ITTO Project :

“Strengthening Surveillance and Monitoring to Tackle the Surge in Forest Loss and LandDegradation, Induced by Intensifying Conflict in Thailand’s Border Areas (PP-A/60-369)”

FOREST LOSS MONITORING PROJECT

April 2025

ITTO Project

"STRENGTHENING SURVEILLANCE AND MONITORING TO TACKLE THE SURGE IN FOREST LOSS AND LAND DEGRADATION, INDUCED BY INTENSIFYING CONFLICT IN THAILAND'S BORDER AREAS"
(PP-A/60-369)

COMPLETION REPORT

INTERNATIONAL TROPICAL TIMBER ORGANIZATION
April 2025

Project Title:	STRENGTHENING SURVEILLANCE AND MONITORING TO TACKLE THE SURGE IN FOREST LOSS AND LAND DEGRADATION, INDUCED BY INTENSIFYING CONFLICT IN THAILAND'S BORDER AREAS
ITTO Project Number:	PP-A/60-369
Project Objective:	Tackle continuing deforestation and forest degradation while sustaining livelihoods in the disturbed Thailand-Myanmar border areas
Donor:	Government of Japan (Japan Emergency Budget)
Project signed:	ITTO with Kasetsart University on 8 June 2024
Duration:	12 months (9 months implementation)
Starting Date:	1 July 2024
Completion Date:	31 March 2025
Executing Agency:	Kasetsart University (KU) in collaboration with the Royal Forest Department (RFD)
Total Project Budget:	USD 278,078.48

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Acknowledgements

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Our sincere gratitude goes to the Faculty of Forestry, Kasetsart University, Thailand as the Project Coordinator with the support of the Royal Forest Department (RFD) of Thailand, ITTO, Japan and relevant agencies to effectively coordinate and work with relevant agencies, local government and local people in Mae Hong Son province. The multi-stakeholders, in particular the local people have shown great dedication to sustaining the project activities and promote the sustainable management of community forests through using a robust forest monitoring system to track forest loss and degradation. In addition, we thank the Director-General of the Royal Forest Department (RFD) for chairing the Project Steering Committee and allows staff to work for the project.

The successful output and outcome of this project was the result of contributions from many organizations and people. We would like to take this opportunity to thank Mr. Hiroyuki Saito, Assistant Director, Global Environment Division, International Cooperation Bureau, Ministry of Foreign Affairs of Japan and Dr. Tetra Yanuariadi, ITTO Projects Manager for their constant support and guidance and encouragement throughout the project. All project Steering Committee (PSC), Project Technical Committee (PTC), and project staff, including consultants and supporting staff also put lot of efforts in the project implementation.

We gratefully acknowledge the technical cooperation provided by Professor Dr. Yongyut Trisurat, the Regional Project Manager of ITTO-BMEL Teak Project Phase II. His support has made the implementation of the project much easier and without it; the project would have been very difficult. We also acknowledge the help and cooperation of the Forest Community Management Office and International Forestry Foreign Affairs of the RFD for hosting the secretary office of the project.

ITTO Forest Loss Monitoring Project Team

List of Abbreviations and Acronyms

ACB	ASEAN Center for Biodiversity
APBON	Asia-Pacific Biodiversity Observation Network
DNP	Department of National Parks, Wildlife and Plant Conservation
EBVs	Essential Biodiversity Variables
ESG	Environmental, Social and Governance
FAO	Food and Agriculture of the United Nations
GBF	Global Biodiversity Framework
GISTDA	Geo-Informatics and Space Technology Development Agency
ITTC	International Tropical Timber Council
ITTO	International Tropical Timber Organization
JAXA	Japan Aerospace Exploration Agency
KU	Kasetsart University
NCAPs	Network Centric Anti – Poaching System
NGO	Non-governmental organizations
P-P-P	Public-Private Partnership
PSC	Project Steering Committee
PTC	Project Technical Committee
RFD	Royal Forest Department
SAP	ITTO Strategic Action Plan
SDGs	Sustainable Development Goals
SFM	Sustainable Forest Management
SMART	Spatial Monitoring and Reporting Tool
UN	United Nations
USD	US Dollar
WCS	Wildlife Conservation Society
YPA	Yearly Plan of Action

1. Project Identification

The project "**Strengthening Surveillance and Monitoring to Tackle the Surge in Forest Loss and Land Degradation, Induced by Intensifying Conflict in Thailand's Border Areas (**PP-A/60-369)**" or ITTO- Forest Loss Monitoring** addresses an urgent need to implement mitigating measures to the serious disruptions to local forest-based economies affecting Thailand due to the intensified armed conflicts in Myanmar,. . These armed conflicts has driven awaythousands of people into Thai's border areas, especially in Tak and Mae Hong Son Provinces. This influx has led to large-scale deforestation, increased illicit trade, and loss of food security and livelihoods for 25 vulnerable communities in the region. Mae Hong Son Province, with its refugee camps, faces the most impact. The fighting along the borders has intensifid in March and April 2023. Additionally, climate change, forest fire threats, and flash floods worsen the situation in the dry season, making it even more precarious.

As of March 2023, the UN reported an estimated 1,704,000 internally displaced people (IDPs) in Myanmar. Although refugee movements to neighboring countries are not systematically monitored, the UN estimates over 75,000 people have fled since the coup. Further displacement is expected due to heavy fighting, shelling, and landmine incidents in the northern province and multiple states and regions in the South-East.

In addition, Cyclone Mocha in May 2023 hit Rakhine State causing deaths and displacement, particularly among the Muslim Rohingya. Droughts in central Myanmar's dry zone are becoming more frequent and intense, driving huge inflex of refugees and migrants into Thailand for better livelihoods. The current El Niño has worsened the situation, with rainfall fluctuations and heatwaves significantly affecting food production in the region. If unchecked, this could threaten social and economic stability. The ongoing political crisis in Myanmar also risks escalating security challenges, competition for resources, social unrest and migration. Urgent interventions are needed to address the socio-economic and environmental impacts of conflict and natural disasters, build resilience, and enhance international cooperation. Proactive measures to address this global issue require local support in the developmental planning tools and knowledge.

The displaced people of Myanmar due to the conflicts, lack access to food, clean water, healthcare, education and livelihoods. As of July 2023, additional 25,000 displaced people were sheltered in 4 Temporary Safety Areas (TSA) in Mae Hong Son province, with a similar number in Tak province and are placed under the general jurisdiction of the Royal Thai Army. Displaced people are not totally sealed off in the refugee camps. Often, they look for food, NTFPs, and other biological resources in nearby forest areas and community forests. This situation not only causes conflicts between local people and refugees, as well as security issues, but also threatens biodiversity and leads to the over-exploitation of biological resources vital for the community livelihoods.

The Royal Forest Department (RFD) reported that 279 and 191 community forests are located in Tak and Mae Hong Son provinces along the Myanmar-Thailand border. Community forests provide food, water, and shelter for the livelihood of rural communities. They also inhabit plants, animals and migratory corridors in human- dominated landscapes.

This project is in consistent with the core objectives of the International Tropical Timber Agreement (ITTA 2006) and the priorities of the current ITTO Strategic Action Plan (SAP 2022-2026). The proposal has strong national and regional support. It aligns with key policy priorities and strategic directions for Thailand's sustainable forest management, such as the

amended National Forest Policy B.E. 2562 (2019) and the Community Forest Act B.E. 2562 (2019), which allow local residents and communities to benefit from national reserved forests (outside protected areas) and manage them.

The project supports key global objectives related to forests as enshrined in the UN Sustainable Development Goals (SDGs), particularly SDG 1 (No Poverty), SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action), and SDG 15 (Life on land), as well as the Global Forest Goals (GFGs) and other forest related global agendas. It aligns with the UNSPF 2017-2030 goals, including Global Forest Goal 1- Reversing forest loss through sustainable forest management (SFM), restoration and afforestation, prevent forest degradation and global effort of addressing climate change; Global Forest Goal 2 - Enhancing forest-based economic, social and environmental benefits, especially for forest dependent people improving their livelihoods; and Global Forest Goal 3 - Expanding protected forests and sustainably managed forests and sustainably sourced forest products.

At international level, the project will share information and experiences of case studies at global forums to support the expansion of this approach to other community forests in Thailand.

2. Project Objectives and Strategy

2.1 Project objective and outputs

The development objective of the project is to contribute to sustainable forest management, biodiversity conservation, and the achievement of SDGs (1, 12, 13 and 15).

The specific objective of the project is to tackle the surge in deforestation, forest/land degradation and food security loss in the disturbed Thailand-Myanmar border areas.

The project included two outputs as shown below:

Output 1: Robust forest monitoring system installation to assist the local authorities and communities in monitoring forest loss and degradation through the application of using satellite and drone data

Output 2: Fulfilled requisite capacity enhancement of local authorities, community groups and youth in community forest protection and sustainable livelihood development.

2.2 Project strategy

The project approach involves four principles: 1) local participation; 2) SMART (Smart Monitoring and Reporting Tool) technologies; 3) capacity building; and 4) local livelihood improvement. To implement effective advanced surveillance and monitoring for forest loss and land degradation in Thailand's conflict prone border areas, the project collaborated with the following stakeholders:

- Authorities/administrative bodies at national and provincial levels;
- Thai local people living in and around the target areas and Myanmar refugees;
- Technology and satellite data providers (international and local markets);
- Community groups and youth in forest protection.

While dealing with these groups, the project prioritized local authorities, community groups, youth and all genders as the targeted beneficiaries ensuring race and gender inclusion in its approach.

To facilitate stakeholder groups to work towards achieving the project objective, the following approaches/strategies were applied:

- *Participatory approach with intensive consultations to engage relevant authorities and communities*: In particular, consultations and in-depth interviews, either offline or online, were conducted to review the current situation on border security, human tariffing, humanitarian assistants and forest degradation in and around the temporary refugee camps, and the policies currently applied as well as capacity gaps that could be properly investigated and discovered. In this way, the review results will serve as feedback and reference . A participatory approach is key for forest protection and sustainable livelihood development, with potential involvement from associations and NGOs, including the Wildlife Conservation Society (WCS)-Thailand Program and Provincial Community Development Office.

  The project team actively engaged key stakeholders to share research findings on collaborative forest monitoring and SMART technology. A launching meeting in Bangkok and field visits were organized to inform policy makers, authorities and the public about the project objectives. Target audiences included RFD, representative of Japanese Government, ITTO, KU, provincial stakeholders, NGOs, and media. Consultation meetings aimed to communicate project goals, foster mutual understanding among stakeholders, and gather input for a collaborative forest monitoring system. At the end of the project, a national workshop and community-led reflection workshops shared relevant findings and discussed future steps for implementating collaborative forest monitoring. *Integration of ongoing initiatives/processes toward forest protection and sustainable livelihood development in and around the project areas*: The project reviewed present and previous activities implemented by governments (e.g., RFD, DNP, Thai Army, Mae Hong Son Province), NGOs both in Mae Hong Son and other provinces. The project proactively incorporated all practices from local, national and international projects/programs while also learning from the failures of previous projects.

  The project team actively collaborated and worked with local communities, government, and youth in patrolling and reporting through citizen science forum. Using SMART technologies, multilayer monitoring technology, satellite images, drones, and camera traps were employed for real-time monitoring and reporting of forest loss (Figure 1). Suitable sites were assessed before installing equipment. This project was the first such an initiative to use SMART technology within the RFD that aims to extend this method to other community forests. We conducted workshops on livelihood improvement, focusing on valued-added handicraft products and sustainable practices.

  This project used satellite imagery to track forest loss in Mae Hong Son Province along the Myanmar border, comparing data from 1990 to the present. Deforestation risks were predicted, and vulnerable deforestation areas were monitored by drones. Project Consultant Mr. Sitthichai installed camera traps in risk zones to detect deforestation and poachers, using SMART patrolling with GPS for data collection. All data will be processed and reported to Kasetsart University.

- *With the capacity building component,* the project enhanced community capacity in forest monitoring activities and equipped participants with technological skills using local communities and existing platforms and networks of RFD, DNP, and Mae Hong Son Province. It also facilitated cross- visits, such as to the Emerald Triangle Transboundary Biodiversity Conservation Project (funded by the Government of Japan) in Ubon Ratchathani province where local people living in the buffer zone domesticated wild orchids and bamboo, reducing illegal wild orchid collection and generating income. Additionally, PSC members visited the NCAPs installation at Salak Phra Wildlife Sanctuary in Kanchanaburi province after the Inception meeting to discuss the successes and failures with local authorities.
- *Maximum use of mass media and online platforms (website, Facebook, newsletter) to raise awareness on forest protection and livelihood development*. Various activities listed in Activity 2.3 were conducted to produce, share and disseminate information, knowledge management, and outreach to target audiences at international, national, provincial and local levels as planned. In addition, the results and lessons learned from the implementation of various activities were widely disseminated and shared at national and international conferences in Japan, Korea and the Philippines. (See details in the project achievements).

