign companies into the agriculture business, for example, is regulated.

The following sections summarize the legal system and approval and license systems associated with REDD+ related business, along with the current status of business operations by Japanese companies and expectations on future improvement in the investment environment.

5.1 Legal System Associated with REDD+ Related Business

Companies operating businesses in Myanmar are required to refer to the following laws and acts: "Myanmar Companies Act," "The Foreign Investment Law," and "The State-owned Economic Enterprises Law: SEE." Notifications are also frequently issued by various public administrations on the listing regulations for foreign companies. For example, Notification No. 26 (issued on March 21, 2016) from the Myanmar Investment Commission (MIC) lists up types of economic activities to be prohibited or regulated.

- Definition of a foreign company (Myanmar Companies Act)
  - Companies whose capital stocks are not wholly owned by Myanmar citizens are defined as foreign companies. If even one share of stock is foreign capital, various regulations are imposed on the company under the Foreign Investment Law.
- Regulations for foreign capital (The Foreign Investment Law, The State-owned Economic Enterprises Law: SEE)
  - A total of 25 economic activities are listed as activities permitted to be carried out only by Myanmar citizens. These include, among others, "conservation and management of natural forests," "traditional herbal cultivation and production," "agriculture or short/long-term cultivation that can be carried out by Myanmar citizens by small investments," and "livestock business permitted only for Myanmar citizens."
  - In principle, private companies are not permitted to enter 12 types of businesses, including "extraction, sales and export of teak timber," "plantation and forest management other than firewood and charcoal production for household uses," and "electric power generation."

5.2 Approval and License System Associated with REDD+

5.2.1 Approval and License Associated with Business Operation

Foreign companies wishing to commence business operations are required to engage in either of two types of approval and license processes according the scale of investment:

- Project by large-scale investment (in which the tenancy period of the project site needs to be more than one year)

- A company to engage in a project by a large-scale investment such as a manufacturing business that requires the construction of factories must submit an application to MIC.
- Obtaining approval and licenses takes six months to one year.
- Obtaining support from external experts (lawyers) incurs large costs.

- Project by small-scale investment
  - The company starting the project submits an application to the Directorate of Investment and Company Administration (DICA).
  - Obtaining approval and licenses takes several months.
  - An application only from the investing company is sufficient (support from external experts is not necessary).

Although the applications for the above processes are submitted to MIC or DICA, some projects also need approvals from related ministries or agencies based on Notification No. 26 issued by MIC. A project targeting CO_2 emission reduction, for example, needs approval from the Ministry of Natural Resources and Environmental Conservation.

5.2.2 Approval and License for Land Use Rights

By obtaining approval from MIC, companies engaged in projects may use or tenant lands for up to 50 years and request to extend a period of use or tenancy up to two times for another ten years.

(1) Current Status of Business Operations by Japanese Companies

As mentioned above, agricultural business by foreign companies is currently prohibited. While Japanese companies are permitted to purchase agricultural products from farmers, they cannot sell those products in Myanmar or export them to Japan. Therefore, agricultural business does not work out in practical terms.

There are cases, on the other hand, where a company can enter an agricultural business by offering consultancy to domestic companies (this type of business is defined not as agriculture, but as consultancy). Alternately, a Japanese trading firm can form an alliance with a domestic company without capital ties and operate a business virtually. In this case, however, there is a risk that the domestic company will unilaterally break the alliance and seize the business.

Furthermore, some Japanese companies entering Myanmar are implementing Corporate Social Responsibility (CSR) activities such as tree plantation. CSR activities offer opportunities to strengthen relationships with the Myanmar government and are expected to generate good impacts on business.

(2) Expectation of Future Improvement in the Investing Environment

The Myanmar government is currently considering deregulation of foreign capitals. Further, a new "Myanmar Investment Law" applied to both domestic and foreign companies was approved in October 2016. While the detailed rules associated with this law will be announced later, there is a possibility that the regulations imposed on foreign companies will be cancelled if the investment from foreign capitals is less than 35% and that the processes associated with long-term tenancy of land will be simplified (while long-term tenancy currently requires approval and licenses from MIC, an application to DICA will suffice in the future).

In addition, the new administration takes a positive stance toward environmental business. Although various regulations still exist, a favorable climate for environmental business is starting to form. From now it may be possible to expand REDD+ related business opportunities if deregulation associated with agricultural business proceeds.

6. Candidate Sites for Formulating the REDD+ Project and the need for activities

6.1 Project site selection

The following criteria were set in order to select candidate sites for the REDD+ project by introducing related funds.

- The site covers relatively wide area (district level)
- Foreigners are permitted to visit the site
- The site is free of problems with land use rights
- The drivers of deforestation and forest degradation of the site are obvious, and feasible measures to avoid the drivers are available.;

After considering these criteria, the Forest Department of Myanmar proposed six candidate sites:

- Bago-Yoma Reserve Forest (each region of West Bago, Ayeyarwady, and East Bago)
- Kyaukphyu district, Wunbike Forest Reserve (Rakhine state)
- Rakhine Range Elephant Sanctuary (Rakhine state)
- Alaungdaw Kathapa National Park (Sagaing region)
- Danu tribe area (Danu self-administered zone) near Kalaw (Shan state)
- Mindon, Magwe Region (Magway region)

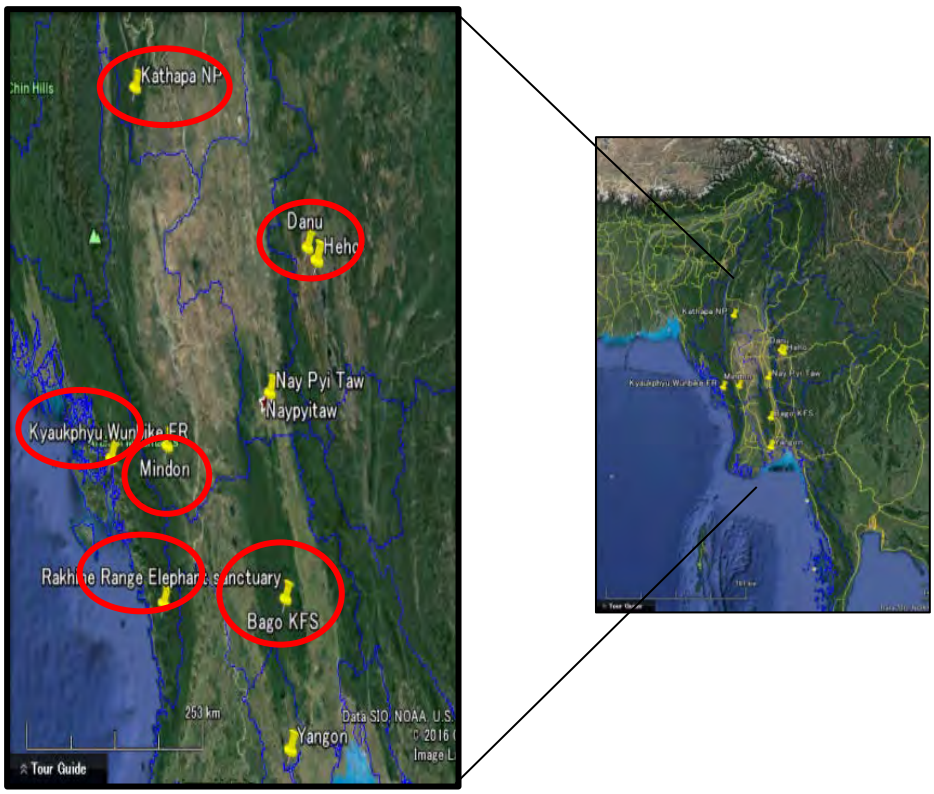

Figure Ⅱ-10　Location map of the potential REDD+ project formulation sites

The sizes of the project areas were not indicated by the Forest Department. Also, boundary information was only available for the site in Alaungdaw Kathapa National Park. The project areas for REDD＋ projects are generally considered to be districts. The districts related to the six project sites are listed in Table Ⅱ-16.

Table Ⅱ-17　The districts related to the six project sites

Candidate site	District	Region/State
1.　Danu Tribe area	Taunggyi	Shan
2. Rakhine Range Elephant Sanctuary	Thandwe	Rakhine
3. Wunbike Forest Reserve	Kyaukpyu	Rakhine
4. Bago Yoma Forest Reserve	Bago	Bago East
	Hinthada	Ayeyarwady
	Thayawaddy	Bago West
5. Alaungdaw Kathapa National Park	Monywa	Sagaing
	Yinmabin	Sagaing
	Kale	Sagaing
6. Mindon	Thayet	Magway

The emission volumes of the six sites should be calculated using the 2005 and 2010 maps prepared by the Forest Department. These maps, however, have yet to be published. Therefore, data from “Forest

Cover Change (2000-2005) of Global Land Cover Facility (GLCF)" from the University of Maryland was used to calculate the magnitude of land use/cover changes. The results are summarized in Table Ⅱ -18.

Table Ⅱ-18 Forest cover change 2000-2005 based on GLCF FCC data

Site name	Land use/cover class / District	Water	Forest→ Forest	Forest→ Non Forest	Non forest → F	Non forest→ Non forest	Change
Danu Tribe Area	Taunggyi	34,730	800,379	15,856	7,471	1,557,678	-93,171
Rakhine Range Elephant Sanctuary	Thandwe	13,079	938,768	4,065	2,068	101,260	-22,189
Wunbike Forest Reserve	Kyaukpyu	37,564	705,912	2,448	3,205	167,621	+8,411
Bago Yoma Forest Reserve	Bago	59,346	555,469	10,285	2,662	700,399	-84,699
	Hinthada	27,985	132,179	3,569	278	538,603	-36,561
	Thayarwady	23,957	144,760	4,547	224	555,023	-48,028
Alaungdaw Kathapa National Park	Monywa	5,990	6	23	6	342,970	-194
	Yinmabin	7,375	152,108	181	3	500,943	-178
	Kale	12,049	521,621	2,486	121	330,491	-26,273
Mindon	Thayet	15,201	193,085	1,140	295	994,336	-845

Unit: hectare

Emission and removal of forest carbon were calculated from the change in forest area listed in Table Ⅱ -18. Since the forest definition of GLCF FCC differs from that of the Myanmar government, the calculated emission and removal listed in Table Ⅱ -19 are provided for reference only. Emission and removal were calculated for each district, as the district will be considered the minimum size of a project area if the REDD+ projects are implemented.

The AGB value for a unit area (hectare) was 180 tonnes/ha, the value listed for Tropical moist deciduous forest Asia (continental) in Table 4-7 Aboveground Biomass in Forests in the IPCC Guidelines 2006. This corresponds to approximately 310 tonnes/ha in CO2. BGB was assessed as 20% of AGB, and the total of AGB and BGB combined is 372 tonnes/ha.

Table Ⅱ-19 Average emission/removal of the six areas between 2000-2005

Site	District	Forest area change (ha)	Average emission/removal 2000—2005 (CO2 ton/year)
Danu Tribe Area	Taunggyi	-93,171	Emission 6,931,922
Rakhine Range Elephant Sanctuary	Thandwe	-22,189	Emission 1,650,861
Wunbike Forest Reserve	Kyaukpyu	+8,411	Removal 625,778
Bago Yoma Forest Reserve	Bago	-84,699	Emission 6,301,605
	Hinthada	-36,561	Emission 2,720,138
	Thayarwady	-48,028	Emission 3,573,283
Alaungdaw Kathapa National Park	Monywa	-194	Emission 14,433
	Yinmabin	-178	Emission 13,243
	Kale	-26,273	Emission 1,954,711
Mindon	Thayet	-845	Emission 62,868

Table Ⅱ-19 shows that emissions are especially large from the Taunggyi and Bago districts. Among the six candidate sites, two sites in Rakhine State, namely, Wunbike Forest Reserve and Rakhine Range Elephant Sanctuary, were excluded from further assessment because of unstable security situations.

The remaining four sites were visited during the second field survey conducted in November 2016. After the field survey, the Mindon site was also excluded because its deforestation and forest degradation were determined to be relatively small compared to the other sites.
The three sites listed below remained under consideration as of the end of December 2016.

- Bago Yoma Reserved Forest site
- Alaungdaw Kathapa National Park site
- Danu Tribe Area site

The following sections outline the profiles of these sites.

6.2 Selected site ①＜Bago Yoma Reserved Forest＞

- Area between Nay Pyi Taw in the north and Pegu to the south. (Please see Figure Ⅱ-11)
- 660 km^2 of forest is currently applied for VCS supported by the Korea Forest Service (KFS) to acquire carbon credit.
- An additional 2,695 km^2 of reserve forest is available.

- Mixed with planted and natural forests.
- Relatively close to Yangon, approximately three hours travel by road; has the potential for development as a recreation area.
- Support for a new forest establishment through forest concessions may be available.
- Separation of the area from VCS is an issue.

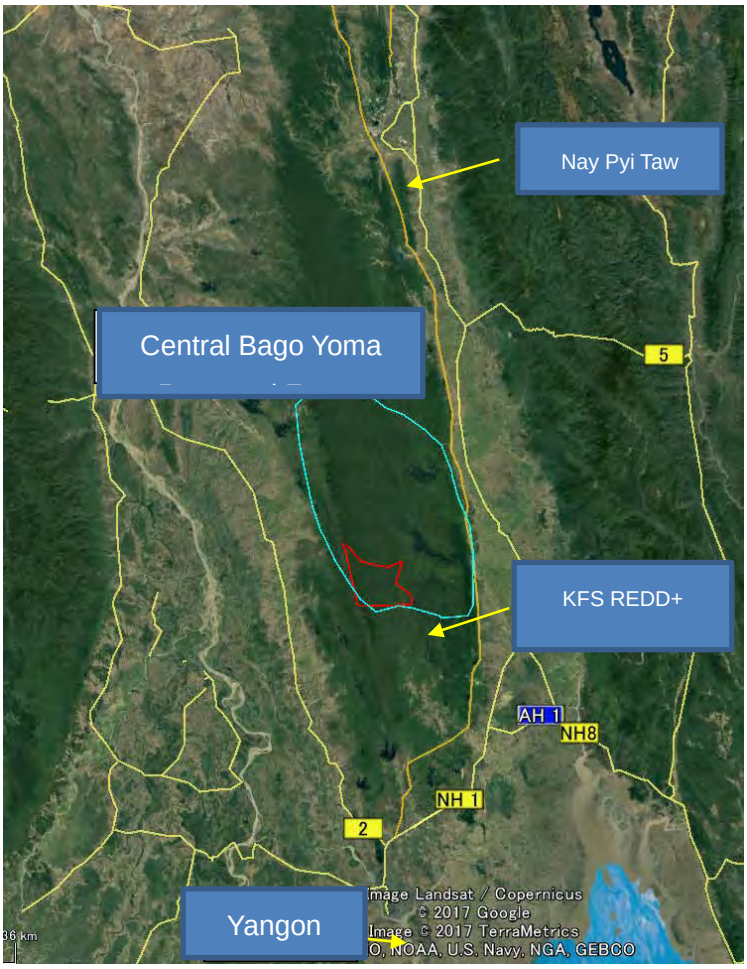

Figure Ⅱ-11 Bago Yoma Reserved Forest and land cover
(Background: GoogleEarth image)

Photo Ⅱ-1 Plantation project site by ITTO and tourist facility

Charcoal transported out from

Bamboo transported out from Reserved Forest and processed in nearby town for export.

Photo Ⅱ-2　Bago Yoma Reserved Forest

6.3 Selected Site ②＜Alaungdaw Kathapa National Park>

- The largest national park in Myanmar, covering an area of 140,278 ha and overlapping two districts and two townships.
- Approximately 10,000 pilgrims visit a famous monastery located inside of the national park, from December (after the end of the rainy season) to April. Park management becomes difficult in the rainy season because the access roads to the park deteriorate and cow carriages and elephants become the primary means of transportation.
- Deforestation inside the park is not obvious, but illegal logging for highly valued timber resources such as rosewood continues. Park staff, forest police, etc. organize patrol teams, but the teams are outnumbered by the illegal loggers and unable to effectively crack down. Deforestation and forest degradation is more obvious in the areas surrounding the park than in the inside of the park.
- WCS, a non-government organization, supports the establishment of a committee for forest preservation of the area including the park, and micro capital grants could potentially be received from the ASEAN Center for Biodiversity, an organization with a secretariat office in the Philippines.
- WCS has not planned the implementation of REDD+ activity in the national park area.

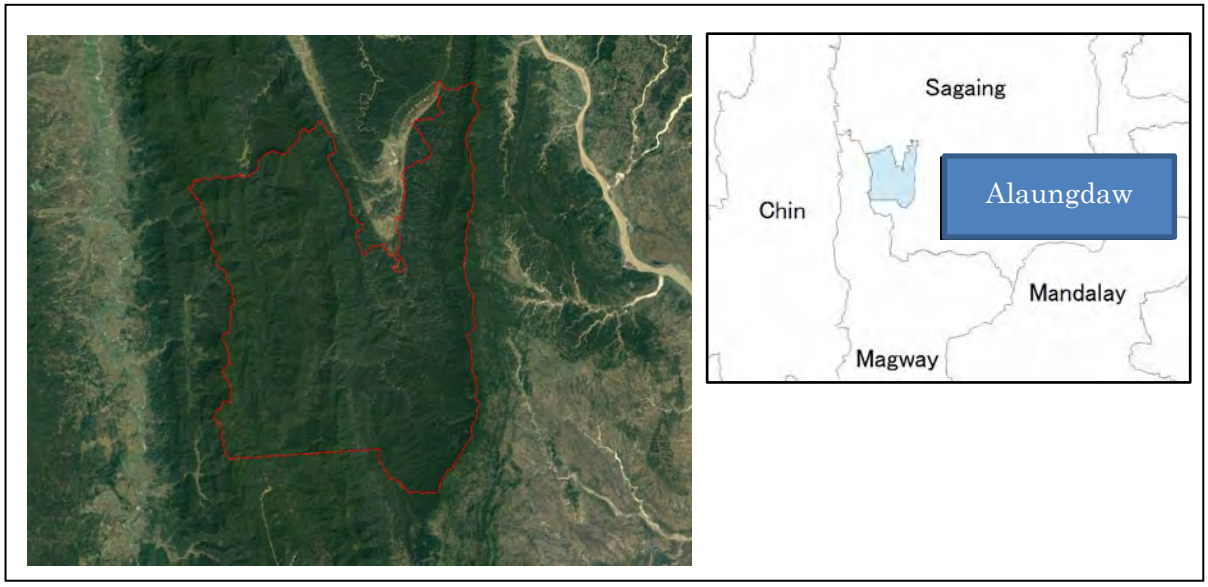

Figure Ⅱ-12　Alaungdaw Kathapa National Park
(Background: GoogleEarth image)

Photo Ⅱ-3　Pile on national park boundary; vegetation condition

Photo Ⅱ-4　Information collection from park rangers and the local community

6.4 Selected Site ③＜Danu Tribe Area＞

- The Danu tribe is one of 33 tribes living in Shan state. Many Danu people live in Pindaya, a relatively large town.
- Several community forests have been established in the neighboring villages for the purpose of water resource preservation.
- Natural forest remains.
- An agricultural area from the past. Crops such as vegetables and tea are produced.
- Small-scale dams were established on rivers with sufficient volumes of water available; water is distributed to the surrounding villages.
- A deforestation trend can be observed at the Taunggyi district level. The Forest Department does not actively manage the forest areas located in the north and south of the district, as an anti-government group is still active.

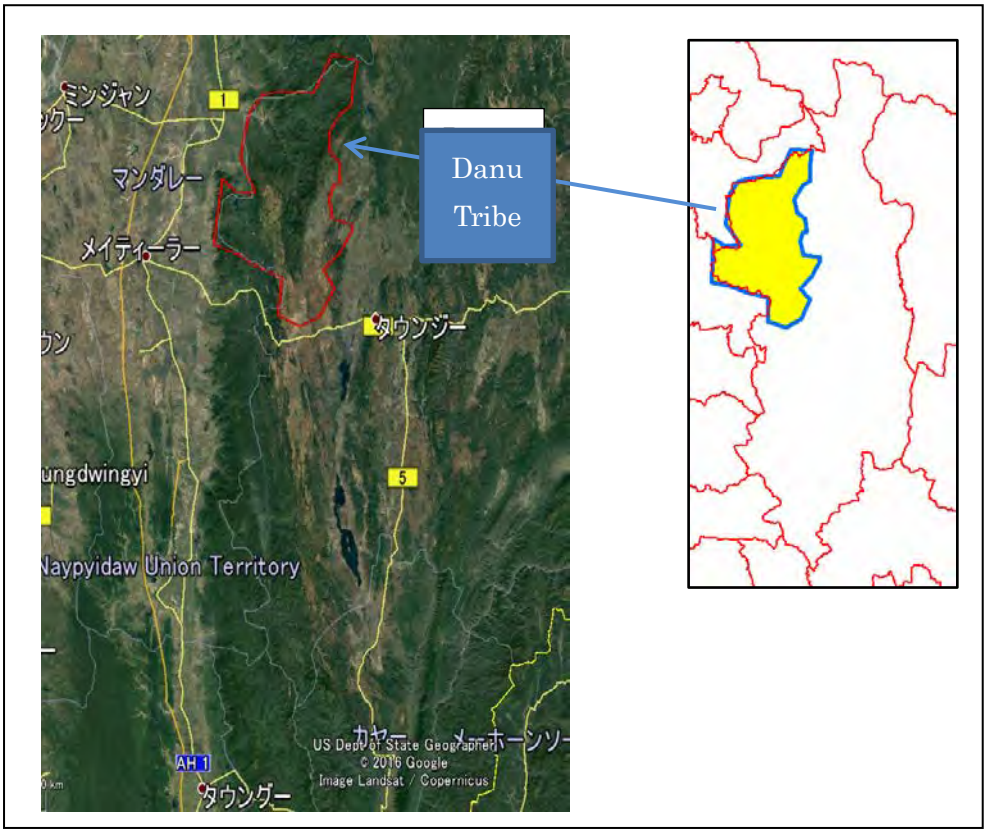

Figure Ⅱ-13 Danu Tribe area (Background: GoogleEarth image)[32]

[32] Source: https://en.wikipedia.org/wiki/Danu_Self-Administered_Zone

Photo Ⅱ-5 Community forestry area surrounding Yagi. The community uses water from reservoirs and springs.


Photo Ⅱ-6 Firewood piled up in a farmer's house; works for producing tea products in town


Photo Ⅱ-7 Survey of agricultural products in a market in Kalaw

After visiting Taunggyi District, the major land use of the district was found to be cultivated land. It seemed that no significant deforestation was occurring. The land use/cover of the district was therefore checked on 2005 and 2016 LANDSAT images at 5 km intervals. GoogleEarth images were used in lieu of field survey data, as no survey could be conducted.

Among 966 points covering the entire Taunggyi district, satellite images from both 2005 and 2016 were available for 861 points. Decreases in forest area were observed at 40 of those 861 points, as indicated in Figure Ⅱ-14.

