Federal Ministry of Food and Agriculture

INTERNATIONAL TROPICAL TIMBER ORGANIZATION

ITTO

# Training Workshop Report
# New Management System and Minimize Harvesting Loss

Enhancing Conservation and Sustainable Management of Teak Forests and Legal and Sustainable Wood Supply Chains in the Greater Mekong Sub-region PP-A/54/331

**Enhancing Conservation and Sustainable Management of Teak Forests and Legal and Sustainable Wood Supply Chains in the Greater Mekong Sub-region PP-A/54/331**

# Training Workshop Report
# New Management System and Minimize Harvesting Loss

**5-7 February 2020 at Phrae Nakara Hotel,**
**Phrae Province, Thailand**

International Tropical Timber Organization (ITTO)

Federal Ministry of food Agriculture, Germany(BMEL)

Kasetsart University (KU)

*Khun Mae Kham Mee Forest Plantation*
*Phrae Province, Thailand*

# Training Workshop on
# New Management System and Minimize Harvesting Loss

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**Preferred citations:**

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The designation employed and the presentations of material herein do not imply the expression of any opinion whatsoever concerning the legal status of any country, region/province or city, or their related authorities or the delimitation of their boundaries.

Although every effort has been made to ensure objectivity and politically correctness, the publication of this summary report does not imply endorsement or agreement with its conclusions by ITTO or the donors of the conference.

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# FORWARD

Teak *(Tectona grandis)* is one of the most important and valuable hardwood species in the world. The Greater Mekong region contributes with over 70% of the global natural teak forests (about 29 million hectares). In particular, Myanmar accounts for 50% of the total area, followed by Thailand. Unfortunately, the natural teak forest area has been reduced substantially due to overexploitation, agriculture expansion, and unsustainable management. Although teak plantations are found in about 70 tropical countries in Africa, Asia and Latin America, seed sources are generally unknown and most likely originate from roadside plantings. Thus there is a high risk of losing the species' high diversity of genetic traits and wood characteristics.

With the financial support from the Federal Republic of Germany through the Federal Ministry of Food and Agriculture(BMEL), "The International Tropical Timber Organization (ITTO) Teak Project Phase I, Enhancing Conservation and Sustainable Management of Teak Forests and Legal and Sustainable Wood Supply Chains in the Greater Mekong Sub-region (PP-A/54-331)", is being executed by ITTO in collaboration with five agencies, namely Cambodia's Forestry Administration (FA), Lao PDR's National Agriculture and Forestry Research Institute (NAFRI), Myanmar's Forestry Department (FD), Thailand's Royal Forest Department (RFD) and Vietnamese Academy of Forest Sciences (VAFS). Kasetsart University of Thailand serves as the Regional Activity Manager for coordinating all activities implemented in the five participating countries.

The organization of the Training Workshop on New Management System and Minimize Harvesting Loss on 5-7 February 2020 at Phrae Nakara Hotel, Phrae Province, Thailand aimed at introducing participants to principles of sustainable forest management standards, which include estimation and reduction of harvesting loss, bucking optimization, and sustainable forest operations in forest plantations. Besides, the participants also had opportunities to visit on-going logging operations at FIO's teak plantations, hand-on practices, and visit to a wood-industry factory in Phrae province.

This Training Workshop Report summarizes key lecture notes and important activities conducted during the workshop period. The local organizing committee does hope that the participants and interested agencies and individuals, especially smallholders, can make use of this report and recall the lecture contents.This Training Workshop and the report would not have been possible without the valuable inputs and supports of many organizations and individual experts. Key institutions providing facilities and support include Royal Forest Department (RFD), Forest Industry Organization (FIO), and Kasetsart University (KU). Our special thanks go to three lecturers, namely Assist. Prof. Nikhom Laemsak (New management system for natural teak forests Consultant), Assist. Prof. Nopparat Kaakkurivaara (Minimize harvesting loss, efficient transport and processing of teak roundwood Consultant) and Dr. Sutep Junkhiaw (invited lecturer).

We express our deep appreciation to Mr. Suchat Kalyawongsa, Director of Forestry Research and Development Office, Royal Forest Department for contributing enthusiastic Opening Remarks. Mr. Palle Havmoller was helpful to carefully check and edit English of all lecture notes. Finally, we gratefully acknowledge the BMEL and ITTO for financial and technical support, respectively.

**Prof. Dr. Yongyut Trisurat**

*Regional Activity Manager (RAM)*
*ITTO Teak Project in Mekong*

*Khun Mae Kham Mee Forest Plantation*
*Phrae Province, Thailand*

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# Acronyms and Abbreviations

| | |
|---|---|
| ASEAN | Association of South East Asian Nations |
| BMEL | Federal Ministry of Food Agriculture, Germany |
| CF | Community forestry |
| DBH | Diameter at breast height |
| FA | Forestry Administration |
| FAO | Food and Agriculture Organization |
| FIO | Forest Industry Organization |
| FRI | Forestry Department/Forest Research Institute |
| GMS | Greater Mekong Sub-region |
| ITTC | International Tropical Timber Council |
| ITTO | International Tropical Timber Organization |
| IUCN | International Union for Conservation of Nature |
| IUFRO | International Union of Forest Research Organizations |
| KU | Kasetsart University |
| MoU | Memorandum of Understanding |
| NAFRI | National Agriculture and Forestry Research Institute |
| RFD | Royal Forest Department |
| VAFS | Vietnamese Academy of Forest Sciences |

## The Event

Teak *(Tectona grandis)* with its outstanding physical and aesthetic qualities is recognized as one of the most important and valuable hardwoods in the world. It has been used for many centuries for a range of products in furniture manufacturing and housing construction, as well as in cultural services. Natural teak forests covering an area of about 29 million hectares occur in central and southern India, Lao PDR, Myanmar and Thailand. However, the natural teak forest area has been reduced substantially in all native teak growing countries mainly due to over exploitation, agriculture expansion, and shifting cultivation. In particular, old-growth high-quality teak stands have declined significantly for many years and there is a high risk of losing their high diversity of genetic traits and wood characteristics.

The International Tropical Timber Council (ITTC) and International Union of Forest Research Organizations(IUFRO) approved at its 53rd Session in Peru and the Global Landscapes Forum in Bonn, Germany in 2017 an activity entitled “Enhancing Teak Management” to improve the management and marketing of both natural and planted teak in all three tropical regions. The Federal Republic of Germany through the Federal Ministry of Food and Agriculture financed the first stage of this activity in the Greater Mekong Sub-region (GMS). ITTO signed the Memorandum of Understanding (MoU) with Kasetsart University and assigned the Faculty of Forestry to serve as the Regional Project Manager to coordinate the implementation of the teak project with National Project Coordinators from 5 participating countries.

*Khun Mae Kham Mee Forest Plantation*
*Phrae Province, Thailand*

The ITTO Teak Project within the Mekong Project aims to enhance the efficiency of natural teak forest management and forest plantations production and marketing by improving legal measures and regulations that facilitate sustainable teak production in the supply chain and enhance the quality of life for people and owners of small forest parks In the Greater Mekong Sub-region area. To enhance the efficiency of the smallholder community-based plantations and agroforestry system, Thailand Component of the ITTO Teak Project in Mekong organized the Training Workshop on New Management System and Minimize Harvesting Loss on 5-7 February 2020 at Phrae Nakara Hotel, Phrae Province, Thailand. The overall goal was to introduce participants to principles of sustainable forest management standards, provide hands-on practices, and visit a wood-industry factory in Phrae province. This activity is relevant to the Inception Report: Output 2, activities 2.1 and 2.4)

| | |
|---|---|
| Date of workshop | 5-7 February 2020 |
| Venue | Phrae Nakara Hotel, Phrae Province, Thailand |
| Executing Agency | International Tropical Timber Organization |
| Collaborators | Forestry Administration, Cambodia<br>Forestry Department/Forest Research Institute, Lao PDR<br>National Agriculture and Forestry Research Institute, Myanmar<br>Royal Forest Department and Kasetsart University, Thailand<br>Vietnamese Academy of Forest Sciences, Vietnam<br>Kasetsart University, Thailand |
| Donor | Federal Ministry of Food Agriculture-BMEL, Germany |
| Contributed by | Assist. Prof. Nikhom Laemsak<br>Assist. Prof. Nopparat Kaakkurivaara<br>Dr. Sutep Junkhiaw |
| English Editor | Mr. Palle Havmoller |

# Welcoming remarks


**Mr. Suchat Kalyawongsa,**
Director of Forestry Research and Development Office, Royal Forest Department

Assist. Prof. Nikhom Laemsak (Dean of the Faculty of Forestry and New management system for natural teak forests Consultant) Assist. Prof. Nopparat Kaakkurivaara (Minimize harvesting loss, efficient transport and processing of Teak- round wood Consultant), Dr. Suthep Junkhiaw (invited lecturer), Dr. Saroj Wattanasuksakul (Senior Expert of the RFD), Prof. Yongyut Trisurat (Regional Activity Manager of ITTO Teak Project in Mekong), Participants, Ladies and Gentlemen.

On behalf of the Royal Forest Department of Thailand and ITTO Teak Project in Mekong, it is my great pleasure this morning to deliver opening remarks at the Joint Training Workshop on New Management System and Minimize Harvesting Loss of the **Enhancing Conservation and Sustainable Management of Teak Forests and Legal and Sustainable Wood Supply Chains in the Greater Mekong Sub-region.**

Teak *(Tectona grandis)* with its outstanding physical and aesthetic qualities is recognized as one of the most important and valuable hardwoods in the world. It has been used for many centuries for a range of products in furniture manufacturing and housing construction, as well as recognized for its cultural services. The International Tropical Timber Council (ITTC) and International Union of Forest Research Organizations(IUFRO) at its 53rd Session in Peru and the Global Landscapes Forum in Bonn, Germany in 2017, approved an activity entitled “Enhancing Teak Management” to improve the management and marketing of both natural and planted teak in all three tropical regions. The Federal Republic of Germany through the Federal Ministry of Food and Agriculture financed the first stage of this activity in the Greater Mekong Sub-region (GMS).