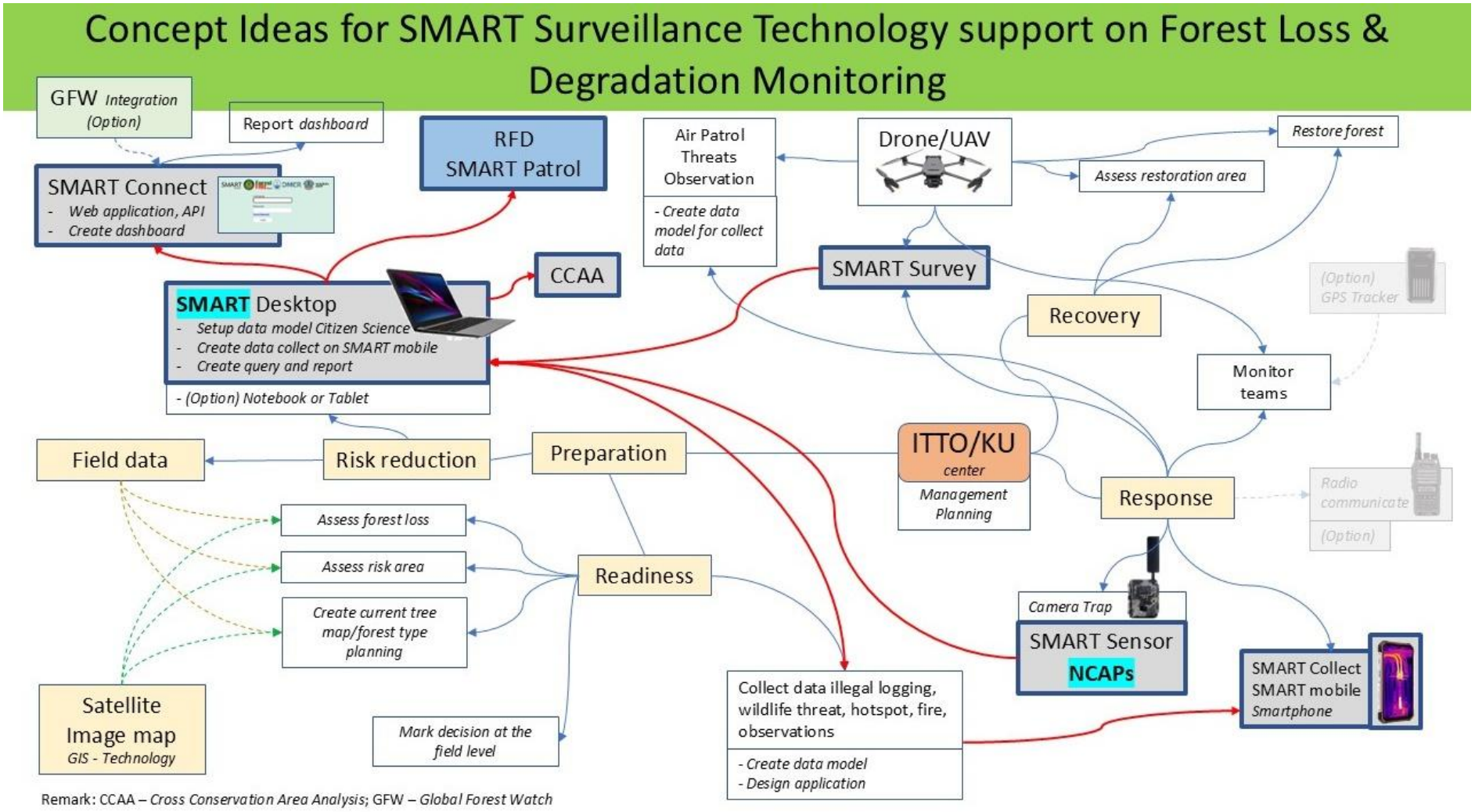


Figure 1. Concept ideas for SMART Surveillance Technology support on Forest Loss & Degradation Monitoring.

To implement the project effectively, a project management team was constituted, which consisted of Advisor, Project Coordinator, Deputy Project Coordinator, Project Secretary, Project Finance and Field Coordinator, respectively (Table 1).

Table 1. Project staff

Title	Name	Position/Tel/E-mail
Central Level		
Advisor	Prof. Yongyut Trisurat	Faculty of Forestry, Kasetsart University Tel. +662-5790176. Email: fforyyt@ku.ac.th
National Project Coordinator	Mr. Preecha Ongprasert	Director of Forestry Foreign Affairs Office, Royal Forest Department Tel. +66-2561-4192-3 ext. 5034 Fax +66-2561-3109 Mobile +66-8-9118-2351 E-mail: precha_ong@yahii.com
Deputy Project Coordinator	Mr. Seksan Kayapanick	Director of Community Forest Development Division, Community Forest Management Office, RFD
Project Coordinator	Dr. Chakrit Na Takuathung	Faculty of Forestry, Kasetsart University Tel. +6625790169; Email: chakrit.n@ku.ac.th
Project Secretary	Dr. Jenjira Fungjanthuek	Faculty of Forestry, Kasetsart University
Project Finance	Ms. Piyachanok Tor-charoen	Faculty of Forestry, Kasetsart University
Field Coordinator	Ms. Worarampa Prodpannam	Mae Hong Son Province

ITTO Secretariat

Title	Name	Position/Tel/E-mail
Central Level		
Supervisor	Dr. Tetra Yanuariadi	Projects Manager of Division of Trade and Industry, ITTO Secretariat, Yokohama, Japan Tel. +81-45-223-1110 Email: tetra@itto.int

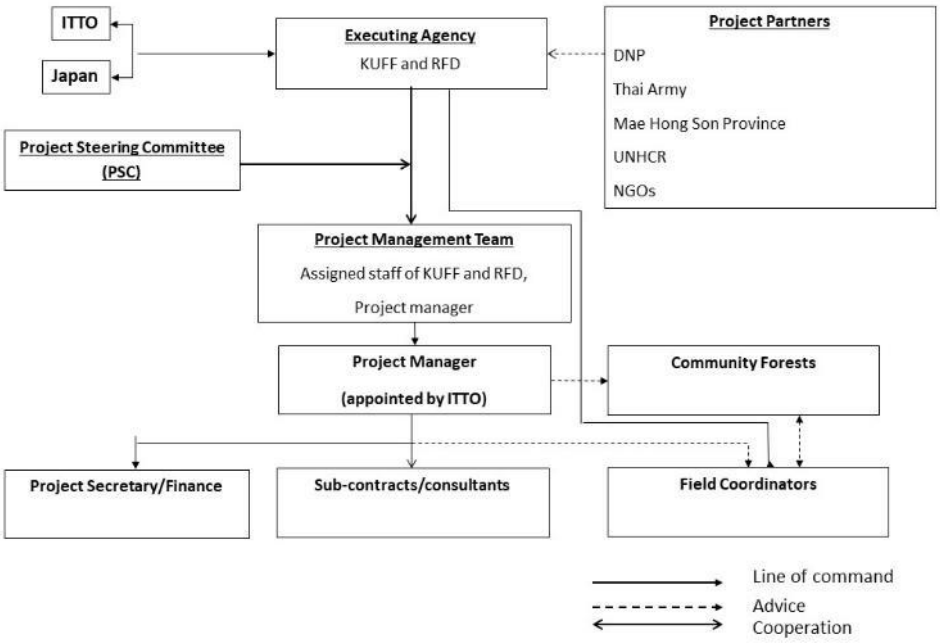


Figure 2. Organizational chart of the ITTO Forest Loss Monitoring Project.

In addition, a Project Steering Committee (PSC) and Project Technical Committee (PTC) were established (Figure 2). The primary role of PSC was to oversee the implementation of the project, approve expenditure within the budget, review the activities that have been carried out, and propose changes in budgets and activities. Director-General of the RFD has served as Chairman of the PSC. See below the official appointment of the PSC on 21 July 2024 :

Kasetsart University Announcement

Subject: Appointment of Project Steering Committee members for ITTO Project "Strengthening Surveillance and Monitoring to Tackle the Surge in Forest Loss and Land Degradation, Induced by Intensifying Conflict in Thailand's Border Areas (PP-A/60-369)"

The International Tropical Timber Organization (ITTO) and Kasetsart University are jointly implementing the project entitled "Strengthening Surveillance and Monitoring to Tackle the Surge in Forest Loss and Land Degradation, Induced by Intensifying Conflict in Thailand's Border Areas (PP-A/60-369)" or ITTO Forest Loss Monitoring Project. This project is financed by the Government of Japan. The project duration is 1 year from July 1, 2024 to June 30, 2025. The ITTO Forest Loss Monitoring Project aims to tackle continuing deforestation and forest degradation while sustaining livelihoods in the disturbed Thailand-Myanmar border areas.

According to the Memorandum of Understanding duly signed between ITTO and Kasetsart University dated 8 June 2024 on the implementation of the ITTO Forest Loss Monitoring Project, the Faculty of Forestry has been assigned to coordinate with the Government of Japan, the Royal Forest Department (RFD), ITTO and relevant agencies and stakeholders. To effectively implement various project activities, Kasetsart University would like to cordially appoint the Project Steering Committee members as follows:

1. Director-General of Royal Forest Department (RFD)	Chairman
2. Dean of the Faculty of Forestry	Deputy Chairman
3. Representative of the Department of National Parks, Wildlife and Plant Conservation (DNP)	Member
4. Representative of ITTO	Member
5. Representative of the Government of Japan	Member
6. Representative of Mae Hong Son Internal Security Operations Command	Member
7. Representative of Mae Hong Son Governor's Office	Member
8. Representative of Provincial Office of Natural Resources and Environment Mae Hong Son	Member
9. Representative of Forest Alumni Society	Member
10. Director of Wildlife Conservation Society - Thailand Program	Member
11. Representative of Geo-Informatics and Space Technology Development Agency (GISTDA)	Member
12. Mr. Suchat Kalyawongsa (Sustainable Livelihood Development Expert)	Member
13. Mr. Sapol Boonsermsuk (Forestry Senior Expert)	Member
14. Prof. Dr. Yongyut Trisurat (KUFF)	Member

15. Director of Community Forest Management Office, RFD	Member
16. Director of Forest Land Management Office, RFD	Member
17. Director of Forest Protection and Forest Fire Control Office, RFD	Member
18. Director of Forest Economics Office, RFD	Member
19. Director of Planning and Information Office, RFD	Member
20. Director of Forestry Foreign Affairs Office, RFD	Member
21. Project Coordinator	Member and Secretary
22. Director of International Cooperation and Organization Division	Member and Assistant Secretary

According to the Project Document, the Project Steering Committee will have the following responsibilities:

1. overseeing the implementation of project activities;
2. adopting work plans and budgets;
3. reviewing project progress and providing guidance;
4. reviewing and proposing changes in budgets and activities (if any); and
5. facilitating the national and international collaboration of participating agencies.

The Project Steering Committee will meet at least once a year in consultation. Expenses for organizing the meeting will be secured from the Miscellaneous Component (budget item 62). Representatives of the donor and ITTO are encouraged to secure their own expenses to attend PSC meetings.

The appointment is effective from July 1, 2024 and ends on March 31, 2025.

Announced on July 21, 2567 (B.E.) 2024

(Chongrak Wachrinrat, Ph.D.)
Acting President of Kasetsart University

Project Technical Committee (PTC) was established to support the work of the PSC through a periodic review of the implementation of all activities geared to achieve the project activity objectives. List of PTC members and its functions are shown below:

Kasetsart University Announcement

Subject: Appointment of Project Technical Committee members for ITTO Project "Strengthening Surveillance and Monitoring to Tackle the Surge in Forest Loss and Land Degradation, Induced by Intensifying Conflict in Thailand's Border Areas (PP-A/60-369)"

The International Tropical Timber Organization (ITTO) and Kasetsart University are implementing the project entitled "Strengthening Surveillance and Monitoring to Tackle the Surge in Forest Loss and Land Degradation, Induced by Intensifying Conflict in Thailand's Border Areas (PP-A/6 0 -369)" or ITTO Forest Loss Monitoring Project. This project is financed by the Government of Japan. The project duration is 1 year from July 1, 2024 to June 30, 2025. The ITTO Forest Loss Monitoring Project aims to tackle continuing deforestation and forest degradation while sustaining livelihoods in the disturbed Thailand-Myanmar border areas.

According to the Memorandum of Understanding duly signed between ITTO and Kasetsart University dated 8 June 2024 on the implementation of the ITTO Forest Loss Monitoring Project, the Faculty of Forestry has been assigned to coordinate with the Government of Japan, the Royal Forest Department (RFD), ITTO and relevant agencies and stakeholders. To effectively implement various project activities, Kasetsart University would like to cordially appoint the Project Technical Committee members as follows:

1. Dean of the Faculty of Forestry	Advisor
2. Director of Forestry Foreign Affairs Office	Chairman
3. Director of Community Forest Development Division, Community Forest Management Office, RFD	Member
4. Director of Legal Office, RFD	Member
5. Director of Information and Technology and Communication Center RFD	Member
6. Director of Public Relation and Extension Division, RFD	Member
7. Director of Forest Resource Management Office No.1 Mae Hong Son Branch, RFD	Member
8. Director of Protected Area Regional Office No.16 (Mae Sariang Branch), DNP	Member
9. Mr. Suchat Kalyawongsa (Sustainable Livelihood Development Expert)	Member
10. Mr. Sapol Boonsermsuk (Forestry Senior Expert)	Member
11. Prof. Dr. Yongyut Trisurat (KUFF)	Member
12. Project Coordinator	Member and Secretary

According to the Project Document, the Project Technical Committee will have the following responsibilities:

1. facilitating project implementation;
2. monitoring activities conducted by implementing agencies;
3. providing information to project teams to facilitate project implementation;
4. coordinating with national and international consultants to effectively implement the assigned tasks; and
5. supervising the Project Coordinator in preparing progress reports and work plans as required by the ITTO.

The Project Technical Committee meeting will be conducted at least once a year in consultation with the Project Coordinator. Expenses for organizing the meeting will be deducted from the Miscellaneous Component (budget item 62).

The appointment is effective from July 1, 2024 and ends on March 31, 2025.