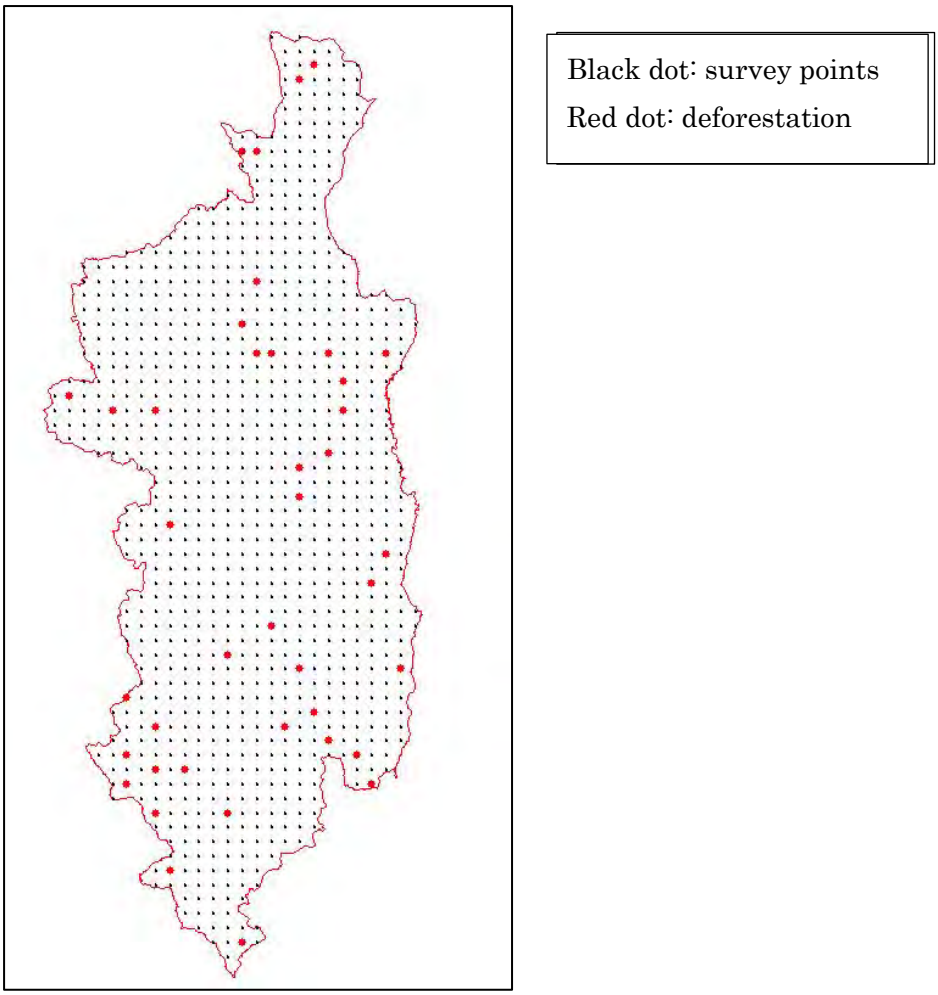

Figure Ⅱ-14　Deforestation points in Taunggyi district between 2005 and 2016

7. Detailed Studies at the Candidate Sites for the REDD+ Project (Taunggy District)

Detailed studies were conducted to explore project formation potential and project possibilities in the two candidate locations discussed in Section 6 of Chapter Ⅱ, "Identification and project needs of candidate locations for new REDD+ projects." These two candidate locations were Taunggyi in Shan State and the vicinity of the Bago Mountains.

Studies have already been performed the Bago Yoma area by Hiroshima University, Kyoto University, and Waseda University via Grants-in-Aid for Scientific Research. As such, a certain amount of data useful for considering the launch of new projects there have accrued. For this reason, the new study conducted in the area assumed a new project based on a specific, concrete foundation such as JCM or VCS.

For Shan State, rather large-scale projects were considered and assumed to have external funding, such as GCF. Basic information about the local areas is lacking in the same regions, both

environmentally and socially. For this reason, the studies conducted focused on set fields in order to specify concrete REDD+ activities or locations, such as forest conservation, socioeconomic/livelihood improvement, agriculture, and community forestry. Study results for each field are shown below.

7.1 Overview of Shan-State

7.1.1 Overview of Shan State

Socioeconomic data were extracted from statistics published by the Central Statistical Organization to attain an overview of Shan State. A summary of the data follows below. Data on states other than Shan State are also provided to add comparative perspective. Although the data below are from sources published in FY 2016, note that the most recent data are compiled in 2012 (the data have not been updated in recent years).

Table Ⅱ-20 Good Water Resources[33]

State and Region	Piped Water, Artesian Well, Covered Well		
	2001	2006	2012
UNION	**51.26**	**61.66**	**65.18**
Kachin State	45.77	56.64	65.70
Kayah State	28.23	43.80	46.41
Kayin State	23.31	42.29	40.07
Chin State	92.89	45.00	59.10
Sagaing Region	56.99	60.73	74.93
Tanintharyi Region	67.97	54.02	59.95
Bago Region (East)	81.30	67.90	65.47
Bago Region (West)	55.70	55.29	
Magway Region	60.20	70.02	66.58
Mandalay Region	59.22	68.24	87.26
Mon State	23.55	36.80	63.02
Rakhine State	22.98	43.68	40.20
Yangon Region	83.28	84.63	76.26
Shan State (South)	**44.61**	**73.67**	
Shan State (North)	**23.18**	**45.88**	**50.88**
Shan State (East)	**64.27**	**70.28**	
Ayeyarwady Region	20.28	48.99	53.72
Nay Pyi Taw	-	-	77.96

[33] Source:Central Statistics Office (2016) Myanmar Statistical Yearbook

Table Ⅱ-21 Electricity Resources[34]

State and Region	Electricity			Battery			Other		
	2001	2006	2012	2001	2006	2012	2001	2006	2012
UNION	**40.41**	**43.38**	**57.50**	**20.66**	**12.20**	**7.22**	**38.93**	**44.42**	**35.28**
Kachin State	23.58	25.70	44.92	13.03	2.74	0.43	63.39	71.55	54.65
Kayah State	68.18	78.04	90.54	0.07	0.09	0.18	31.75	21.87	9.28
Kayin State	47.95	59.41	77.11	6.30	0.06	-	45.75	40.53	22.89
Chin State	48.55	67.86	52.25	2.84	0.24	0.01	48.61	31.90	47.74
Sagaing Region	62.81	35.14	55.66	16.51	19.95	7.02	20.68	44.91	37.32
Tanintharyi Region	40.89	39.76	79.62	3.09	0.27	-	56.02	59.97	20.38
Bago Region (East)	37.80	47.99	54.96	24.76	22.56	12.97	37.44	29.45	32.06
Bago Region (West)	39.02	48.06		26.29	15.41		34.69	36.53	
Magway Region	41.37	54.85	40.82	24.57	16.04	8.33	34.06	29.11	50.85
Mandalay Region	34.22	29.94	65.17	40.29	18.22	4.24	25.49	51.85	30.59
Mon State	39.93	43.98	64.00	6.34	9.55	0.56	53.73	46.46	35.44
Rakhine State	41.38	10.15	37.64	0.76	1.23	0.10	57.85	88.62	62.26
Yangon Region	63.00	74.62	89.43	11.48	5.52	2.13	25.52	19.85	8.44
Shan State (South)	**41.20**	**61.00**		**1.88**	**2.32**		**56.92**	**36.67**	
Shan State (North)	**33.19**	**35.88**	**73.95**	**6.72**	**2.21**	**1.04**	**60.09**	**61.91**	**25.01**
Shan State (East)	**37.22**	**40.15**		**11.98**	**3.24**		**50.80**	**56.62**	
Ayeyarwady Region	11.77	29.53	24.31	39.15	16.11	25.31	49.09	54.36	50.39
Nay Pyi Taw	-	-	54.93	-	-	2.74	-	-	42.33

[34] Source) Central Statistics Office (2016) Myanmar Statistical Yearbook

表IV-22　Major Source of Energy（%）[35]

State/ Region	Firewood			Charcoal			Electricity			Other		
		2006	2012	2001	2006	2012	2001	2006	2012	2001	2006	2012
UNION	**70.84**	**69.94**	**63.81**	**23.29**	**26.90**	**22.43**	**1.49**	**1.66**	**13.21**	**4.38**	**1.50**	**0.54**
Kachin State	90.58	82.12	75.19	7.70	16.77	22.07	0.06	0.06	2.63	1.65	1.05	0.12
Kayah State	90.55	79.60	72.40	6.77	13.34	12.14	2.29	6.89	15.46	0.39	0.17	-
Kayin State	48.57	76.05	38.10	48.34	23.70	39.70	2.96	0.23	21.93	0.13	0.02	0.28
Chin State	99.47	97.63	94.23	0.53	2.22	5.67	0.00	0.14	0.09	0.00	-	-
Sagaing Region	80.38	81.96	82.79	16.82	16.19	11.63	0.71	0.17	4.77	2.09	1.67	0.81
Tanintharyi Region	47.83	43.71	49.09	51.15	55.84	50.39	0.18	0.24	0.47	0.85	0.21	-
Bago Region (East)	66.33	74.98	68.01.0	21.94	22.94	24.12	0.67	0.37	7.50	11.06	1.71	0.37
Bago Region (West)	68.58	74.05		26.50	21.22		0.38	0.03		4.53	4.71	
Magway Region	85.63	80.56	82.12.0	10.81	16.25	6.13	1.76	0.36	11.56	1.80	2.82	0.19
Mandalay Region	52.27	57.54	48.89.0	43.42	40.79	41.06	0.88	0.40	9.84	3.42	1.28	0.21
Mon State	76.61	82.78	64.83.0	19.84	15.31	25.83	2.38	1.84	8.43	1.16	0.08	0.90
Rakhine State	86.69	89.59	83.67.0	13.05	10.26	16.15	0.00	-	0.12	0.26	0.15	-
Yangon Region	35.66	34.72	17.92.0	52.16	54.58	28.97	7.48	8.77	51.79	4.71	1.93	1.32
Shan State (South)	**75.99**	**55.02**		**22.59**	**41.89**		**1.28**	**3.09**		**0.13**	**-**	
Shan State (North)	**72.30**	**68.93**	**68.14.0**	**27.26**	**30.60**	**19.28**	**0.26**	**0.31**	**12.26**	**0.17**	**0.17**	**0.32**
Shan State (East)	**87.52**	**86.50**		**6.56**	**12.60**		**2.38**	**0.09**		**3.55**	**0.81**	
Ayeyarwady Region	80.20	89.32	81.53.0	7.79	9.17	12.98	0.15	0.12	4.62	11.86.0	1.38	1.05
Nay Pyi Taw	-	-	44.12.0	-	-	29.95	-	-	25.56	-	-	0.36

[35] Source)「Myanmar Statistical Yearbook」(2016)

7.1.2 Overview of Nyaung Shwe District

The population of the NS district was checked at the immigration office. Past information on the demographics was recorded in a paper document. Only the records from 2016 and 2005 were available during this investigation.

Table Ⅱ-23 Population of Nyaung Shwe District[36]

Item	2005	2016	Average population increase per year
Population	163,210	175,320	About 1,100 people
Family	31,862	34,544	About 244 families
Average home population	5.1 people	5.1 people	—

7.1.3 Field Survey (Status of Community Forestry in Southern Shan State)

(1) Contents of field survey

Questioner survey was conducted over Nyaung Shwe town ship and Inle Lake area in order to understand general situation of these area. Consultation with FD officials, Communities related with forest resources and land uses are selected as target area. Community forestry (herein after CF) framework is applicable under REDD+ activity implementation and CF user group shall be major target of investigation.

Most of field survey is conducted over Nyaung Shwe area. Not only CF area but also communities which have been engaging forest conservation are investigated by field observation and interviewing to relevant authorities, local people.

Table Ⅱ-24 Investigation distance

Visited Sites	Investigation division *				Research zone around Inle Lake
	Forest	Non-forest	CF	Non-CF	
(1)		○	○		The northwest upstream area
(2)	○				The northwest midstream area
(3)		○	○		The northwest upstream area
(4)	○		○		West mid- to downstream area.
(5)	○		○		The southwest midstream area
(6)	○			○	The west midstream area

[36] Material) Investigation committee, obtained from the immigration office

Visited Sites	Investigation division *				Research zone around Inle Lake
	Forest	Non-forest	CF	Non-CF	
(7)	○		○		The west downstream area
(8)	○		○		The east up- to midstream area
(9)	○			○	The east upstream area

See Figure Ⅱ-15 for details on the Investigation division.

- Investigation division

Forest: Forest in jurisdiction by Forest Division (FD)

Non-forest: Forest outside the jurisdiction of the FD

CF: Registered as CFUG.

Non-CF: Unregistered as CFUG.

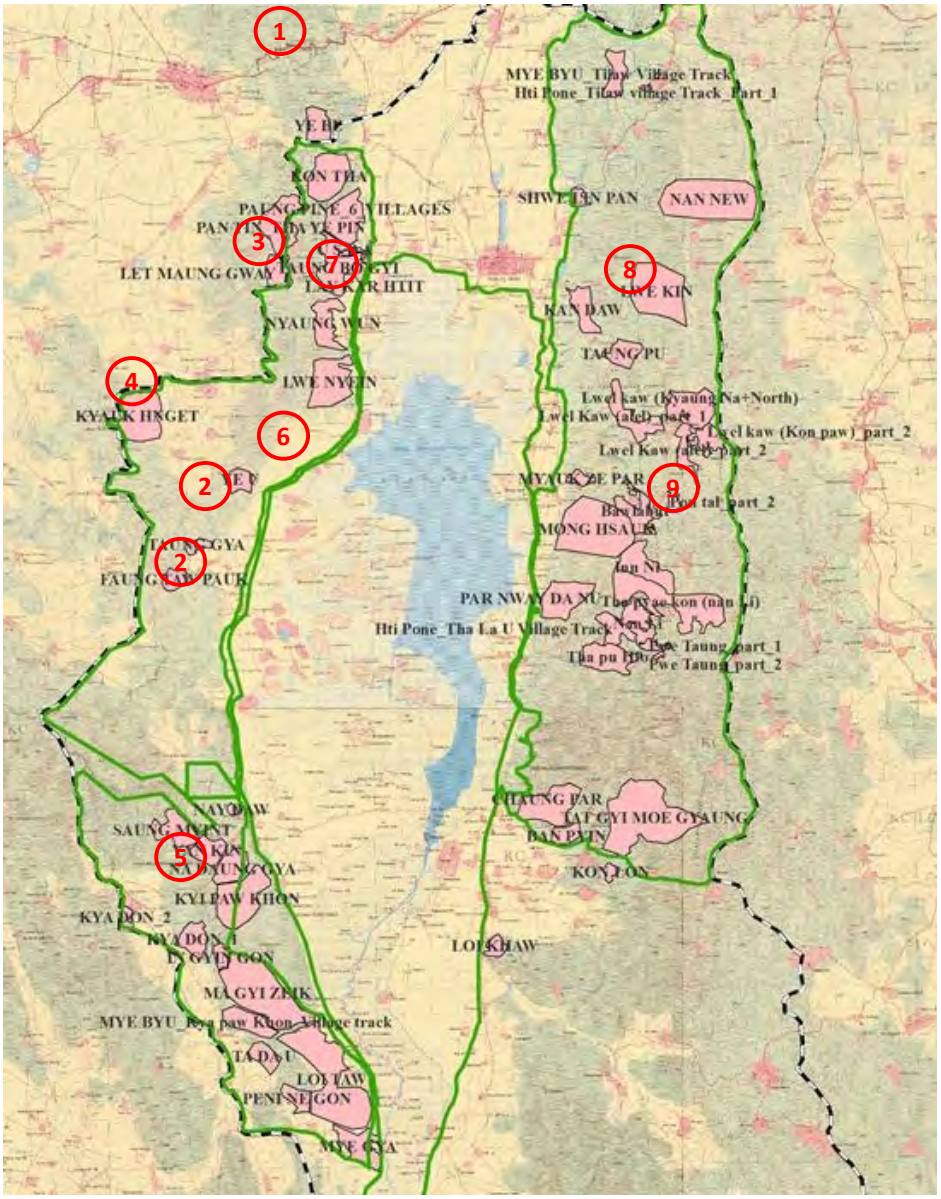

Figure Ⅱ-15 Location of the research zone

(2) Results of field study

- Only 2 out of 12 communities were founded by immigration; the other 10 communities have existed for more than 100 years.
- A community is basically formed by members of a single ethnic group (some members from a different ethnic group occasionally join the community by way of marriage). While the population (10-30% increase in a decade) is increasing due to a growing number of families through marriage and childbirth, no report has been made on large-scale immigration of the type seen in Bago.
- When a community has an agricultural income, this is earned by the cultivation of single crop that vulnerable to the effects of market trends and the climate. Environmental factors

and limited knowledge prevent the communities from seeking opportunities to cultivate various crops. Most of the past efforts to cultivate various crops have ended in failure.

- Compared with the downstream communities, mid- to upper stream communities have limited ways of earning their living as a whole, which deprives them of earnings or makes it difficult for them to gain livelihood when the trends in the market or climate turn unfavorable.
- Family annual income ranges from 0 to one million kyat.
- None of the 12 communities engage in shifting cultivation with burn agriculture, though some burn their farms when mowing.
- The rights of use of the farmland and the residential area are handed down from generation to generation in most cases. Those rights, however, are not registered. There are no reports of disputes over the land-use or resource use rights in any of the communities.

Photo Ⅱ-8 Food processing, domestic industry of non-CF

Photo Ⅱ-9 The fuel wood used for household industry is bought from another region (about 110 dollars for a boatful of fuel wood).

In terms of land usage, forests had already been converted into agricultural land in many regions. Among the 12 communities, none employ shifting cultivation with slash-and-burn techniques. There were cases, however, in which fires were set to clear out undergrowth.

In most cases the land-use rights for agricultural and residential land were inherited from ancestors, although these transfers were unregistered. Land-use boundaries were recognized among residents, and there were no disputes observed within any of the communities regarding land-use rights or resource-use rights. Moreover, the areas studied were without traditional village rules or any equivalents unique to the local ethnic groups. In most of the villages, problems between residents were resolved through the mediation of the village mayor/chief or anyone serving the same kind of role. A socioeconomic overview of each village is provided in the table below

Table Ⅱ-25 A socioeconomic overview of each village

Village The numbers in parentheses correspond to the numbers on the map	Survey category*				Village overview	Socioeconomic circumstances Primary means of livelihood	Presence of social infrastructure
	Forest	Non-forest	CF	Non-CF			
(1) NW upper basin		○	○		Taungyo 200 households; population of approx. 1,000 people; Increase of 60 households in 10 years; The village itself was established over 100 years ago.	Method of earning income (percentage of all households): 75% agriculture, 25% migrant work	Electricity available only via simple solar power generation.
(2) Western middle basin; Yeu village	○		○		Intha people 150 households; population of approx. 630 people; Increase of 60 households in 20 years	Method of earning income: 10% agriculture, 10% migrant work Annual income of 0 to 500,000 kyat per household	80% of households have electricity installed; 20% have simple solar power (households that cannot afford to pay initial setup costs have no electricity installed).
(3) NW upper basin; Let Maung Gway village		○	○		Taungyo 54 households; population of approx. 248 people	Method of earning income: 100% agriculture (Annual income of 100,000 to 500,000 kyat); primary source of income for most households is ginger cultivation. This village also produced firewood and wood-based fuel until around 2012, but this became unsustainable due to a lack of forests, resulting in a reduction of the available sources of income.	Electricity is available to some residents using simple solar power generators that residents installed themselves. Heat is provided using firewood. Residents receive external financial support from a USAID project. The funds are used to improve land usage and make bamboo handicrafts.
(6) Western middle basin Kaung Dine	○			○	(Village level) Intha people 25 households; population of approx. 100 people;	Source of income: 80% agriculture, 100% selling firewood and wood-based fuel. Market prices for produce and firewood have dropped off, but there are no replacement means	・No electricity installed. The government installed solar power generators in 2012. The heat source is firewood. ・Water is fetched from 2 miles away

Village The numbers in parentheses correspond to the numbers on the map	Survey category*				Village overview	Socioeconomic circumstances Primary means of livelihood	Presence of social infrastructure
	Forest	Non-forest	CF	Non-CF			
village					Population growth rate: 30 people in 10 years; The village itself was established over 100 years ago.	of livelihood available and the village continues single-species cultivation. As a result, no income was earned for 2015 or 2016. There has been a drop in market demand for firewood and wood-based fuels in recent years, leading to a drop in prices.	(approx. 3.2 km). ・This community receives no financial support from the government because another community in the same village is relatively affluent.
(9) Eastern upper/mid basin	○			○	Pa'O people 54 households; population of approx. 266 people; Increase of 20 households in 10 years; The village itself was established over 100 years ago.	Source of income: 100% agriculture, 10% migrant work	The heat source is firewood.

(3) Summary of socioeconomic circumstances

Means of livelihood are divided into two broad categories between residents of the lower basin around Inle Lake and residents of the middle and upper basin areas who utilize those areas' sloping terrain. Those in the upper-basin communities who earn farming income mostly produce a single crop and are very likely[37] to be extremely fragile in the face of changes in the market or weather. Meanwhile, the means of livelihood for the residents of the lower basin span a wide range. Some of the communities rely on hydroponics, for example, or the sale of processed produce or sightseeing. Electricity is widespread in the lower-basin villages. Although they use electricity as their source of heat for cooking, they purchase the fuel they use for food processing from other regions (from the southern Inle Lake area at the time of this survey). This suggests that they may have an impact on forest resources in other regions (leakage).

Turning to the impact of deforestation on livelihoods in the affected regions, the communities in the middle and upper basin areas were more likely than the lower-basin communities to rely on agriculture alone across the entire community. In many cases, impacts from the market or weather prevented such communities from earning any income. Per-household income in the middle and upper basin areas ranged from 0 to 1,000,000 kyat per year, with the Taungyo and Pa'O communities seeming to display more limited means of livelihood than the Intha communities around the lake. Although electrical infrastructure is in place in the lower-basin area, access to electricity and water is limited in the upper-basin area. The availability of electricity in the lower-basin area can be explained by the tendency of the residents to solicit and collect funds within their villages to install the electrical infrastructure themselves. Households that earn too little income to afford the initial setup costs instead get their electricity from simple solar power generators, even in villages with electrical infrastructure in place.

For residents of the middle and upper basin areas, that attainment of stable and diversified means of livelihood is likely to be important to their success in improving land usage and furthering natural resource management in the future.

7.2 Forest Conservation (Erosion Control)

In consideration of the REDD+ project under the Taunggy district, Inle Lake located in the central of Taunggy will play an important role. In terms of integrated watershed management,

forest management under the upper stream of the sub-catchment could influence Inle Lake environment directly. Another factor is the increasing number of tourists, which is driving local economic development. These factors may influence the forest condition, and *vice versa*. In other words, Inle Lake conservation and forest management are inseparable works.

Based-on this, sedimentation control through forest management and civil engineering shall be deployed as a measure under the REDD+ project.

7.2.1 Objectives of the Field Study

Sedimentation from the upper-stream is resulting in a shrinkage of the Inle lake area and deposition to the bottom of the lake. Local people identify this as a serious issue with which to contend for Inle lake conservation. A field study is therefore being carried out to recognize the current status of the upper-stream area and explore countermeasures for erosion control.

7.2.2 Field Study Area

Among 29 rivers flowing into Inle Lake, Nam Lat river, Yei Pei river, Kalaw river, and Upper-Bilu river have major sub-catchment areas occupying 87% of the total catchment area[38]. Silting amounts have also been monitored in these four rivers[39]. Based on this monitoring report, 95% of the total silt deposits inside the lake and the remaining 5% flows out downstream. This field study has focused closely on these four streams.

Due to accessibility and time constraints, some areas cannot be observed. The field study tries to observe the status of land use, sediment production, sediment deposition, and existing countermeasures, such as the dam from the delta area to the uppermost stream area, as thoroughly as possible.