ITTO signed the Memorandum of Understanding (MOU) with Kasetsart University and assigned

the Faculty of Forestry to serve as the Regional Project Manager to coordinate the implementation of the Teak Project with National Project Coordinators from 5 participating countries.

The ITTO Teak Project in Mekong Project aims to enhance the efficiency of natural teak forest management and forest plantations, including production and marketing, by improving legal measures and regulations that facilitate sustainable teak production in the supply chain and enhance the quality of life for people and owners of small forest parks In the Greater Mekong Sub-region area.

Ladies and Gentlemen,
The objectives of this training workshop are to introduce participants to basic new sustainable forest management system, minimizing harvesting loss and sustainable forest operations. In addition, field excursion and hands-on practices are to facilitate understanding. It is an essential and recognized as a new management approach, which is highly relevant to forest certification.

I really hope that participants from the Royal Forest Department, Forest Industry Organization and smallholders will gain valuable knowledge and experience for lectures, and consequently can enhance your teak plantations. Furthermore, you can disseminate knowledge to your colleagues, who are interested in teak plantation and harvesting.

I would like to thank all instructors/trainers, the project secretariat and the participants for attending this training workshop. Furthermore, I would like to extent my appreciation to **the Federal Republic of Germany and ITTO** for financially and technically supports to the ITTO Teak Project in Mekong. I wish the Joint Training Workshop on New Management System and Minimize Harvesting Loss will succeed and achieve all desired outputs.

**Thank you.**

**Group photo of participants and trainers**

# New Management System

Assist. Prof. Nikhom Laemsak

(New management system for natural teak forests Consultant)

**Assist. Prof. Nikhom Laemsak,**
Dean of the Faculty of Forestry, KU, Consultant

**Forest Certification**

The United Nations Conference on Environment and Development (UNCED) was held in Rio de Janeiro, Brazil, between 3 and 14 June 1992 and raised the issues of global warming and the reduction of forest areas. This Conference was the driving force for finding measures to combat illegal timber handling. This resulted in the concept of establishing a sustainable forest management certification system that focuses on responsibility for a balance of economic, social and environmental factors, including the importance of using wood or the enhancement of forests. Standards of sustainable certification were established by non-profit organizations and called the Forest Stewardship Council TM (FSCTM). After that, many other standards were developed on an international regional and local levels such as:

- PEFC (Programmed for the Endorsement of Forest Certification) is a standard that certifies the national standard to be equivalent to international standards.
- SFI (Standards promoting sustainable forest management) is the certification standard for importing wood into the United States of America.
- JIA (The Japan Gas Appliances Inspection Association) is the certification standard for importing fuel into Japan.
- SGEC (Sustainable Green Ecosystem Council) is Japan's sustainable forest management certification standard that is endorsed by the PEFC standard.
- MTCC (Malaysian Timber Certification Council) is Malaysia's sustainable forest management certification standard that is endorsed by the PEFC standard.

There are also many other standards such as VFCC (Vietnam), IFCC (Indonesia) and CFCC (China), which are all national standards (National Standard), and many countries have had these endorsed already.

For Thailand, there is a Forestry National Standard, TIS 14061 for the certification of sustainable forest management (FM) and TIS 2861 for the certification of a sustainable Chain of Custody (CoC).

**Forest Certification (FC)** involves voluntary partnership agreements (VPAs), which the manufacturer may or may not choose to enter, depending on the conditions required by the buyer.


**Products with Forest Certification (FC)**

If manufacturers do not enter the system but still want to sell those wood products, they can find a market involving buyers who are not interested in the certificate, and the manufacturers do not suffer any fault or be deemed to have done anything illegal such as contravening local laws, cutting wood from restricted areas, illegal wood processing, and unfair labor practice. However, if any of these restrictions are broken, then the manufacturers using such wood will not be able to gain certification.


**Dr. Suthep Junkhiaw (invited lecturer) presented CoC.**

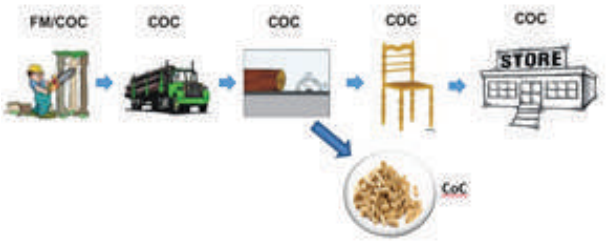
The certification standards are divided into 2 forms: 1) Forest Management (FM) and 2) Chain of Custody (CoC). It is essential to separate certified and non-certified wood materials (e.g., timber, lumber) during processing. To ensure this caution, criteria and indicators related to FM and CoC are developed for each certification scheme.

**Sustainable Forest Management (SFM)** certification is a market-based conservation initiative that aims to promote the environmentally appropriate, socially beneficial, and economically viable management of forests. The idea behind certification is straightforward. A logging company demonstrates to operate with high standards both in ecological and socio-economic aspects related to forest management. Consequently, it obtains the approval of a third-party certifying agency and thereby gains access to markets willing to pay higher prices for sustainably harvested forest products.

If applied for forest plantation, it is a certification at a forest plantation or a source of wood certification. The inspections will be carried out through reforestation practices that meet requirements or are at risk of adverse effects. The inspection process will be inspected from seedlings, preparation of planting areas, maintenance up to sales, including plans for replacement plants. The practice will focus on legal planting, attention to health, society and the environment.

**Chain of Custody (CoC)** verifies certified forest products through the production chain. It is a channel through which products are distributed from their origin in the forest to their end-use. The CoC enables verification of use of certified material through the production process – from the forest to the consumer, including all successive stages of processing, transformation, manufacturing and distribution.

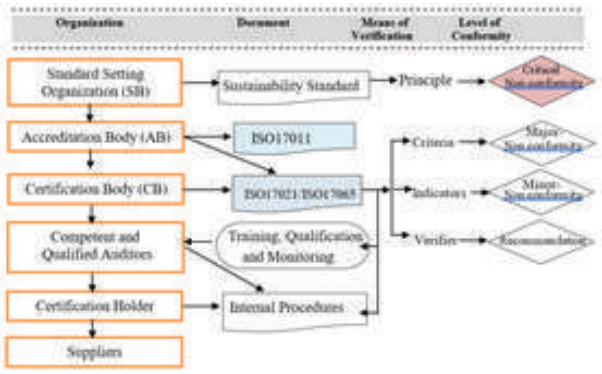
In addition, there must be information on the cut wood including the size, height, volume, wood cutting tools, including where does the wood cut come from, and who cut the wood. The CoC document should be related to the FM document, so it is called the FM/CoC. The documents are linked together until transportation, importing, storing and processing, sales management, and delivery including product claims, which involve the mechanism of inspection and certification of CoC.




**Mechanism of Chain of Custody (CoC)**

This standard is based on ISO 9001, which focuses on documenting, quantity and quality control, and traceability. The certification will be randomaccording

to the list of requirements. It also includes the knowledge and experience of the auditor.




**Mechanisms of forest certification systems according to international standards.**

**Certification Process:** Because it is a voluntary sector mechanism and most certification standards are initiated by the social sector and independent organizations, the international principles in the certification mechanism should give importance to independence, transparency, and actions that comply with the requirements.

The certification uses the third-party mechanism consisting of:

1. *Standardization Body (SB):* this is an organization that sets the standard principles and criteria including updating the standard to create confidence in its effectiveness to maintain the sustainability of planted forest and community forest. It also has a duty to negotiate with partners or to make arrangements. In addition, there is a duty to receive complaints as well as examine conflicts both domestically and internationally.

2. *Accreditation Body (AB):* this may be an organization or government agency that has been accredited to the 17011 standards, and probably also being a member or in networks of world partners in the AB certification system. The AB is responsible for issuing licenses to the certification bodies (CBs) and for ensuring the CBs can check and issue certificates according to the standards set by the SB. There must also be control of the standards to the appropriate specifications, including suspension or withdrawal. The AB will also be responsible for providing other CBs to replace any CB that is suspended or withdrawn.

3.*Certification Body (CB):* This is a juristic body that has received accreditation for ISO 17021 for forest management (FM) certification and ISO 17025 for Chain of Custody (CoC).

These three bodies must be independent of each other, nor should they have any conflict of interest. In addition, there must be a balance in their powers and their ability to investigate each other. Furthermore, all parts should be subject to appeal by the public and the owner of the forest, including the business sector involved in trading the products. In addition, the certification standards should be checked against other standards to ensure all standards are still upholding the Economic, Social, and Environmental basis of the system.


**C&I/CoC for sustainable management of planted and community forests.**

**Training topics are as follows**

During the training workshop, Dr. Nikhom Laemsak and Dr. Suthep Junkhiaw delivered the following topics:

1) Introduction to the wood market value.
2) Knowledge about forest certification such as FSC, PEFC and other standards.
3) Sustainable forest management certification jointly developed by ITTO and the RFD. This certification consists of 7 criteria and 35 indicators as follows.
   i) Compliance with relevant laws, policies and measures consisting of 7 indicators.
   ii) The proportion and condition of forest area consisting of 3 indicators.
   iii) Health and adaptation of forest ecosystems consisting of 5 indicators.
   iv) Productivity and ecosystem services of forests consisting of 5 indicators.
   v) Forest biodiversity consists of 3 indicators.
   vi) Soil and water conservation consist of 4 indicators
   vii) Economy, society and culture of local communities consist of 6 indicators
4) Chain of Custody (CoC) Lecture contents include:
   i) CoC Within the plantation
   ii) Transportation
   iii) Warehouse
   iv) Internal processes include 7 steps:
      (1) Product purchase approval
      (2) Wood transportation inspection Forest products
      (3) warehouse
      (4) Production operation
      (5) Confirmation and labeling
      (6) The sale
      (7) Management system
5) Practice in the Due Diligence System (DDS) The template of DDS is attached.