Announced on July 21, 2567 (B.E.) 2024

(Chongrak Wachrinrat, Ph.D.)
Acting President of Kasetsart University

National Consultants and Supporting Staff

The ITTO Forest Loss Monitoring Project recruited two national consultants, Consultant 1: Image Interpretation and Consultant 2: SMART and NCAP Surveillance system development, as well as three supporting staff for conducting training workshops to increase the capacity of government staff and local people. List of national consultants and supporting staff are shown in Table 2.

Table 2. National consultants and supporting staff

Technical field	Name	Project activity	Duration of assignment	Institution/Agency (Indicative)
Consultant 1: Land use map, monitor and develop modeling of forest lost	Dr. Laddawan Riantakool	Activity 1.1	8 months (starting 1 July 2024)	Faculty of Forestry, Kasetsart University
Consultant 2: SMART and NCAP Surveillance system development	Mr.Sitthichai Jinamoy	Activity 1.3	9 months (starting 1 July 2024)	Thailand Hornbill Research Project
Support staff #1: Arrange the project's study visit for community and other stakeholders	Assoc. Prof. Dr. Naris Bhumpakphan	Activity 2.2	2 months (January-February 2025)	Faculty of Forestry, Kasetsart University
Support staff #2: Arrange	Dr. Pruet	Activity	2 months	Faculty of Forestry,

Technical field	Name	Project activity	Duration of assignment	Institution/Agency (Indicative)
domesticated cultivation of bamboo and NTFPs stakeholders	Racharak	2.2	(January-February 2025)	Kasetsart University
Support staff #3: Arrange training on value-added handicraft and livelihood improvement	Mr. Sapol Boonsermsuk	Activity 2.2	2 months (January-February 2025)	Senior Forestry Expert

2.3 Project Assumptions and Risks

The success of the project relies on the ongoing commitment and political will of responsible agencies, particularly RFD, to support national cooperation and promote advanced earth and ground technologies through a participatory approach to address deforestation and forest degradation while sustaining livelihoods in the disturbed Thailand-Myanmar border areas. Other key assumptions for the project's success include the commitment and motivation of national and local authorities, community and youth groups, and relevant stakeholders to participate in the project implementation. With the collective efforts of the project staff and constant support from RFD, the project can minimize the risks outlined in Table 3.

Table 3. Risk/uncertainty and planned mitigation measures

No.	Risk	Probability of occurrence	Mitigation measure
1.	Reluctant of forest communities to adopt advanced surveillance and monitoring to tackle the surge in forest loss and land degradation, induced by intensifying Cncflict in Thailand's border areas	Medium	Active engagement of RFD and partners at local level. Project design phase has included close consultations with communities and elements that are considered realistic within the given timescales. The project has worked closely with government stakeholders during proposal development and builds upon strong relationships between local communities, partners, and the respective governments.
2	Re-spread of COVID-19 and other diseases such as malaria, cholera interruption caused delay project activities	Low	Collaborate with responsible agencies (public health and local authority) to monitor the situation; COVID test and health screening for all participants. Luckily, no evidence was detected during the planned activities.
3	Lack of sufficient incentives/resources to engage local communities and youth to get involved in ground monitoring and surveillance.	Medium	RFD, the project team, and field coordinator frequently discussed and communicated consistently with the communities and local authorities about the importance of participatory approach to forest monitoring. In addition, the project facilitated support, food and necessary monitoring gears to local communities and youth groups.
4	Lack of adequate knowledge to use the advanced tools for monitoring	Medium	The project provided a series of on-hand trainings and knowledge sharing workshops as appropriate, aimed to raise awareness and attention of local communities to effectively use the system with the support of the project team and field coordinator.

No.	Risk	Probability of occurrence	Mitigation measure
5.	Lack of strong commitments and political will from responsible agencies (RFD)	Low	The DG of the RFD was the Chair of the PSC; and senior RFD officials are the members. This strategy was to ensure that the decision makers truly understand and support the project implementation and to continue all activities even after the project termination.
6	Local communities may be unwilling to change existing livelihoods and cultural practices in relation to occupation.	Medium	Review the uptake of awareness raising and capacity building activities and undertake corrective measures, where necessary. The project introduced incentives for sustainable livelihoods and forest management practices in the targeted communities. Case studies and study visit to best practices (Ubon Ratchathani Province) was conducted.
7	Earth monitoring (remotesense data and drone) failed to deliver the results and interrupt activity progress crash.	Low	The Project catalyzed/facilitated meetings between wood industry firms and smallholder plantation owners to discuss and initiate cooperation. The source of funding was explored. KU and the project team ensured early engagement of experts and partners to seek satellite images from various sources (Japan and Thailand). Drone was used in vulnerable areas for deforestation monitoring far away from the border to avoid security restrictions.

3. Project Performance

3.1 Planned *vs*. realized project performance (Workplan Review)

The total project outlay was USD 278,078.48 for previously planned activities for the 12 months period (June 2024 to May 2025). However, the project period was shortened from 12 months to 9 months (July 2024 to March 2025) to align with Japan's fiscal year. A Hybrid Project Inception Meeting was held on 26 July 2024 at Best Western Nada Don Mueang Airport hotel, Bangkok to approve the Inception Report, Workplan and Yearly Plan Operation (YPO).

3.2 Project schedule and duration

The original project duration (12 months) was shortened to 9 months to align with Japan's fiscal year. Many of the project activities were rescheduled accordingly (Table 4).

Table 4. Revised workplan for the ITTO Forest Loss Monitoring and approved by the PSC on 19 November 2024

Outputs/Activities	Responsible agencies	2024							2025			Status
		Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
Output 1: Robust forest monitoring system installation to assist local authorities and communities in monitoring forest loss and degradation through the application of using satellite and drone data												
Activity 1.1: Prepare hard copy and digital copy of land use/forest cover maps in 1990 and present, and assess changes	KU, RFD, Consultant#1			x	x	x	x	x				Completed
Activity 1.2 Prepare the vulnerable deforestation areas map using GIS and monitor the risk areas using drone technology	KU, consultant#1						x	x	x	x		Completed
Activity 1.3: Develop and install SMART PATROL SMART technologies for citizen science and community reporting illegal activities (logging, poaching and encroachment) in and around the 5 target community forests	KU, RFD, Consultant#2				x	x	x	x	x	x		Completed
Activity 1.4: Install cameras and NCAPS technologies for real-time monitoring and reporting illegal activities (logging, poaching and encroachment) in and around the 5 target community forests	KU, RFD, Consultant#2				x	x	x	x	x	x		Completed
Output 2: Fulfilled requisite capacity enhancement of local authorities, community groups and youth in community forest protection and sustainable livelihood development, including those in Myanmar												
Activity 2.1: Conduct trainings and workshops on forest and land monitoring, and user-friendly digital forest monitoring platform that integrates cutting-edge technologies to stakeholders (e.g., local authorities, community groups and youth) on the following subjects: 1) drone monitoring, 2) NCAPs, and 3) SMART PATROL	KU, RFD, Consultant#1,#2					x	x	x				Completed
Activity 2.2: Conduct training on sustainable livelihood development activities and income generation to local people and Myanmar refugees on the following subjects: 1) cultivation, harvesting, processing and commercializing bamboo and NTFPs, 2) improvement handicraft products, and 3) conduct study visit to Pha Taem National Park on domesticated wild orchid in the buffer zone to reduce illegal collection in the park	KU, RFD, Supporting staff #1, #2, #3					x			x	x		Completed
Activity 2.3: Produce, share and disseminate information, knowledge management, and outreach to other community forests	KU, RFD, ITTO			x			x			x		Completed

Outputs/Activities	Responsible agencies	2024							2025			Status
		Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
Reporting and monitoring												
Submission of inception report (before the start of project)	KU, RFD, ITTO		x									Completed
Submission of Yearly Plan of Operation for the first year (before the start of project)	KU, RFD, ITTO		x									Completed
Submission of progress report (every 6 months) with training, workshop, technical report	KU, RFD, ITTO						x					Completed
Submission of financial report (6th month) and audited financial report (12th month)	KU, RFD, ITTO, auditor						x				x	Completed
Technical and steering committee meetings (back-to back) and monitoring	KU, RFD, ITTO		x				x					Completed
Submission of project completion report (3 months after the project end)	KU, RFD, ITTO										x	Completed

3.3 Project budget and inputs applied

The total budget of the Forest Loss Monitoring project was **USD 278,078.48** (Two hundred seventy-eight thousand seventy-eight US Dollars and forty-eight cents). The support from the Government of Japan was **USD 234,857** (Two hundred thirty-four thousand eight hundred fifty-seven US Dollars), and the remaining was in-kind support from Kasetsart University. The amount from ITTO was paid in semi-annual instalments as the project progresses. The first disbursement of **USD 100,000** (One hundred thousand US Dollars) or THB 3,661,000.00 (exchange rate THB 36.61 per USD 1) was transferred to the project account from ITTO on 24 June 2024 (Annex 1) upon signing the MOU by both the parties. In addition, the second disbursement of **USD 100,000** (One hundred thousand US Dollars) or THB 3,424,000.00 (exchange rate THB 34.24 per USD 1) was transferred on 4 December 2024 (Annex 2) after the submission of progress report during project implementation year. The remaining budget funds or the third installment of **USD 34,857** (Thirty-four thousand eight hundred fifty-seven US Dollars) was transferred on 19 March 2025 (Annex 3).

As a consequence of the 9-month project duration, there was a remaining budget of at least USD 11,700 previously allocated for the project staff (Project Coordinator, Project Secretary and Project Finance). The project team discussed this issue with Dr. Tetra Yanuariadi, ITTO Projects Manager and also raised this matter at the 1st PSC meeting on 19 November 2024.
Based on consultation with Dr. Tetra Yanuariadi, ITTO Projects Manager, the project had proposed two rounds of budget modification. Details of each modification are shown in Annex 4 (budget modification 1) and Annex 5 (budget modification 2). The summaries of both requests are shown below:

Proposed budget modification- 1 on 26 November 2024 and approval by ITTO on 29 November 2024 (ITTO NOL No. F.24-0079).

1. The physical project implementation period was shortened from 12 months (April 2023 - March 2024) to 9 months (July 2023 - March 2024). Thus, the salary of project staff (items 11.1-11.3) was reduced accordingly.
2. Payment for Field Coordinator is reduced from USD 7,200 to USD 4,500 according to the TORs and ITTO NOL Ref. No. 24-0054.
3. Item 31.1 DSA National experts/consultants increase USD 2,700 (from item 11.4) due to conducting a series of training session in target community forest areas.
4. Budget for Materials (item 51) was reduced to USD 3,000 due to shortening of project period from 12 months (April 2023 - March 2024) to 9 months (July 2023 - March 2024).
5. Budget for Utilities (supplies for livelihood development after training) and office supplies (Item 53) was reduced to USD 3,000. This was due to the conduct of project back-to-back training on domesticated wild plants and NTFP and improved handicraft products (Activity 2.2).
6. It is proposed to increase the budget for Training/workshop/meeting (item 61) of USD 17,700. This is due to the fact that project has to conduct a series of training sessions rather 1 session for all participants because of remoteness of areas. In addition, pre- survey and consultation meeting with stakeholders were needed before the actual training plan (tissue culture and visit to Pha Taem NP).

Proposed budget modification 2 on 12 March 2025 and approved by ITTO on 18 March 2025 (ITTO Ref. No. F.25-0018).

1. The budget provision for incentives to local communities (item 31.2) reduces to USD 3,710 due to the late start of SMART patrolling in the forest which could not start before finishing the SMART system installation.

2. The budget for international travel for national experts (item 32.1) reduces to USD 3,693 due to the less travel than expected.
3. The budget for utilities (supplies for livelihood development after training) and office supplies (Item 53) was reduced to USD 1,717. This is due to the conduct of project back-to-back training on domesticated wild plant and NTFP and improved bamboo products (Activity 2.2).
4. The budget for Information, media, publications and other contingencies (item 64) reduced to USD 1,428 due to the less consumption than expected.
5. The budget for local transportation costs (item 33.1) increased to USD 2,339 due to the broadening of participants of the workshop which would like to have representatives from all regions.
6. The budget for training/workshop/meeting (item 61) increased to USD 8,261 due to series of training and broad participation in the workshop.
7. The small modifications for some items are due to the exchange rate and remaining budget. Computer (item 44.1), printer and camera items (item 44.3) reduced to USD 23 and USD 36, respectively. The sub-contract (resource persons) (item 23) increased to USD 7.

The expenditure of the Project Budget currently incurred is explained below.

The overall cash flow statement from 1 July 2024 to 31 March 2025 is in agreement and matched with the bank statement (Table 5 and Figure 3).

The up-to-date project financial resource as of 31 March 2025 was USD 0.00 (THB 0.00 – including opening account of USD 27.31 (THB 1,000) and interest accrued of USD 117.24 (THB 4,020.11) (Tables 5).

Expenditure on project personnel was lower than planned due to shortening of project duration, while training/workshop costs exceeded more than double due to multiple NCAP training sessions and an additional workshop organized to disseminate the lessons learned. In contrast, the costs for capital items (computers, NCAPs and SMART patrol equipment) and international travels for project staff were significantly lower than estimated.