7.2.3 Results of the Field Study

Two interviews have been conducted in the field study.

Two times of interview has been conducted under field study as follows.

(1) Results of the Field Study

[38] Inle Lake LONG TERM RESTORATION & CONSERVATION PLAN, Government of the Republic of the Union of Myanmar, Ministry of Environmental Conservation and Forestry, July 2014

[39] INLAY LAKE CONSERVATION PROJECT: A PLAN FOR THE FUTURE. In support of the Action Plan for Environment Conservation and Sustainable Management of Inlay Lake 2010-2015 by the Ministry of Environment Conservation & Forestry AUGUST 2012, Institute on International Development

◆ Interview about silt sedimentation condition into the Inle lake

Meeting Minutes	
Date:4 April 2017	Location: FD Nyan Shwe office

Participants

- ✓ Dr. Tun Hlaing (Inle Lake development committee vice chair、Shan state Minister)
- ✓ Thein Zaw Moe (Shan state parliament member)
- ✓ Khin Maung Win (Shan state parliament member)
- ✓ Thein Htay (Shan state forest department director)
- ✓ Htay Mg (Shan state Taunggyi vice forest department director)
- ✓ Soe Win Myint (Shan state Taunggyi district Yaungshwe forest field office head)

Interviewees：Ochiai、Nishio

Interview contents

- ✓ Flood in 2006: There was no damage due to the sediment disaster such as landslides and hillside collapsing in this area.
- ✓ The water level has decreased since drought in 2010 around 3-4 feet.
- ✓ Causes of water level decrease in Inle Lake were listed as follow;
  - Unbalance of inflow and outflow of water（Increase of water usage for irrigation）
  - Inflow of earth and sand（Deforestation and forest degradation）
  - Climate Change（Less rain）
  - Increase of agricultural and settlement areas.
- ✓ Floating field (cultivation) has traditionally continued since 500～600years ago
- ✓ Causes of water quality decrease are due to the increased usage of pesticide and chemical fertilizer.
- ✓ Expansion of peatland
- ✓ As main land classification around Inle Lake: water surface, rice field, agriculture, orchard, and forest.
- ✓ Preparing policy for Inle Lake under Integrated Lake Basin Management[40]
- ✓ Main work of Forest Department regard as forest rehabilitation. This includes the distribution of

[40] It is an international NGO established by Shiga prefecture in 1986 after organizing International Lake Conference in 1984. The NGO supports for developing countries, send information for sustainable management for lakes, ponds, and wetland, organizing international exchange

Pine、Eucalyptus, and Acacia seedlings. No installation of devices preventing from soil erosion years ago and extent terrace cultivation 20 years ago.

- ✓ A Japanese company has measured water level and quality. They gather these information by satellite image.
- ✓ Although Japanese NGO named KARAMOSIA operated for the extension of organic agriculture, its project was finished. In a later study, KARAMOSIA supported from 2001 to 2010. Terra People Association has supported since 2011.

◆ Interview survey on countermeasures against inflow of silt by irrigation department

Meeting Minutes	
Date：7 April 2017	Place：Yaungshwe office, Irrigation Management agency

Participants

- ✓ Kyaw Kyaw Oo（Chief）

Interviewees：Ochiai, Nishio, Soe Win Myint（Yaungshwe forest field office head）

Interview contents

- ✓ The office was built in 1992。 Silt trap was done in Yei Pei River. in the same year。
- ✓ Main works are as follow;
  - Irrigation construction and its measurement.
  - Setting and management of Silt Trap and Check dam.
  - Dredging of accumulated earth and sand
  - The measurement of managing cultivation area along with main rivers.
  - Removal of abandoned floating island and water grass（they are utilized as fertilizer too）
  - Other: reserving route for boat running in Inle Lake.
- ✓ There is a report that 450 large scale gully erosions are existed within watershed
- ✓ Currently there are 6 Silt traps and 75 check dams. Earth and sand are dredged in every 2-3years
- ✓ There are also 6 Sedimentation ponds which were built around 100 years ago.
- ✓ For limiting inflow of earth and sand into, silt trap is difficult to choose appropriate area to build due to the difficulties of aptitude judgement such as waterway gratitude and area. This is why there is a policy to increase the number of catchment dam construction and focus on gully in Kalow River watershed.
- ✓ Obtained document：Inle lake Long Term Maintenance and Conservation Project, Nyaung Shwe(Ministry of Agriculture and Irrigation, Irrigation Department, Shan State)

（2）Overview of the researched watershed

The area of Inle Lake is 368,200 ha[41]. This includes not only the catchment area where water flows into the lake, but also the catchment area with Mobye dam Lake in the downstream area. This definition is common in the existing documentation, so this report applies the same terminology.

Based on the report[42], the area of Inle Lake has declined from 69.10km^2 to 46.69km^2 over the period from 1935 to 2000 due to sedimentation resulting from the generation of earth caused by logging, shifting cultivation, and unsustainable cultivation.

The north side of Inle Lake is located downstream of the Nam Lat river, where the sedimentation area is used for rice fields. The quantity of earth and sand flowing into the kake on the east side is relatively small because the river is short in length and mountain ranges approach the lake nearby. While the mountain ranges extend north and south, a long distance separates the mountains and the lake, and the area on the west side of the lake is utilized for cultivation. Additionally, the west side of the mountains is part of the Yei Pei river and Kalaw river watershed. The Inle Lake flows out downstream to the south, so there is no river in that direction. Overviews of the main rivers follow.

1）Nam Lat river watershed

Nam Lat river flows straight into Inle Lake from the north side. The quantities of earth and sand are reported to be the largest among the rivers flowing into the lake due to the big watershed. The area from the downstream to middle-stream area is utilized as rice fields. Only hillside is visible on the left bank, as mist prevents more distant views. All of the hillside area is used for cultivation except the mountain ridge area, and the lands were bare in this season after the harvests.

Based on the interview with the Forestry Department (FD), the hillside of the upper stream area is also utilized for agriculture, and some areas unsuited for cultivation are abandoned. The satellite image below shows muddy water flowing into Inle Lake from the north side. The quantities of earth and sand are thought to be substantial. An officer from the Irrigation

[41] Inle Lake LONG TERM RESTORATION & CONSERVATION PLAN, Government of the Republic of the Union of Myanmar, Ministry of Environmental Conservation and Forestry, July 2014

[42] Contemporary changes in the open water surface area of Lake Inle, Myanmar (Integrated Research System for Sustainability Science, Springer 2007)

Department (ID) stated that a sedimentation pond was built in this watershed more than a century ago as a countermeasure against sediment inflow.

2) Yei Pei river watershed

Few forest areas and many hillside agricultural areas were acknowledged from the sky before landing at Heho airport nearby Inle Lake. The area is located at the furthest points upstream from the Yei Pei river watershed. There is no cultivation, and a few trees stand in areas with thin surface layers of soil. Muddy water is also recognized. A sedimentation pond was built in 1992 by the Irrigation Management Agency in an alluvial fan area in a downstream section of the river.

3) Kalaw river watershed

Kalaw river watershed is located in the southern part of Yei Pei river and used as an agricultural area. However, the area is mainly used as pastureland for cows due to thin surface soil and steeper slopes compared with those of the Yei Pei river watershed.

Although pine forest and bamboo forest were seen, they were too sparse to be regarded as high in forest quality. Eroded cliffs can be observed along with roads and streams. A small check dam built in 2017 by FD was also seen. Foundation rock consisting of limestone and sandstone is observed in a mountain range extending from north to south on the west side of Inle Lake.

The downstream of Kalaw river becomes a blind river flowing through a limestone cave (straight-line distance of 3 km from the entrance to exit). Water flows into Inle Lake as underground water through the cave. A 2 m sedimentation area can be found around the exit area of the cave. Steps should be taken to confirm when the catchment area of Kalaw river was checked, as this river was not shown on a 1/50,000 scale map.

4) Bilu river watershed

The Bilu river watershed expands long and deep, so time limitations prevent travel to the upstream area. A channel-type power plant has been funded and built by Chinese. Water streams on switching of the water channels were clear, and very little earth and sand were seen. The mountain range around this construction area has a steep slope, so the vegetation is very poor and trees are only seen along the stream. The land surface is darkened, taking on the appearance of an area burned out by forest fire. Based on the FD, however, this area remains in the same condition as before –an unconfirmed condition not attributable to forest fire. This darkened area also expands broadly on the satellite image.

Photo Ⅱ-10 Gully developed at road side

Photo Ⅱ-11 The depth of gully at agricultural field: around 6m

Photo Ⅱ-12 Surface soil remains so that cultivation is possible.

Photo Ⅱ-13 Surface soil was eroded and foundation soil is exposed.

Photo Ⅱ-14 Catchment dam build by Forest Department（Utilization of rocks and timbers locally procured）

Photo Ⅱ-15 Terrace treatment for the prevention of soil erosion（FD has extended since 20 years ago）

Photo Ⅱ-16 Running muddy water（There is muddy water during dry season earth and sand are contained）

Photo Ⅱ-17 Spring at the West side of Inle Lake（It is said there is less water quantity gushed up compared with 20-30 years ago）

Photo Ⅱ-18 Fomer site of forest fire and a trench for the prevention from surface erosion within CF area.

Photo Ⅱ-19 Former forest fire in the mountain. It is seen with in protection forest too.

7.2.4 Draft activities in erosion control

Challenges which were revealed are briefly listed as below;

- Kalo River is needed to take measure most among 4 main rivers.
- Earth and sand erosion has four classifications including bed load which has rough particle size, wash-road which is medium size particle, and floating sand which is very fine particle. Bed load is assumingly generated by gully erosion at upstream area.
- Wash load is considered to be generated by relatively small gully and the unpaved road in which is recently expanded.
- Floating sand is produced from cultivation areas in which is developed in entire basin

Although above points are still hypothetical since quantitative measurement has not conducted yet, it is important set these hypothesis prior to conduct measurement.
Following part states a counter measures.
Check dam is effective for preventing from the expansion of gully and making slope gradient stable at upstream area of watershed.
FD implemented to build simple catchment dam by using local materials, but activities to improve how to construct the catchment is needed.

Photo Ⅱ-20 Small Check Dam constructed by FD

For medium particle size of wash load, counter measurement to build a catchment dam and dealing with unpaved road would be effective. On the other hand, to build sedimentary lake,

which is most effective, would face difficulty since there are few unused land

Photo Ⅱ-21 Sedimentation Pond

The installation of sloping agriculture to prevent from erosion is effective measure for floating sand. This technology has introduced to individual household by FD so that scale up is expected.

Photo Ⅱ-22 Trench along contour

7.3 Agriculture

Taunggyi is an ancient farming district in southern Shan state with many large farms cultivating vegetables and tea around Inle Lake. While the forests of the Taunggyi mountains are decreasing due mainly to agricultural development and the harvesting of fuel wood, those on the western and eastern sides of Inle Lake are still undiminished and encompass

several community forests for water resources conservation. Recent reports describe water pollution generated by soil and pesticides flowing into Inle Lake, along the effects of tourism hampering Taunggyi's already limited ability to process waste. The need to secure forests upstream and improve the farming methods is pointed out.

The following section presents data from a survey on the current status of agriculture, the types of support needed, and the potential for a JICA project.

7.3.1 Overview of Myanmar Agriculture

(1) Characteristic

Eighteen percent of the land in Myanmar is used for agriculture to produce mainly rice, sugar cane, and beans. The government selected 10 crops for domestic consumption and sources of foreign exchange.

Table Ⅱ-26 Yields of Major Crops (1,000 ton)[43]

	1970	1980	1990	2000	2005	2010	2014
Rice	8,162	13,317	13,972	21,324	27,683	32,580	26,423
Sugar cane	1,312	1,461	1,931	5,801	7,073	9,398	11,128
Cotton	23	33	42	118	118	264	326
Maize	47	166	187	359	904	1,376	1,693
Peanuts	444	342	459	634	1,039	1,362	866
Sesame	102	110	207	296	504	868	519
Sunflowers	0.3	13	89	157	379	782	456
Beans※	151	275	264	1,285	2,175	3,530	4,651
Pigeon peas	23	21	37	182	547	773	575

※ The actual major products are Black gram and Green Gram. Available data offer the sum of the yields of all types of beans.

Farmland is divided into four farming zones in Myanmar according to the geography, farmland environment, climate, and crops. The characteristics of each zone are shown in the following table. Shan state is classified in Zone 1.

[43] Source) FAOSTAT

Table Ⅱ-27 Agricultural Zoning and the Characteristics of Each Zone

	Zone 1 Hilly and Mountainous Zone	Zone 2 Central Dry Zone	Zone 3 Delta Zone	Zone 4 Coastal Zone
Administrative district	Kachin State Kayah State Chin State Shan State	Sagaing Region Magway Region Mandalay Region	Ayeyarwaddy Region Yangon Region Bago Region	Mon State Tanintharyi Region Rakhine State
Geography/Farmland Environment	An area with high mountains, mountain ranges, and forests. Rivers run through some parts of the area due to heavy rains. Crops are cultivated in the mountain and slash-and-burn agriculture is employed on the hills.	A flat terrain with a semidry to dry climate. Rice cropping with irrigation facilities is the mainstream farming method. Many rain-fed paddy fields are spread across the area.	A flat and low-lying area consisting of the Ayeyarwaddy Delta and Sittaung Delta. Monoculture farming, mainly producing rice over a total area of around 3.1 million ha.	Agricultural fields are located in the coastal areas of the states of Mon, Tanintharyi, and Rakhine.
Major Crops / Suitable Crops	The main crops are rice, wheat, maize, sorghum, and sugar cane. The soil and geography are suitable for agroforestry.	Various crops are cultivated, including rice, peanuts, sesame, beans, and oilseed.	The main crops are rice and beans. The rice yield in this area accounts for 60% of the total rice yield of Myanmar.	Perennial crops are cultivated, including rice, rubber, and oil palm. Self-sufficient in rice. High potential for developing farmland for the cultivation of rubber, coconut, and oil palm.

Source) Final Report on Information Collection and Verification Survey on the Agricultural Sector in Myanmar (2013).

(2) Administrative Organizations

The Ministry of Agriculture, Livestock and Irrigation (MOALI) is responsible for agriculture in Myanmar.

In addition to MOALI, the Republic of the Union of Myanmar Federation of Chambers of Commerce and Industry (UNFCCI) and subsidiary agencies established according to each agricultural product play key roles in dealing agricultural products, especially in developing a value chain consisting of processing, distribution, and sales of the products. UNFCCI is established under the Ministry of Commerce and shares the responsibilities in the management of subsidiary agencies with the Ministry of Commerce (mainly supervises distribution), MOALI (mainly offers technical assistance), and the Ministry of Planning and Finance. For vegetables, the Myanmar Fruit and Vegetable Producer and Exporter Association (MFVP) oversees the establishment of a value chain consisting production, distribution, and sales.

Reference) MFVP Activities[44]

- Funding for MFVP comes from overseas donors (USAID, GIZ, UKAID). For distribution, MFVP cooperates with the German Business Association, JETRO, and similar Chinese organizations.
- Since MFVP supervises only a limited number of vegetable and fruit distributors, it has worked to enhance the capabilities of farmers for the past 10 years by establishing farming groups.
- As a result of the above activities, some of the vegetables and fruits (e.g., melons, mangos) have been designated as national strategic crops.
- The challenges in establishing a value chain lie in quality management and market access. MFVP has implemented activities to address the challenges by holding seminars to improve quality, offering help in finding business partners, reaching out to international communities, etc.
- Local offices of MFVP are established in areas that greatly contribute to vegetable and fruit production, including one located in southern Shan state. Activities are

[44] Source) Interview with MFVP.

carried out according to each area and crop. The major crops cultivated in each area are specified. Lectures and on-site training are conducted for key farmers to increase the productivity of specified crops.

(3) Japan's Activities and Support for Agriculture in Myanmar

JICA has been offering various support measures to develop agriculture in response to requests from the Myanmar government. The major challenges in Myanmar's agricultural sector have been: combating drugs (opium poppy cultivation), improving irrigation technology to better cope with the limited water resources, and distributing quality seeds for improved productivity. Restoring agriculture in areas severely damaged by natural disasters such as cyclones has been another urgent task to undertake. JICA's activities are listed in table Ⅱ-28 below.

Table Ⅱ-28 JICA's Activities for Myanmar's Agriculture Sector

Project	Area	Period	Type of Assistance	Outline
Project for Strengthening Human Development Institutions in Agriculture	Yezin Agricultural University	May, 2013~	Grants	Assistance in developing an experimental facility and provision of experiment / research equipment.
Project for Profitable Irrigated Agriculture in Western Bago Region	Western Bago region	September, 2014~	Loan Aid	Developing and renovating irrigation facilities and providing necessary equipment in Western Bago, where irrigation is not popular.
The Irrigation Technology Center in the Union of Myanmar	Irrigation Technology Center (Bago)	April, 1999 ~March, 2004	Technical Cooperation	Transfer of water management technology for the maintenance / improvement of irrigation systems.
The Eradication of Opium Poppy Cultivation and Poverty Reduction Project in Kokang Special Region No. 1	Kokang Special Region (Northern Shan state)	April, 2005 ~ March, 2011	Technical Cooperation	Sought to eradicate the cultivation of opium poppy, a narcotic raw material, by offering assistance in growing buckwheat as an alternative crop, producing buckwheat liquor ("shochu"), and helping to promote tea and rice as subsistence crops.

Project	Area	Period	Type of Assistance	Outline
Project for the Preservation of Farming Areas for Urgent Rehabilitation of Agricultural Production and Rural Life in Areas Affected by Cyclone Nargis	Irrawaddy Delta	December, 2009 ~ October, 2011	Technical Cooperation	Offered assistance in the following activities to help restore agriculture in the delta area affected by the cyclone: repairing the banks and floodgates, restoring the windbreak forest, producing quality cereal seed, and improving livelihood by planting vegetables.
Development of a Participatory Multiplication and Distribution System for Quality Rice	Ayeyarwaddy Delta	August, 2011 ~ March, 2017	Technical Cooperation	In cooperation with officials from local governments, including the Yezin Department of Agricultural Research, established a system with Ayeyarwaddy farmers to increase and distribute quality rice seed, and enhanced the capabilities of government officials for the maintenance of the system.
Project for the Development of Water-Saving Agriculture Technology in the Central Dry Zone	Department of Agriculture Nyaung-U Experiment Station	June, 2013 ~ June, 2018	Technical Cooperation	The research facility at Nyaung-U Agricultural Experiment Station specializes in the agriculture of the Central Dry Zone, where farmers tackle low rainfalls and variable rainfall patterns. The project at this facility is providing assistance in identifying suitable crops and developing human resources for improving technologies for cultivation and soil management.
Project for the Eradication of Opium Poppy Cultivation and Rural Development in the Northern Part of Shan State	Three regions in the Northern Shan state	May, 2014 ~ April, 2019	Technical Cooperation	Helping to eradicate the cultivation of opium poppy by implementing and supporting activities to introduce alternative crops and raising awareness of the activities.

Project	Area	Period	Type of Assistance	Outline
Project for Capacity Development of Yezin Agricultural University	Yezin Agricultural University	November, 2015 ~ November, 2020	Technical Cooperation	Offering assistance in introducing hands-on learning methods by developing a facility and equipment; improving the organization and skills of the teaching staff at Yezin Agricultural University, Myanmar's only single-department university specialized in agriculture.
Project for Profitable Irrigated Agriculture in Western Bago Region	Western Bago region	March, 2016 ~ March, 2021	Technical Cooperation	Offer support in the maintenance of an irrigation system set up with Loan Aid, promoting the widespread use of the system, and providing assistance in establishing a profitable farming business model by introducing new types of beans.

Source) JICA's web page and interviews with individuals in the areas

Japanese private business operators in Myanmar have recently been expanding their business activities in the agriculture sector, some of which are carried out under a JICA Program (JICA Partnership Program). Several private companies, including major trading firms, recognize business opportunities and are actively investing in the sector. Figure Ⅱ-16 shows the major business activities of private Japanese companies.

The business activities of private Japanese companies can be roughly classified into two types: large-scale projects and small-scale projects. In the large-scale projects, a trading firm and manufacturer are establishing a fertilizer manufacturing plant and food-processing factory in cooperation with local companies and building a refrigerated transportation system to deliver fresh food. While these projects encourage agriculture-related business to create value chains, their activities have no direct ties to producing agricultural products on farms. The small-scale projects, meanwhile, are carried out by single business entities with a view to producing crops such as vegetables/tea and quality seeds utilizing JICA's Partnership with the Japanese Private Sector or local networks. In most cases, the companies carrying

out the projects cooperate with only limited numbers of famers. In addition to these activities, organizations such as NPOs are providing technical training to local farmers.

Viewed geographically, many private companies implement their business activities in Shan state, where vegetables can be easily cultivated. Some trading firms are building transportation systems from Shan state to major cities, including Yangon. In the Thilawa special economic zone (SEZ), trading firms and manufacturers are developing plants for producing fertilizers and farm equipment.

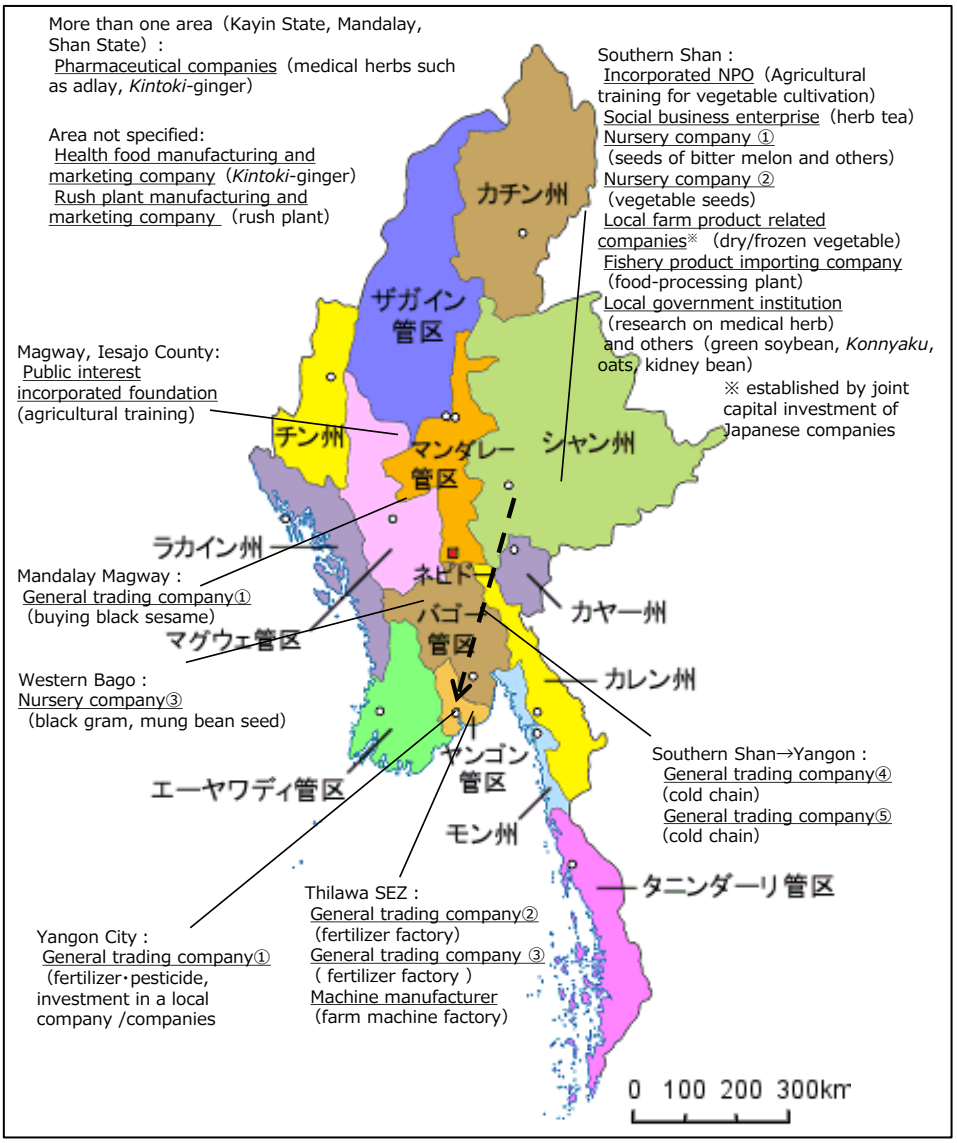

Figure Ⅱ-16 Activities of Japanese private entities in the agriculture sector[45]

[45] Source) Interviews with local individuals

7.3.2 Agriculture in Southern Shan State[46]

(1) Cultivated Crops

Various crops are cultivated in Southern Shan state in accordance with climate and geography. Rice is cultivated during the rainy season (mid-May through mid-October) on the abundantly farmed plains, which makes it the most prolific crop in the region. Vegetables are grown occasionally on these farms during the dry season (mid-October through mid-May) and are cultivated throughout the year on the hills and in the mountainous area. Farmers in the forest area of the mountains traditionally engage in slash-and-burn agriculture for raising vegetables, which is one of the causes of deforestation. Tomatoes are hydroponically cultivated with lake water on the shores of Inle Lake.