**Activities in the training room and participants practice in the Due Diligence System (DDS)**

## ระบบตรวจสอบความถูกต้อง (Due Diligence System : DDS)
## แบบประเมินสำหรับวัตถุดิบป้อนเข้า Valuation Sheet for Input Material

| | |
|---|---|
| **ชื่อหน่วยงาน**<br>Applicant name | |
| **ชื่อผู้รับผิดชอบ**<br>Personal | |
| **ที่อยู่**<br>Address | |
| **หมายเลขโทรศัพท์**<br>Phone number | |
| **วันที่ขอการรับรอง**<br>Applied date | |

### 1. การประเมินการปฏิบัติตามข้อกำหนดของวัตถุดิบป้อนเข้า
### Compliance valuation of input material

(1) แหล่งกำเนิดและชนิดของผลิตภัณฑ์ (Origin country and type of material)

| ประเทศ )Origin) | รูปลักษณ์ (Type) | แบบผลิตภัณฑ์ )Form) |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

(2) รายการพื้นที่และที่ตั้งของสวนป่า (Entry area and the location of the plantation.)

| จังหวัด )Province( | อำเภอ )District( | พื้นที่ (ไร่) Area (Rai) |
|---|---|---|
| | | |
| | | |
| | | |

(3) รายการประเมินความเสี่ยงของพื้นที่ Risk assessments

| ชนิดป่า )Forest Type) |
|---|
| ☐ สวนปาล์มน้ำมัน(ไม่เป็นพื้นที่สวนปาล์มน้ำมันที่เปลี่ยนมาจากพื้นที่ป่าไม้) Plantation (Not being converted into forest land) |
| ☐ ป่าธรรมชาติ National Forest |

## 2. การประเมินการปฏิบัติตามกฎหมายที่เกี่ยวข้อง

| กฎหมาย/ข้อปฏิบัติ Application Law/Act | การประเมินการปฏิบัติตาม Compliance valuation | หลักฐานของการปฏิบัติตาม Proof of compliance |
|---|---|---|
| 1. **Forest Act, B.E. 2484** (1941) พรบ. ป่าไม้ พ.ศ. 2484 | ☐ ปฏิบัติตาม (complete)<br>☐ ไม่ปฏิบัติตามบางอย่าง (partially complete)<br>☐ ไม่ทราบ (don't know)<br>☐ ไม่เกี่ยวข้อง (NA) | ☐ ตรวจสอบในพื้นที่ (field investigation)<br>☐ สัมภาษณ์ (interview)<br>☐ ตรวจเอกสาร (document)<br>☐ อื่น ๆ (others) |
| 2. **National Park Act, B.E. 2504** (1961) พรบ. อุทยานแห่งชาติ พ.ศ. 2504 | ☐ ปฏิบัติตาม (complete)<br>☐ ไม่ปฏิบัติตามบางอย่าง (partially complete)<br>☐ ไม่ทราบ (don't know)<br>☐ ไม่เกี่ยวข้อง (NA) | ☐ ตรวจสอบในพื้นที่ (field investigation)<br>☐ สัมภาษณ์ (interview)<br>☐ ตรวจเอกสาร (document)<br>☐ อื่น ๆ (others) |
| 3. **National Forest Reserve Act, B.E. 2507** (1964) พรบ. ป่าสงวนแห่งชาติ พ.ศ. 2507 | ☐ ปฏิบัติตาม (complete)<br>☐ ไม่ปฏิบัติตามบางอย่าง (partially complete)<br>☐ ไม่ทราบ (don't know)<br>☐ ไม่เกี่ยวข้อง (NA) | ☐ ตรวจสอบในพื้นที่ (field investigation)<br>☐ สัมภาษณ์ (interview)<br>☐ ตรวจเอกสาร (document)<br>☐ อื่น ๆ (others) |
| 4. **Commercial Forest Plantation Act, B.E. 2535 (1992)** พรบ. สวนป่า พ.ศ. 2535 | ☐ ปฏิบัติตาม (complete)<br>☐ ไม่ปฏิบัติตามบางอย่าง (partially complete)<br>☐ ไม่ทราบ (don't know)<br>☐ ไม่เกี่ยวข้อง (NA) | ☐ ตรวจสอบในพื้นที่ (field investigation)<br>☐ สัมภาษณ์ (interview)<br>☐ ตรวจเอกสาร (document)<br>☐ อื่น ๆ (others) |

| กฎหมาย/ข้อปฏิบัติ<br>Application Law/Act | การประเมินการปฏิบัติตาม<br>Compliance valuation | หลักฐานของการปฏิบัติตาม<br>Proof of compliance |
|---|---|---|
| 5. **Chainsaw Act, B.E. 2507 (2002)** พรบ. เลื่อยโซ่ยนต์ พ.ศ. 2535 | ☐ ปฏิบัติตาม (complete)<br>☐ ไม่ปฏิบัติตามบางอย่าง (partially complete)<br>☐ ไม่ทราบ (don't know)<br>☐ ไม่เกี่ยวข้อง (NA) | ☐ ตรวจสอบในพื้นที่ (field investigation)<br>☐ สัมภาษณ์ (interview)<br>☐ ตรวจเอกสาร (document)<br>☐ อื่น ๆ (others) |
| 6. **Wild Animal Reservation and Protection Act B.E. 2535 (1992)** พรบ. สงวนและคุ้มครองสัตว์ป่า พ.ศ. 2535 | ☐ ปฏิบัติตาม (complete)<br>☐ ไม่ปฏิบัติตามบางอย่าง (partially complete)<br>☐ ไม่ทราบ (don't know)<br>☐ ไม่เกี่ยวข้อง (NA) | ☐ ตรวจสอบในพื้นที่ (field investigation)<br>☐ สัมภาษณ์ (interview)<br>☐ ตรวจเอกสาร (document)<br>☐ อื่น ๆ (others) |
| 7. **Act on Ancient Monuments, Antiques, Objects of Art and National Museums B.E. 2504 (1961)** พรบ. โบราณสถาน โบราณวัตถุ ศิลปวัตถุ และพิพิธภัณฑสถานแห่งชาติ พ.ศ. 2504 | ☐ ปฏิบัติตาม (complete)<br>☐ ไม่ปฏิบัติตามบางอย่าง (partially complete)<br>☐ ไม่ทราบ (don't know)<br>☐ ไม่เกี่ยวข้อง (NA) | ☐ ตรวจสอบในพื้นที่ (field investigation)<br>☐ สัมภาษณ์ (interview)<br>☐ ตรวจเอกสาร (document)<br>☐ อื่น ๆ (others) |
| 8. **Labor Protection Act B.E. 2541(1998)** พรบ. คุ้มครองแรงงาน พ.ศ. 2541 | ☐ ปฏิบัติตาม (complete)<br>☐ ไม่ปฏิบัติตามบางอย่าง (partially complete)<br>☐ ไม่ทราบ (don't know)<br>☐ ไม่เกี่ยวข้อง (NA) | ☐ ตรวจสอบในพื้นที่ (field investigation)<br>☐ สัมภาษณ์ (interview)<br>☐ ตรวจเอกสาร (document)<br>☐ อื่น ๆ (others) |
| 9. **Labor Relations Act B.E.2518 (1975)** พรบ. แรงงานสัมพันธ์ พ.ศ.2518 | ☐ ปฏิบัติตาม (complete)<br>☐ ไม่ปฏิบัติตามบางอย่าง (partially complete)<br>☐ ไม่ทราบ (don't know)<br>☐ ไม่เกี่ยวข้อง (NA) | ☐ ตรวจสอบในพื้นที่ (field investigation)<br>☐ สัมภาษณ์ (interview)<br>☐ ตรวจเอกสาร (document)<br>☐ อื่น ๆ (others) |
| 10. **Establishment of and Procedure for Labor Court Act, B.E. 2522 (1979)** พรบ. จัดตั้งศาลแรงงานและวิธีพิจารณาแรงงาน พ.ศ. 2522 | ☐ ปฏิบัติตาม (complete)<br>☐ ไม่ปฏิบัติตามบางอย่าง (partially complete)<br>☐ ไม่ทราบ (don't know)<br>☐ ไม่เกี่ยวข้อง (NA) | ☐ ตรวจสอบในพื้นที่ (field investigation)<br>☐ สัมภาษณ์ (interview)<br>☐ ตรวจเอกสาร (document)<br>☐ อื่น ๆ (others) |