Table 5. Project cash Flow Statement as of 31 March 2025

Project No: PP-A/60-369 **Period ending: 31 March 2025**
Project title: Strengthening Surveillance and Monitoring to Tackle the Surge in Forest Loss and Land Degradation, Induced by Intensifying Conflict in Thailand's Border Areas
Executing Agency: Kasetsart University in collaboration with the Royal Forest Department, Thailand

Component			Amount (USD)		Expenditures (Jul 2024 -present)	Balance
			Project Doc	Modi-fication 2 /1	(USD)	(USD)
A	**Funds received from ITTO:**					
		First Installment 24 June 2024	100,000.00			
		Second Installment 4 December 2024	100,000.00			
		Third installment (19 March 2025	34,857.00			
		Bank interest	117.24			
		ETC. (open account)	27.31			
		Total Funds Received:	235,001.55			
B	**Expenditures by Executing Agency:**					
10	**Project Personal 2/**					
	11	11.1 Project Manager	30,000.00	22,500.00	22,500.00	
		11.2 Project Secretary	9,000.00	6,750.00	6,750.00	
		11.3 Project Finance	7,800.00	5,850.00	5,850.00	
		11.4 Field Coordinator	7,200.00	4,500.00	4,500.00	
	19	**Sub total**	**54,000.00**	**39,600.00**	**39,600.00**	
20	**Sub contracts**					
	21	Sub-contract for image mapping)	8,000.00	8,000.00	8,000.00	-
	22	Sub-contract (SMART Patrol &NCAPs)	5,000.00	5,000.00	5,000.00	-
	23	Sub-contract (resource persons)	4,500.00	4,507.00	4,507.00	-
	29.	**Sub total**	**17,500.00**	**17,507.00**	**17,507.00**	**-**
30	**Duty travel**		-			
	31	Daily subsistence allowance	-			
		31.1 DSA National experts/ consultants	19,000.00	21,700.00	21,700.00	

Component			Amount (USD)		Expenditures (Jul 2024 -present)	Balance
			Project Doc	Modi-fication 2 /1	(USD)	(USD)
		31.2 Provision of incentives to local communities	12,000.00	8,290.00	8,290.00	
	32	International travel 3/				
		32.1 International travel for national expert	4,000.00	307.00	307.00	
	33	Local transportation				
		33.1 Local transport costs	25,000.00	27,339.00	27,339.00	
	39	**Sub total**	**60,000.00**	**57,636.00**	**57,636.00**	
40 Capital items						
	44	Computer equipment				
		44.1 Computer	3,000.00	2,977.00	2,977.00	
		44.2 SMART mobile system	20,000.00	20,000.00	20,000.00	
		44.3 Printer and camera	1,507.00	1,471.00	1,471.00	
		44.4 NCAP cameras and accessories	13,800.00	13,800.00	13,800.00	
	49	**Sub total**	**38,307.00**	**38,248.00**	**38,248.00**	
50 Consumable items						
	51	Materials	13,850.00	10,850.00	10,850.00	
	53	Utilities (supplies for livelihood development after training) and office supplies 4/	11,000.00	6,283.00	6,283.00	
	54	Exhibition (Annual Forest conference)	1,500.00	1,500.00	1,500.00	
	59	**Sub total**	**26,350.00**	**18,633.00**	**18,633.00**	
60 Miscellaneous						
	61.	Training/workshop/ Meeting 5/	15,700.00	41,661.00	41,805.55	
	62.	PSC meeting and audit	20,000.00	12,000.00	12,000.00	
	64.	Information, media, publications and other contingencies	11,000.00	9,572.00	9,572.00	
	69	**Sub total**	**46,700.00**	**63,233.00**	**63,377.55**	
70	**Total Project**		242,857.00	242,857.00	**234,857.00**	
80. Project monitoring and administration			-			

Component			Amount (USD)		Expenditures (Jul 2024 -present)	Balance
			Project Doc	Modi-fication 2 /1	(USD)	(USD)
	81	ITTO monitoring & evaluation	12,000.00	-		
	83	ITTO program support costs (lump sum)	23,221.48	-		
	89	**Sub total**	**35,221.48**	**-**		
100 GRAND TOTAL			**278,078.48**	**234,857.00**	**235,001.55**	
Remaining Balance of Funds: (A - B)			**43,076.93**	**144.55**	**0.00**	

[1/] Proposed modification 2 and approved by ITTO on 18 March 2025
2/ Project personnel salaries reduced from 12 months to 9 months
3/ significantly decreased due to the planned conference after March 2025 is not possible (beyond the project duration)
4/ The project could significantly save costs for capital items
5/ Tailored workshop was added to disseminate less learned. In addition, travel cost for visiting Pha Team National Park exceeded the planned budget.

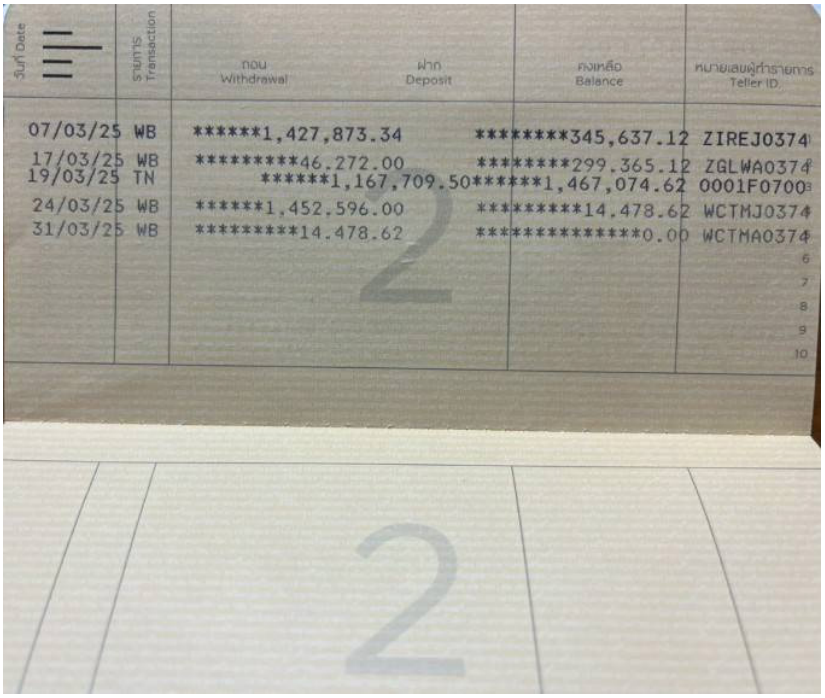


Figure 3. Bank statement dated 31 March 2025.

4. Project Outcomes and Target Beneficiaries Involvement

4.1 Project outputs and contribution to achievement of objective

The implementation of the project towards achieving outputs complied with the verifiable indicators specified in the Logical Framework Matrix of the project document. The project's achievements of each activity are summarized as follows**:**

Output 1: Robust forest monitoring system installation to assist local authorities and communities in monitoring forest loss and degradation through the application of using satellite and drone data

Activity 1.1 Prepare hard copy and digital copy of land use/forest cover maps in 1990 to present, and assess changes.

Recruited Dr. Laddawan Rianthakool (Kasetsart University) to engage as Consultant#1- Land use map, monitor and develop modeling of forest loss from 01 July 2024 to 28 February 2025 (Table 2). Dr. Laddawan Rianthakool and her assistants completed the assignments as outlined below:

1.1.1 Satellite image data collection:

- Satellite images covering the entire Mae Hong Son province and a 20 km buffer area along the Thailand-Myanmar border for 1990 and 2023 were successfully acquired (Figures 4 and 5).

1) **Landsat 5 Satellite Image Data**: Thematic Mapper (TM) data with Level 1 Precision Terrain corrected (L1TP) product, 30-meter resolution for land use classification in 1990. This includes 5 image scenes: Path 131 Row 046, Path 131 Row 047, Path 131 Row 048, Path 132 Row 046, and Path 132 Row 047. The satellite image data was acquired from the period between December and March in 1990.

2) **Landsat 8-9 Satellite Image Data**: Operational Land Imager (OLI) and Operational Land Imager-2 (OLI-2) data with L1TP product, 30-meter resolution for land use classification in 2023. This includes 6 image scenes: Path 131 Row 046, Path 131 Row 047, Path 131 Row 048, Path 132 Row 046, Path 132 Row 047, and Path 132 Row 048. The satellite imagery data was acquired from the period between December and March in 2023.

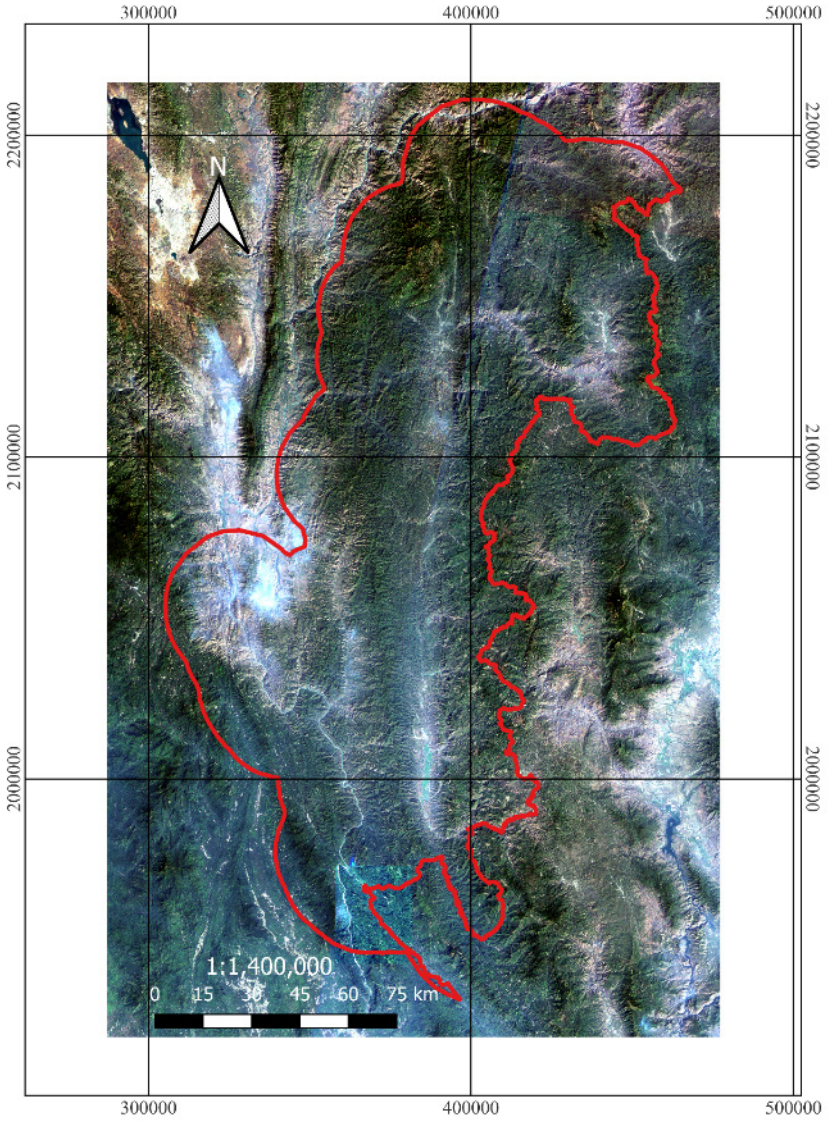


Figure 4. Landsat 5 satellite image in 1990.

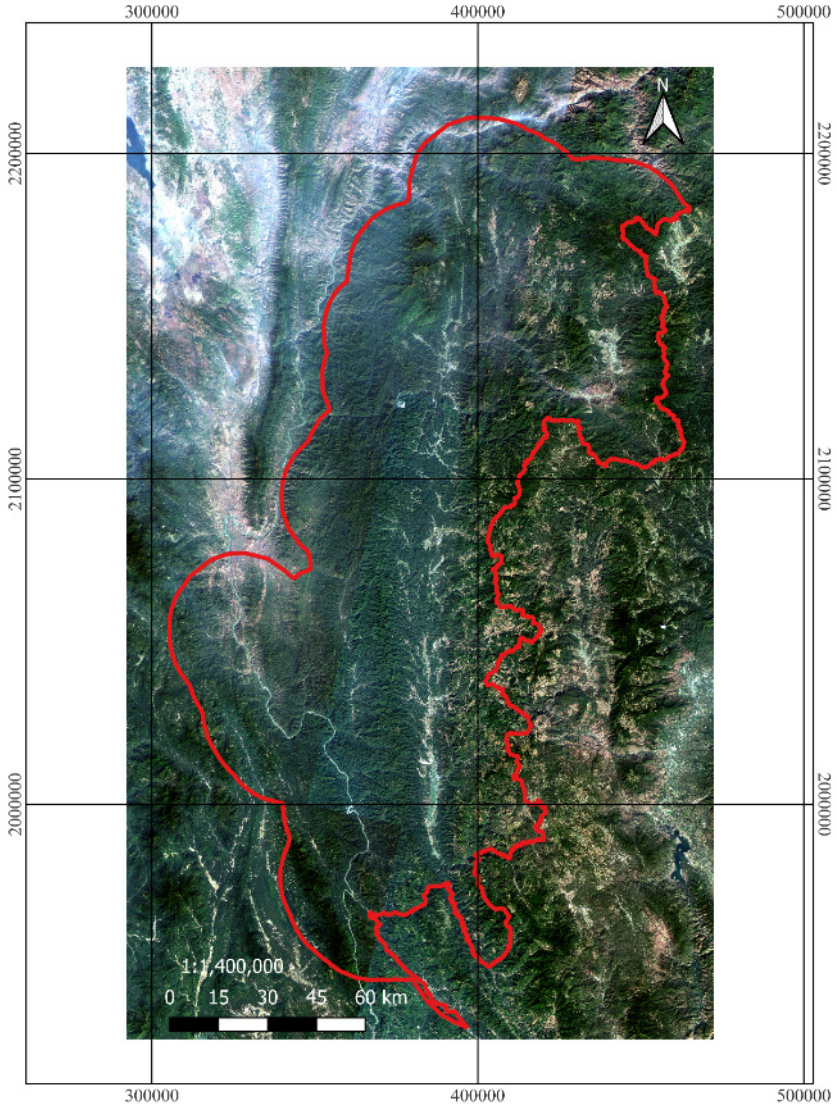


Figure 5. Landsat 8-9 satellite image in 2023.