Table Ⅱ-29 Agricultural Products in Southern Shan State (viewed by geography and season)

	Land		Waterside
	Plain	Mountain	(Inle Lake)
Rainy season (mid-May through mid-October)	Rice	Vegetables (Rice in some areas)	Tomatoes, taro, loofah, and others
Dry season (mid-October through mid-May)	Vegetables (when double-cropped)	Vegetables	

Table Ⅱ-30 Area Used for Major Crops in Shan (compared with nationwide farmland)[47]

	Size of farmland (Myanmar) [Acre]	Size of farmland (Shan State) [Acre]	Percentage [%]
Maize	1,166,140	581,828	49.9
Lentil	4,247	1,658	39.0
Soybean	367,198	192,090	52.3
Tea	236,576	200,505	84.8
Coffee	49,192	27,635	56.2
Garlic	69,626	44,285	63.6

[46] Tables and figures in this section without footnotes are created based on the field survey conducted in southern Shan state or JICA's "Preparatory Survey for the Intensive Agriculture Promotion Program in the Republic of the Union of Myanmar, Final Report" (2016)

[47] Source) Ministry of Planning and Finance, Myanmar Statistical Yearbook 2016.

	Size of farmland (Myanmar) [Acre]	Size of farmland (Shan State) [Acre]	Percentage [%]
Potato	90,684	54,685	60.3
Sugar Cane	400,087	94,634	23.7
Vegetables	1,402,955	195,025	13.9

Southern Shan state is regarded as a suitable area for cultivating vegetables. Farmers who own farmlands on the plain or in the mountainous area decide what to grow based on the crop prices of the current and previous years, along with the trend in demand. The main farm products are ginger, garlic, potato, taro, maize, cucumber, tomato, sunflower, sugar cane, mango, avocado, and others.

In some areas, harvested crops (e.g., sugar cane, beans) are processed to make decorated candy or tofu (soy curd) to be shipped and sold.

Photo Ⅱ-23 Hydroponically cultivated tomato
(This tomato farmer owns a 1.5 ha farm.)

Photo Ⅱ-24 OA farmland in the mountainous area ①
(Behind the nearest crop, garlic, farmland is used for growing tomato and cucumber. This farmer owns a 1.5 ha farm.)

Photo Ⅱ-25 OA farmland in the mountainous area ②[48]

Photo Ⅱ-26 Drying soybeans

Photo Ⅱ-27 Sun-drying sunflower seeds

Photo Ⅱ-28 Drying heater for sunflower seeds (Corncobs are used to compensate for the lack of firewood.)

Table Ⅱ-31 Market research of local products

Items	Units	Price [Kyat]	Products	Remarks
Vegetables	3 pieces	1,000	Taunggyi	—
Cauliflower	1 piece	800	Taunggyi	—
Corn	1 piece	200	—	—
Carrot	1 Bundle	300～400	Taunggyi	Small size
Bean	1 Bundle	500	—	7～8 pieces
Tomato	1.3 kg	400～500	Nyaung Shwe	1 Bag contains 30 pieces. 800Kyat in Yangon

[48] Note: Crops such as onion, red beet, and garlic are cultivated in a small farm in the remote part of the village

Items	Units	Price [Kyat]	Products	Remarks
Potato	1kg	200	－	－
Okura	1kg	1,600	－	－
Ginger	1kg	600～800	Nyaung Shwe	
Garlic	1kg	2,800	－	－
Arugula	1 Bag	200	Shan State	－
Bamboo shoot	1kg	1,600	Nyaung Shwe	2,000 Kyat in Nay Pye Taw
Cut Mango	1kg	2,000	－	5 pieces
Lime	1 Piece	上：200、 下：100	Yangon	－
Mango	1 Piece	1,000Kyat	Nyaung Shwe	－
Apple	1 Piece	500	China	－
Rose	1	50	10 km from Nyaung Shwe	
Rice	1 Cup	1,500～3,000	－	Price diverse due to quality
Egg	1 Piece	110	Re-selling from Chicken Farm	－
Fish（Nya Pei）	1kg	6,500	－	－
Sea Fish（Big）	1kg	4,000	From Costal area	3,000Kyat in Yangon
Carp	1 Bundle	1,200	－	4 fishes
Sweetfish	1 Bundle	2,000	－	4 fishes
Bamboo basket	1 Piece	1,000	Nyaung Shwe	－
Seed (Tomato)	1 Bag	5,500	Thai	F1-seed (500 grain)
Fertilizer	1 Bag	15,000～40,000	China, Thai	－

（2）Land Use

Some of the farmers make their living by farming their own farmlands, and others don’t. The majority of the farmers in Southern Shan state, especially those in the mountainous area, own small farms (0.4 ~ 1 ha) for cultivation. Although the farmlands are usually used once during the rainy season, they are sometimes used twice to raise rice in the rainy season and vegetables in the dry season (double cropping).

Farmlands had been traditionally handed down from older generations until 2015, when the Department of Agricultural and Land Management Statistics of MOALI started providing a registry management system to secure land-use rights. This registry management system is called "Form 7," the name of the document necessary for registration. While registered farmers have to pay a certain amount of tax, they can obtain real-estate mortgage loans from a bank. However, small farmers in the mountainous area have yet to register their farmlands and generally depend on their village chiefs for the approval of land use.

(3) Challenges in Agriculture

Farmers in Southern Shan state are facing the following six issues.

- Lack of water (in the mountainous area in the dry season)
  - Especially in the mountainous area, farmers have difficulty in raising their crops during the dry season due to the lack of water. They regard the decreases in water as a result of deforestation in the upstream area.
- Lack of Firewood for Primary Processing of Farm Products
  - Beans and sunflower seeds are primary processed to make dried products or tofu (soybean curd), although the firewood necessary for the processing is lacking. Farmers on the west bank of Inle Lake can no longer collect firewood, for example, which forces them to buy firewood from the south bank or use corncobs purchased from suppliers nationwide.
- Improper Use of Chemical Fertilizers and Pesticides
  - Now that farmers are experiencing decreased productivity and failing crop health in some cases, they are beginning to realize how the overuse of chemical fertilizers and pesticides contaminates the soil and water used for farming. The number of farmers who want to learn about organic agriculture or the proper doses of chemicals is increasing.
  - These chemical-related problems are caused by overseas companies (not authorized by the Myanmar government) that sell unknown chemicals to local farmers. Farmers pay kickbacks to the chemical sales companies once they see a rise in crop yields as a result of using the purchased chemicals. After the first year of chemical use, however, the crop yields from the newly contaminated soil begin to drop. To address these problems, headway in controlling chemicals was made based on the law on chemicals revised in 2015. Chemicals imported freely from China were identified as the culprit behind health and environmental (soil and water) problems, prompting the government to order companies dealing with chemicals to obtain licenses. The number of licensed companies is still very small.

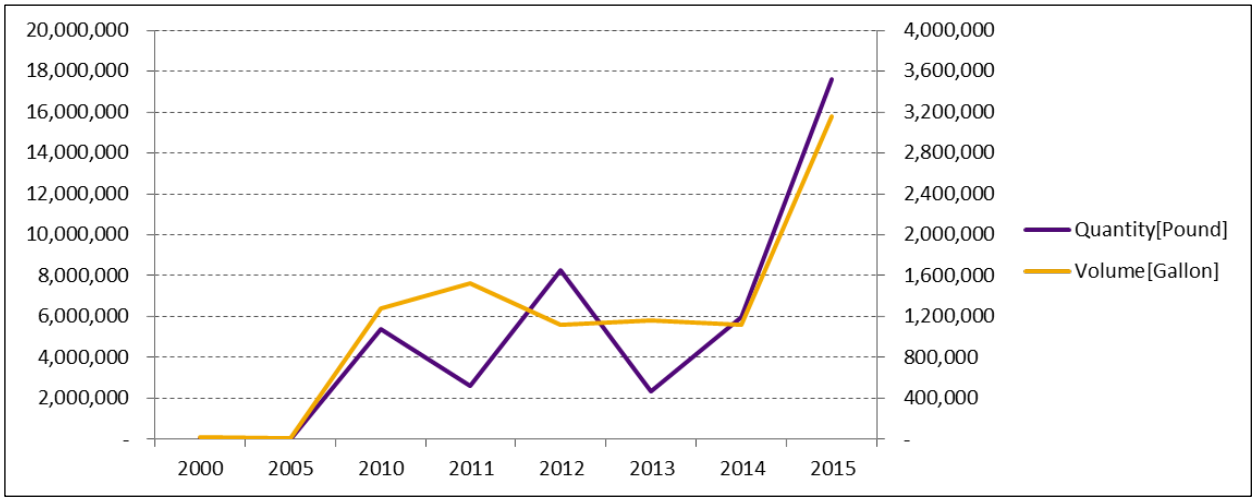

Figure Ⅱ-17 Chemical Consumption in Myanmar (Left, Pounds; Right, Gallons)[49][50]

- Insufficient Demand in OA Products
  - To address the problems of improper chemical use described above, farmers face a rising need to start Organic Agriculture (OA). Some farmers are receiving assistance from organizations such as government or NPOs to engage in OA. These OA products, however, are sold only to "Green Hill," an OA vegetable shop in Yangon. The OA vegetable market urgently needs to be expanded.
- Not Fully Functioning Land Registration System (Form 7) of the Myanmar Government
  - The majority of farmers have yet to register their lands, so the land registration system established by the Myanmar government is not fully working.
  - While farmers acknowledge that they must have their own land for hydroponic cultivation, land ownership is not clearly defined. At first the government gave certification to farmers who owned land, insofar as it knew they actually engaged in the cultivation. Now, however, it can no longer grasp who is the actual owner of a certain land, as the population has grown and some farmers have started cultivation without certification.
- Lack of Investment Funds
  - Investment funds are lacking when a farmer wants to increase or improve productivity by securing water (digging/maintaining wells), starting OA, or buying/maintaining farming equipment.

[49] Source) Ministry of Planning and Finance, Myanmar Statistical Yearbook 2016

[50] Note) This figure indicates Myanmar's total chemical consumption (not Shan State's consumption alone).

7.3.3 Prospects of Efforts for Addressing Agricultural Issues

(1) Ongoing activities by local governments and other donors

1) Activities for reducing the use of chemicals

- Demonstration activity by local government

As the farming area for tomato cultivation expanded, the quality of Inle lake water deteriorated due to the use of chemicals. The local government has started to address this issue by taking measures to control the cultivation areas.

For tomato cultivation, the GAP (Good Agriculture Product) program has been carried out since its establishment in 2016. Under the instruction of the Nyaung Shwe Township Office of the MOALI Department of Irrigation, farmers who are willing to join the project cultivate tomatoes without chemicals in a total of 20 ha of farmlands spread across five villages. The program is still in an early stage, so issues such as the effects on labor and customers and price differences between tomatoes cultivated in this project and other tomatoes are to be studied.

Governmental efforts to implement the GAP program will include marketing chemical-free tomato to consumers (e.g., hotels or companies), establishing a certification system for agricultural products cultivated under the GAP program, and implementing other GAP programs for the cultivation of other farm products such as eggplants, pumpkins, cucumbers, water melons, and wax gourds. The Food and Drug Administration (FDA) is expected to be in charge of the food certification system and is already conducting quality inspections in its laboratory.

- Expanding organic farming methods with an NPO

A Japanese non-profit organization, Terra People Association (TPA), cultivates human resources capable of giving OA instruction through mid- to long- term training programs for local people who are willing to engage in agriculture. With these human resources, TPA runs an agricultural union in pursuit of assisting OA farmers. To give incentives to the OA farmers, TPA also signed an agreement with “Green Hill,” an OA vegetable shop in Yangon, as a way of securing a market channel to sell OA products at prices about 1.5 ~ 2 times higher than the prices of non-OA products.

Reference) TPA's Operation of Organic Agricultural Union[51]

- Form a group with around 10 farmers who have interest in OA.
- Union members can receive loans (monthly interest of 2%). Moreover, members can share farming equipment (available at prices 10% lower than usual), are given priority for acquiring Japanese quality crop seeds, and can buy organic fertilizers at a lower price.
- The union invests a total of 1 million Kyat in the union members. If the union invests 0.1 million in each member, it collects 0.12 million Kyat in six months (0.1 million Kyat x 2% x 6 months x 10 farmers). With this amount, it can invite one farmer to join the group.
- This project is independent of governmental funding assistance.

(2) Activities to create a value chain

GIZ, a German international cooperation agency, works with MFVP on the establishment of a value chain for mango and tea in Southern Shan state. GIZ conducts training seminars for groups of business entities organized by MFVP according to region and farm product with a focus on the production or distribution of farm products.

Reference) GIZ's Efforts in Building a Value Chain in Southern Shan State[52]

- Offers assistance to clusters established for each product/area. For example, GIZ will spread its activities by training around 25 farmers who are to serve as leaders of 3,000 farmers.
- Creates strategies according to each farm product and area, then works the strategies into an operational plan. Issues such as adding value, employment, and market access are considered when creating strategies. Once a plan is established, GIZ holds workshops on improving farming technology, capacity-building, building linkages with the market, and organizing farmers groups.
- Established two model factories for green tea processing in Pindaya. A portion of the tea produced in these factories is exported to Germany. Receives advice on export from South Africa, a key player in the export.
- Sells mangos at various events. Also, a quality standard has been established for mangos (classified into five grades from A to E). Overseas sales of mangos are now being discussed. Given the difficulty of delivering fresh fruit to faraway Europe, mangos will be sold in small amounts in trials in Europe. The major

[51] Source) Interviews with TPA.

[52] Source) Interviews with GIZ.

market for the fruit will be China, which is located close to Shan state.

(3) Others: Issues related to the Inle Lake Conservation Plan

A five-year action plan was established covering 2015 ~ 2020 for the conservation of Inle Lake. The plan identifies10 priority action items, including measures against deforestation and the promotion of agriculture and health and safety[53]. According to plans, the focus is to be kept on the first priority, that is, the building of an implementation structure with multiple ministries and sectors. As such, a large portion of the funds from the Swedish government is now allocated to structure building. By all expectations, it will take several years before any actions against actual environmental challenges are taken in the areas, including challenges in agriculture.

An urgent and serious task is to create regulations and systems for the tourism industry in addition to the forestry and agriculture industries. While the number of sightseeing and accommodation facilities is increasing as more tourists visit the lake, few measures are taken for waste management. Hence, the tourist activity is generating environmental pollution.

7.3.4 Prospect for Support from JICA

The above survey results on the activities to cope with agricultural issues can be summarized in the following table.

[53] Source) Ministry of Environmental Conservation and Forestry (MOECAF), Inle Lake Conservation 5-Year Action Plan (2015-2016 to 2019-2020), May 2015.

Table Ⅱ-32 Gap analysis on agricultural sector

Inle Lake Area	People /Institutions Concerned	Current Situation・Issues	Support Needs	Current/Future Support from Other Donors
Upper Region	Government / Policies	・ A land registration system has been established, but it is not widely accepted. (Most farmers follow the customary rules of land use rather than file applications.) ・ Slope farming is encouraged but there are insufficient staff to carry it out.	・ Expansion of the farmland registration system. ・ Establishment of an implementation structure for raising awareness on the dangers of using excess chemicals among both farmers and government officials.	–
	Local Communities	・ Vegetables are selected according to the latest market trend and cultivated. ・ Some farmers have adopted organic farming in view of sustainability. Problematically, they have only one customer. ・ Farmers have limited fuels for primary processing.	・ Promotion of the proper use of chemical fertilizers and pesticides. ・ Promotion of OA (MOALI recommended areas: Kalaw, Heho, Pinlaung, others) ・ Development of an OA product market and establishment of a value chain.	・ TPA conducts OA training in 3 areas. (It manages training centers and educates instructors.) ・ GIZ started giving assistance in developing a value chain. (It cooperates with government organizations to instruct farmers and distributors of mango and tea.)
Lower Region	Government / Policies	・ Lake water is deteriorating as large amounts of chemicals are used for cultivation of tomatoes, a rapidly expanding crop. ・ Local offices of Irrigation The department started taking measures against the rapid expansion of tomato	・Promotion of the land registration system. ・ Establishment of an implementation structure for raising awareness on excess chemical use among both farmers and government officials.	–

Inle Lake Area	People /Institutions Concerned	Current Situation・Issues	Support Needs	Current/Future Support from Other Donors
		farming. ・ The land registration system has started but is not fully adopted.		
	Local Communities	・ Hydroponic tomato culture is spreading rapidly and widely. ・ A small number of farmers started farming without chemicals under government instruction.	・ Promotion of the proper use of chemical fertilizers and pesticides. ・ Evaluation and promotion of OA methods. ・ Development of an OA product market and value chain.	–

Based on the above, the following actions are considered necessary.

- Assistance to the government (top-down approach)
  - Capacity-building for government officials
    Enhance officials' ability to give technical instructions on the proper use and amounts of chemical fertilizers and pesticides, in order to build a system that enables MOALI local staff to educate farmers in each area.
- Assistance to farmers (bottom-up approach)
  - Promotion of the proper use of chemical fertilizers and pesticides
    Offer village representatives instructions on how to properly use the chemicals, in order to enlighten the farmers.
  - Expand organic farming methods
    Encourage the farmers who have interest in organic farming to switch from chemical use to organic farming. While TPA's efforts in running a training center can serve as a good example, additional activities are needed for the further expansion of the OA.

※ MOALI recommended that OA promotion efforts focus on areas on the west bank of Inle Lake, such as Kalaw, Pinlaung, Heho, and Pekkon, as the farmlands being developed there are causing deforestation.

※ When considering forest conservation, MFVP recommended technical assistance on the cultivation of black cardamom and yams in the forests and other areas surrounding Pekon lake as a highly effective approach.

- Others
  - Development of new markets and establishment of a value chain for OA products
    In conjunction with expanding organic farming, markets where OA products are recognized and sold at reasonable prices should be developed in addition to Green Hill in Yangon. Since there are some obstacles in delivering products to big cities, including transportation problems, opportunities should be sought to promote the marketing of OA products to sightseeing facilities located around Inle Lake.

    For issues such as the lack of water resources and fuel wood, measures addressing deforestation and forest degradation are necessary. A survey should be conducted to identify the areas that need conservation actions, before implementing any conservation project.

To provide the above assistance, research should be conducted on the following issues.

- Collect additional fact data and conduct a baseline survey
  - There is a need for information and registration data on the farmlands managed by the government (MOALI's agriculture and land data and Central Statistical Organization's information), as well as FRI's survey data on soil and water quality in the areas around Inle Lake.
- Identifying the scope, site, and implementation structure for each project
  - For selecting areas, other assistance needs and their potentials should be considered.
  - It will be necessary, for example, to conduct interviews with sightseeing facilities located around Inle Lake to evaluate their potential to develop the market for OA products and build a value chain.

7.4 Community Forestry and Livelihood Improvement

Judging from interview results to NGO which was describe in previous section, CF promotion may effective to implement REDD+ activities. Under REDD+, addressing to rights of resources-use by local people and land tenure is essential. Community forest has right the use of resources for 30 years and the right of land management. Therefore, implementation of CF framework is useful for addressing of safeguard.

In this section, CF in Myanmar is summarized and a result of filed survey on South Shan state which is candidate site of REDD+ project is described.

7.4.1 Overview of Community Forestry

This section presents an overview of Community Forestry in Myanmar, as well as a field survey on the current situation in Southern Shan State, one of the potential project sites.

（1）Background

・ Global background of Community Forestry

According to ECCDI, with the advent of democracy and the implementation of political reforms, initial steps towards the reform of the economy were taken in 2011 through the lowering of export taxes and an easing of restrictions on the financial sector. The GDP growth rate was more than 6% after 2012 (ECCDI, 2014[54]). This is expected to lead to a healthy economic climate that can provide local people with more income and job opportunities.

Democratic devolution of resource control towards more locally controlled forestry such as CF offers a key opportunity for both improved management and incomes for the rural poor. This trend parallels experiences elsewhere in the world showing the economic potential of locally controlled forestry (Macqueen et al., 2012). The reliance of rural people on forests for food, shelter, education and recreation provides an incentive for protection and management. From the mid-1970s, government forest departments in a growing number of countries began acknowledging the legitimacy of local forest use (RECOFTC, 2011a-d).

More recently, alliances of indigenous peoples, and CF and family smallholders, have preferred to use the term ‘investing in locally controlled forestry’ (ILCF). Locally controlled forestry has been defined as “the local right for forest-owner families and communities to make decisions on commercial forest management and land use, with secure tenure rights, freedom of association, and access to markets and technology.” Policies that support locally controlled forestry continue to spread and evolve in a growing number of countries (Macqueen, 2012). Locally controlled forestry has been successfully applied for the alleviation of poverty among local forest communities, as well as forest conservation and sustainable management.

・ Economic opportunity to the forest community in the democratization of Myanmar

[54] ECCDI（2014）Unleashing the potential of community forest enterprises in Myanmar

The promotion of Community Forestry began in 1995 when the government of Myanmar issued the Community Forestry Instruction (CFI). The Forest Department (FD) sought to aid the participation of rural communities in the protection of forests, including replanting degraded areas. The aim was also to help communities satisfy their local need for forest products.

（2）Status of Law preparation in Community Forestry[2]

Community Forestry in Myanmar is defined in the Forest Law (1992) and CFI (1995) as follows. It is assumed, "Forestry operations in which the local community itself is involved; such as: the establishment of woodlots where there is insufficient fuel wood or other products for community use, and the planting trees and exploiting of forest products to obtain food supplies, consumer products, and incomes at the farmers' level." But the implementation of CF in Myanmar has so far followed the FAO definition, excluding commercial activities.

Table Ⅱ-33 below summarizes the application procedure for Community Forestry shown in CFI and the main regulations applied.