| กฎหมาย/ข้อปฏิบัติ<br>Application Law/Act | การประเมินการปฏิบัติตาม<br>Compliance valuation | หลักฐานของการปฏิบัติตาม<br>Proof of compliance |
|---|---|---|
| 11. **Workmen's Compensation Act B.E. 2537 (1994)** พรบ. เงินทดแทน พ.ศ. 2537 | ☐ ปฏิบัติตาม (complete)<br>☐ ไม่ปฏิบัติตามบางอย่าง (partially complete)<br>☐ ไม่ทราบ (don't know)<br>☐ ไม่เกี่ยวข้อง (NA) | ☐ ตรวจสอบในพื้นที่ (field investigation)<br>☐ สัมภาษณ์ (interview)<br>☐ ตรวจเอกสาร (document)<br>☐ อื่น ๆ (others) |
| 12. **Social Security Act, B.E 2533 (1990)** พรบ. ประกันสังคม พ.ศ. 2547 | ☐ ปฏิบัติตาม (complete)<br>☐ ไม่ปฏิบัติตามบางอย่าง (partially (complete)<br>☐ ไม่ทราบ (don't know)<br>☐ ไม่เกี่ยวข้อง (NA) | ☐ ตรวจสอบในพื้นที่ (field investigation)<br>☐ สัมภาษณ์ (interview)<br>☐ ตรวจเอกสาร (document)<br>☐ อื่น ๆ (others) |
| 13. **Rehabilitation of Disabled Persons Act, B.E. 2534 (1991)** พรบ. ฟื้นฟูสมรรถภาพคนพิการ พ.ศ. 2534 | ☐ ปฏิบัติตาม (complete)<br>☐ ไม่ปฏิบัติตามบางอย่าง (partially complete)<br>☐ ไม่ทราบ (don't know)<br>☐ ไม่เกี่ยวข้อง (NA) | ☐ ตรวจสอบในพื้นที่ (field investigation)<br>☐ สัมภาษณ์ (interview)<br>☐ ตรวจเอกสาร (document)<br>☐ อื่น ๆ (others) |
| 14. **Persons with Disabilities Empowerment Act B.E. 2550 (2007)** พรบ. ส่งเสริมและพัฒนาคุณภาพชีวิตคนพิการ พ.ศ. 2550 | ☐ ปฏิบัติตาม (complete)<br>☐ ไม่ปฏิบัติตามบางอย่าง (partially complete)<br>☐ ไม่ทราบ (don't know)<br>☐ ไม่เกี่ยวข้อง (NA) | ☐ ตรวจสอบในพื้นที่ (field investigation)<br>☐ สัมภาษณ์ (interview)<br>☐ ตรวจเอกสาร (document)<br>☐ อื่น ๆ (others) |
| 15. **Occupational safety, Health and Environment Act, B.E. 2554 (2011)** พรบ. ความปลอดภัย อาชีวะอนามัย และสภาพแวดล้อมในการทางาน พ.ศ. 2554 | ☐ ปฏิบัติตาม (complete)<br>☐ ไม่ปฏิบัติตามบางอย่าง (partially complete)<br>☐ ไม่ทราบ (don't know)<br>☐ ไม่เกี่ยวข้อง (NA) | ☐ ตรวจสอบในพื้นที่ (field investigation)<br>☐ สัมภาษณ์ (interview)<br>☐ ตรวจเอกสาร (document)<br>☐ อื่น ๆ (others) |
| 16. **Factory Act, B.E. 2535 (1992)** พรบ. โรงงาน พ.ศ. 2535 | ☐ ปฏิบัติตาม (complete)<br>☐ ไม่ปฏิบัติตามบางอย่าง (partially complete)<br>☐ ไม่ทราบ (don't know)<br>☐ ไม่เกี่ยวข้อง (NA) | ☐ ตรวจสอบในพื้นที่ (field investigation)<br>☐ สัมภาษณ์ (interview)<br>☐ ตรวจเอกสาร (document)<br>☐ อื่น ๆ (others) |
| 17. **Hazardous Substance Act,** | ☐ ปฏิบัติตาม (complete) | ☐ ตรวจสอบในพื้นที่ (field |

| กฎหมาย/ข้อปฏิบัติ<br>Application Law/Act | การประเมินการปฏิบัติตาม<br>Compliance valuation | หลักฐานของการปฏิบัติตาม<br>Proof of compliance |
|---|---|---|
| **B.E. 2535 (1992)** พรบ. วัตถุอันตราย พ.ศ. 2535 | ☐ ไม่ปฏิบัติตามบางอย่าง (partially complete)<br>☐ ไม่ทราบ (don't know)<br>☐ ไม่เกี่ยวข้อง (NA) | investigation)<br>☐ สัมภาษณ์ (interview)<br>☐ ตรวจเอกสาร (document)<br>☐ อื่น ๆ (others) |
| 18. **Industrial Estate Authority of Thailand Act, B.E. 2522 (1979)** พรบ. การนิคมอุตสาหกรรมแห่งประเทศไทย พ.ศ.2522 | ☐ ปฏิบัติตาม (complete)<br>☐ ไม่ปฏิบัติตามบางอย่าง (partially complete)<br>☐ ไม่ทราบ (don't know)<br>☐ ไม่เกี่ยวข้อง (NA) | ☐ ตรวจสอบในพื้นที่ (field investigation)<br>☐ สัมภาษณ์ (interview)<br>☐ ตรวจเอกสาร (document)<br>☐ อื่น ๆ (others) |
| 19. **Cleanliness and Orderliness of the Country Act, B.E. 2535 (1992)** พรบ. รักษาความสะอาดและความเป็นระเบียบเรียบร้อยของบ้านเมือง พ.ศ.2535 | ☐ ปฏิบัติตาม (complete)<br>☐ ไม่ปฏิบัติตามบางอย่าง (partially (complete)<br>☐ ไม่ทราบ (don't know)<br>☐ ไม่เกี่ยวข้อง (NA) | ☐ ตรวจสอบในพื้นที่ (field investigation)<br>☐ สัมภาษณ์ (interview)<br>☐ ตรวจเอกสาร (document)<br>☐ อื่น ๆ (others) |
| 20. **Enhancement and Conservation of National Environmental Quality Act, B.E. 2535 (1992)** พรบ. ส่งเสริมและรักษาคุณภาพสิ่งแวดล้อมแห่งชาติ พ.ศ. 2535 | ☐ ปฏิบัติตาม (complete)<br>☐ ไม่ปฏิบัติตามบางอย่าง (partially complete)<br>☐ ไม่ทราบ (don't know)<br>☐ ไม่เกี่ยวข้อง (NA) | ☐ ตรวจสอบในพื้นที่ (field investigation)<br>☐ สัมภาษณ์ (interview)<br>☐ ตรวจเอกสาร (document)<br>☐ อื่น ๆ (others) |
| 21. **National Health Act, B.E. 2550 (2007)** พรบ. สุขภาพแห่งชาติ พ.ศ. 2550 | ☐ ปฏิบัติตาม (complete)<br>☐ ไม่ปฏิบัติตามบางอย่าง (partially complete)<br>☐ ไม่ทราบ (don't know)<br>☐ ไม่เกี่ยวข้อง (NA) | ☐ ตรวจสอบในพื้นที่ (field investigation)<br>☐ สัมภาษณ์ (interview)<br>☐ ตรวจเอกสาร (document)<br>☐ อื่น ๆ (others) |
| 22. **Public Health Act, B.E.2535 (1992)** พรบ. การสาธารณสุข พ.ศ. 2535 | ☐ ปฏิบัติตาม (complete)<br>☐ ไม่ปฏิบัติตามบางอย่าง (partially complete)<br>☐ ไม่ทราบ (don't know)<br>☐ ไม่เกี่ยวข้อง (NA) | ☐ ตรวจสอบในพื้นที่ (field investigation)<br>☐ สัมภาษณ์ (interview)<br>☐ ตรวจเอกสาร (document)<br>☐ อื่น ๆ (others) |
| 23. **Prescribing Plan and Process for Decentralization** | ☐ ปฏิบัติตาม (complete)<br>☐ ไม่ปฏิบัติตามบางอย่าง (partially | ☐ ตรวจสอบในพื้นที่ (field investigation) |

| กฎหมาย/ข้อปฏิบัติ<br>Application Law/Act | การประเมินการปฏิบัติตาม<br>Compliance valuation | หลักฐานของการปฏิบัติตาม<br>Proof of compliance |
|---|---|---|
| **Act, B.E. 2542(1999)** พรบ. กำหนดแผนและขั้นตอนการกระจายอำนาจให้แก่องค์การปกครองส่วนท้องถิ่น พ.ศ. 2542 | complete)<br>☐ ไม่ทราบ (don't know)<br>☐ ไม่เกี่ยวข้อง (NA) | ☐ สัมภาษณ์ (interview)<br>☐ ตรวจเอกสาร (document)<br>☐ อื่น ๆ (others) |
| 24. **Municipal Act, B.E. 2496 (1953)** พรบ. เทศบาล พ.ศ. 2496 | ☐ ปฏิบัติตาม(complete)<br>☐ ไม่ปฏิบัติตามบางอย่าง (partially complete)<br>☐ ไม่ทราบ (don't know)<br>☐ ไม่เกี่ยวข้อง (NA) | ☐ ตรวจสอบในพื้นที่ (field investigation)<br>☐ สัมภาษณ์ (interview)<br>☐ ตรวจเอกสาร (document)<br>☐ อื่น ๆ (others) |
| 25. **Provincial Administration Organization Act, B.E. 2540 (1997)** พรบ. องค์การบริหารส่วนจังหวัด พ.ศ. 2540 | ☐ ปฏิบัติตาม (complete)<br>☐ ไม่ปฏิบัติตามบางอย่าง (partially complete)<br>☐ ไม่ทราบ (don't know)<br>☐ ไม่เกี่ยวข้อง (NA) | ☐ ตรวจสอบในพื้นที่ (field investigation)<br>☐ สัมภาษณ์ (interview)<br>☐ ตรวจเอกสาร (document)<br>☐ อื่น ๆ (others) |
| 26. **The Energy Conservation Promotion Act B.E. 2535 (1992)** พรบ. การส่งเสริมการอนุรักษ์พลังงาน พ.ศ. 2535 | ☐ ปฏิบัติตาม (complete)<br>☐ ไม่ปฏิบัติตามบางอย่าง (partially complete)<br>☐ ไม่ทราบ (don't know)<br>☐ ไม่เกี่ยวข้อง (NA) | ☐ ตรวจสอบในพื้นที่ (field investigation)<br>☐ สัมภาษณ์ (interview)<br>☐ ตรวจเอกสาร (document)<br>☐ อื่น ๆ (others) |
| 27. **Rubber Authority of Thailand Act B.E.2558 (2015)** พรบ. การยางแห่งประเทศไทย พ.ศ. 2558 | ☐ ปฏิบัติตาม (complete)<br>☐ ไม่ปฏิบัติตามบางอย่าง (partially complete)<br>☐ ไม่ทราบ (don't know)<br>☐ ไม่เกี่ยวข้อง (NA) | ☐ ตรวจสอบในพื้นที่ (field investigation)<br>☐ สัมภาษณ์ (interview)<br>☐ ตรวจเอกสาร (document)<br>☐ อื่น ๆ (others) |
| 28. **The Navigation in Thai Waters Act, B.E. 2456 (1913)** พรบ. การเดินเรือในน่านน้ำไทย พ.ศ. 2535 | ☐ ปฏิบัติตาม (complete)<br>☐ ไม่ปฏิบัติตามบางอย่าง (partially complete)<br>☐ ไม่ทราบ (don't know)<br>☐ ไม่เกี่ยวข้อง (NA) | ☐ ตรวจสอบในพื้นที่ (field investigation)<br>☐ สัมภาษณ์ (interview)<br>☐ ตรวจเอกสาร (document)<br>☐ อื่น ๆ (others) |