- Gathered existing land use data for the year 2020 from Land Development Department and forest and non-forest map for 2023 from the RFD to use as basemaps for interpretation.

1.1.2 Image pre-processing (Figure 6):

- Digital number (DN) values were converted to top-of-atmosphere (TOA) reflectance, an essential parameter for satellite image analysis, to mitigate atmospheric effects at the time of image capture. This process was done manually by converting DN values band-by-band using the Raster Calculator. Once each year's images were corrected, the bands were combined to create a single composite image for further analysis. The images were also. geo-referenced to align accurately with the Land Development Department's land use basemap.
- Land use data was analyzed and classified using machine learning techniques, with additional manual corrections performed through visual inspection (Figure 8 and 9).

1.1.3 Basemap Integration and Interpretation:

- Representative training areas for land use classification were established using the Support Vector Machine (SVM) learning technique. Sample areas for each land use type (Level 2), including evergreen forest, deciduous forest, natural water bodies (rivers), artificial water bodies (reservoirs), paddy fields, field crops, perennial crops, swidden cultivation, city areas, villages, bare land, and wetlands or beach areas were collected with the support of the Field Coordinator (Mrs. Worarampa Prodpannam). At least 30 sample areas were selected for each land use type.
- A field verification survey classified and allocated 301 checkpoint locations across Mae Hong Son province, proportionally based on land use types (Figure 7). The Kappa assessment shows that the overall accuracy of image interpretation was 70%.
- The results showed that in both 1990 and 2023, most of the area was covered by forest areas. Evergreen forest accounted for 15% of the total area, while deciduous forest contributed 8% of the total area. Together, these two forest types comprised approximately 97% and 94% of the total land use in 1990 and 2023, respectively.

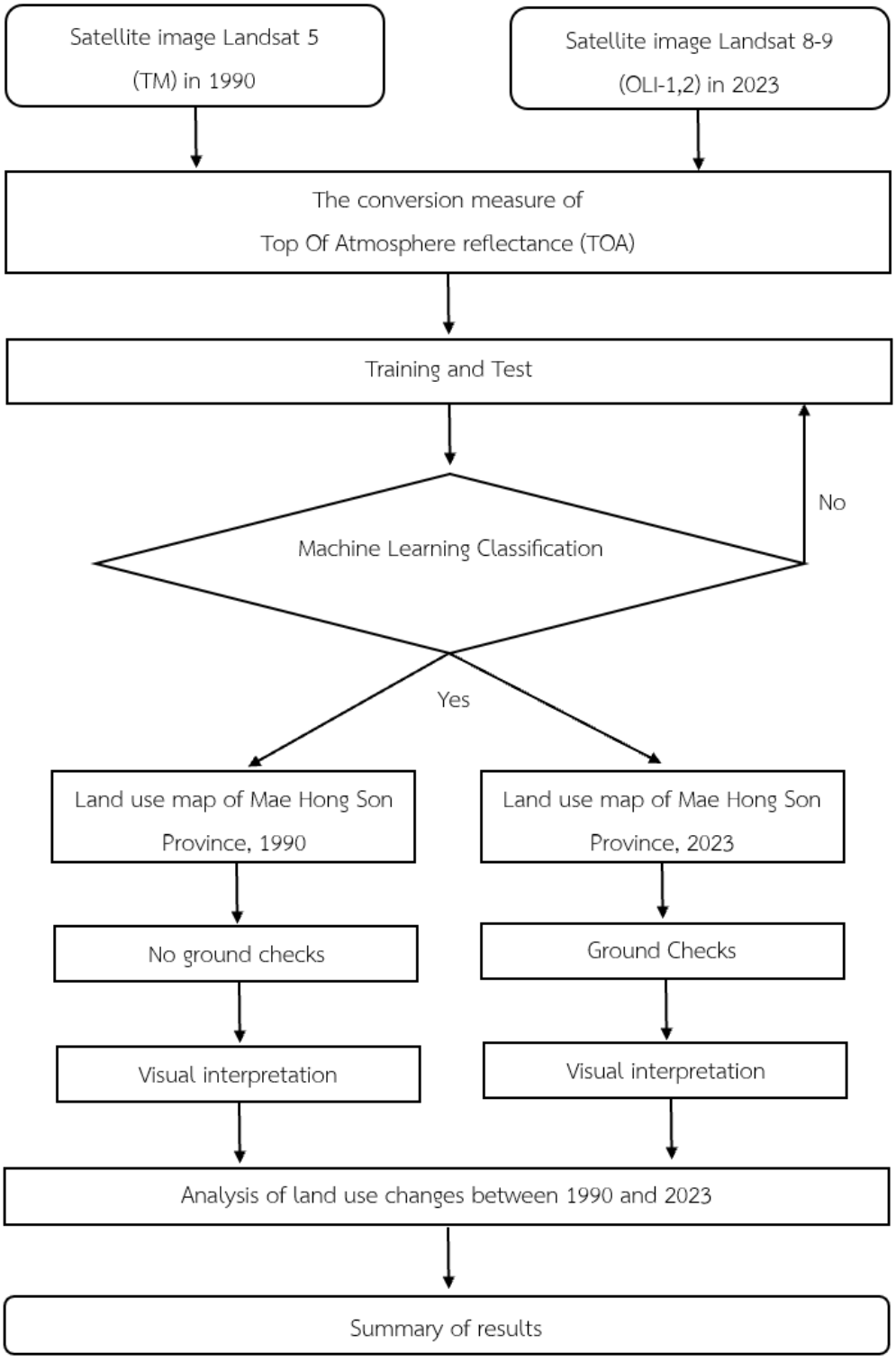


Figure 6. Image Interpretation Workflow for Forest Change Analysis in Mae Hong Son Province and Adjacent Border Areas (1990-2023).

A1 Paddy field crop - 11 pnt

A2 Field crop - 18 pnt

A3 Perennial - 3 pnt

U1 City, Commercial and Service -17 pnt

U2 Village - 27 pnt

U3 Official build - 7 pnt

U4 Transportation - 3 pnt

F1 Evergreen Forest - 70 pnt

F2 Deciduous Forest - 70 pnt

W1 Natural Water Bodies - 8 pnt

W2 Reservoirs - 7 pnt

M2 Wetland - 4 pnt

B1 Bare soil - 33 pnt

Figure 7. Land use type and number of training areas for image interpretation

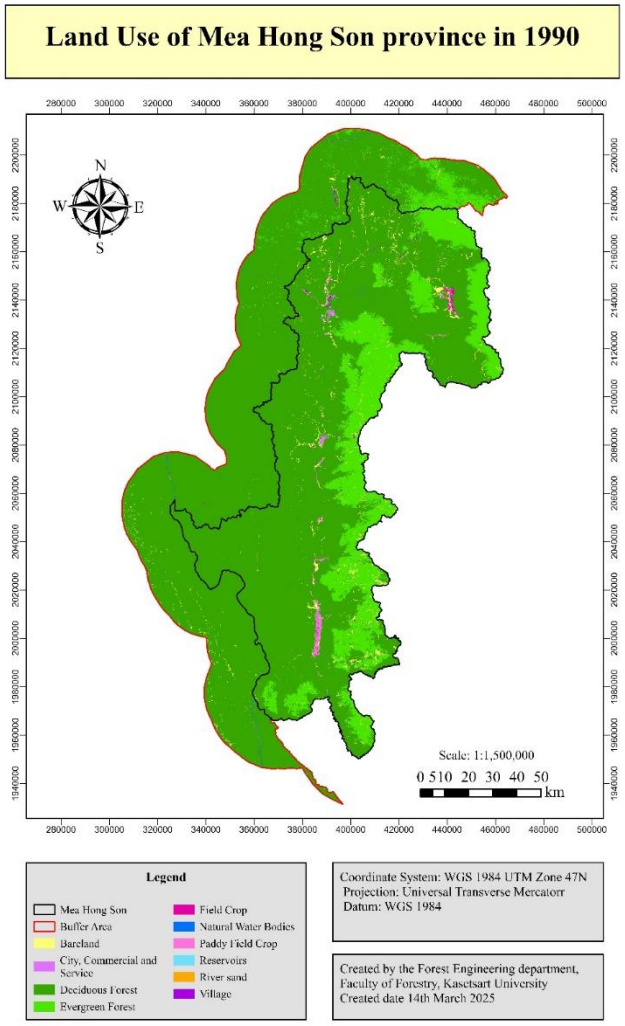


Figure 8. Land use map of Mae Hong Son province and border areas in 1990.

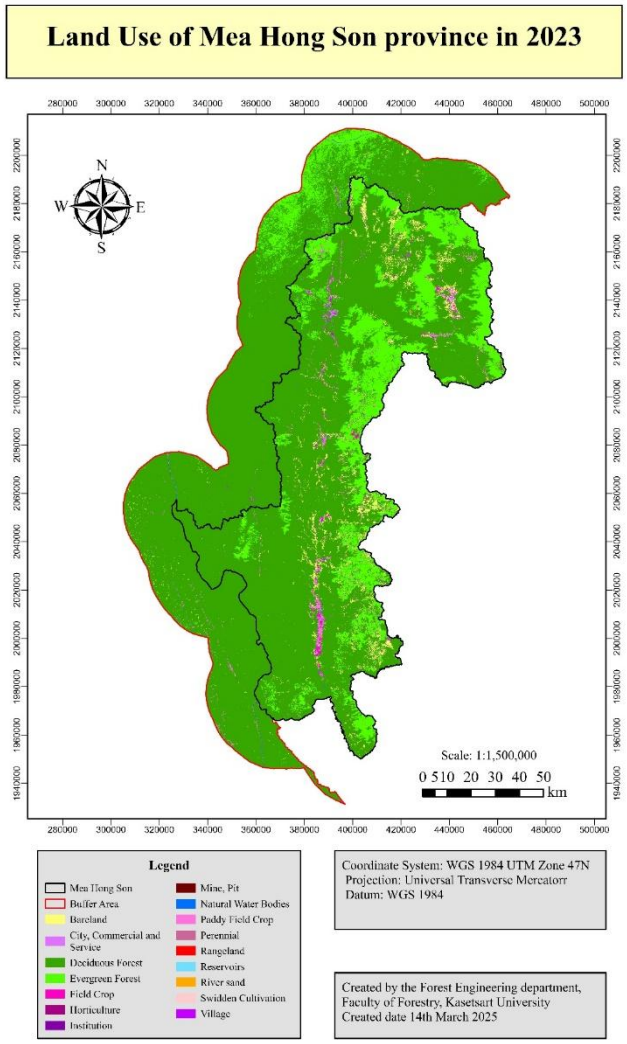


Figure 9. Land use map of Mae Hong Son province and border areas in 2023.

Table 6 Extent of each land use class, changes in area and annual rate of change from 1990 to 2023 and predicted for 2056

	1990 (Dec)			2023 (Feb)				Predicted 2056 [2/]	
Major land use	Area (km^2)	Area (rai)	%	Area (km^2)	Area (rai)	%	Ann. change (%) [1/]	Area (km^2)	%
Forest	12,348.43	7,717,769	96.74	11,958.25	7,473,906	93.68	-0.097	11,745.04	91.95
Nat. water	17.77	11'106	0.14	17.31	10,819	0.14	-0.079	19.38	0.15
Reservoirs	0.20	125	0.00	1.91	1,194	0.01	7.077	3.33	0.03
Paddy	61.88	38,675	0.48	123.64	77,275	0.97	2.120	186.68	1.46
Cash crops	21.56	13,475	0.17	52.14	32,588	0.41	2.712	80.72	0.63
Perennial trees	0.00	0	0.00	7.82	4,888	0.06		11.17	0.09
Settlement	47.54	29,713	0.37	91.18	56,988	0.71	1.993	142.31	1.11
Bare land/range land	267.63	167,269	2.10	512.76	320,475	4.02	1.990	576.39	4.51
Total	12,765.01	7,978,131	100.00	12,765.01	7,978,131	100.00		12,765.01	100.00

Notes: 1/ annual change rate for 33 years; 2/ derived from Markov chain model

Table 7. Land use transition between 1990 and 2023 (ha)

	2023								
1990	Forest	Nat. water	Reservoirs	Paddy	Cash crops	Perennial trees	Settlement	Bare land/range land	Total
Forest	1,179,030	415	94	5,633	2,384	420	3,630	43,237	1,234,843
Nat. water	490	1,066	25	22	13	1	14	146	1'777
Reservoirs	6		10		1			3	20
Paddy	825	164	14	2,602	1,316	71	453	743	6,188
Cash crops	350	8	3	222	463	22	323	765	2'156
Perennial trees									
Settlement	1,307	18	3	281	122	88	2,755	180	4,754
Bare land/range land	13,817	60	42	3,604	915	180	1,943	6,202	26,763
Total	1,195,825	1,731	191	12,364	5,214	782	9,118	51,276	1,276,501

- Overlaid land use between 1990 and 2023. The result showed land use transition between classes (Table 7).

Activity 1.2 Prepare the vulnerable deforestation areas map using GIS analysis and monitor the risk areas using drone technology

Based on the land use maps derived from the activity 1.1, the project team (Prof. Yongyut Trisurat and Dr. Chakrit Na Takuathung) determined land use change between 1990 and 2023, annual rate of land use change, projected land use trend in 2056 and the vulnerable deforestation areas using statistical analysis and GIS (Figure 10). The procedures of each step and results are shown below.