Table Ⅱ-33 Overview of CFI[55]

Item	Overview
Application Procedure	・ The local community has to form a Community Forest User Group (CFUG) and elect five or more management committee members. ・ The CFUG has to submit a request through the Township Forest Officer (TFO) to the District Forest Staff (DFO). ・ If the application is accepted, the DFO has to identify the area, issue the permit, and submit detailed data and a map of the area to the State or Regional Forestry Officer. - Since the enactment of the Vacant, Fallow, and Virgin (VFV) Lands Law in 2012, anyone who wants to use these lands must apply to the Central Committee for the Management of Vacant, Fallow and Virgin Lands (CCVFV), including for CF establishment.
Duration of Land lease	・ A land lease has a 30-year duration and is renewable, depending on the performance and the interest of the CFUG.
Management Plan and	・ Upon receiving permission to establish a CF, the CFUG has to draw up a management plan. ・ After approval of the management plan, the DFO will issue a Community Forest Establishment Certificate with forest rules, instructions, and restrictions attached.

[55] Source: Made by the investigation committee based on the RECOFTC (2015) Country engagement strategy Myanmar and Myanmar (1995), Community Forestry Instructions2

Item	Overview
Certificate for the Establishment of CF	・ If the CFUG violates the forest law and regulations, the DFO has the right to revoke the certificate.
Technical Support	・ The FD will provide inputs (seedlings) for the first rotation and technical advice to the CFUG, which has to protect and manage the forest according to the management plan.
Exploitation of Forest Products from CF	・ Production and sales of the forestry products shown in the management plan are permitted. Surplus products from CF marketed within the village are tax exempt. If sold outside the village, tax at specified rates will be levied by the FD. ・ Income is to be used for forest management and development. Surplus income can be used for social welfare and enterprise development. ・ The fund is managed at the CFUG committee, and CFUG members will receive financial reports at least once a year. ・ The user's group issues receipts for all of the forest products sold in the CF. Forest products transported outside the township need a transport permit.
Records and Report	・ The CFUG committee will have to keep detailed records on planting, tending, and production activities in forms attached to the management plan. ・ TFO and DFO will inspect the CF and its records as conditions permit. Instructions and corrections are to be provided when they are deemed to be necessary. ・ At the end of the budget year, the CFUG committee must submit a progress report to DFO through TFO. ・ DFO adds comments and recommendations to the progress report and submits the report to the Planning and Statistics section of the FD.

Table Ⅱ-34 CF development in Myanmar and a strengths, weaknesses, opportunities, and threats analysis (SWOT) of the policy environment[56]

Strength	Weakness
1. Strong commitment to reform, expected to be reflected in forest and land policy, as well as CFI, granting more use rights to forests by communities 2. Strong historical tradition of sustainable forest management 3. Experience, lessons learned, and opinion in CF	1. Weak rural forest and land tenure 2. Obsolete land classification 3. Overlapping institutional mandates in VFV land 4. Unclear system for land-use planning 5. Commercial use of forests by communities not permitted 6. Top-down tradition/culture in the FD

[56] Source: Made by the investigation committee based on the RECOFTC (2015) Country engagement strategy Myanmar.

development 4. Basis for decentralized planning and management establishment 5. Considerable and expanding number of NGOs and donors introducing participatory and sustainable arrangements in forest management	7. Limited understanding of CF principles andconcepts
Chance	Threat
1. Stated emphasis on balanced sustainable (economic, social, and environmental) development 2. Awareness in the forestry sector on the need to enhance sustainability and value addition 3. Increased interest from donors in supporting sustainable, participatory development	1. Use of forest and VFV land for large-scale commercial agricultural and forest development 2. Ethnic conflicts affecting CF development 3. Emphasis on coercive forest protection and conservation policies 4. Forest and land receive lower priority in democratic reform process

（3）Stakeholders of Community Forestry Management

The main stakeholders of Community Forestry are villagers (about 70% of the rural population) whose sources of livelihood include forests and the VFV lands. The other stakeholders include the central government, local administration, traditional ethnic minority groups, private companies, and NGOs.

RECOFTC executed a SWOT analysis on the management capacity of the FD, Settlement and Land Records Department (SLRD), Department of Fisheries, and NGOs.

Table Ⅱ-35 Result of SWOT analysis on the CF development capacity of stakeholders[57]

Stakeholders	Strength	Weakness	Chance	Threat
FD	・ Skill of foresters ・ Leading role in land use and poverty reduction ・ Collaboration with NGOs ・ Forest law to be revised	・ Low priority for CF ・ Limited extension skill ・ No CF law or budget. ・ Coordination with other	・ Increased international collaboration with NGOs and INGOs engaged in CF ・ Poverty is a	・ Mechanism to reach local communities ・ Policing role ・ Bureaucratic operation ・ Insecurity of livelihoods

[57] Note: The results of the SWOT analysis compiled in this report are from Aung and K.M. (2013) Capacity-building needs assessment for community forestry in Myanmar.

Stakeholders	Strength	Weakness	Chance	Threat
		departments ・ No dedicated CF division ・ No clear policy on staff transfer ・ No social research skills	priority issue. ・ Climate change (REDD+) ・ Increased public awareness of the value of forests	・ Language barriers ・ No financial support for social research
SLRD	・ Authority over CF land allocation outside PFE	・ Lack of CF knowledge ・ Poor coordination with the FD	・ NGO could provide CF knowledge ・ Coordination with the FD via CFNWG	・ Low interest in CF
Fishery Bureau	・ Influence in the Ayeyawady Delta	・ Lack of CF knowledge ・ Poor coordination with the FD ・ Lack of understanding of CF rights	・ Coordination with the FD via CFNWG	・ Overlapping mandate ・ Competition between CF development and fishery development
NGO	・ Training capacity ・ Networking ・ Facilitation skills ・ Policy advocacy ・ Research, knowledge-sharing, and demonstration	・ Focus more on targets than on process ・ Limited CF understanding ・ Limited recognition of CFUG rights ・ Limited participatory planning skills ・ Weak forestry knowledge	・ Donor interested in a community-based approach ・ Chance for political reform ・ Trust-building capacity ・ Food security and environmental rehabilitation priorities	・ Exclusion of ・ some villagers ・ Limited facilitation of local rules ・ Poor law enforcement ・ Political conflict

（4）Community Forestry development priorities

The objective of the National Forestry Action Plan (2001-2030) to institutionalize CF as an integral part of a wider national sustainable forest management strategy with a target of bringing 0.92 million ha under CF management by 2031 (RECOFTC, 2011) is an important priority for guiding CF development. In addition, the Myanmar government has made it clear, through the President's Office, that community forestry is a high priority. To this end, the MOECAF has been directed to develop 'demonstration sites' in every state and region with a long-term objective of developing best practices in order to scale up towards a national CF programme.

The research and reviews (including RECOFTC) make several recommendations regarding the identification of CF development priorities in the country that guide the strengthening of CF arrangements, approaches, and capacities, including the Land law and VFV land law.

【 Recommendation for Community Forestry 】

- Strengthen the legal basis for CF;
- Enhance social inclusiveness – include all villagers, not just people from self-selected groups;
- Introduce a gender-specific and pro-poor approach in policy and extension support;
- Strengthen CFUG;
- Review the practical steps of CF development to meet the 2031 target;
- The best CFUGs need to be supported as they move into the 'second generation' phase of more active forest management and develop networks to support other CFUGs;
- The FD needs to play a lead role in CF extension support after the CFUGs are formed; and
- Clarify the roles and contributions of Community Forestry in Climate Change adaptation and mitigation.

【 Recommendations on the legal review of the farmland and VFV land laws 】

- Strengthen protection against the alienation or sale of communal land;
- Improve land title certification procedures;
- Recognize and respect customary land use and customary laws;
- Improve the system of land classification based on participatory land-use planning at different levels (local and national);
- Strengthen the right to transfer Community Forestry Certificates

- Provide access to loans by authorized banks for FUGs in order to eventually realize the provision of an insurance system for CFs.

（5）How to promote Community Forestry enterprises in Myanmar

Between 1996 and 2013, a total of 47,948 ha of CFs have been officially formed by 742 users' groups. As the target for 2031 is over 900,000 ha, the pace of establishment will need to be stepped up considerably to achieve this target. Moreover, recent studies suggest that perhaps as few as half of these FUGs are actually functioning well and around one-fifth may actually be stagnant (Tint et al., 2011). A major problem exists in motivating communities to take on responsibility for local forests. The lack of dynamism within FUGs is caused by the limited use of this 'subsistence-oriented' model of forest-use rights and forestry income, a model monopolized by the military. Evidence suggests that forest management fails to address poverty and forest conservation. The report from ECCDI mentions the following: to catch up with policies for investing in locally controlled forestry elsewhere, CF in Myanmar must evolve from a subsistence-oriented model or monopoly on timber production by government agencies towards an enterprise-oriented model.

In parallel with forest sector developments, there has also been an internationally growing recognition of the crucial economic role of small and medium enterprises (SMEs) in innovation and job creation. SMEs contribute more than larger enterprises in terms of employment, output and investment in Myanmar's economy (Aung Kyaw, 2008), representing 96% of production in both rural and urban sectors and about 92% of the manufacturing sector (Wai Lwin Than, 2012). Myanmar's economic growth thus depends heavily on the development of SMEs in the private sector. However, the economic structure of the country has been somewhat monopolistic due to military patronage of 'crony' businesses in key areas. Although there is a need to promote SMEs in the forest sector, there is necessarily an accompanying need for democratic policy support to smaller businesses in general in order to 'level the playing field.'

（6）Method for promoting the participation of private enterprises

To provide maximum benefit to the rural poor and shift from a subsistence-oriented model to an enterprise-oriented model, the ECCDI report compiles the following on the potential of a market-led approach to CF in Myanmar with this aim in mind.

- Factors that encourage the development investible enterprises

- ✧ Clear tenure and decision-making power over forest and broader land use, freedom of association to achieve scale-efficiencies and market power, plus support services for business capacity development and access to technology.

- Investment environment
  - ✧ Securing investment requires a reliable and predictable return. Nobody will invest without assurances over commercial rights; nor will they invest in the absence of professional business organization and management
- Key strategy to encourage CFUG
  - ✧ It will be necessary to strengthen CFUG, scale up production, and attract partnership with investors.
- Partnership between CF enterprise and investors
  - ✧ This requires the development of a credible product-based business plan that can attract investment if necessary. Investors, whether the communities themselves or outside financiers, need clear information on the economic potential and revenues that a venture might generate. They also need a predictable business environment.

To this end, six suggestions have been made on updated policies and practices necessary for the enterprise-oriented model in Myanmar:

- Communities should be allowed commercial use rights to their CFs.
  - ✧ Beyond transfers of management, there is also a need for security, legal, and administrative reforms. Associated forest product-related regulations, such as transit rules, must also be modified to provide an enabling policy environment for community-based SMFEs.
- Community awareness should be raised regarding commercial opportunities, and marketing links should be supported
  - ✧ Communities need to understand the new opportunities and potential net benefits.
  - ✧ It is crucial that communities understand and manage trade-offs when considering moving towards an enterprise orientation. They should consider alternative forest management options and determine which option best suits the community and protects the livelihoods and interests of the poorest.
- The hand-over of local forests to FUGs should be streamlined and accelerated.
  - ✧ Administrative processing of applications is often sluggish and uncertain. Public servants must treat them more efficiently. The actual processes should be simplified where possible. A lack of response from a District Forest Officer

after a due period, perhaps one month, should signify approval of an application.

- FUGs need to have their enterprise capacity developed and strengthened.
  - ✧ Community groups need technical support and training to develop enterprise management capacity.
- Support and participatory monitoring for FUGs and SMFEs should be provided to ensure that enterprise development is sustainable and equitable.
  - ✧ To avoid stagnation, ensure that FUGs are pro-poor and that risks of elite bias and mismanagement are avoided.
  - ✧ FUG networks and federations are the ideal institutional structures for support and development in constructive relationships with foresters.

(7) Risk

To improve the Community Forestry, RECOFTC have identified three considerable risks.

- Risks related to the possible loss of momentum and direction of the ongoing political reforms
  - ✧ There is a risk that vested commercial interests and rent-seeking administrators will capture the space for initiatives in forestland development. The recent legal change related to VFV lands demonstrates that this risk is real. Strong support for CF and local-level land-use planning is expected to provide some counterbalance to any unbridled expansion of commercial land concessions.
- Risks related to ethnic conflicts
  - ✧ It is expected that this may at worst affect only specific areas and groups without affecting the expansion of CF in other areas.
- Risks related to the high expectations of donors and partners
  - ✧ A clear and realistic programme with specified outcomes will need to be prepared, based on the engagement strategy, so as to enhance the generation of realistic expectations.

7.4.2 Current Status of CF over South Shan State

CF user groups (hereafter, CFUG) engaged in Community Forestry (CF) activities developed in the Shan state's Taunggyi region are assumed to be a major target, and information on the current situation and problems is being gathered. Information related to conservation and watershed management around Inle Lake is sorted out to determine the efforts and areas considered to be effective and suitable for CF development.

For the site investigation in the CF field, on-the-spot visits in CF-implemented regions and interviews with related organizations and communities mainly in Taunggyi's Nyaung Shwe region (hereafter, NS region) were carried out. A simple questionnaire using survey slips was administered in the communities visited, and an overview of the current situation of the region was studied. In Yangon, opinions were exchanged with RECOFTC, the entity managing CF in Myanmar.

In the Taunggyi region, the communities around the Inle Lake and CF sites (12 communities in eight areas) were visited and interviews with the Forest Division county office and immigration office were carried out.

Table Ⅱ-36 Investigation distance

Visited Sites	Investigation division *				Research zone around Inle Lake
	Forest	Non-forest	CF	Non-CF	
(10)		○	○		The northwest upstream area
(11)	○				The northwest midstream area
(12)		○	○		The northwest upstream area
(13)	○		○		West mid- to downstream area.
(14)	○		○		The southwest midstream area
(15)	○			○	The west midstream area
(16)	○		○		The west downstream area
(17)	○		○		The east up- to midstream area
(18)	○			○	The east upstream area

See Figure Ⅱ-18 for details on the Investigation division.

- Investigation division
Forest: Forest in jurisdiction by Forest Division (FD)
Non-forest: Forest outside the jurisdiction of the FD
CF: Registered as CFUG.
Non-CF: Unregistered as CFUG.

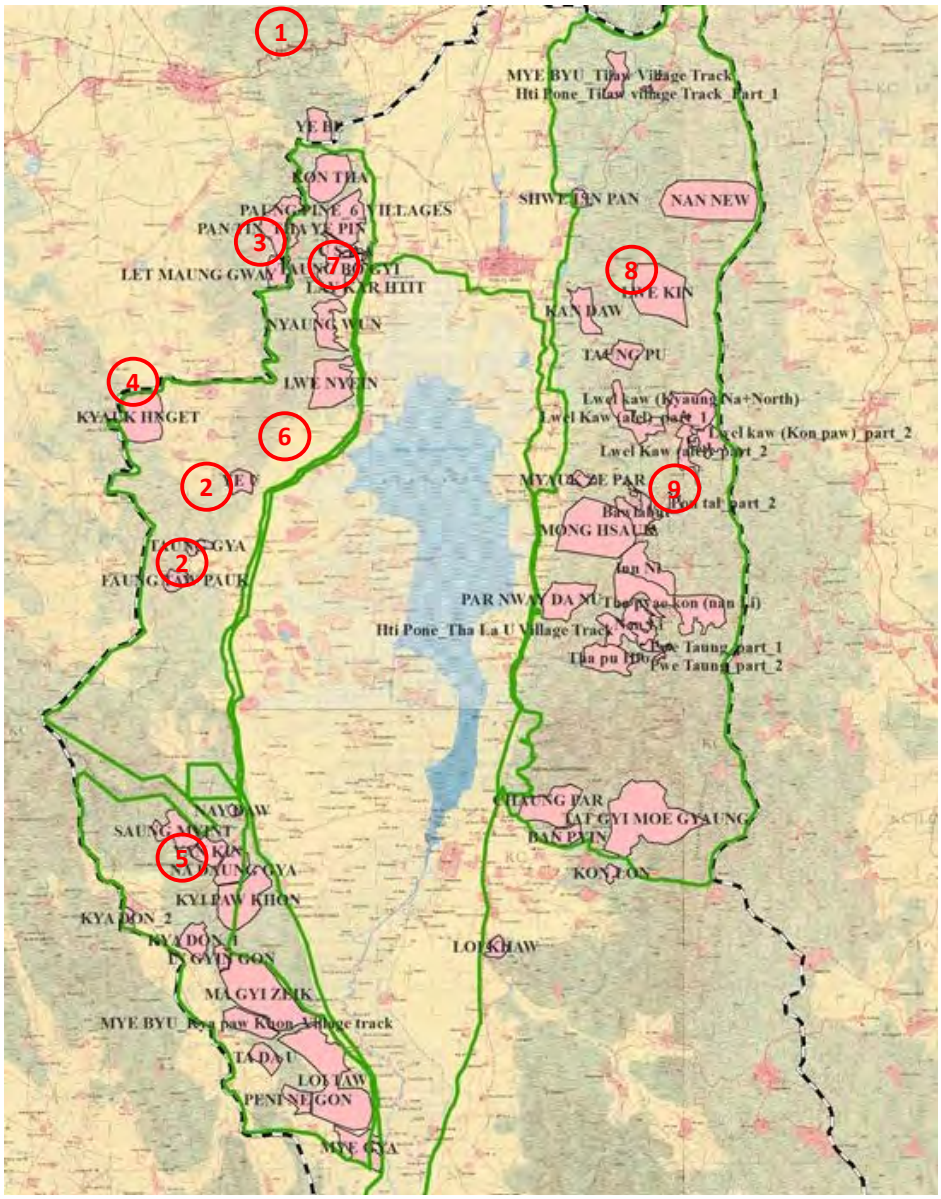

Table Ⅱ-18 Total Community Forest Establishment in Taunggyie[58]

(1) Status of CF in South Shan state

CF can be divided into two types: one that is set up in the forest managed by FD and the other that is set up in the area not classified as forest (hereafter Unclassified Forest). The CF of 20,959.7 acres (about 8,482ha) of 71 CFUGs is registered in Nyaung Shwe jurisdiction according to FD, which makes Nyaung Shwe the township with the largest CF around Inle Lake. In Nyaung Shwe, there is no CF registered as Unclassified Forest.

[58] Material offered by a staff member in FD Dissemination Planning Div. in April, 2017

The areas registered as CF, which include non-active CF, are shown in the table below. There are some CFs where agroforestry is employed for their severe desolation and intense dryness. (③ on the map). When planting trees, provincial FD offices offer free seedlings (① on the map).

Table Ⅱ-37 Status of CF in South Shan state

No.	Twonship	Reserved/ Protected			Unclass Forest			Grand Total	User Groups	members
		Plantation	Natural Forest	Total	Plantation	Natural Forest	Total			
		Acre	Acre	Acre	Acre	Acre	Acre	Acre		
1	Taunggyi	434.6	15.0	449.6	0.0	0.0	0.0	449.6	2.0	163.0
2	Kalaw	2,654.2	1,759.7	4,413.8	0.0	6,425.1	6,425.1	10,838.9	82.0	3,648.0
3	Pinlaung	402.0	3,063.3	3,465.3	0.0	7,347.0	7,347.0	10,812.3	41.0	1,320.0
4	Pindaya	11.0	0.0	11.0	0.0	5,727.4	5,727.4	5,738.4	19.0	2,073.0
5	NyaungShwe	1,828.1	19,131.6	20,959.7	0.0	0.0	0.0	20,959.7	71.0	4,573.0
6	Ywangan	0.0	0.0	0.0	0.0	8,695.0	8,695.0	8,695.0	29.0	1,662.0
7	SiSaing	1,356.5	0.0	1,356.5	0.0	2,074.2	2,074.2	3,430.6	10.0	781.0
8	Yatsauk	3,842.0	0.0	3,842.0			0.0	3,842.0	10.0	800.0
9	Phekhon	520.0	0.0	520.0			0.0	520.0	9.0	108.0
Grand Total		**11,048.3**	**23,969.6**	**35,017.9**	**0.0**	**30,268.7**	**30,268.7**	**65,286.6**	**273.0**	**15,128.0**

As a results of field study, overview of CF and Non-CF area in Nyaung Shwe are summarized in Table Ⅱ-38. Land use confliction and recourse-use right confliction between local people or against government was clarified under field survey. However, there is no confliction founded.

Table Ⅱ-38 Overviews of typical CF and non-CF communities in Nyaung Shwe district

Numbers in () correspond to the numbers on the map	Target				CF activity or forest conservation activity	Motive of CF activity (incentive) and problem
	Forest	Non-forest	CF	Non-CF		
(1)The northwest upstream area		○ -	○ -		Active group 140 members in 2016; 41 acres are registered. The key activity is afforestation. Planted 2,000 trees in fiscal 2016. 1,500 trees are to be planted in fiscal 2017.	■ Motive for the activity Acquisition of rights for collecting wood for construction and/or making fire, Inle Lake conservation, and climate change mitigation (storm protection) Disseminate information on the effectiveness of CF. □ Problems: none
(2) The west midstream area	○ -		○ -		One small, active group Forest conservation activity began in 1995, and 137 members are registered in 2011. Afforestation and patrol are key activities.	■- Motive for the activity Water source forest maintenance and acquisition of fuel wood collection right □- Problems Poor survival rate of planted seedlings (photograph 1). Illegal logging in CF area by intruders
(3),(4) The northwest upstream area		○ -	○ -		A group that hardly conducts any activities Land of 250 acres, with 70 members registered in 2000. No afforestation is currently being done. Forests are increasingly converted into farmlands. Hardly any forest remains in the reserve except CF.	■ Motive for the activity Acquisition of fuel wood collection rights, technical support from the government, and conservation of water source forest Trial of agroforestry led by the FD (photograph 2) □Problems: None that are serious
(6)The west midstream area	○ -			○ -	An unregistered CF group. Each family collects fuel wood from 3 acres of land (forest in the reserve) and sells it. (photograph 3)	Although the group recognizes the importance of forests and plants trees, few of the planted trees take root. While the group is willing to join CF, it is uncertain that it can join the CF as a smaller group than a village.

Numbers in () correspond to the numbers on the map	Target				CF activity or forest conservation activity	Motive of CF activity (incentive) and problem
	Forest	Non-forest	CF	Non-CF		
(9)- The east up- to midstream area	○ -			○ -	Unregistered CF group The community has managed 280 acres of forest since 2000 and prohibits deforestation without permission. New development of farmland is prohibited. (photograph 4)	With its unique climate, the percentage of seedlings taking root is low when the seedlings are planted.

Photo Ⅱ-29　Few planted trees take root, and some withered (②on the map).

Photo Ⅱ-30　Agroforestry that FD promotes (③on the map)

Photo Ⅱ-31　The fuelwood the size of 2m or taller is set against the tree in the back (⑥ on the map).

Photo Ⅱ-32　The forest (⑨ on the map) that the community manages by itself can be seen at the back of the farmland.

Photo Ⅱ-33 Food processing, domestic industry of non-CF

Photo Ⅱ-34 The fuelwood used for household industry is bought from another region (about 110 dollars for a boatful of fuelwood).

Photo Ⅱ-35 The water source forest in CF (water is used for drinking and cultivation) Upstream is enclosed as CF area, and trees are planted.

Photo Ⅱ-36 The remains of grass fire is observed in the woodlot of CF.

(2) Interview with FD officials

The current situation of the forest and CF management was investigated through interviews with officials from the local FD and NS offices. To upgrade the forest management, it became clear that the technical capacity of the forester should be enhanced and the manpower shortage should be addressed. The relationships between the CF communities and foresters were excellent at the sites where the interviews were conducted.