วัตถุดิบป้อนเข้ามาจากแหล่งที่มีความเสี่ยง ☐ สูง ☐ ปานกลาง ☐ ต่ำ
Raw material supply from risk area high moderate low

**3. การประเมินของการพัฒนาอย่างยั่งยืน**
**(สำหรับความเสี่ยงปานกลางและสูงเท่านั้น)**

| ประเด็นข้อกังวล<br>Issue | การประเมิน<br>Assessment level | แนวทางการแก้ไข<br>Possible solution |
|---|---|---|
| | | |
| | | |
| | | |
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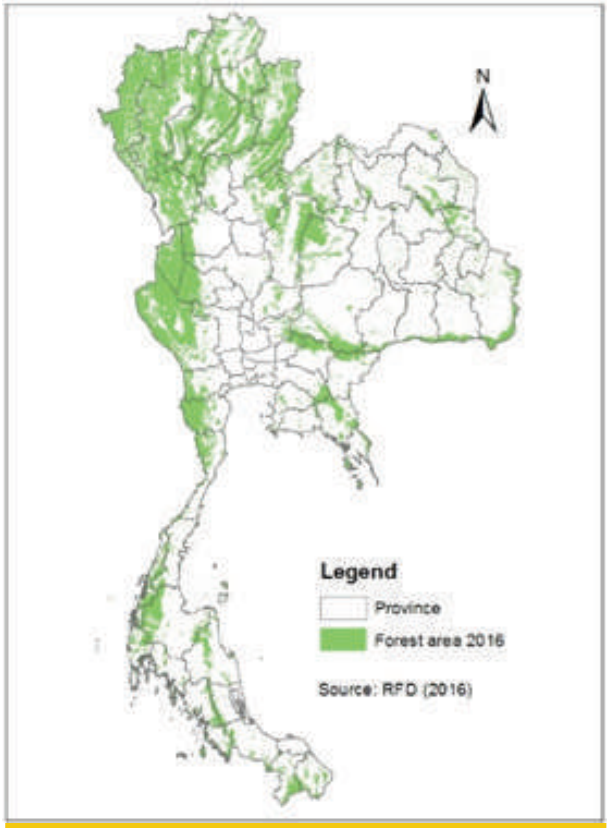
| | | |

**4. การตรวจสอบโดยบุคคลที่สาม**
**Third Party Reviewing**

| การตรวจสอบการประเมินผลโดยผู้ที่มีความเหมาะสม<br>We (I) verified the evaluation by the applicant is appropriate. | |
|---|---|
| ประเภทของผู้ตรวจ<br>Reviewer Type | ☐ บุคคลทั่วไป (individual)<br>☐ หน่วยงานหรือองค์กร (agency/institution)<br>☐ หน่วยรับรอง )Certification Body : CB( |
| หมายเลขใบอนุญาต<br>License No | |
| ชื่อหน่วยงาน<br>Name of Organization | |
| ชื่อผู้ตรวจรับรอง<br>Name of Reviewer | |
| ลายมือชื่อ<br>Signature of Reviewer | |
| วันที่ตรวจรับรอง<br>Date of Reviewing | |

Certified forest and wood in Thailand

About one-third of Thailand (32.1%) or 16.6 million ha is under forest cover. Forest plantations cover about 624,000 ha or 1.2% of the country area. In addition, some 3.5 million ha of land in Thailand is covered by rubber plantations, with about 90% in smallholdings, whereas the area of certified rubber plantations is only 16,082 ha (less than 1%). Additionally, only 7,914 ha (approximately 1% of the planted forest) is awarded forest certification (eucalyptus plantations). About 80% of the certified forests are managed by state enterprises, 15% by smallholders and 5% by big companies.




**Remaining forest cover in 2016**

Wood demand in Thailand

The Faculty of Forestry, Kasetsart University reported 70-80% of the eucalyptus wood is used for paper and pulp industry, 10-15% for charcoal and 5% for poles and other uses. Specific wood utilizations include pulp, woodchips, wood composites, sawn timber, materials for mushrooms and fertilizer, poles, household energy and commercial energy (see below Table). The demand is expected to increase 58 million tonnes in 2016 to 156 million tons in 2036 or 3 folds in next 20 years.

*The industrial wood sector (KUFF, 2016)*

| Industry | Deman(million tonnes) | | | |
|---|---|---|---|---|
| | 2016 | 2021 | 2026 | 2036 |
| Pulps (paper & dissolving) | 7 | 7 | 7 | 10 |
| Wood chips | 6 | 10 | 15 | 20 |
| Wood composites (PW, PB, FB, CBB, WPC) | 6 | 10 | 18 | 32 |
| Sawn lumber | 7 | 8 | 9 | 11 |
| Materials for mushroom and fertilizer | 0.5 | 0.75 | 1 | 2 |
| Pole/pile/ scaffold | 0.5 | 0.75 | 1 | 2 |
| Household energy (fuel, wood, charcoal) | 15 | 15 | 15 | 15 |
| Commercial energy (chips, pallet, charcoal) | 16 | 28 | 32 | 64 |
| Totals | 58 | 79.5 | 100 | 156 |

Source: KUFF (2016)

Timber production (except teak) in Thailand is mainly produced from tree outside reserved and natural forest areas, which implies that smallholder production is likely to increase exponentially. The major portion of natural rubber, rubber wood products (furniture, toys, medium density fiberboard-MDF), and eucalyptus woodchip, (pulp, paper, veneer and some furniture) are mainly produced by smallholder farms.

Smallholder tree-farmers are important players in wood production in Thailand. However, most smallholders, and large scale commercial plantation owners in Thailand face serious bottlenecks which affect the use of best practice management standards.

**Certified timbers from teak plantations**

The bottlenecks are related especially to the lack of access to good quality genetic materials, red-taps of government administration, and restricted access to finance and markets. Consequently, smallholders often manage their forest plantations by ad-hoc approaches that are not efficient or sustainable, or seek alternative profitable income by converting plantations into cash crops.

The number of certified forests In Thailand decreases in recent years due to high cost and complexity of the schemes. The statistical data show that only 15% of the total certified forests belong to smallholders. To minimize these obstacles, the modified schemes (e.g. ITTO/RFD C&I) should facilitate accessible, affordable and sustainable approach to certification for the forest owners, smallholders.

**Forest plantation registration, Lao PDR**

# Minimize Harvesting Loss

**Assist. Prof. Nopparat Kaakkurivaara**

(Minimize harvesting loss, efficient transport and processing of teak roundwood Consultant)

## Harvesting Loss

Damage is often seen as an important consideration when conducting selection cutting. Logging damage to residual trees during selection cutting may lead to serious economic losses in terms of both timber quality and diameter growth reduction (Tavankar et al., 2015). Damage was considered to be physical wounds that detracted value from the harvested log or on the residual trees.

*Damage on residual trees :*

An excessive damage to residual trees is significantly reduce the potential value and quality of the residual stand. Former studies, i.e. Murphy and Twaddle (1985) indicated that nearly 40 percent of the standing value of a tree could be lost through degradation during the harvesting process. Tavankar et al. (2015) found that logging wounds cause a substantial reduction (8.1 %) in diameter growth of residual trees left after a selective logging operation.

**Damage on harvested log**

**Assist. Prof. Nopparat Kaakkurivaara, Kasetsart University, Consultant**

*Damage on harvested log :*

Damage to harvested logs, especially veneer logs and sawn timbers can be more important concern relative to value loss associated with log degrade. Williston (1979) found that breakage and skidding damage associated with harvest operations destroyed almost six percent of the total value of harvested logs.

## Types of harvesting loss

Generally harvesting loss can be divided into two groups: avoidable loss and unavoidable loss.

Avoidable Loss is a loss which normally caused by human activities. Loss can be mitigated when work with care. Damage to harvested trees or logs can occur along the timber harvesting process, such as, during the felling, bucking, extraction (skidding), and transportation. For example, barber chair, the splitting of the butt log during the tree felling. The tree often remains attached to the stump, creating a danger zone and ruining the log value.

The higher incidence of damage near the base of the tree is important because the butt log is generally the most valuable log in a tree. Skidding trees during thinning or partial harvesting can contribute to log breakage in certain situations. Thus, the proper harvesting techniques together with skilled workers can reduce such damages.

Unavoidable Loss is a loss which occurring naturally, for example, the physiology (growth stresses) of the tree, damage from pest disease outbreak, etc. That is in necessary, when processing, to remove or exclude from harvested logs. There is not much we can do to eliminate this type of loss.

Harvesting loss occurs at all processing points in the harvesting and processing. Damage occurs on butt logs during felling and on subsequent logs cut further up the stem. Damage includes torn wood fibers and the splitting of stems and logs during felling (capping, slabbing, splitting, shake, shatter and fracture), snigging (shatter, fracture), cross cutting (slabbing, spiking) and transport (shatter, spiking, quartering), and includes internal damage to wood structures during falling and processing.

**Damage occurs on butt logs during felling**

**Causes of harvesting loss**

Common causes of harvesting loss may include: lacking of training, lacking of knowledge or experience, lacking of incentives, improper decision making, improper machine selection, etc. Some of damage occurs might because of the application of the extremely high mechanical forces applied by the machine. This can create high damage losses from forest to mill.