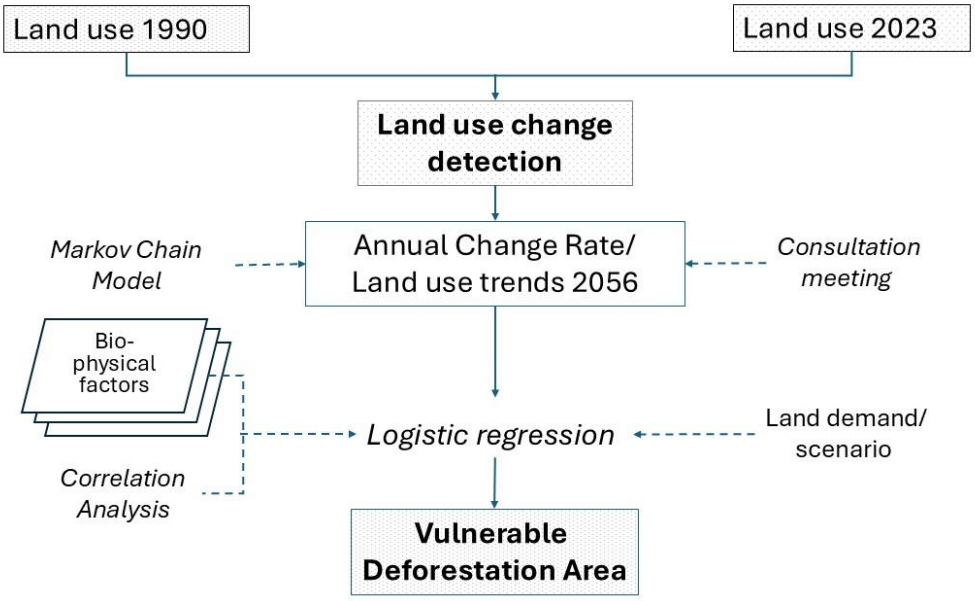


Figure 10. Main steps of land-use change detection and prediction.

- Land-use map 2023 was overlaid with land-use map 1990, then the *Markov Chain Model* was employed to simulate future land use changes for the next 33 years period until 2056. Note that the Markov Chain Model is a mathematical simulation model to examine potential long-term trends in land use/land cover changes.
- The results indicated that about 390 km^2 of forest areas or with the annual rate of -0.1 % per year were converted to other uses, mainly to barren land/range land, followed by settlement and paddy cultivation (Table 6). It should be noted that paddy and cash crops increased over 2% annually, while barren land/range increased almost 2% annually. In addition, the area of natural water (streams and rivers) slightly decreased due to different dates of satellite image (1990 – December; 2023 – February). If the land use change trends continue, it is predicted that by 2056, the area of forest cover will be approximately 92%.

- We used the logistic regression model to find the location of vulnerable deforestation areas based on the relation between occurrence of deforestation between 1990 and 2023 (Figure 11) and the physical and socio-economic conditions of location factors. A logistic model is defined as following:

$$\text{Logit}(p_i) = \ln (p_i)/(1-p_i) = \beta 0 + \beta_1 X_{i,i} + \beta_2 X_{2,i} + \ldots + \beta_n X_{n,i}$$

where p_i is the probability of a grid cell for the occurrence of the change detection and the X's are the driving factors. The coefficients (β) are estimated through logistic regression using the occurrence of the land uses change between 1990 and 2023 as dependent variable (binary variable).

- Physical factors treated as independent factors include topographic factors and anthropologic factors. Altitude and slope represent limiting factors for agriculture, in contrast they are physical barriers for deforestation. In addition, distance to available water (stream and reservoir), soil texture, and geology are primary land use characteristics for agricultural systems. The anthropologic factors that influence deforestation include distance to village and refugee camp, distance to main road, and population density. Proximity to ranger stations is considered as a negative driving factor for deforestation and agriculture.
- The convert application also has some other options such as 'balanced' sample or leaving a distance between observations to minimize the influence of spatial autocorrelation. However, in this example we will not use these options.
- To avoid multi-collinearity, we randomly selected explained variables based on balance samples of the occurrences of deforested and none, then calculated the correlation values. If one or more maps are significantly correlated (e.g. above 0.8), you can select only one of these maps, but not both. If one or more maps are significantly correlated (e.g. above 0.8), you can select only one of these maps, but not both. Then, we should select uncorrelated factors for further analysis. The results revealed that there were no highly correlated factors.
- The derived logistic regression is shown below:

  $$\text{Logit}(p_i) = 19.28 - 0.00027\text{DEM} - 0.000058\text{road} - 0.000169\text{stream} + 1.308\text{geo}(1) + 1.242\text{geo}(4) + 2.197\text{geo}(5) + 1.347\text{geo}(6) + 1.281\text{geo}(7) + 1.465(8) + 3.204\text{geo}(9) + 2.147\text{geo}(12) + 1.541\text{geo}(15) + 1.042\text{geo}(17) + 1.563\text{geo}(19) - 0.0008\text{village} - 0.000016\text{camp} + 0.000043\text{ranger}$$

  Where, DEM = altitude; road = distance to road; stream = access to stream/river; geo(x) = geological type (see Annex 6); village = distance to village; camp = distance to camp site; ranger = distance to ranger station

- The logistic model reveals that deforestation prefers low altitude, close to road, stream, village and camp site, but far from ranger station. Soil and population density were not included in the model. In addition, we used the area under curve to determine the accuracy of prediction model and found that the model accuracy is high (0.81 out of 1.00). See details in Annex 6.
- Besides future land use trends derived from the *Markov Chain Model*, the project also conducted consultation meetings with local communities and representatives of local governments during field visit at Pha Team National Park on 15-17 February 2025. Based on recent developments and the provincial development plan, local multi-stakeholders predict a worst-case scenario of deforestation in Mae Hong Son province. Forest cover may decrease to 84% of the provincial area rather than 92% as predicted by the Markov Chain Model.
- Based on the above findings, we allocated the potential areas of deforestation (vulnerable areas). The results showed that the vulnerable areas are mainly located on the main roads

and likely to expand from the existing agricultural areas (Figure 12). Thus, regular patrolling using drone technology to fly and monitor risk prone areas of deforestation are highly recommended in these areas.

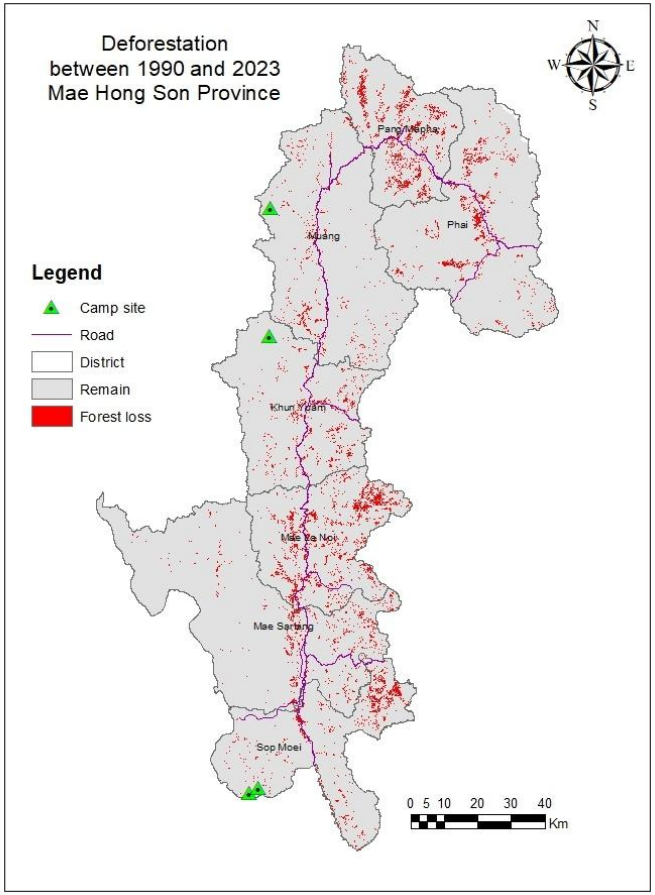


Figure 11. Deforestation area of Mae Hong Son Province between 1990 and 2023

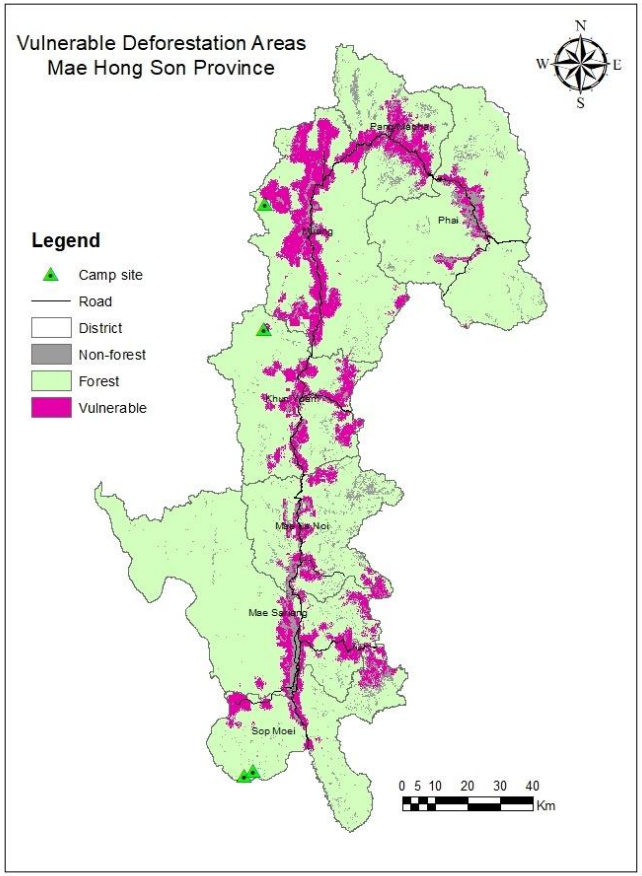


Figure 12. Vulnerable Deforestation areas of Mae Hong Son Province

Activity 1.3 Develop and install SMART PATROL technologies for citizen science and community reporting illegal activities (logging, poaching and encroachment) in and around the 5 target community forests

1.3.1 Recruited Mr. Sithichai Jinamoy to engage as Consultant#2- SMART and NCAP Surveillance System development from 01 July 2024 to 1 March 2025. Mr. Sithichai Jinamoy had done the following activities:

1.3.2 Reviewed past and current SMART PATROL technologies used in Thailand (advantages, limitations, and recommendations for improvement).

Thailand uses SMART Patrol System together with a patrol database called a program, "SMART" (Spatial Monitoring and Reporting Tool) more than 20 years to help protect wildlife and forests. The program includes GPS technology, systematic monitoring, and reporting. The SMART program boosts rangers and managers morale, enhances protection efforts, and supports species' survival. In addition, the SMART program has also helped to reduce the number of arrests, uncover poaching camps, and stabilize the tiger population.

The SMART program is used in several wildlife sanctuaries in Thailand, including Thungyai Naresuan East, Thungyai Naresuan West, and Huai Kha Khaeng Wildlife Sanctuary, developed by the Wildlife Conservation Society (WCS) Thailand. It integrates mobile apps combining GPS, communication, and reporting tools, with a user-friendly interface and real-time data sharing, including SMART Connect and SMART Sensor (drones, camera traps, and GPS trackers). The program is now implemented across over 200 protected areas managed by the Department of National Parks, Wildlife and Plant Conservation.

SMART PATROL technology can be effectively used for patrolling, security, and applied for citizen science in reporting illegal activities like logging, poaching, and encroachment in community forests and national reserve forests managed by the RFD. This project aims to employ the use of SMART Patrol with mobile apps outside protected areas, utilizing the up-to-date technology.

1.3.3 Developed and installed SMART PATROL to suit specific needs and location conditions, and connect to personal devices – mobile phone application (e.g., via the App or Play Stores) to assist local authorities, community groups and youth in community forest loss and degradation

The ITTO Forest Loss Monitoring project ordered and purchased equipment for field surveillance. Regarding the development of SMART PATROL system, Mr. Sithichai Jinamoy (Consultant#2) and the project team (Figure 13) undertook the following activities:

- Studied and analyzed SMART PATROL data related to the agency's core missions, then prepared, collected, and analyzed data for community-based data collection design and work development indicators.
- Conducted field reconnaissance survey (3-5 August 2024), and consultation meetings with officials from the Regional Forest Management Office and local communities about the existing data collection template and reporting needs. Then, a new SMART PATROL data collection template was developed to suit specific needs and connect

to mobile devices (via App or Play Stores) to help local authorities, communities and youth to report forest loss and degradation.