- Community Forestry (CF) has been introduced to 273 user groups in the Taunggyi as part of the forest management. The Forestry Department offices (hereafter, local FDs) in various regions support CFUG by monitoring each activity, supporting the creation of CF action plans, providing free seedlings, offering technical support, etc. When a local FD wants to plant trees in a forest reserve, it grows seedlings at its farm and provides the seedlings to the community (whether it is CFUS or not).
- Twenty-three staff members are assigned to the NS office of the FD. The foresters rely on patrols to manage the forests, but they have no know-how on effective patrolling and no technical capacity to fulfill the demands of the communities (they cannot give technical advice). Other unfavorable trends include a shortage in labor, rapid conversion to farmland in spite of the willingness to promote CF, and a lack of measures against the conversion.
- Local FD budgets are allotted based on the action plan: planting 150 trees in a farmland of 1 acre (about 0.4 ha) in four villages in eastern Inle Lake and one village in western bank under the budget for 2017. More acres (about 20 ha) have been secured for extra activities, but there have been no decisions on what to do or how to allocate the budget. Apart from the above activities, the state FD is in charge of allocating the budget for each labor cost. (The activity expense recognized so far is generated by afforestation of 5 acres in five villages.)

(3) Issues of CF in the southern part of Shan State

The damage to the forests around Inle Lake has becomes severe and farmlands are expanding into the reserves in the upstream area the FD manages. According to the interviews with the communities, deforestation started at least 15 years ago. A population growth of about 1,100 could be confirmed in the past ten years according to the immigration office in the NS district, and a similar tendency was confirmed in the NS region during the site investigation. The

demand to use resources and cases of land conversion are assumed to have increased, so land use management and management requests to the municipal offices are urgent issues to address.

After 2014, power supplies became available in larger areas and the dependency of the communities on fuel wood began to decrease in mid- to downstream areas. However, fuel wood remains the main energy source in the upstream areas. Deforestation is therefore caused by a lack of energy resources in local communities and lack of alternative livelihoods for the communities depending on fuel wood sales, which casts effects on the socio-economy.

The survey confirmed that the communities in the mid-upstream area (mountain region) still rely on forest resources or slope farming while those in the downstream area have switched their livelihood to the travel industry and agriculture. Moreover, the communities in the upstream area have only a single means of earning a living and are thus easily affected by both the market and climate. Since forest resources are already gone in the area surveyed, few non-wood products (e.g., honey, mushrooms, medical herbs, fruits) were produced, as in other countries.

CF can be roughly divided into two groups. One group received CF certification in the early 2000's but is not actively involved and relies on patrols as its major activity. The other is actively involved CF and has been active in projects by planting trees, etc. since the CF certification in 2015. The passiveness of the former group may stem from the decline in the use of natural resources due to the decreasing demand for fuel wood and the large distance from the residential area to the CF. The activeness of the latter group is thought to stem from the secured rights to use natural resources, the ability to protect a certain forest area as a water resource (prohibit intruders), the effect of mitigating windy and dry climate, and other factors.

As to other donors' activities, RECOFTC is conducting CF promotion activities in cooperation with the FD mostly on the eastern bank of Inle Lake, and will continue doing so until December 2017. It was also confirmed that USAID implements efforts4 to improve land use in the upstream area on the northwest bank of Inle Lake.

By observing the forest management system of the local FD, it became clear that the capacity-building of foresters and labor shortage should be addressed to promote forest management and CF. According to the FD, there are also difficulties in promoting afforestation and forest conservation in the lands where communities insist on their rights to use them. This is to be expected, as the forest reserve was established in an area inhabited by the community for

more than 100 years. (An excellent relationship between CF community and forester was observed during the visit to the community.)

The use of CF is assumed to be effective in enhancing the natural resource management around Inle Lake. The introduction of land use planning and land use improvement (including improvement of agricultural techniques) along with the CF activity conducted in the forest area is thought to be effective for the community. Another indispensable task will be to raise the awareness about natural resource management and CF activities in not only the target community, but also the neighboring communities. Regarding the FD, it is recommended that it evaluate and improve its forest management skills (selection of nursery trees, evaluation of tree-planting techniques, and others) while establishing an effective monitoring system. Added to that, an issue found in Nyaung Shwe township was a shortage a labor in a local FD for monitoring and managing a vast area that the FD sought to expand as a natural resource area. Training of the FD's partners (CSO group and/or communities' group) is thought to be important to the realization of the sound management and monitoring of the vast area.

7.4.3 Potential of business for solving problems in the CF field

In promoting natural resource conservation activities in the area around Inle Lake, the need to conduct activities targeting communities and regional FDs was confirmed.

The FD must strengthen its governance for forest conservation and improve the capacity for natural resource management systems. For the community, meanwhile, the implementation of livelihood improvement is proposed. The current status, issues, and necessary support are summarized in the table below.

Table Ⅱ-39 Current issues

Inle Lake Catchment area		Improvements in governance abilities and abilities to maintain a natural environment management regime	Social economy / CF expansion / living improvement
Upstream	Administrative body and policy	・ The CF area and forest under the FD's jurisdiction are managed to some extent. ・ No watershed management is performed in the catchment area around Inle Lake. ・ Management shortage in the Unclassified Forest under GAD ・ Cooperation between ministries and parties concerned is underdeveloped.	・ The implementation status and management regime are below a satisfactory level while CF is promoted. ・ The numbers of staff members are limited in the local areas (labor shortage). ・ Management shortage of Unclassified Forest area (deforestation in the non-classified area)
	Local populace	・ Forest management through CF ・ Management shortage for Unclassified Forest ・ Unsustainable forest use	・ Communities still depend on forest resources as heat sources in the non-electrification region. ・ Fuel wood shortage ・ An alternative livelihood after the deforestation is limited. ・ Forest fires occur frequently in CF.
Downstream	Administrative body and policy	・ Management for the UNESCO reserve is handled by the FD. ・ An Inle Lake conservation committee has set it up. ・ Cooperation is not fully developed among the parties concerned.	・ The implementation status and the management regime are below a satisfactory level while CF is promoted. ・ The numbers of staff members are limited in the local areas (labor shortage). ・ Unclassified Forest ・ Management shortage of Unclassified Forest area (deforestation in the non-classified area)
	Local populace	(Issues are addressed in the agricultural sector.)	・ A total of 273 user groups (CFUG) have registered in the Inle Lake catchment area. ・ A part of CFUG is non-active. ・ Forest fires occur frequently in CF. ・ Because of the difficulty in accessing the resource, the means of livelihood have to be changed.

Table Ⅱ-40 Item that requires support

Inle Lake Catchment area		Governance, improved ability to maintain a natural environment management regime, and biodiversity conservation	Social economy / CF expansion / living improvement
Up-stream	Administrative body and policy	・ Inclusive plan-making and capacity-building for land use improvement and resource use improvement of slope land ・ Strengthening the ties among central and local ministries ・ (Upgrade the management regime in Unclassified Forest)	・ Identification of baseline ・ Effective CF promotion and establishment of a management regime ・ Securing a budget for CF promotion in the upstream area ・ Management of non-forest area ・ Management of non- CF area
	Local populace	・ Inclusive plan-making and capacity-building for land use improvement and resource use improvement of slope land	・ Identification of baseline ・ Forest fire prevention in CF (awareness-raising) ・ Securing heat sources by afforestation through CF activity ・ Creation of alternative means of livelihood
Down-stream	Administrative body and policy	・ While the Inle Lake maintenance committee has been supported by UNDP and others, the committee needs additional support in order to fully function (support from UNDP is expected). ・ System establishment for enlightenment	
	Local populace	・ Optimization of Inle Lake conservation and agriculture ・ Building of a system to diffuse information and knowledge to a larger area	・ Identification of baseline ・ Forest fire prevention in CF (awareness-raising) ・ Securing heat sources by afforestation through CF activity ・ Creation of alternative means of livelihood

1）Activities for forest resource users (community) around Inle Lake

The figure below summarizes the groups that use the forest resources directly and/or indirectly around Inle Lake. The resource users are classified according to the above-mentioned findings into six groups, from A to F (circled in gray). Each classified group is expected to execute an activity concerning the use of the CF system when it undertakes the watershed management and natural resource management of Inle Lake. The CF activities

implemented by CFUG were twice to three times p. How to motivate CFUG will be a challenging issue.

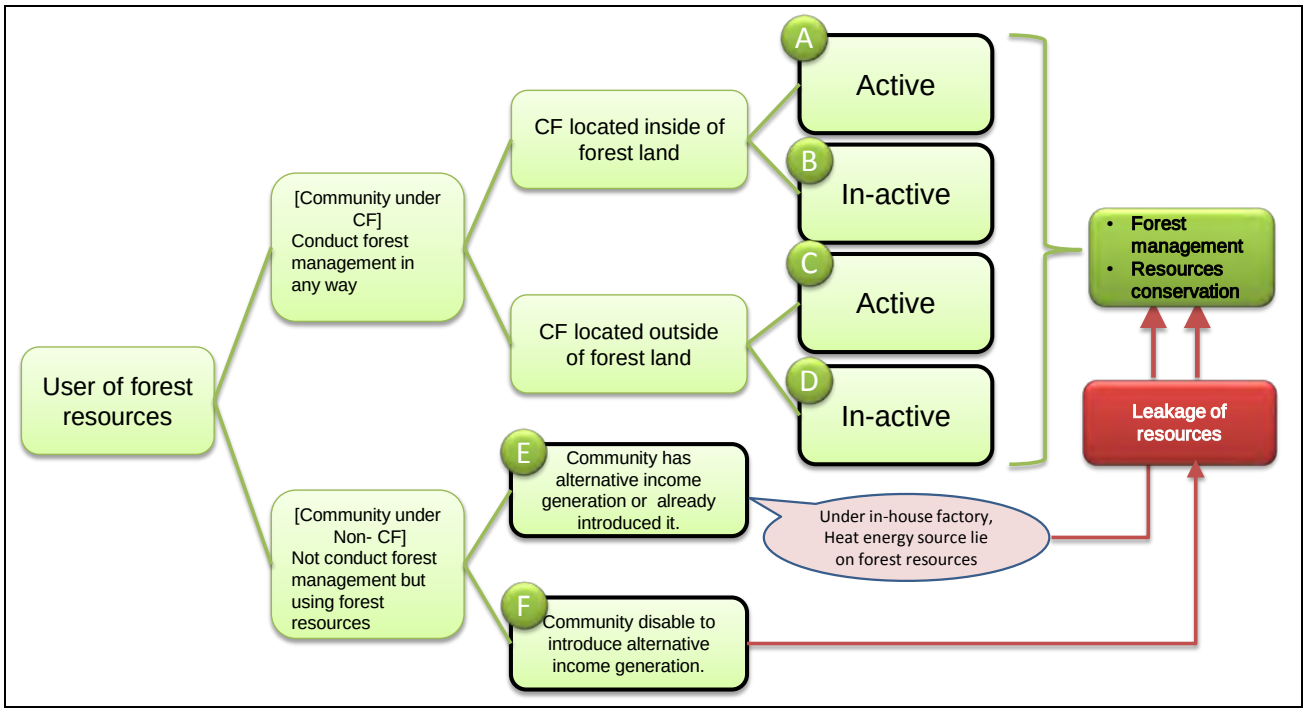

Figure Ⅱ-19 Categorization of forest user group around Inle lake (Agent)

2) Activity for local FD

There is room for improvement in the afforestation technology, but technical support for local FD foresters may be limited. Forest management can be enhanced by screening tree species for the production of nursery trees and improving the tree-growing processes after the technological ability of FD is evaluated.

Illegal logging by intruders continues in the forest remaining in CF, and the FD and community cannot thoroughly prevent them. More efficient and more effective monitoring must be conducted along with awareness-raising in the neighboring areas in order to expand CF.

7.5 Mobilization of GCF Fund over Shan State

7.5.1 Overvoew of GCF fund and application to REDD+

Readiness and scaling up of REDD+ are phases to establish implementation framework including national strategy and action plan, formulate monitoring system, and build capacity in order to shift to implementation phases. MRV of emission reduction is not included and this is, thus, the outside of framework to regulate operation, which is currently discussed at GCF board.

This means that project approval and fund injection are implemented with the same form of general forest related projects.

（1）Full scale implementation Phase

Result based payment shall be execute while appropriate MRV apply to project results (emission reduction). Outline of payment rule has been defined under UNFCCC. However, credit price or avoidance of double finance, detail rule has not been regulated yet. These issues are discussing under GCF Board and it may concluded on next 18th GCF Board meeting.

（2）Readiness and Feasibility Study Phase

This phase is transition phase to full scale implementation and development of national REDD+ strategy/action plan, development of monitoring framework and related capacity development are include. MRV for emission reduction is exclusion of this phase. Therefore, project approval is carry out as same as general forestry projects.

This fund is mobilized through either “Readiness and Preparatory Support Programme” “Project preparation facility” or a project. The fund of Readiness and Preparatory Support Programme is available for 1,000,000 US dollar as maximum per year per country for capacity building on National Designated Authorities (NDA) and focal points. Project preparation facility is a funding support to Accredited Entity (AE) to formulate small scale projects.

The facility is applied for 1,500,000 US dollar as maximum. On the other hand, so far, the projects in Ecuador and Madagascar are accepted as forest related projects that potentially become REDD+ complete implementation project in the future. The project in Madagascar includes not only forest related activities but also adaptation and mitigation activities through agriculture and renewable energy programs.

7.5.2 Discussion on fund mobilization to Taunggyi

There are three steps in case mobilizing GCF fund to REDD+ as mentioned at 7.5.1. Formulation of action plans and monitoring system in relation to REDD+ are moved ahead by UN-REDD to the Government of Myanmar. Moreover, with a central focus on UNDP, there is an action to mobilize GCF readiness scheme for strengthening support.

It is considered that not only emission reduction activities based on REDD+ actions, but also activities including the installation of forest conservation and sloping agriculture in order to deal with an area in which agriculture is main income source, so called 'adaptation', are essential. Hence, scaling up phase scheme rather than implementation phase is more appropriate.

However, Taunggyi district is relatively small compering with the projects in Ecuador and Madagascar. Furthermore, safety issue will be emerged if its project area was extended to Shan state scale resulting in that this project would face hardships. Therefore, GCF fund mobilization to proposing project at Taunggyi district is difficult.

Instead of GCF fund mobilization, a JICA technical cooperation project is evaluated with promising result. There are mainly two reasons; firstly, JICA has experiences and knowledge to implement various activities to address current situations, and secondly, the scale of project and its area is appropriate for the JICA technical cooperation project.

8. Detailed Studies at the Candidate Sites for the REDD+ Project (Bago Yoma)

8.1 Introduction

Myanmar is a forest country with 67% of its land (44 million ha) is covered by forests and woodlands. The country used to produce timber under an exemplary forestry management system that originated during British colonial rule. However, as modern development led to excessive timber extraction, Myanmar shifted its forestry policy in 1990 from management to protection, aiming to conserve forests for public purposes by enacting the Forest Law in 1992, and encouraging local citizens to participate in forest management by issuing the Community

Forestry Instructions in 1995. Yet Myanmar's timber production began to soar and, according to the forest resource statistics of FAO, it became the world's third fastest deforestation country, losing 546,000 ha of forest every year at an annual rate of 1.8%. As illegal logging and timber export became rampant, the Myanmar government issued a ban on the export of raw timber logs in 2014 and launched other forest conservation initiatives albeit in a chaotic manner at times. In view of these circumstances, studying the feasibility of implementing REDD+ projects in Myanmar is a timely attempt for the country as well.

8.2 Outline of the Surveyed Region

Researchers, etc. have conducted a study related to the implementation of REDD+ in Moe Swe District in the Bago Mountains between FY2014 and FY2016 under the Environment Research and Technology Development Fund, the results of which indicated that implementing REDD+ will have high forest conservation effects in the region. However, due partially to the presence of experimental forests created in Moe Swe by the Forest Research Institute of Myanmar, no large-scale deforestation is occurring in Moe Swe, and forest degradation in the region is caused mostly by illegal logging but not so much by slash and burning, a common farming practice in other parts of Myanmar.

For this reason, we expanded the candidate region for REDD+ to include Lewe, a district located along the northern edge of Bago Yoma, where apparent signs of slash and burning can be observed in Google Earth images. We organized village assembly meetings and conducted questionnaire surveys in the following three villages within Lema District and carried out biomass and socio-economic studies in order to assess the potential for implementing REDD+.

The results of the studies revealed that deforestation and forest degradation are progressing in all three villages but for different reasons due to each village's unique historical background and problem structure.

Both Moe Swe and Lewe used to be covered by forests dominated by natural teak, which, however, was aggressively extracted to support the financial needs of the country. While natural forests of large biomass trees still remain in remote areas that are difficult to access, natural teak and other valuable commodity trees have been mostly logged out of existence. As for plantation teak, large-scale teak plantations spread along the roads in Moe Swe, where experimental forests are also situated, and are about to mature. In Lewe, teak trees are also planted widely because of its favorable geographic conditions, but not successfully in most cases, as teak trees in Lewe rarely have a chance to mature due to illegal logging and slash and burning.

In both districts, areas with relatively easy access are dominated by thick bamboo groves as a result of open burning and other human activities, and forest ecosystems composed only of wooded trees are hardly seen.

The major difference between the two districts is the commercial use of abundant bamboo resources. While people in Moe Swe actively extract bamboo shoots and stalks for commercial purposes even to an excessive degree in some cases, those in Lewe harvest them only for their own consumption and leave the rest in most areas with some exceptions.

8.3 Local Offices of the Department of Forestry

8.3.1 Lewe District Forestry Office

Lewe is within a day trip distance from Naypyidaw. Lewe District is an administrative division equivalent to district, and the forests within the District fall under the jurisdiction of the local office of the Department of Forestry. To conduct a field survey in this area, the study team needs to visit the District Office first to obtain permission. In Lewe District, multiple afforestation and reforestation projects using the taungya plantation method have been implemented.

8.3.2 Minbyin Forestry Station

This is a local station of the Forestry Office that can provide lodging and food for the forestry officers in charge of the west end area of its jurisdiction. Study expeditions to all target villages are to be accompanied by the forestry officer at the station.

8.4 Reasons for Selecting the Candidate Sites

We selected Moe Swe and Lewe districts in the Bago Mountains as candidate sites for the study for the following reasons:

- Large carbon storage capacity preserved through forest conservation

High potential regions for REDD+ activities in Myanmar that are left with relatively large forest areas are situated near the borders of Shan, Kachin, Sagaing, and Chin State, as well as in the Bago Mountains in the central region.

- Regions with ongoing deforestation and degradation, on which REDD+ will have a significant impact

REDD+ requires a timeframe spanning a few decades, as well as collaboration between the government and local residents based on mutual trust, which is essential. In this regard, the Bago Mountain region is more primed for REDD+ activities than the state border regions. In addition, large-scale slash and burning, one of the drivers of deforestation and forest degradation, was observed in the Google Earth images of Bago Yoma.

- No security risk

The state border regions have some security and access issues. The Bago Mountain Region is better suited for establishing a project implementation structure within a short period of time.

- No redundancy with other REDD+ projects

Korea Forest Service is implementing a project that aims to register in VCS in Taunggyi District in the Bago Mountains. To avoid redundancy, we selected Lewe District at the northern end of Bago Yoma.

- Close proximity to capital city Naypyidaw

To create a model case for REDD+, it is desirable to maintain close communication with the officers of the Forest Department of the Ministry of Natural Resources and Environmental Conservation that comprise the task force of REDD+. Thus, the site was chosen within a day trip distance from Naypyidaw.

- Can be built upon Japan's past experiences and activities

Technical cooperation and study projects related to REDD+ have been conducted by Asia Air Survey and Hiroshima University, the outcome of which can be utilized for new REDD+ activities.

- Can be a model case for future propagation

The Bago Mountain Area has been following the typical patterns of deforestation and forest degradation in Myanmar, such as influx of new population associated with the migration of forestry workers into the mountain area to work for large-scale timber extraction projects by the Myanmar Timber Enterprise, as well as deterioration of forests caused by slash and burning and unplanned logging. In addition, close proximity to administrative organizations in charge of

REDD+ makes the area suitable for establishing the center, from which the outcome of REDD+ can spread to the rest of the country.

8.5 Extraction of Target Villages of REDD+ Study and Their Outline

Among the villages that show many signs of slash and burning in their Google Earth images taken at different time periods, we selected three target villages for the study: 1) a village located in an easily accessible area along a railroad or major road, s) a village located away from major roads where slash and burning is practiced widely but natural forests remain in the surrounding areas, and 3) a village located near Naypyidaw surrounded by forests that are already deteriorated. The outline of each village is described below.

8.5.1 Swe Taw Myaung (Village S)

This village is located in a hard-to-access area away from major roads and still left with many forests around normal and slash and burn farmlands.

[Facts gathered by interviewing 40 or so villagers at a village assembly meeting]
Village S is the most difficult to access among the three villages studied this time. The village already existed over 100 years ago with 15 households, which expanded to 264 households with 1,400 residents today. 80 households own farmland while 180 do not and engage in slash and burn farming. Population pressure of the village is high.

Of the agricultural crops produced, rice is grown for their own consumption, and sesame and beans for cash. The ethnic composition is 100% Bamar. As mentioned earlier, selling of cash crops is hindered by difficult access to major transportation routes.

Although Village S appears to be more blessed with forest resources than the other two villages, the economic value of the forests is deteriorating due to extraction of commercial tree species by the state-owned Myanmar Timber Enterprise. During the logging season, workers move into the village and engage in slash and burn farming, one cycle of which used to be 10 to 15 years, but is shortening recently, contributing to deforestation and forest degradation.

8.5.2 Aung Myan Yar (Village A)

This village is located along a railroad crossing the Bago Mountains east to west. Majority of the forests has been converted to normal and slash and burn farmlands.

[Facts gathered by interviewing 20 or so villagers at a village assembly meeting]

The number of households increased from 42 around 1976 to 300 today, composed equally of Bamar and Chin tribes. Although the Chin people are generally catholic, those living in this village are Buddhist. The Bamar people engage in stationary farming while the Chin people practice slash and burn farming, one cycle of which is usually three to five years but may vary depending on the size of the land available. The whole village grows rice for their own consumption and extracts bamboo stalks (a broker comes to the village) and wood charcoal for cash.

It was initially a Bamar village but has been inhabited by an increasing number of outsiders since teak plantation projects began there with financial assistance from ADB and World Bank. Following this trend, the Chine people also began settling into the village increasingly. Old-time villagers own farmland to cultivate rice. New settlers, who came to work for plantation projects and remained in the village after the projects, are engaged in slash and burn farming. Agricultural crops that the villagers are interested in Mango, plantation teak, green bean, cotton, and chili pepper.

8.5.3 Lema (Village L)

This village is situated on mild hills halfway between the above-mentioned two villages and the flat plains. The forests surrounding the village are severely deteriorated. There are traces of planted teak trees, which however are not growing well.

[Facts gathered by interviewing 30 or so villagers at a village assembly meeting]
Forestry workers began settling in the village in and around 1975. The government-initiated plantation projects were completed between 1996 and 1999, and the Department of Forestry allotted a plot of land to each of the 123 households then. Subsequent settlers were not provided with land. The number of households has increased to 220 today.

While large-scale farmers can live on agricultural income alone, 100 households without land cannot. We observed many teak plantations, which were originally developed by the government but are now dominated by bamboo groves, as well as many teak stumps left by illegal loggers. According to the farmers we interviewed, the areas, from which teak trees were extracted, have been converted to farmland.