**Measures to mitigate harvesting loss**

Harvesting loss mitigation measures include: training, proper machinery selection, guideline or best practice, incentives, proper decision making, and developing appropriate technology.

**Harvesting loss measurement**

A guideline or training can significantly reduce harvesting damages occurring during the timber harvesting process. Another way around, log damage can be minimized by experienced operators using 'best practice' techniques for particular machines, tree sizes, forest structures and stand condition.

**EXERCISE 1: Bucking optimization**

**Objectives of the exercise:**

- participants are understand the principle of bucking optimization
- participants are able to make the properdecision making

Optimal bucking is cutting a tree into parts that maximize total tree value according to the decision making's objectives. Improper bucking could lead up to almost a 25-percent loss in potential log value for certain operations. Bucking can divided into three different levels: stem, stand, and forest levels.

The goal of stem level bucking optimization is to assign each tree to be cut a bucking pattern yielding the highest total stem value. Goal of stand level is to find a bucking policy maximizing the aggregate production value from all stems being cut from a forest stand. and lastly, goal of forest level is to assign each stand a bucking policy such that the overall production value from all stands to be harvested during planning period will be maximized. Bucking operations can be carried out either at harvesting site or at mill site.

**Participants were divided into groups to brainstorming on "Reduction of Harvesting Loss"**

The stem level bucking optimization requires two components: 1) the stem profile and 2) each possible length-diameter combination of logs be given a value reflecting its profitability on the market. The principle of cutting a tree stem into logs with the highest aggregate value is commonly called bucking to value (Sondell 1987). Stem-level bucking optimization are clearly based on dynamic programming (DP).

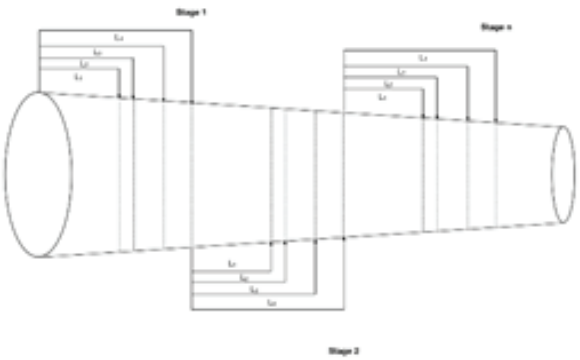


**Figure x. Dynamic approach that have been used in this study. (modified from Kivinen 2007)**

A tree stem is divided into N segments, the optimal bucking pattern is found by recording the highest cumulative log value at each stage and the starting position of the last log (Nasberg 1985). In this way the algorithm proceeds all the way towards the top of the tree. The stem diameter and volume were calculated using taper models as a function of the breast height diameter and the height of the trees. The dynamic programming generated several cutting alternatives for each stem. Calculated the value of each alternative according to price, the option which provides the maximum value of stem is selected (figure x).

**Participants were presenting work from brainstorm on "Reduction of Harvesting Loss"**

**Assignment:**

Find the right decision making based on given condition of different tree sizes and possible length-diameter combination of logs which reflecting its profitability on the market.

**Exercise summary**

- Bucking optimization aims for maximized tree value and minimized waste
- More assortments, more complicated
- Larger tree, greater options/better results

**EXERCISE 2: Harvesting loss measurement**

**Objectives of the exercise:**

- participants are understand the estimation of harvesting loss
- participants are able to identify the route cause of harvesting loss and seeking for solution

**Assignment:**

At the log landing, participants were splitter into groups. Each group has to find the damaged logs and measure the damage. On each damaged log, the following parameters were recorded: type of damage, damage severity (i.e. bark, phloem, wood fibers), cause of damage (i.e. felling or extraction), and position and size of wounds. The wound size was determined by measuring the maximum length and width by measuring tape and calculating the ellipse surface area. After that they have to estimated the harvesting loss and identified the harvesting loss cause.

**hands-on practice in estimation of bucking optimization**

**Exercise summary**

- The percentage of harvesting loss somehow reflects the efficiency of harvesting operations
- Harvesting loss percentage can be used and analyzed to improve harvesting operations in the future.

**Group photo**

# Technology Transfer Center for Wood Industry Standard Improvement

Rong Kwang district, Phrae Province

The Technology Transfer Center for Wood Industry Standard Improvement of the Forest Industry Organization (FIO) was established at Rong Kwang District, Phrae Province. Previously, It was used as a sawmill in Phrae Province. The center aims to be a training facility for students, and general public to have skills in being a craftsman of wood furniture products in the initial and advanced stages.

Manager of the center (Mr. Chaichana Sopa) indicated that the center has a capacity to process wood, mainly harvested from FIO teak plantations in northern Thailand, in various steps up to furniture products approximately 510 m3/month or 6,000 m3/year. This processed material can produce lumber of lumber) 64,000 feet3/year or approximately 30% of timber. The center employs more than 400 staff working in various tasks of wood processing products. It is predicted that the size (girth) of timber input for wood processing is smaller in the future because most greater size have been harvested.

**Teak timber at log yard harvested from FIO plantations in northern Thailand.**

Besides the square lumber, the FIO center has developed technology to use waste wood in various products as the added values such as finger joint, which is high demand by the market. All raw materials (teak timber) are from FIO teak plantations.

**Value-added products from waste wood (finger joint)**

Mr. Chaichana Sopa, Chief of Khun Mae Kham Mee Forest Plantation Station elaborated that this station was established in 1978. Up to now, 19,000 rai (approx... 3,000 ha) of teak have been planted. forest plantation The FIO center is also located inside the forest plantation area. This station is one of FIO forest plantation, which is awarded Forest Stewardship Council (FSC) certificate and employs Chain of Custody COC for sustainable forest management. Therefore, it is able to track the origin of timber (wood) to make furniture products. This is relevant and compile with the regulation for international trade. Nevertheless, all of wood products are sold in Thailand and Phrae Province.

The Technology Transfer Center for Wood Industry Standard Improvement not only produces teak furniture products, but also disseminate appropriate and practical knowledge to local people on production of teak furniture, as well as improve livelihood of local community and local income. Besides, the FIO is working to improve the quality of teak furniture products and packaging to meet the international standards. The outputs indirectly reduce deforestation rate.

Process of sanding teak products

Teak products processing

Teak products

Process of laminated wood

Group photo

## Awarding Training Certificate of Participation

**By Mr. Suchat Kalyawongsa**

Director of Forestry Research and Development Office, Royal Forest Department






# Training Evaluation
# New Management System and Minimize Harvesting Loss

5-7 February 2020 at Phrae Nakara Hotel,

Phrae Province, Thailand

The training evaluation results were analyzed from questionnaires distributed to participants who attended the training workshop on New Management System and Minimize Harvesting Loss, held during 5-7 February 2020 at Phrae Nakara Hotel, Phrae Province, Thailand. There were 25 participants submitting the completed evaluation questionnaires. Besides the collection of basic information of participants, the main objective of the evaluation was to assess the effectiveness and satisfaction level against the defined training objectives in order to improve logistic and content in the next training sessions.

**Section 1 Personal information**

There were 21 males (84%) and 4 females (16%) attending the training workshop. Approximately 56% of the total participants had ages between 40 and 50 years old, followed by ages of 20-30, ages of 30-40 and over 60 years old **(Table 1).**

**Table 1** Number of participants by age class

| Age (year) | No. of individuals | % |
|---|---|---|
| 20-30 | 6 | 24 |
| 30-40 | 3 | 12 |
| 40-50 | 14 | 56 |
| Over 60 | 2 | 8 |
| **Total** | **25** | **100.00** |

Seventeen or 68% of participants were affiliated with Forest Industry Organization (FIO), which has the main mission for economic forest plantations. while the percentages of participants either from Royal Forest Department (RFD) and smallholders of forest plantations (mostly teak) were the same (16%**) (Table 2).**

**Table 2** Number of participants and their affiliations

| Affiliation | No. of individuals | % |
|---|---|---|
| Royal Forest Department | 4 | 16 |
| Forest Industry Organization | 17 | 68 |
| Smallholders | 4 | 16 |
| **Total** | **25** | **100.00** |

The ITTO Teak Project also evaluated the education background of participants. The result indicated that approximately 56% of respondents have bachelor's degree, while 6 participants have higher than bachelor's degree and only 5 participants have lower than bachelor's degree **(Table 3)**.

**Table 3** Education background of participants

| Education level | No. of individuals | % |
|---|---|---|
| Lower than bachelor's degree | 5 | 20 |
| Bachelor's degree | 14 | 56 |
| Higher than bachelor's degree | 6 | 24 |
| **Total** | **25** | **100.00** |

Most respondents are classified as Forest Industry Organization (FIO) planted areas (56%). 14 of the respondents have plantation areas of more than 100 rai or 16 ha. About 8 percent of respondents have plantation areas ranging from 50-100 rai (8-16 ha), and the remaining 36% have less than 50 rai or 8 ha. The accumulated plantation areas of all 25 respondents are 86,500 rai with the average of 3,460 rai **(Table 4)**.

**Table 4** Number of respondents and planted areas

| Planted area (rai) | No. of individuals | % |
|---|---|---|
| 0-50 | 9 | 36 |
| 50-100 | 2 | 8 |
| Over 100 | 14 | 56 |
| **Total** | **25** | **100.00** |

**Remark**: Excluding public plantation areas (RFD and FIO)

**Section 2 Satisfaction level and understanding**

The check list questionnaire was designed and used to determine levels of satisfaction and subject understanding. There are six questions, namely 1) obtain information prior to the training, 2) overall training contents, 3) lecture and practice on new management system, 4) lecture and practice on minimize harvesting loss, 5) training venue and accommodation, and 6) additional knowledge gained. Each question consists of five alternative answers or levels of satisfaction (very good, good, moderate, poor and very poor). The respondents selected only one answer that reflects his or her satisfaction **(Table 5)**.