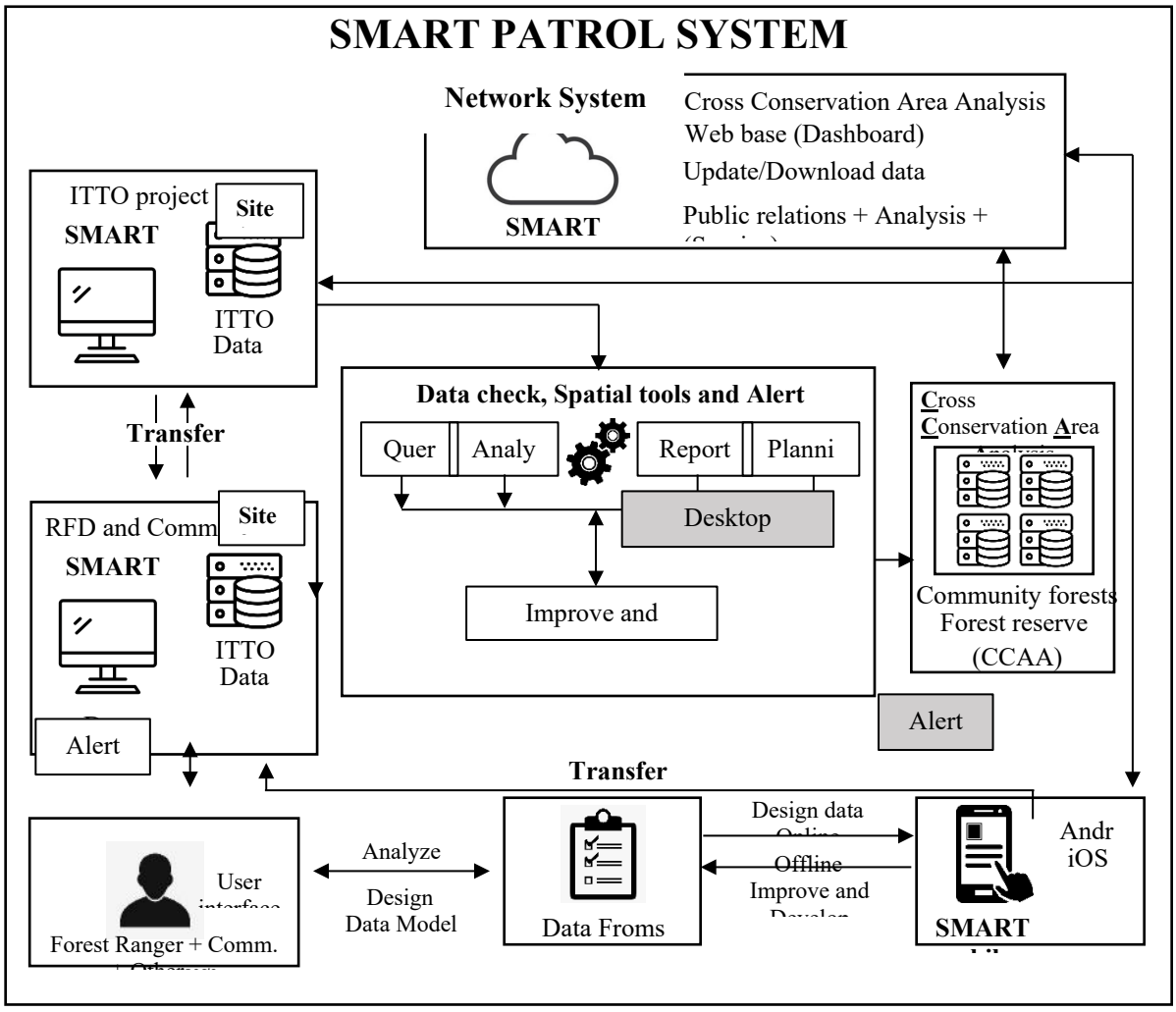


Figure 13. The overall SMART PATROL system diagram for developed for ITTO Project.

- Specify and set up Domain + SSL for SMART Connect. The domain namely: https://itto-forestloss.org/. For SMART Connect website is: https://itto-forestloss.org:8443/server/connect/home.
- Install SMART Connect and develop SMART Mobile to suit specific needs and connected to personal devices – mobile apps (e.g., via App or Play Stores) to help local authorities, community groups and youths make reporting easier in forest loss and degradation (not yet installed in this progress report before the SMART training and workshop).
- Prepared documents, reports, and a manual for community and officer operations of RFD. The manuals include: SMART Desktop, SMART Connect, and SMART mobile.
- Developed The SAMART PATROL Application to be used by local communities.

Activity 1.4 Install cameras and NCAPs technologies for real-time monitoring and reporting illegal activities (logging, poaching and encroachment) in and around the 5 target community forests

As mentioned in Section 2.3.2, the reconnaissance survey for consultation meeting with local community and local government, and identification of suitable sites were conducted during 3-5 August 2024 in Mae Hong Son Province (Figure 14). The 2nd consultation meeting was organized on 10-14 September 2024 to confirm their interest in the ITTO Forest Loss Monitoring project. Then, the following activities were performed.

1.4.1 Reviewed camera trap technologies used in Thailand (called "NCAPs", advantages, limitations, and recommendations for improvement) and provide the device to support and connect with the SMART PATROL SYSTEM.

1.4.2 Worked with forest Rangers, Thai army and head of target community forests to identify suitable sites (3 sites per each target area) to install NCAP cameras

1.4.3 Purchased and installed NCAP cameras and regular check of its operation.

1.4.4 Set up the NCAP cameras to connect the mobile phones of selected stakeholders to alert illegal activities and its routine maintenance and operation.

1.4.5 Prepared documents, reports, and a manual for community and officer operations of RFD. The manuals include: Using NCAPs, and GPS Tracker.

1.4.6 Conducted NCAPs Training and workshop for forest Rangers, community groups and youth in and around the 5 target community forests.

1.4.7 Connected data NCAP cameras and sharing data with SMART Mobile, reporting on SMART Connect and SMART PATROL program.

Figure 14. Ban Thung Paem (upper left), Ban Mae Tha Lu (upper right), Ban Le Koh (lower left) and Ban Tor Pae (lower right).

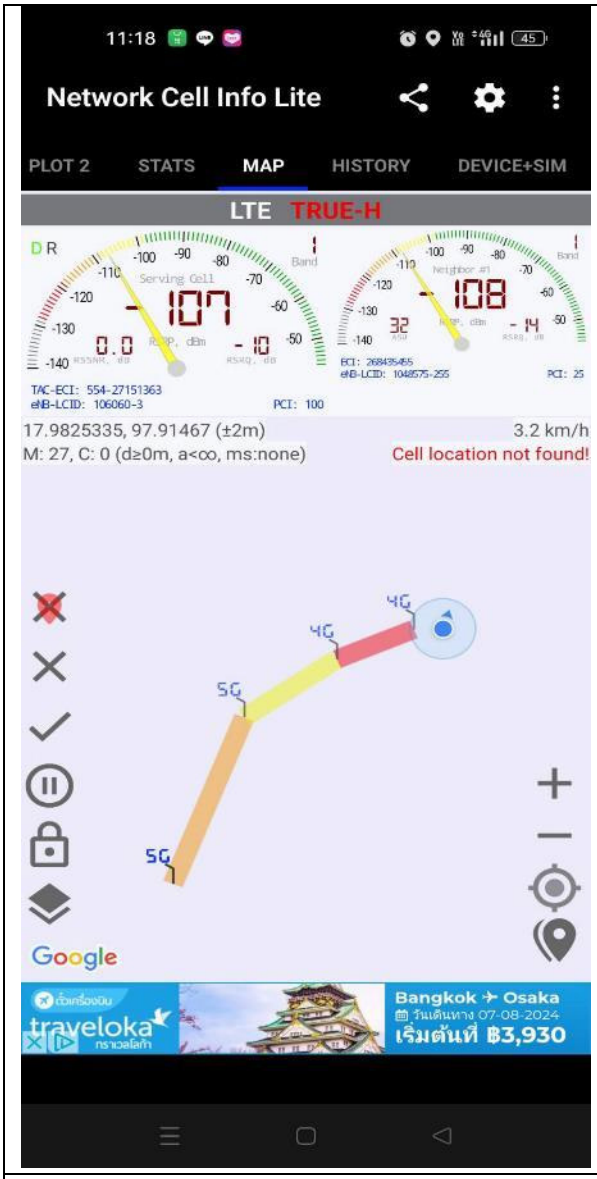
The specific location to install cameras at each site was identified. The camera ID number and each target site are shown in Table 8. In addition, the person responsible for each target site was assigned to further communication and correspondence (Table 9).

Table 8. Target community forests and national reserve forests, and camera id

Name of Community Forest/Reserved Forest	**District**	**Code**	**Camera ID**	**x-y coordinates** (UTM WGS Zone 47)
Pra Tu Muang Community Forest	Khun Yuam	PTMCF-001	015081000762966	379327-2078971
		PTMCF-002	015081000763139	380702-2079428
		PTMCF-003	015081000763147	376201-2079119
Le Koh Community Forest	Sop Moei	LEKCF-001	015081000763212	378372-1973450
		LEKCF-002	015081000763238	378601-1972874
		LEKCF-003	015081000763261	378628-1973922
Tor Pae Community Forest	Khun Yuam	TOPCF-001	015081000763519	386146-2076833
		TOPCF-002	015081000763873	386716-2077422
		TOPCF-003	015081000764103	386538-2078197
Thung Paem Community Forest	Mae Sariang	THPCF-001	015081000764178	382924-2002957
		THPCF-002	015081000764194	382322-2003797
		THPCF-003	015081000764210	382007-2004025
Salawin National Reserved Forest	Khun Yuam	SARRF-001[(1)]	015081000764806	385370-2084817
	Sop Moei	SARRF-002	015081000764830	367556-1987849
		SARRF-003	015081000764905	379623-1992689

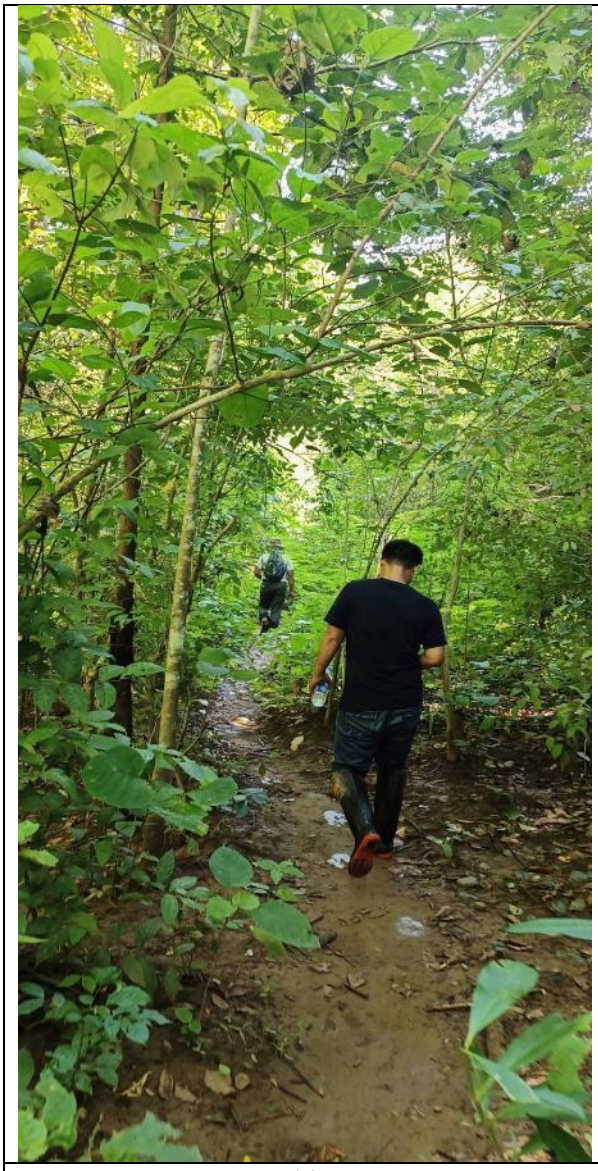
Criteria to select suitable site to install NCAP camera (Figure 15)

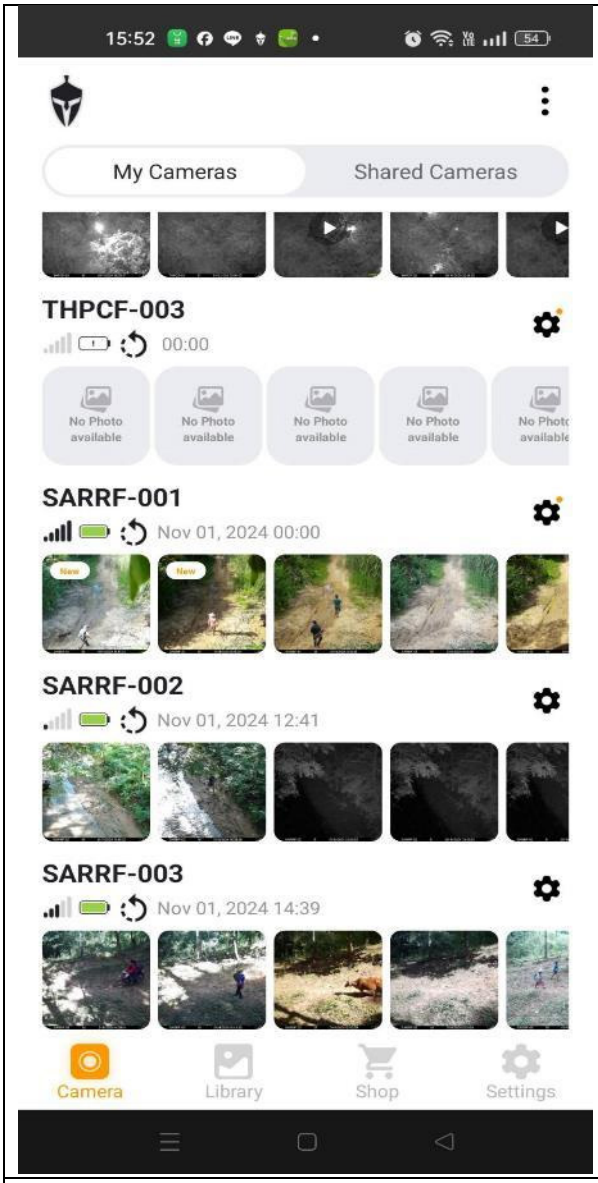
1. Good telephone signal (3G/4G/LTE).
2. Hiding position.
3. Illegal tracking routes (trails and roads), and wildlife trails.
4. Avoid sun reflection and shadow.
5. Appropriate height (9-10 m) and camera angle.
6. Check photo-video sending to Camera Management App.