Due to lack of farmland to ensure self-sufficiency, 7% of the villagers go to other countries to work, and 20% to other places within Myanmar. In addition, a large flood disaster occurred last

year, for which deterioration of the surrounding natural environment may be partially responsible, resulting in the loss of 1,200 baskets of rice.
On the other hand, the villagers have enough fuel wood for their own consumption, as well as an ample supply of bamboo materials as a result of conversion of teak plantations into bamboo groves. The villagers are hoping to grow vegetables and peanuts to increase income.

8.5.4 Geographical Conditions of the Surveyed Villages

Village A and Village S are both situated in the deepest areas of Lewe District. Forest development began relatively early in Village A due probably to its location along the railroad, where plantation projects were implemented by international organizations (ADB and World Bank) in 1976. Village S has forest reserves in the adjacent area and is blessed with abundant forest resources. Timber extraction was carried out in the village by public enterprises 20 or so years ago. Village L sits on a mountainous terrain in an easily accessible area, where teak plantation has been carried out by the Department of Forestry.

Lewe District has mild hills spreading over the area close to Naypyidaw with little steep slopes that are not suitable for agricultural production. For this reason, the secondary forests that are remaining after repeated burning are not growing well and covered mostly by thick-growing bamboo as the dominant vegetation. As we went deeper into the hills, we saw steeper, longer slopes with distinct elevation differences between the ridges and valleys. However, the topography of the surveyed area is relatively moderate compared to that of the adjacent Moe Swe District.

8.6 Status of Forests

As far as we observed from roads, intrusion of bamboo suggested acceleration of deforestation and forest degradation in Lewe at a faster pace than in adjacent Moe Swe. Forest deterioration was observed widely throughout the district caused by a variety of factors, including expansion of farmland within the forests, legal and illegal logging, poorly grown secondary forests as a result of slash and burn farming and abandonment of croplands, and extraction of fuel wood, logging of teak and other commercial wood species.

However, as we went deeper into the forested ridges of the Bago Mountains, we increasingly saw spots and patches of woodlands, indicating that deforestation and forest degradation caused by population influx is currently expanding inward.
1) Chronological changes in forest resources based on satellite data

To assess the deforestation status of the target villages, we cut a rectangle (Fig Ⅱ-18) as the representative area out of Landstat images captured in 1989, 1999, and 2016 (Fig Ⅱ-19). The size of the rectangle is 25km east to west and 50km north to south.

Figure Ⅱ-20 Satellite data area

Here, we attempted to assess the degree of deforestation by comparing the images of 2000 and 2016. However, as the area has many bamboo-wood mixed stands and small gaps, it was difficult to distinguish shrub, mixed, bamboo forests, etc. in many parts of the images due to low resolution. To overcome this, we created 198 sample points in the 2016 image and identified representative forest stands within a 100m radius from each sample point using Google Earth images. In some areas around Lewe, for which high-resolution Google Earth photos were not taken in 2000, we derived the land cover classification based on logical reasoning.

Through the above process, we identified 28 out of 198 points that have been converted from forest to non-forest, meaning that the deforestation rate in and after 2000 is 14%.

Jan 16, 1989 (Landsat 4) Dec 30, 1999 (Landsat 7) Feb 4, 2016 (Landsat 8)

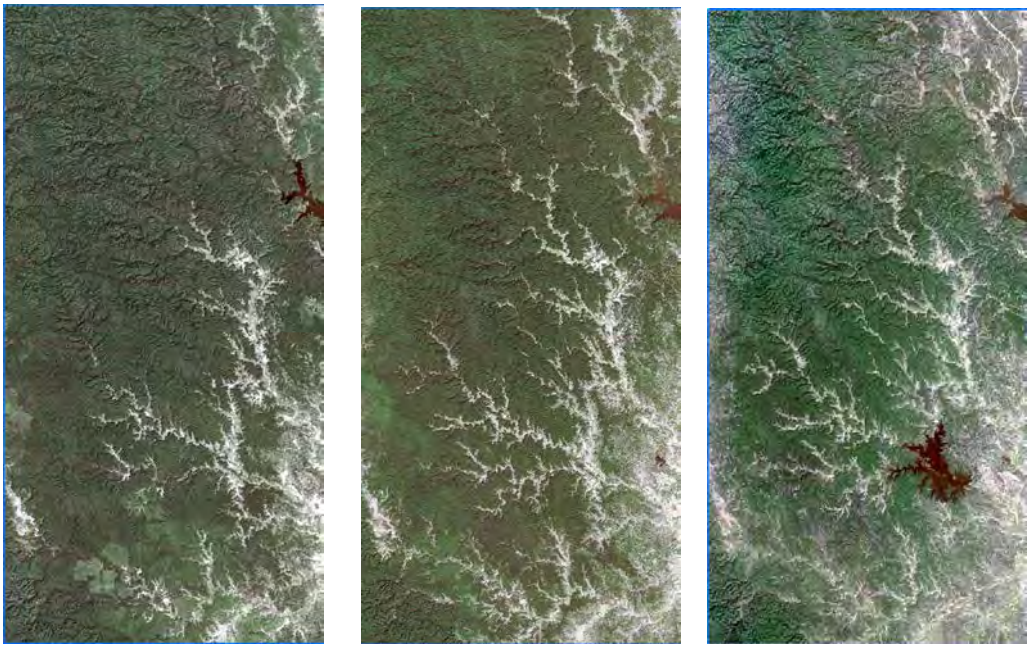

Figure Ⅱ-21 Landstat Images of Moe Swe and Lewe

For Moe Swe District, which is the northern half of the rectangle, a detailed analysis on forest classifications has been conducted under a separate project (Environment Research and Technology Development Fund) using ground truth information. Using the result thereof (Fig Ⅱ-19), we will explain in more detail the changes in forest cover below.

We used Landstat images, as is the case with Fig Ⅱ-19, complemented by Google Earth, Worldview, and drone aerial images, as well as field survey findings, etc. to improve accuracy of forest classification. Fig Ⅱ-20 shows an aerial photo of a wood-bamboo mixed forest taken with a drone.

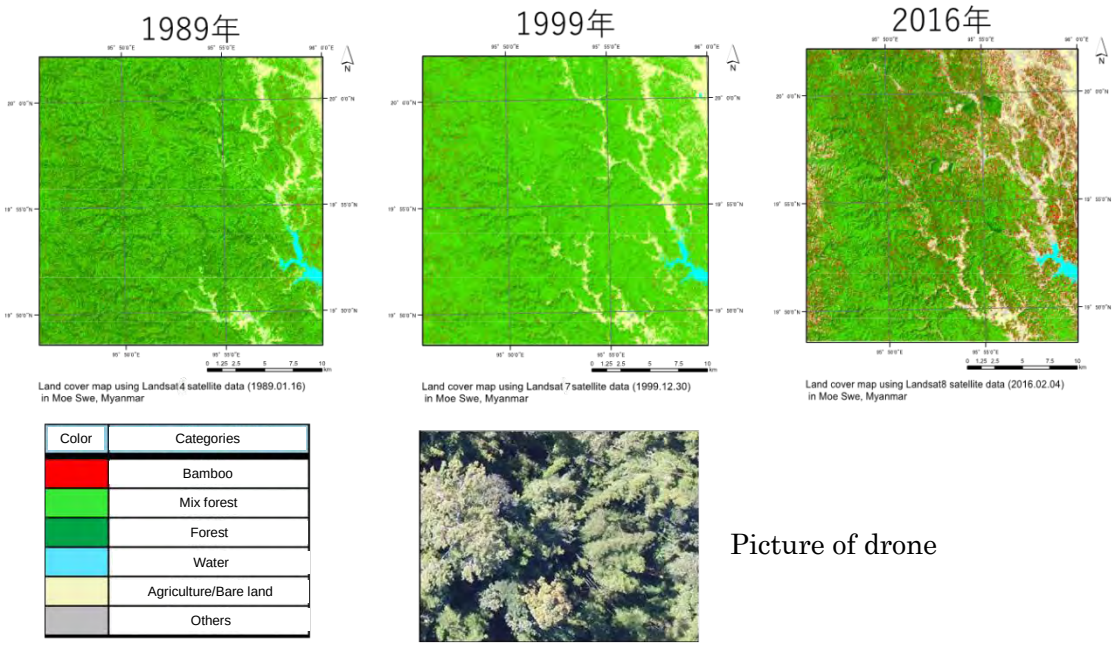

Figure Ⅱ-22 Forest classification based on remote sensing data

Table Ⅱ-41 Forest maps created based on Landstat Images

Class	1989/1/16	1999/12/30	2016/2/4
①Bamboo forest	18.1	15.9	77.7
②Mixed Bamboo forest	386.0	484.4	257.5
③Forest	183.9	67.3	172.9
④Agriculture/Bare land	32.6	53.0	72.8
⑤Water body	5.3	4.8	3.9
⑥Others	0.3	0.7	41.9
Total	626.2	626.2	626.8

We investigated the changes in land use at the three different time points while paying attention to bamboo groves. The changes in the area of each land use type is shown in Table Ⅱ-41, which shows that both farmland and bare land (①) expanded with time at a slow pace of 20km^2 per interval and that the land use categories that showed the greatest fluctuation are mixed bamboo-wood forests (②) and wooded forests and tree-dominant forests (③). The 1980s and 1990s were the times when teak was extracted and planted vigorously in the Bago Mountains as the specialty product of the region, which also facilitated the extraction of other commercial tree species besides teak by the Myanmar Timber Enterprise. For instance, the timber production in the whole of Myanmar was 18.8million m^3 in 1990 and deceased to 4.3 million m^3 in 2010.

Against this backdrop, wooded forests and tree-dominant forests (③) decreased significantly during the 1990s, which invited the intrusion of bamboo into extracted forest gaps, causing the increase of mixed bamboo-wood forests (②).

According to Table Ⅱ-42, the deforestation rate of bamboo and wooded forests between 1999 and 2016 was 10.5%. As the deforestation rate shown in Table Ⅱ-42 was 14%, it can be said that Lewe has a greater deforestation rate than Moe Swe albeit some differences in interpretation precision.

Table Ⅱ-42 Area (km^2) by Land Use Category

Category	1989/1/16	1999/12/30	2016/2/4
①Bamboo grove and bamboo-dominant forest	18.1	15.9	77.7
②Mixed bamboo-wood forest	386.0	484.4	257.5
③Wooded forest, tree-dominant forest	183.9	67.3	172.9
④Farmland, bare land	32.6	53.0	72.8
⑤Water body	5.3	4.8	3.9
⑥Other	0.3	0.7	41.9
Total	626.2	626.2	626.8

Forest degradation is also aggregated by population growth, as the demand for fuel wood (38.3 million m^3) is much greater than that for timber (4.3 million m^3) in Myanmar. The 2000s saw the acceleration of teak plantation in the bamboo-wood mixed forests (②), and wooded forests and tree-dominant forests (③) were divided into two groups that have taken opposite paths with one group travelling towards reforestation and the other towards degradation and conversion into bamboo groves/bamboo-dominant forests (①) due to fuel-wood extraction and illegal logging.

There are some spatial characteristics in land use patters: the further away the forest from villages, the greater the forest biomass and the number of teak trees. Illegal logging pressure tends to be larger in deep remote areas that are out of site from supervision. Contrary to our initial assumption that the greater the distance from villages the weaker the human impact, no apparent spatial trend was observed in forest degradation.

8.7 Profiles of the Surveyed Villages

8.7.1 Survey Method

We interviewed the headman and primary members of each village and asked questions regarding the basic profile of the village as shown in Table Ⅱ-41. The interviews were carried out by the Study Team in Village A and by the staff of the Forest Research Institute in Villages S and L.

8.7.2 Main Characteristics of the Villages

(1) Ethnic Groups

Village A is composed equally of the Bamar and Chin peoples. The population of Village S is a mixture of Bamar and Karen people, and Village L is comprised only of the Bamar.
Each village is divided into two groups: one consists of people who own farmland and have been living in the village since old times and the other is a group of new comers without farmland. Some of the villagers with farmland are also engaged in slash and burn farming. In Village L, which is located near Naypyidaw and under the heavy influence of monetary economy, 7% and 20% of the households send their family members to work in other countries and other places in Myanmar, respectively.

None of the villages has a customary law or a committee-like organization that regulates land use. For this reason, we were told that new settlers are using part of the farmland owned by their relatives who invited them to live in the villages. However, the Google Earth image of 2016 shows large-scale slash and burn farmlands 2 to 3km away from the villages, which are not in the Google Earth image of 2003. This may mean that, contrary to what we were told at the village assembly meeting, new settlers are creating new slash and burn fields. Moe Swe District has a rule that a villager, who has cultivated the same plot of land for 10 consecutive years, will be allotted the plot by the Forestry Department.

(2) Changes in the Number of Households

According to the basic profiles of Swe Taw Myaung (S), Aung Myan Ya (A), and Lema (L) Villages shown in Table Ⅱ-41, Village A has the largest population followed by Village S and Village L. Each household has five or so members on average.

The number of households doubled during the past decade in all the three surveyed villages, and human impact on the environment is evidently increasing as shown in the satellite data taken at three different time periods. High population growth is due to migration triggered by the

commencement of forestry activities by the Myanmar Timber Enterprise, as well as associated tree-planting activities by the World Bank, etc. and forestry activities of private enterprises, which caused influx of forestry workers into the forest areas. Many natural forests remain in Village S, which has the largest population growth rate with the largest number of new settlers among the three villages. This means that the Village S presents a great development potential and, at the same time, is the most critical village from the viewpoint of forest conservation. As for available translation, Village A is situated along a railroad and easiest to access, whereas motorbikes are basically the only means of quick transportation in the other two villages.

（3）Infrastructure

All three villages have sufficient supply of drinking water, as the Bago Mountains are still left with many forests with abundant groundwater. Each village has elementary and junior high schools. The only welfare facility lacking is a health clinic. As for transportation infrastructure for travelling in and out of the village, only Village A has access to railway while people in Villages S and L do not have adequate transportation means and need to travel on foot or by motorbike at best. None of the villages are installed with irrigation facilities for agricultural production.

（4）Social and Natural Phenomena

Settling of new populations began in Village L, A and S in that order. As tree-planting activities began in the same order, it is safe to assume that population influx began following the start of forestry production.

Forest fire has been a chronic occurrence in the Bago Mountains due to practice of slash and burn farming while flood hazard is a recent phenomenon of the last few years. The impression we received from the interviews was that floods are caused by the decreased watershed recharge capacity due to deforestation combined with abnormal weather. This is a phenomenon never experienced before in previous generations according to the village elders.

Table Ⅱ-43 Basic information of the villages

	Population	No. of households			Transportation			
	2016	2016	2011	2006	Bicycle	Motor-cycle	Truck	Train
Swe Taw Myaung	1264	264	200	120	Yes	Yes	No	No
Aung Myan Yar	1661	300	245	160	Yes	Yes	Yes	Yes
Lema	936	220	170	140	Yes	Yes	No	No

	Drinking water	Education			Health facility	Fund	
	Well (%)	Elementary	Jr. high	Sr. high		Village Fund	NTFP
Swe Taw Myaung	100	Yes	Yes	No	No	No	No
Aung Myan Yar	100	Yes	Yes	No	No	Yes	No
Lema	100	Yes	Yes	No	No	No	Yes

	Rules				Social/natural phenomena			
	Forest management	Land use	Dispute	Water resource	Settlement began	Tree planting	Forest fire	Flood
Swe Taw Myaung	No	No	No	No	1991-	1971-1990	1970-	2010-
Aung Myan Yar	Yes	No	No	No	1981-	1970-1989	1970-	2010-
Lema	Yes	Yes	No	Yes	1980-	1971-1980	No	2010-

8.7.3 Socio-economic Conditions of the Surveyed Villages

(1) Survey Method

Sustainable forest conservation by sustainable forest management is a prerequisite for REDD+. To ensure this, a three-phase approach has been adopted as part of the REDD+ mechanism. The objective of Phase 1 is capacity building of REDD+ stakeholders, such as administrative agencies, residents, NGOs and consulting firms that provide support, and forestry-related enterprises having direct interest in forest conservation. REDD+ activities are implemented on a trial basis in Phase 2 and in full scale linked to the carbon credit market in Phase 3. International aid organizations most often take part in Phase 1.

In order to mitigate deforestation and forest degradation caused by humans, we need to identify the causative activities (drivers) and those engaged in such activities (agents) and extract the root causes as to why the agents have to engage in such activities.

Socio-economic surveys are essential for these types of analysis that hold key to successful implementation of REDD+. In this study, we inquired about each household's family structure, real estate and movable properties, revenues and expenditures, degree of satisfaction with life, agricultural production, use of forests, experience and willingness to participate in group activities. Due to limitations of space, only those that are relevant to REDD+ are described below.

We conducted the survey at the beginning of a rainy season, which is a busy period for farmers. For this reason, we decided to limit the sample size to 30 households and surveyed 10 households that were available to answer questions instead of selecting the samples randomly. It should be noted that some villagers might not have answered some of the questions concerning illegal practices honestly, as the survey was conducted by the personnel of the Forest Research Institute of Myanmar, a subordinate organization of the Forestry Department. Accordingly, the statistical data is biased more or less.

(2) Villagers' Livelihood from the Perspective of Movable Properties

We analyzed the livelihood of villagers in Village S, A, and L based on their responses to the questionnaire. Every household uses well water for drinking and is satisfied with the status quo for their water needs. Under a government project, each house has been provided with a solar panel, and 26 of 30 households own a cell phone, and about half of them (16 households) own a TV set. 27 households own a motorbike as an essential property for living. Every household in Village S, which is located in a remote area with low accessibility, owns a motorbike.

Root causes of deforestation and forest degradation from the perspective of movable property possession

All surveyed households expressed a strong desire to purchase a TV, cell phone, and motorbike, which could easily escalate into buying other electric appliances, truck, etc. Infiltration of a monetary economy will directly lead to expanded cultivation of cash crops, thus urgently calling for countermeasures to address the root causes through REDD+.

（3）Education Levels of the Villagers

We conducted a questionnaire survey with 65 male and 68 female villagers aged 20 or older. There is not much gender gap in the average number of schooling years, which is 4.8 for male and 4.4 for female. This, however, does not necessarily mean gender equality, as the gap is shortened by a small number of females who have received college education like their male counterparts.

We analyzed the schooling years based on the number of people using a box-and-whisker diagram (Fig. Ⅱ-23). The number of women is low both in the third and first quartiles, suggesting that women have less skills and opportunities to participate in society than men.

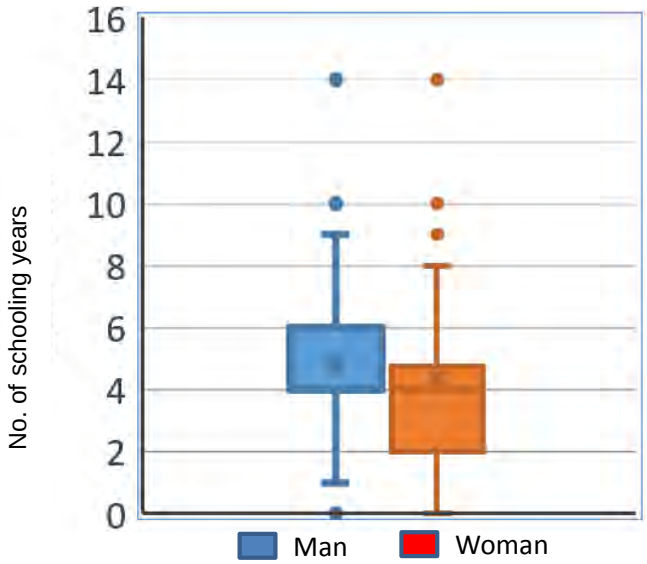

Figure Ⅱ-23 Schooling year and ratio of Man and Woman

As women's voices will play a vital role in REDD+ especially in such areas as gathering of fuel wood and access to water that are deeply related to forest conservation, empowerment of women will hold key to effective implementation of REDD+.

Nevertheless, the number of schooling years for women is improving lately compared to prior years. As shown in Fig Ⅱ-24, none of women under 40 years of age are without formal education. Compared to Fig Ⅱ-25, which shows the correlation between men's age and schooling years, the improvement rate of schooling years represented by the angle of the line is greater for women that for men.

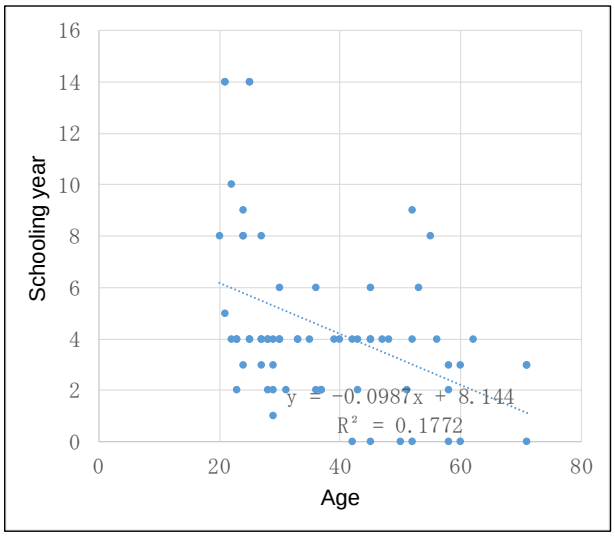

Figure Ⅱ-24 Women's age and schooling years

These two graphs show that all adults without formal education are 40 years or older, and there are more such women than men. There are only three men in their 20s and 30s with less than four years of schooling, whereas there are 10 such women, more than three times the number of men. We performed the same analysis for each of the three villages separately, and as a result, Village S (Swe Taw Myaun), which is located in the most remote area still left with many natural forests to be preserved, showed the largest gender gap in schooling years (Table Ⅱ-44).

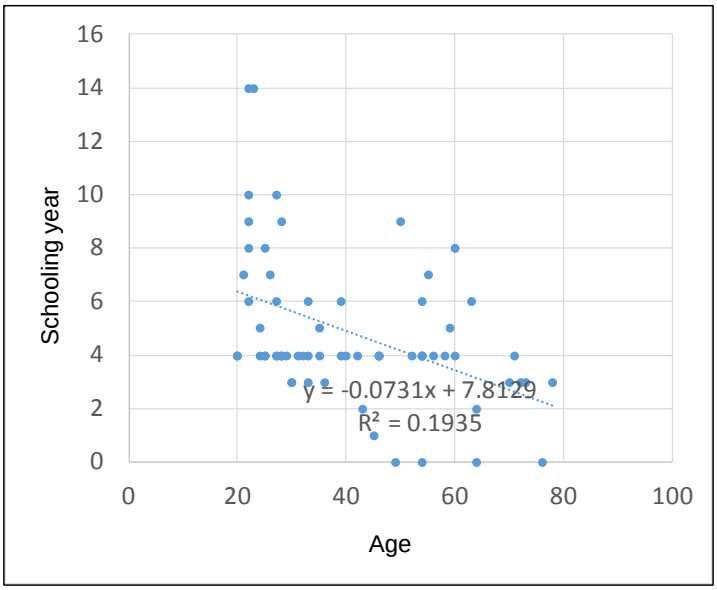

Figure Ⅱ-25 Men's age and schooling years

Based on the above, it can be said that continuing the effort to provide more educational opportunities for women will lead to sustainable forest conservation in Phase 1 (preparation phase) of REDD+ implementation.

It should be noted, however, that the number of schooling years shown in Table Ⅱ-44 varies depending on the village. In Village A, the number of schooling years is greater for women than for men.