**Table 5 Level of satisfaction and understanding by training contents and logistic arrangements**

| Subject | Level of satisfaction/understanding (%) | | | | |
|---|---|---|---|---|---|
| | Very good (score 5) | Good (score 4) | Moderate (score 3) | Poor (score 2) | Very poor (score 1) |
| 1. obtain information prior to the training | 28 | 16 | 40 | 16 | - |
| 2. overall training contents | 68 | 20 | 4 | 8 | - |
| 3. lecture and practice on new management system | 48 | 40 | 4 | 8 | - |
| 4. lecture and practice on minimize harvesting loss | 64 | 24 | 8 | 4 | - |
| 5. training venue and accommodation | 56 | 32 | 8 | 4 | - |
| 6. additional knowledge gained | 64 | 20 | 12 | 4 | - |

About half of the respondents reported good or very good satisfaction on training information announcement and logistic arrangement prior to the actual training (e.g. provision of concept note, travel arrangement, communication with the project staff). The overall training content was ranked as of the highest satisfaction. This is due to the topic itself is very interesting and an up to date issue in this region.

About 88% of the respondents were satisfied with the lecture on the new management system (48% ranked it very high and 40% high). This is because the instructor presented a lot of case studies from his experiences in forest management, especially for teak. Respondents had a chance to do a small exercise based on criteria and indicator of National sustainable forest management standard.

The lecture and field practice on minimize harvesting loss practices had similar evaluation levels. About 88% of the respondents were satisfied with the lecture on minimize harvesting system (64% ranked it very high and 24% high). This is due to the fact that all participants had opportunities to practice how to estimate the harvesting loss. Moreover the instructor applied several techniques for participation, i.e. online quiz, group work, brainstorming, etc.

Moreover, 88% of the respondents were satisfied with the training venue and accommodation. A majority of the respondents (84%) were satisfied with the training. They gained new and additional knowledge during the workshop. Participants enhanced their capacity on relevant topics. **(Figure 1)**

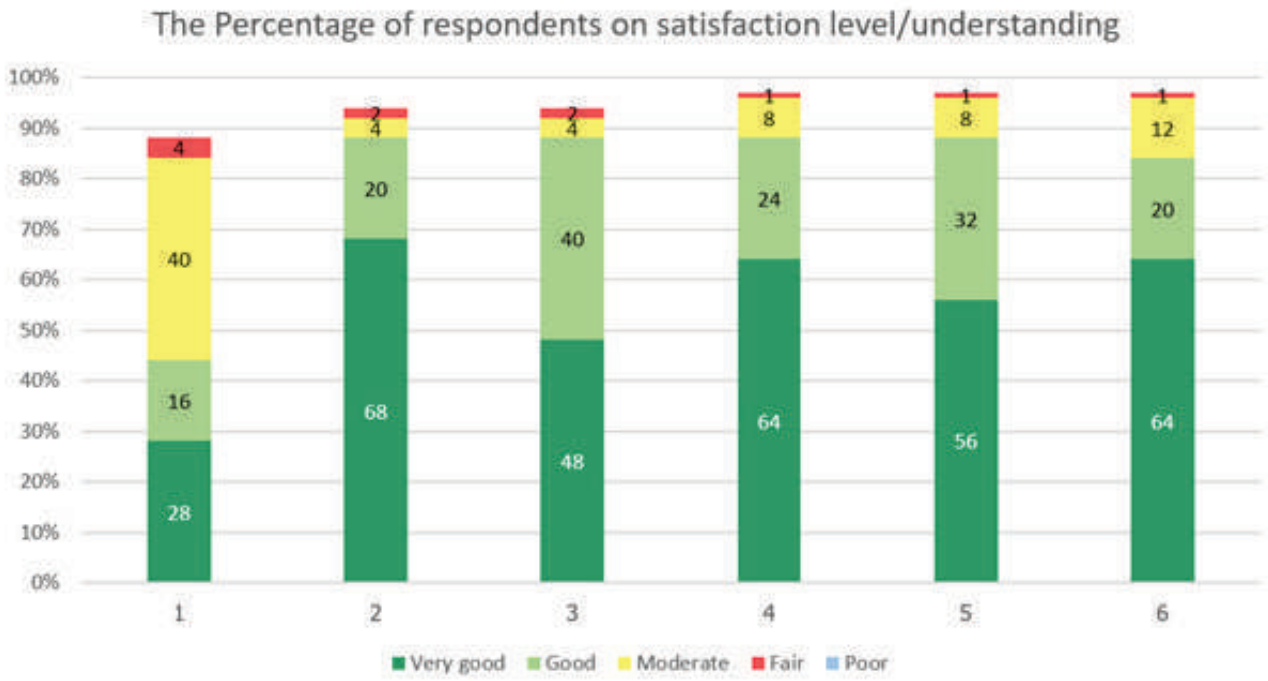



**Figure 1** Percentage of satisfaction or understanding for each training session

Notes: 1) obtain information prior to the training, 2) overall training contents, 3) lecture and practice on new management system, 4) lecture and practice on minimize harvesting loss, 5) training venue and accommodation, and 6) additional knowledge gained.

**Section 3 Recommendations**

The questionnaire also provided open-end questions and space for participants to present their feedbacks and recommendations to improve future training sessions. We obtained constructive comments and recommendations from 4 respondents. They are as below:

| Comments and recommendations | |
|---|---|
| 1. | Abroad excursion would be great |
| 2. | Teak pest and insect might be good topic for next training |
| 3. | Aboard excursion please |
| 4. | Such a training or regular training on forest management shall be continuously organize |

The training organizers thank respondents for providing valuable comments, accept their concerns and will improve the next training sessions accordingly.

**Out of the totally 30 participants. 15 persons were affiliated with Forest Industry Organization (FIO), (FIO has the main mission for economic forest plantations), 4 persons were affiliated with Royal Forest Department (RFD) and 11 persons affiliated with Private and smallholder teak plantations.**

# List of Participants Attending the Training Workshop on New Management System and Minimize Harvesting Loss

5-7 February 2020 at Phrae Nakara Hotel,
Phrae Province, Thailand

| No. | Name-Surname | Role | Affiliation | E-mail/Tel. |
|---|---|---|---|---|
| **Project Staff** | | | | |
| 1 | Mr. Suchat Kalyawongsa | PSC com. | RFD | suchat_forester@yahoo.com |
| 2 | Dr. Saroj Wattanasuksakul | PSC com. | RFD | tic2508@gmail.com |
| 3 | Dr. Nopparat Kaakkurivaara | Consultant 3 | Kasetsart University | ffornrm@ku.ac.th |
| 4 | Dr. Nikhom Laemsak | Consultant 4 | Kasetsart University | ffornil@ku.ac.th |
| 5 | Dr. Sutep Junkhiaw | Lecturer | Kasetsart University | fforsj@ku.ac.th |
| 6 | Prof. Yongyut Trisurat | RAM | Kasetsart University | fforyyt@ku.ac.th |
| 7 | Miss. Saichon Mutarapat | Secretary | ITTO Teak Project | chon-ag44@hotmail.com |
| 8 | Miss.Suchanart Suyarat | Finance | ITTO Teak Project | plantz.sucha@gmail.com |
| **RFD** | | | | |
| 1 | Mr. Hongsepijarn Buakhai | Technical Forestry Official | RFD | 092-2705771 |
| 2 | Mr. Worapoj Khombai | Technical Forestry Official | RFD | 093-2251588 |
| 3 | Mr. Prapai Kaennark | Technical Forestry Official | RFD | 081-6044916 |
| 4 | Mr. Patawee Puthipairoj | Technical Forestry Official | RFD | 080-1123095 |
| **FIO** | | | | |
| 1 | Mr. Somboon Kumsuwan | Chief of Huai Rabum Forest Plantation | FIO | 065-0816320 |
| 2 | Mr. Sayan Mattayakhun | Chief of Lat Yao Forest Plantation | FIO | 086-4465136 |
| 3 | Mr. Rittee Kingtupluang | Chief of Mae Moh Forest Plantation | FIO | 097-9988924 |
| 4 | Mr. Anuchit Kasian | Chief of Mae Sai Kham Forest Plantation | FIO | 083-9003143 |
| 5 | Ms. Piamporn Sripatai | Technical Forestry Official | FIO | 087-0563344 |
| 6 | Mr. Prawoot China | Director of Research and development sustainable forest management | FIO | 081-884-5915 |
| 7 | Ms. Kornnika Wongmittae | Technical Forestry Official | FIO | 089-6639057 |
| 8 | Mr. Nopporn Yoonsongnern | Chief of Nam Sui Huy Pra Duk Forest Plantation | FIO | 084-6049018 |

| No. | Name-Surname | Role | Affiliation | E-mail/Tel. |
|---|---|---|---|---|
| 9 | Mr. Aphichat Buaquttha | Chief of Phu Sawan Forest Plantation | FIO | 081-9611160 |
| 10 | Mr. Thammarat Yoojongdee | Chief of Tong Pha Phum Forest Plantation | FIO | 081-8803531 |
| 11 | Mr. Kiatthani Klangthong | Chief of Sai Yok2 Forest Plantation | FIO | 092-6406074 |
| 12 | Mr. Krittiphon Jansanga | Chief of Si Satchanalai Forest Plantation | FIO | 083-9552121 |
| 13 | Mr. Satit Jaisue | Chief of Tha Pla Forest Plantation | FIO | 081-9626518 |
| 14 | Mr. Chaichana Sopa | Chief of Khun Mae Kham MiForest Plantation | FIO | 062-2424760 |
| 15 | Mr. Kriangsak Phayungsaenkul | Chief of Mae Jang Forest Plantation | FIO | 081-951-0251 |
| **Farmer** | | | | |
| 1 | Mr. Wipass Wasanasitthi | | Farmer | 081-9452394 |
| 2 | Mr. Vised Pheersai | | Farmer | 094-4739614 |
| 3 | Mr. Thanathuek Thamdun | | Farmer | 097-2049663 |
| 4 | Mr. Jongrak Srina | | Farmer | 099-8648360 |
| 5 | Ms. Phongsri Srison | | Farmer | |
| 6 | Ms. Penwipa Panyawai | | Farmer | |
| 7 | Ms. Pimwika Panyawai | | Farmer | |
| 8 | Mr. Apichat Poungdok | | Farmer | |
| 9 | Ms. Patcharin Srewanchai | | Farmer | |
| 10 | Mr. Phaitoon Chanlohit | | Farmer | |
| 11 | Mr. Watat Chaiyavong | | Farmer | |

*Khun Mae Kham Mee Forest Plantation*
*Phrae Province, Thailand*

# Concept Note

## Joint Training Workshop on New Management System and Minimize Harvesting Loss 13-17 January 2020 at Phrae Province

Enhancing Conservation and Sustainable Management of Teak Forests and Legal and Sustainable Wood Supply Chains in the Greater Mekong Sub-region PP-A/54/331

1. **Background and rationale**

Teak *(Tectona grandis)* with its outstanding physical and aesthetic qualities is recognized as one of the most important and valuable hardwoods in the world. It has been used for many centuries for a range of products in furniture manufacturing and housing construction, as well as its cultural services. Natural teak forests covering an area of about 29 million hectares occur in central and southern India, Lao PDR, Myanmar and Thailand. However, natural teak forest area has reduced substantially in all native teak growing countries mainly due to over exploitation, agriculture expansion, and shifting cultivation. In particular, old-growth high-quality teak stands have declined significantly for many years and there is a high risk of losing their high diversity of genetic traits and wood characteristics.

The International Topical Timber Council (ITTC) and International Union of Forest Research Organizations(IUFRO) at its 53rd Session in Peru and the Global Landscapes Forum in Bonn, Germany in 2017 approved an activity entitled “Enhancing Teak Management” to improve the management and marketing of both natural and planted teak in all three tropical regions. The Federal Republic of Germany through the Federal Ministry of Food and Agriculture financed the first stage of this activity in the Greater Mekong Sub-region (GMS). ITTO signed the Memorandum of Understanding (Mou) with Kasetsart University and assigned the Faculty of Forestry to serve as the Regional Project Manager to coordinate the implementation of the teak project with National Project Coordinators from 5 participating countries.

ITTO Teak Project in Mekong project aims to enhance the efficiency of natural teak forest management and forest plantations. Production and marketing by improving legal measures and regulations that facilitate sustainable teak production in the supply chain and enhance the quality of life for people and owners of small forest parks In the Greater Mekong Sub-region area. To enhance the efficiency of the smallholder community-based plantations and agroforestry system, the ITTO Teak Project in Mekong is planning to organize a training workshop on basic genetic improvement of teak and selection of materials for propagation, basic principles of plant propagation, techniques for propagating teak by using seeds and propagation without sex, principles of establishment of teak plantations. This activity is relevant to the Inception Report: Output 1, activity 1..3 and Output 2, activity 2..1)

**2. Objective**

1) To introduce participants to basic new management system.
2) To introduce sustainable forest management standards that will be applied to the new system management
3) To introduce participants basic principle of harvesting loss.
4) To brainstorm participants on reduction of harvesting loss.
5) To introduce participants to principle of bucking optimization.
6) To introduce participants to principle of sustainable forest operations
7) To see the practices of the given techniques on the ground (field training)

**3. Participants of the meeting**

This training Focus on providing knowledge to field staff and responsible office staff to become trainers (training for trainer) and are able to convey knowledge to interested people in planting teak in the future. Potential participants are from both Thailand and the participating countries. In addition, individuals, private sectors and small farmers are targeted. List of participants as follows:

| | | |
|---|---|---|
| 1) Royal Forest Department | 5 | persons |
| 2) Forest Industry Organization | 15 | persons |
| 3) Private and smallholder teak plantations | 10 | persons |
| 4) Officials or smallholders from the remaining 4 participating countries (3 persons each) | 12 | persons |
| Total | 42 | persons |

*It should be noted that the Project aims at having the same participants attending a consecutive training workshops throughout the project periods and become trainers later.*

**4. Work Plan and Process**

1) Arrange a consultation meeting with Consultants#3 and #6 and project team (19 December 2019)
2) Propose a training plan and content (see table)
3) Notify relevant agencies in order to nominate training participants
4) Conduct reconnaissance survey to determine demonstration plots and field visit sites, as well as training facilities (8-10 July 2019)
5) Conduct actual training workshop consisting of lecture on theories, hand-on practices and study visits in nearby areas
6) Evaluate training satisfaction, summary and report to the Project Technical Committee and Project Steering Committee, respectively.

**5. Training period time and venues**

1) 5 Day's period (4-8 February 2020)
2) Lecture: Maueng District, Phrae Province
3) Field practices and field visit: Khun Mae Kham Mee Teak Plantations, Travel to Technology Transfer Center for Wood Industry Standard Improvement, Rong Kwang district, Phrae Province

**6. Responsible agency**

ITTO Teak Project in Mekong 'Enhancing Conservation and Sustainable Management of Teak Forests and Legal and Sustainable Wood Supply Chains in the Greater Mekong Sub-region' PP-A/54-331

**7. Budget**

Budget from the project to Enhancing Conservation and Sustainable Management of Teak Forests and Legal and Sustainable Wood Supply Chains in the Greater Mekong Subregion (budget item activity C43: Training cost)

**8. Expected outputs**

1) Trainees are able to identify the management system that complies with international standards.
2) Participants are able to choose the right technique to the new management system and standard system.
3) Participants are able to identify harvesting loss and causes.
4) Participants know how to reduce the harvesting loss.
5) Participants understand the bucking optimization which maximize the profit and minimize loss.
6) Participants are able to choose harvesting techniques correctly.
7) Participants have an opportunity to exchange experience among each other and the trainers and plantation owner.
8) The trainees are able to function as trainers in their respective countries

**9. Monitoring and evaluation**

1) Daily wrap-up and recommendation for adaptation
2) Deliver and gather a questionnaire before and after completion of training program
3) Summary and report to the Project Technical Committee and Project Steering Committee, respectively

**TRAINING WORKSHOP PROGRAM**

**"New Management System and Minimize Harvesting Loss"**

**4 February 2020**

| | | |
|---|---|---|
| 17.30 –19.00 | Arrival of participants | Transportation provided from Phrae Airport to |

**5 February 2020**

| | | |
|---|---|---|
| 07.00 – 08.00 | Breakfast | |
| 08.00 –08.30 | Registration | Meeting Room of the Hotel, |
| 08.30 –09.00 | Opening ceremony and group photo | |
| 09.00 –10.00 | Lecture on " New Management System and The Sustainable Forest Management Standards" | Assist. Prof.Nikhom Laemsak (consultant) |
| 10.00 –10.15 | Coffee Break | |
| 10.15–11.00 | Lecture on " Sustainable Forest management (SFM) - Principles and requirements " | Assist. Prof.Nikhom Laemsak (consultant) |
| 11.00–12.00 | Lecture on " Sustainable Forest management (SFM) - Practices and applications for forest management." | Assist. Prof.Nikhom Laemsak (consultant) |
| 12.00–13.00 | Lunch | |
| 13.00–14.30 | Lecture on "Chain of Custody (COC) - Principles and requirements" | Assist. Prof.Nikhom Laemsak (consultant) |
| 14.30 –14.45 | Coffee Break | |
| 14.45–16.30 | Lecture on "Chain of Custody (COC) - Manuals and Examples Operation System" | Assist. Prof.Nikhom Laemsak (consultant) |
| 16.30 –17.00 | free time | |
| 17.00 –20.00 | Welcoming Dinner | |

**6 February 2020**

| | | |
|---|---|---|
| 07.30 – 08.00 | Breakfast | |
| 08.00 –10.30 | Lecture on "Harvesting loss" | Assist. Prof.Nopparat Kaakkurivaara (consuktant) |
| 10.30 –10.45 | Coffee Break | |

| | | |
|---|---|---|
| 10.45 –12.00 | Brainstorm on "Reduction of Harvesting loss" | Assist. Prof.Nopparat Kaakkurivaara (consultant) |
| 12.00–13.00 | Lunch | |
| 13.00–14.30 | Lecture on "Bucking optimization" | Assist.Prof.Nopparat Kaakkurivaara |
| | | (consultant) |
| 14.30 –14.45 | Coffee Break | |
| 14.45–16.30 | Lecture on "Sustainable Forest Operations: Thailand" | Assist. Prof.Nopparat Kaakkurivaara (consultant) |
| 16.30 –17.30 | free time | |
| 17.30 –20.00 | Dinner | |

**7 February 2020**

| | | |
|---|---|---|
| 07.30 – 08.30 | Breakfast | |
| 08.30 – 9.30 | Travel to Khun Mae Kham Mee Teak Plantation, Rong Kwang district, Phrae Province | Consultant, Consultant#6 and ITTO Project in Mekong-Thailand Component |
| 9.30 –13.00 | Practicing on minimize harvesting loss | Consultant Lunch and break will be served during the excursion. |
| 13.00 –13.30 | Travel to Technology Transfer Center for Wood Industry Standard Improvement, Rong Kwang district, Phrae Province | |
| 13.30 –14.30 | Excursion on Efficient Processing of Teak Round-wood | Consultant |
| 14.30 –16.00 | Wrap-up and closing | Consultant, Consultant#6 and ITTO Project in Mekong- Thailand Component |
| 16.00-17.00 | Travel back to the Hotel | |

**8 February 2020**

| | | |
|---|---|---|
| | Departure of All Participants | Transport provided to Phrae Airport |

**Remark**

- Schedule may be changed as appropriate.

ITTO-TEAK IN MEKONG

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