Table Ⅱ-44 Schooling years of men and women

No. of schooling years	Men	Women
Swe Taw Myaung	5.6	4.5
Aung Myay Yar	4.5	5.3
Lema	4.4	4.2

The above table shows a typical trend that men have much longer average schooling years than women in remotely-located Village S while the gender gap is negligible in Village L located near the city. However, the gender trend is reversed in Village A. To analyze more closely, we compared the schooling years of those who were born in the villages and those who moved into the villages as settlers. The average number of schooling years was 5.5 for the former group and 4.2 for the latter group. This is partially because the settlers belong to the Chin Tribe, an ethnic minority group, but due mostly due to the short schooling years of their men averaging 3.6.

Target of capacity building from the perspective of education of local residents

While empowerment of women is an important program for building the capacity of this region, it would be insufficient to simply focus on gender equality in preparing the region for REDD+. Capacity building efforts need to be supported in a fair and equitable manner by paying attention to the diversity of the people, especially to the group comprised of middle-aged and older men who settled in the area relatively recently. As lack of education is one of the root causes of deforestation and forest degradation, involving the socially-disadvantaged people is an important element of village-wide forest conservation.

(4) Status of Agricultural Resources

We interviewed 10 households in each village and asked questions regarding the area of their owned/leased farmland and the area of cultivated land. The results are shown in Table Ⅱ-45. In

all three villages, the area of land actually cultivated is larger than the area of farmland owned or leased. The discrepancy may be due partially to poor memory of the interviewees, but is mostly to unauthorized farming inside the forests. The discrepancy between owned/leased farmland and cultivated area is minute in Village L because it is located close to urban area with less forest cover and greater surveillance. In contrast, the gap is relatively large in Village A and S, as both of them have a relatively thick forest cover with less surveillance and more new settlers, which means that they are more susceptible to illegal farmland expansion.

Table Ⅱ-45 Owned/leased Farmland & Cultivation Area per Household

	Owned/leased farmland	Cultivated land
Swetawmyaug	5.15	7.25
Aung Myay Yar	5.25	6.35
Lema	2.95	3.05

The underlying cause of this includes the ongoing population influx into the villages, lack of means to earn a living other than farming, and the assumption of the villagers that if they continue to use a farmland albeit illegally for 10 consecutive years, the government will grant them the right to use the farmland.

This kind of unmanaged land clearing for farming needs to be controlled in preparation for REDD+, and the countermeasures would include improving agricultural productivity, introducing high-value cash crops or varieties, and creating other means for earning livelihood. The farmland of this region can be divided into three groups: rice paddy, slash and burn farm for growing upland rice, etc., and normal farmland for growing sesame, peanut, and other cash crops. The ratios of the three groups in each village are shown in Fig Ⅱ-26.

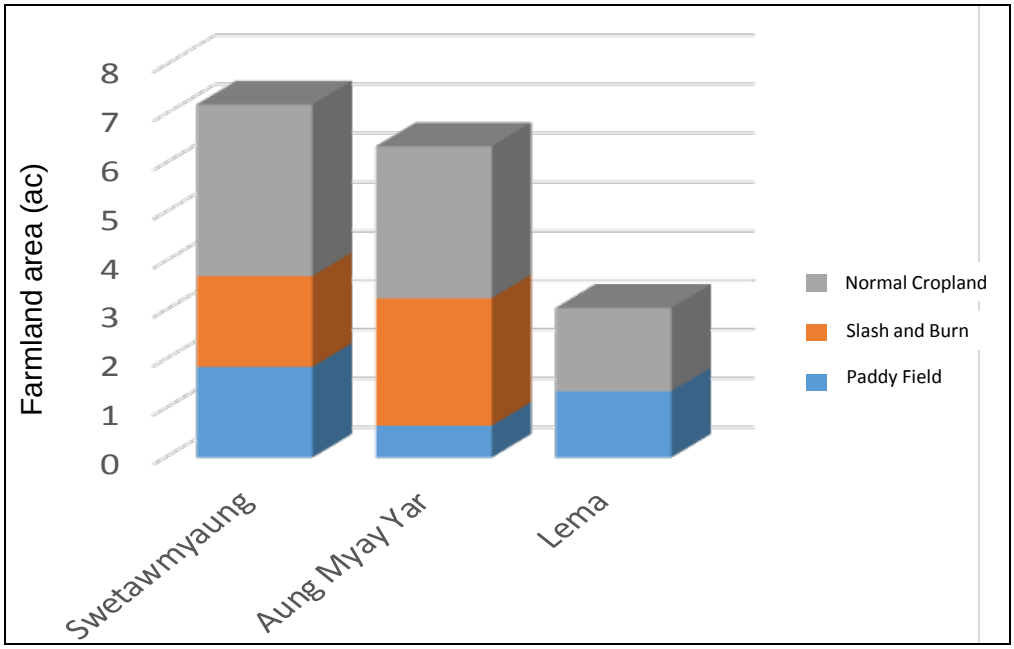

Figure Ⅱ-26 Average cultivate land per individual house hold

Although the result shows that Village L has no area for slash and burn farming, we did observe slash and burn fields in scattered places inside the village. Unlike Village S, Village L is surrounded by teak forests, and slash and burn fields are created out of sight of outsiders, which may be the reason the villagers had difficulty answering the questions honestly.

Deforestation and forest degradation driver based on the status of farmland ownership

Considering that some surveys were carried out by the government personnel in charge of controlling land use of the villagers, and taking into account the facts visually confirmed by the Study Team, the situation needs to be analyzed by assuming that slash and burn fields also exist in Village L. Table Ⅱ-45 revealed the presence of illegal farmland use while Figure Ⅱ-25 clearly shows that slash and burn farming is being practiced in Village S and A and that normal farmland is used for growing cash crops. All these point to the fact that land clearing for farming to earn more income is the major driver in this region.

Deforestation and forest degradation agent based on the status of farmland ownership

According to the profiles, the population doubled in all three villages over the last decade. Considering the fact that new settlers need new farmland to earn a living and that they cannot create new rice paddies by themselves in the mountainous locations without irrigation facilities, it is nearly impossible for them to acquire new farmland without converting forests. Accordingly, we need to address the new settlers as an important target group of REDD+ activities.

One of the essential items to be studied towards identifying the drivers of deforestation and forest degradation is the pasturing of large livestock animals. Accordingly, we surveyed the number of livestock raised by each household, and the result is shown in Table Ⅱ-46.

Table Ⅱ-46 Average Number of Livestock per Household

	Buffalo	Cow	Pig	Chicken	Duck
Swetawmyaung	1	2.5	1.3	7.2	3.5
Aung Myay Yar	0	1.6	1.3	5.5	0
Lema	0.7	1.7	0.9	8.7	1.5

Deforestation and forest degradation driver related to livestock farming

According to Table Ⅱ-46, the number of large grazing livestock is small, meaning that the deforestation pressure related to livestock farming is low.

(5) Use of Forest Resources

Table Ⅱ-47 Use of Forest Resources by the Villagers (1)

	Fuel wood	Bamboo shoot	Bamboo stalk*	Mushroom
Swetawmyaug	1,389.0	44.9	82.0	3.8
Aung Myay Yar	1,380.0	89.3	76.1	2.1
Lema	8,790.0	498.0	51.0	3.3
Average of all households	3,853.0	210.7	69.7	3.1
				Unit: kg (*no. of stalks)

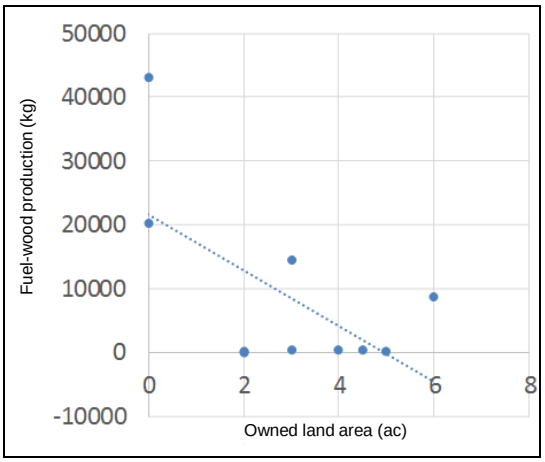

Figure Ⅱ-27 Owned land area vs. Fuel-wood production in Village L

To survey how the forest resources are used by the villagers is an important step towards raising their awareness of planned forest management. Table Ⅱ-47 shows the result of the survey on the extraction of forestry products by the villagers. They gather bamboo shoots and stalks for their own consumption only. Fuel wood and mushroom are also extracted mostly for self-consumption except Village L, which sells fuel wood and mushrooms as an important income source. Figure Ⅱ-27 shows the relationship between the owned land area and fuel-wood production in Village L. We can see that those without land of their own are producing large amounts of fuel wood.

Deforestation and forest degradation driver based on forest resource use

Fuel-wood production in Village L is equivalent to 3ha forest extraction. Gathering of bamboo shoots is not much of a problem, albeit over exploitation in some localized parts, because of abundant supply of bamboo resources in the whole village. Therefore, we need to address the use of fuel wood as the driver of deforestation and forest degradation.

Root cause of fuel-wood over-exploitation

The small farmland area per household and close proximity to large consumption areas such as Naypyidaw and Pyinmana are the underlying causes of excess harvesting of fuel wood in Village L. In addition, unlike Village S or A, forest resources of Village L are dwindling as a result of over exploitation for many years. Presently, there are no rules to regulate the use of forest resources in the region. In order to manage forests sustainably, each village needs to enhance its capacity to manage forest resources as common assets through group activities

Agent of over exploitation of forest resources

As shown in Figure Ⅱ-27, villagers without farmland are the agent of deforestation and forest degradation.

(6) Income Sources of Each Household

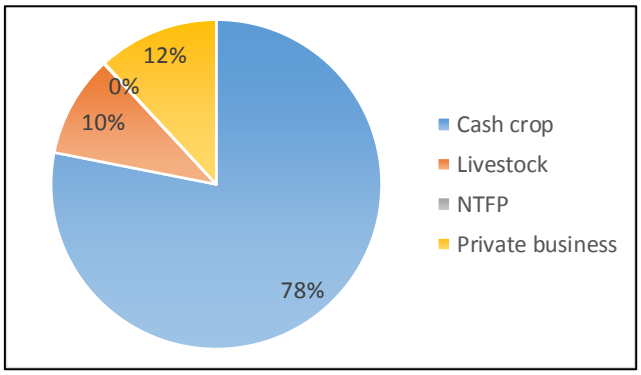

Figure Ⅱ-28 Household Income Sources of 3 Villages

Figure Ⅱ-28 shows the income sources, consisting of 80% cash crop, 10% livestock, and 10% private businesses. According to this graph, income from the sales of NTFP and fuel-wood accounts for virtually 0%. This is because villagers were reluctant to answer honestly, as they are extracting these items from state-owned forests.

Cash crops consist of rice, peanut, beans, and sesame as shown in Figure Ⅱ-29. Sesame is Myanmar's key agricultural product and has a large market base.
Figure Ⅱ-30 shows the composition of livestock sales, consisting of 76% pig, 16% chicken, and 9% buffalo. It consists mostly of small to medium livestock animals.

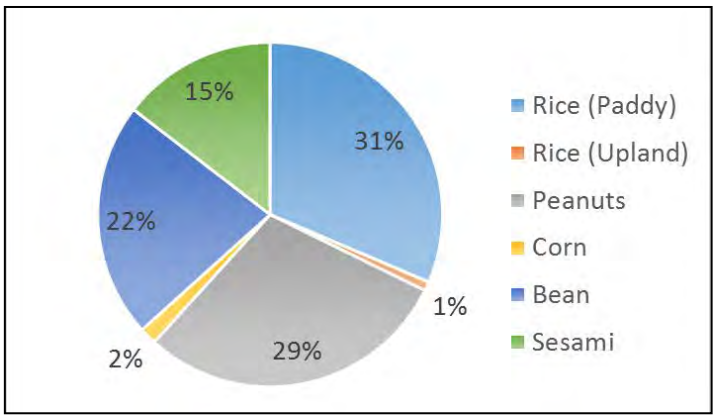

Figure Ⅱ-29 Composition of Cash Crop Sales

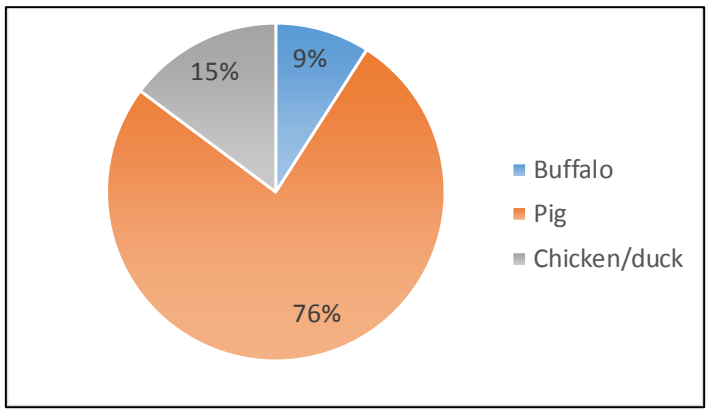

Figure Ⅱ-30 Composition of Livestock Sales

<u>Deforestation and forest degradation driver based on household income composition</u>
Since livestock incomes is mostly from the sales of non-grazing animals such as pigs and chickens, the main income source that contribute to deforestation and forest degradation is the

sales of cash crops. New settlers also have a similar income structure. Therefore, the survey results indicate that increased land clearing for growing cash crops is the driver of deforestation and forest degradation.

Root causes of deforestation and forest degradation based on household income structure

Root causes in the surveyed villages include poor access to markets, underdeveloped irrigation and other agricultural facilities and equipment, and absence of a system to diffuse farming techniques. In addition, people of Village L, though they were too cautious to answer fully, must be earning some cash by selling fuel wood and bamboo shoots. Absence of a system, which allows the villagers to earn non-agricultural income from forests, is likely another under underlying cause.

Deforestation and forest degradation agent based on household income structure

The leading actors of deforestation and forest deforestation in the target region are the farmers engaged mostly in slash and burn and normal farming. There are many incentives for the villagers to increase their income, such as the provision of solar panels that motivated them to buy new electric appliances, as well as the desires and needs of each household to have more than one cell phone, purchase an additional motorbike, and own a truck. It important to implement REDD+ to conserve forests before these needs manifest themselves.

8.7.4 Encouraging Group Efforts of the Residents

REDD+ will not be effective unless the residents can work collectively to manage land use instead of making individual efforts. To realize this, their ability to work together needs to be developed. We asked the villagers to list four examples of typical group activities and how they are participated in. As shown in Table Ⅱ-48, the vast majority of the villagers take part in every community event, indicating no resistance to participating in group activities on the part of the villagers.

Table Ⅱ-48 Group Activities Participated by Residents

	Group activities			
	Social event	House construction	Farm work	Religious event
Swetawmyaug	100	100	90	80
Aung Myay Yar	90	100	80	80
Lema	90	100	90	90

Among the three villages, Village S has the highest participation rate due likely to its remote location and poor access, which necessitate the villagers to work cooperatively.
Next, to analyze the underlying incentives, we asked the villagers if the reasons for their participation in community events match those listed in Table Ⅱ-49. The main reasons for participation turned out to be provision of labor and socializing.

Table Ⅱ-49 Reasons for Participating in Group Activities

	Reasons for participating in group activities			
	Wage pay	Provision of labor	Information sharing	Socializing
Swetawmyaug	10	100	10	100
Aung Myay Yar	20	80	0	100
Lema	30	80	0	100

The responses varied slightly from village to village. While people of Village S is most willing to pitch in and help other villagers, people of Village L, many of whom do not own farmland, tend to expect payment for the labor they provide for group work.

As shown in Figure Ⅱ-26, the farmland area of average household in Village L, which does not have enough land to support all villagers, is about half of that of other villages. In addition, because of its close proximity to the capital city Naypyidaw, it is difficult for new settlers, who were not allotted farmland at the completion of plantation projects, to engage in illegal slash and burning on a large scale. For these reasons many of them without farmland rely on wages for their income.

It should be noted that although all the villagers are willing to participate in collective work as clearly expressed in their responses, they are suffering from flood damages that are increasing lately due to abnormal weather and are aware that the rapid deforestation is the major cause. Our study this time revealed that they have the basic awareness necessary for making village-wide REDD+ efforts by organizing a village committee, etc.

8.8 Summary (Preparation towards implementation of REDD+ in Bago Yoma)

Summarized below are desirable approaches for JICA in developing human resources as part of Phase 1 of REDD+ based on the analyses thus far.

8.8.1 Drivers, Agents, and Causes of Deforestation and Forest Degradation

(1) Drivers of deforestation and forest degradation

a) Expanded land clearing, both legal and illegal, by new settlers to create normal farmland.
b) Random slash and burn activities inside the forests and forest fires caused by them.
c) Deterioration of forests due to fuel-wood extraction.
d) Deterioration of forests due to illegal logging.
We were able to identify a) through c) as the major drivers of deforestation and forest degradation as a result of this socio-economic survey, but could not verify d) because the interviewer was the person in charge of controlling illegal logging. Nevertheless, it is definitely one of the major drivers of forest deterioration.

8.8.2 Agents of deforestation and forest degradation

(1) Identified agents

a) Villagers without land ownership rights who are forced to create new farmland
b) Villagers who have been practicing slash and burn farming for many years
c) New settlers
d) Villagers who rely on fuel wood extraction for the majority of their income
e) Villagers who are trying to increase sales of cash crops
f) Illegal loggers
Two or more of the attributes listed above may apply to the same agent. Some of the new settlers used to work for the Myanmar Timber Enterprise as loggers and have the skills to cut down standing trees, even large-diameter trees. Tree stumps and fallen trees resulting from illegal logging are regular sights in Bago Yoma.

(2) Root causes of deforestation and forest degradation

a) Absence of farmland allotment system
b) Underdeveloped irrigation and other agricultural infrastructure facilities
c) Ongoing extraction of forest resources to secure non-agricultural income
d) Insufficient utilization of non-timber forest products
e) Absence of clearly-defined rules concerning fuel-wood extraction

(3) Efforts to Eliminate Root Causes

a) Installation of small-scale and simple irrigation systems to develop rice paddies & double-crop fields

To control the expansion of normal and slash and burn farming as drivers of deforestation, the issues of new settlers and the villagers with no or insufficient farmland need to be addressed and supported. To do so, it is necessary to install irrigation systems so that highly productive rice paddies and double-crop fields can be created. Constructing small reservoirs and simple irrigation systems that take advantage of the slopes in the Bago Mountains to develop rice paddies will be effective for eliminating root causes, as well as for controlling floods that began to occur during the 2010s.

b) Diffusion system of farming techniques

The surveyed region does not have a system to diffuse farming techniques. If the existing farmland can be utilized more efficiently by combining rice paddies and upland rice fields combined with increased productivity through selective breeding and fertilizer use, the pressure to expand normal farmland will decrease.

c) Utilization of bamboo materials

Provision of alternative income sources can mitigate slash and burn farming, illegal logging, and farmland expansion. Bago Yoma has abundant bamboo resources, and bamboo trees grow naturally and vigorously in gaps created by logging and slash and burning. Moe Swe District adjacent to Lewe District has a system in place to handle bamboo extraction, pick up, brokerage, transport, and sales, which allows production of bamboo materials even in places away from roads. The trade price of bamboo ranges between 50 to 200MMK depending on the diameter, or 100MMK on average. 100 or so stalks per day can be harvested. Bamboo in the region holds a high potential as an income source although bamboo resources are hardly utilized lately due to poor road conditions.

As bamboo extraction does not require special skills and can be practiced throughout the year to meet the demand during both the dry and rainy seasons, it can be a useful temporary income source for new settlers.

d) Systematic fuel-wood production

Fuel wood is an essential life commodity for the villagers and easily available in the region, which could make it susceptible to over harvesting. To prevent this, it is recommended to create fuel-wood production forests near village communities and use the fuel wood under a community-wide management system. Creating forests around the village will be useful in preventing damage by weather disasters, as well as for watershed recharge.

e) Development of arterial roads

Due to poor road conditions, the surveyed areas cannot be accessed by car during rainy seasons, preventing the shipment of cash crops and NTFPs. Rehabilitating/developing the arterial roads to make them usable throughout the year will be effective in facilitating REDD+ activities.

8.8.3 Targets of Capacity Building

(1) Resident groups subject to capacity building

The socio-economic survey revealed that capacity building is most needed by new settlers, women, and villagers without farmland of their own. These people should be provided with a capacity enhancement program so that they can take active part in REDD+ activities. The program should desirably consist of contents that will facilitate the target people to acquire a variety of skills related to forest conservation, including farming techniques such as fertilizer production and small-scale irrigation, as well as topics and techniques related to bamboo crafts, rattan cultivation, plant dyeing, and group consensus building.

(2) Organizing community residents towards REDD+ activities

Forest conservation requires the engagement of the whole village, as individual efforts cannot lead to effective solutions. Whole-village participation is also required for establishing rules for creating new rice paddies and other cropland, installing irrigation facilities, etc. For this reason, the capacity building training should include a plenty of group activities.

(3) Adult education

New settlers tend to have shorter schooling years. Adult education will empower the socially disadvantaged people and consequently enhance the social safeguards in REDD+.

(4) Administrative capacity building

While the objective of REDD+ is forest conservation, the actual activities will be aimed at utilizing NTFPs and increasing agricultural productivity. Thus, it is important to involve administrative officers in charge of agriculture and education more so than involving those in charge of forestry. Accordingly, administrative capacity building should be designed and implemented to enable administrative officers in diverse sectors work collaboratively in REDD+ activities.

8.1 Challenges on external fund mobilization including JCM and other funds to Bago Yoma.

8.1.1 Current JCM-REDD+ situation

REDD+ project under JCM has started since 2015. It has operated under the subsidy program of Ministry of Environment in Japan and its projects has implemented in, for example, Lao PDR. On the other hand, a point that regulation documents, such as guidelines on the development of methodology related to REDD+, have not been agreed between Japan and a partner country should be paid attention.
Challenges on JCM shall be considered from the point of views on its scheme and fund.

As the challenge of its scheme, current JCM-REDD+ implementation is project level. This has not been consistent with UNFCCC's regulation, which is stated that REDD+ should be national level or sub-national level as temporal.

Each project expects to broaden project areas in the future, but this takes certain length of time and is required coordination with REDD+ projects under other schemes like FCPF would be necessary. This implies that there are risks to threaten stable lasting project implementation.

This is why it is essential to gather information in relation with other donors' entry and coordinate with the government of a partner country on future target area expansion for implementing the JCM-REDD+ project.

As the challenges of the fund, the issuance of credit, which investors are interested in, has not been achieved. This shows that future prospects are unclear resulting in the limited entry of private sector.
Instead of past over expectation to credit business, new REDD+ implementation strategy such as the combination with green businesses has been looked for.

8.1.2 Challenges to implement JCM-REDD+ in Bago Yoma.

Since overlaps with other schemes are not currently existed and planed in Bago Yoma, JCM-REDD+ implementation is of advantage.

On the other hand, credits have not been issued yet, it is vital to seek the possibility to coordinate with the green businesses from the viewpoint of Japanese enterprises' entry as

mentioned at previous chapter. As mention at 8.8.2, effective bamboo forest utilization is one of the examples to attract enterprises.

There is a high possibility to realize JCM implementation in case, firstly, regulation documents related to REDD+ under JCM are adopted, and secondly, private sector interested in green businesses are attracted. Therefore, a support system on JCM implementation through a technical cooperation at Bago Yoma, in which no competition has been emerged with other donors yet, is vital.