(a)
Check the strength of telephone signal (3G/4G)

(b)
Testing SMART + NCAPs app.

	
(c) Illegal tracking routes (trails and roads), and wildlife trail	(d) Hidden position/avoid sun reflection and shadow



(e)
Check photo-video sending to Camera Management App

(f)
Check camera angle, and photo-video resolution

Figure 15. Installation of camera according the criteria

Table 9. The responsible persons assigned at each site for correspondence and contact

No	Name	Position	Affiliation	Contact/ Tel	Camera Code	Setting Date
1	Mr. Wichit Kantha	Unit Chief	Salween National Reserved Forest Unit 3, Forest Protection section (Khun Yuam)	081-9610131	SARRF-001	November. 1. 2024
2	Mr. Chaidet Suttinakorn	The Head of Village (Tor Pea)	Tor Pae Community Forest, Mae Ngao, Khun Yuam, Mae Hong Son	081-9807743	TOPCF-001	October. 26. 2024
					TOPCF-002	
					TOPCF-003	October. 27. 2024

No	Name	Position	Affiliation	Contact/ Tel	Camera Code	Setting Date
3	Mr. Khammoon Singkhacharnbanjong	Unit Chief	Salween National Reserved Forest (Unit 9), Forest Protection section (Sob Moei)	094-2868229	SARRF-002	October. 26. 2024
					SARRF-003	
4	Mr. Kongpoon Bunyuang	Headman of Mae Yuam Sub-district	Thung Pam Community Forest, Mae Yuam, Mae Sariang, Mae Hong Son	089-8505615	THPCF-001	October. 27.2024
					THPCF-002	
					THPCF-003	October. 30. 2024
5	Mr. Chaiyan Yokratanapong	The Head of Village (Le Ko)	Le Ko Community Forest, Sop Moei, Sop Moei, Mae Hong Son	064-2513508	LEKCF-001	October. 28. 2024
					LEKCF-002	
					LEKCF-003	October. 31. 2024

As of 20 March 2025, more than 6,000 photos have been recorded (Table 10).

Table 10. No of photos recorded from the cameras

Places	Image number	Human	Weapon [1/]	NTFPs [2/]	Agricultural equipment [3/]
Le Ko Community Forest	1,001	44	10	3	0
Pratoo Muang Community Forest	1,073	354	50	20	0
Salween National Reserved Forest	1,930	1,002	53	79	2
Thung Pam Community Forest	1,068	287	24	35	3
Tor Pae Community Forest	1,313	114	6	17	2
Total	**6,385**	**1,801**	**143**	**154**	**7**

Remarks**:** 1/ Gun and knife
2/ Bamboo, bamboo shoot, vegetable and unidentified object in the bag
3/ Spade and bush cutter

Output 2: Fulfilled requisite capacity enhancement of local authorities, community groups and youth in community forest protection and sustainable livelihood development.

Activity 2.1 Conduct trainings and workshops on forest and land monitoring, and user-friendly digital forest monitoring platform that integrates cutting-edge technologies to stakeholders (e.g., local authorities, community groups and youth) on the following subjects: 1) NCAPs, 2) SMART PATROL, and 3) Drone

2.1.1 The project team arranged NCAP camera installation and training for targeted community forests and the RFD staff from 25-29 October 2024. The provisional training agenda is attached in Annex 7. A total of 37 participants attended, including 22 village leaders and residents from 4 villages and 12 RFD officials from the Forest Protection Units and the Forest Community

Division from the Regional Forest Management Office (Mae Hong Son Branch) (see Table 11). Participant names and affiliations are listed in Annex 8.

The project initially planned to hold training at one venue, but due to the distance (50-100 km over 2 hours drive) from remote communities like Tor Pae Community Forest (Khun Yuam District) and Lo Koh Community Forest (Sop Moei District), the training was split. It was held at each site in the morning, with NCAP camera installation in the afternoon.

It should be noted that the project team and Consultant #2 invited the DNP staff working at Phu Khieo Wildlife Sanctuary to help in NCAP camera installation. They are experts and familiar with the system and have working experience over 5 years for monitoring illegal poaching in the sanctuary (Figure 16).

Figure 16. Camera setting and introduction of NCAP system (above), and installation of NCAP camera (below).

The training covered the following topics:

1. Opening and background of the Project
   by Dr. Chakrit Na Takuathung, Project Coordinator
2. Introduction of the Project Team
3. Principle of NCAP, data collection template, and mobile application
   by Mr. Sitthichai Jinamoy (Consultant#2)
4. Case study and NCAP installation at Phu Khieo Wildlife Sanctuary
   by Phu Khieo Team
5. Component of NCAP camera, camera setting and camera management application
   by Phu Khieo Team
6. Problems and resolutions
   by Phu Khieo Team
7. Demonstration and practices of installing NCAP camera
   by Phu Khieo Team and local community
8. Actual installation of NCAP camera (3 units) and the target sites
   by Phu Khieo Team and local community

PPTs and Manual of NCAP installation is available at
https://drive.google.com/drive/folders/1Et6v1PsoWeDiwjkB31X7aT3DByIDDCZ6?usp=sharing

The project evaluated the level of participant's satisfaction (Figure 17). It was found that 43% of the participants were highly satisfied and 57% were satisfied with the NCAP training. All participants were aware of using NCAP for monitoring threats to forest resources. In addition, they responded that the lectures and exercises were practical, and they could capture most of the content provided. Additional training sessions and support were proposed to maintain the equipment.

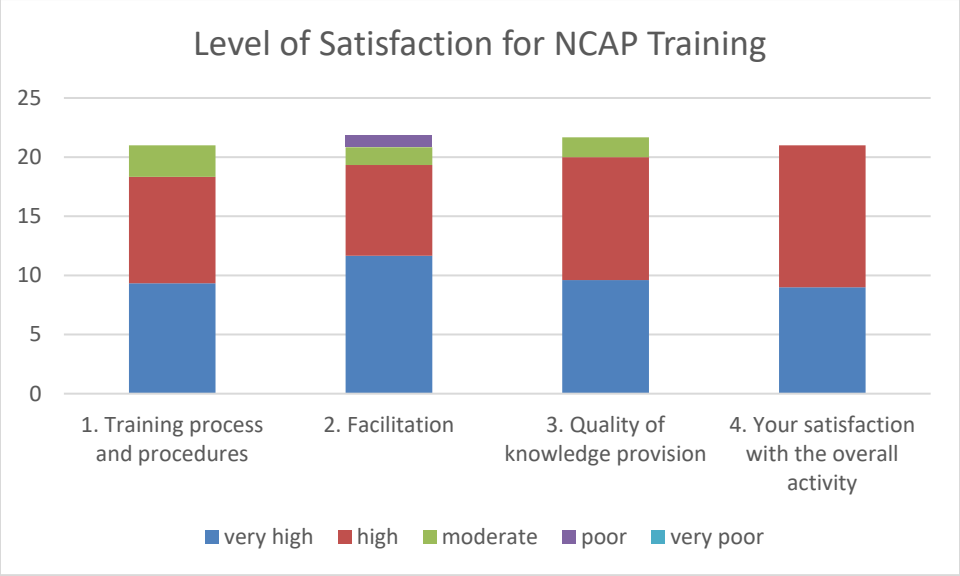


Figure 17. NCAP training response level results.

2.1.2 Training sessions on SMART PATROL monitoring

This training aims to increase the capacity of four participants of forest communities and one from forest protection unit of the Salawin National Reserve Forest used the developed SMART PATROL technologies and installed the system for effective reporting of illegal activities (logging, poaching and encroachment).

In the morning session, the participants were trained to understand the basic principles and steps to make use of SMART Mobile for patrolling in the target areas. The afternoon session was for actual field work. After the training, it was found that all 6 SMART Mobiles sent information on patrol routes in each area, showing various threats that the consultant had specified in this tracking system. This threat information was very useful to link it with the NCAPs camera installation information.

Table 11. A series of training events (6 nos.) on SMART Application Training for Qualitative Patrol Data Collection (SMART Patrol System)

No	Date	venue	No. of participants
1	January 7, 2025	Ban Pratu Muang, Khun Yuam District	5
2	January 8, 2025	Ban Tor Pae and Unit 3 (Khun Khueam), Khun Yuam District	11
3	January 9, 2025	Ban Tung Pam, Mae Sariang District	5
5	January 10, 2025	Ban Leko, Sop Moei District	5
6	January 11, 2025	Defense Unit, Huai Pho, Sop Moei District	11

Altogether, there were 37 participants (Annex 9).

- Note that the project invited a lecturer, Mr. Suphalak Khanphu Khieo from Phu Khieo Wildlife Sanctuary, Department of National Parks, Wildlife and Plant Conservation to give a talk together with the project consultant. The project provided 6 SMART Mobile devices to the 4 community forests and officers from 2 forest protection units under Forest Resource Management Office 1, Mae Hong Son Branch. The project provided the mobile phone number including the WI-FI pre-paid for one year to keep the activity being active.
- The project evaluated participant's satisfaction level (Figure 18) and found that they were very interested and well aware of the importance of SMART PATROL to help protect natural resources in community forests and national forest reserves. Out of the 37 participants, 50% were extremely satisfied and another 50% satisfied with the project.

- Suggestions from participants include the following:

(1) The training period was too short. They requested refreshment training in the future.

(2) The participants requested additional support on advanced technology equipment such as drones and cameras to take pictures.

(3) Continued communication and networking among participants, lecturers and project staff.

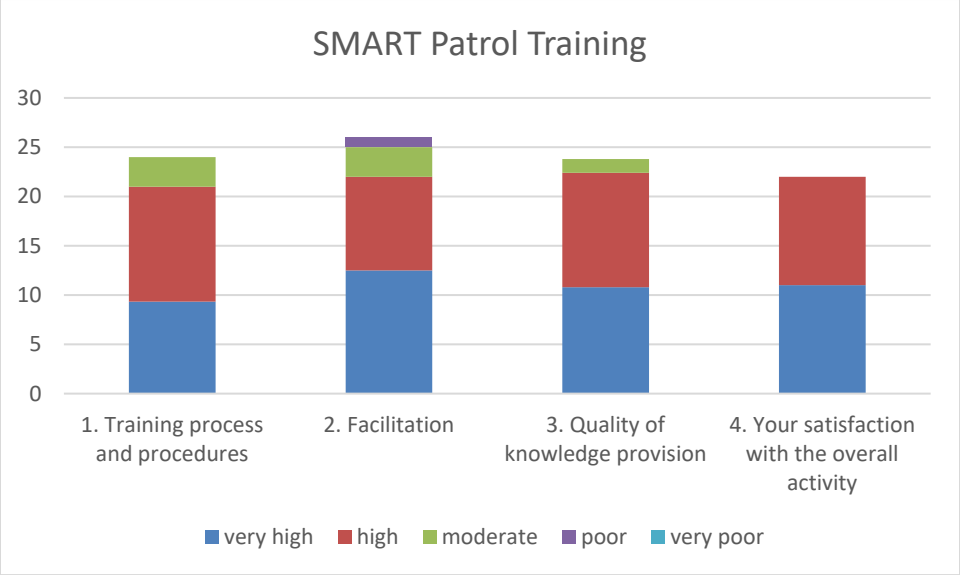


Figure 18. SMART Patrol training results.

2.1.3 Training on Use of Drones for Forest Monitoring

- In connection with the derived vulnerable deforestation areas, the project used drone technology and trained the RFD officials to familiarize with this technology. The advanced drone technology provides a significant opportunity to enhance their forest monitoring efforts. The DJI Air 3S drone, equipped with high-resolution cameras and intelligent flight capabilities, enables more efficient and precise data collection. By integrating drone-based surveys into forest resource management, officers can obtain comprehensive and up-to-date information, improving decision-making and conservation strategies more effective.

- This training program on 8 January 2025 at Mae Hong Son Central Stadium aimed to equip forest officers with the necessary skills to effectively operate DJI Air 3S drones for forest resource surveys. The program follows DJI's official guidelines and focuses on systematic flight planning, data collection, and secure data storage. This approach ensures data accessibility for future reference and facilitates visualizing geo-tagged images on mapping platforms.

The training aims to:

(1) *Enhance technical proficiency* – Train forest officers to operate the DJI Air 3S drone in compliance with DJI's official manual and safety protocols.
(2) *Improve data collection and analysis* – Enable participants to conduct systematic drone surveys, capture high-quality images, and integrate geo-tagged data for mapping and analysis.
(3) *Ensure effective data management* – Guide participants in storing survey data securely in a Synology NAS system, allowing for efficient retrieval and long-term monitoring.

(4) *Support sustainable forest management* – Equip officers with drone-based monitoring skills to detect deforestation, assess forest conditions, and enhance conservation efforts.

- The training program was designed as a hands-on practical with a combination of theoretical instruction and field exercises (Figure 19). Contents of the training included 1) lectures on theories and introduction to drone-based data collection techniques, 2) practical hands-on training, pre-flight preparation and capturing high-resolution images, and 3) data management and analysis (e.g., transferring and organizing survey data in Synology NAS).

- There were five RFD officials (Annex 10) attended the training session. It is anticipated that monthly drone flights will be conducted at designated survey points, and the collected data stored in a Synology NAS system for future retrieval.

Figure 19. Drone monitoring training on 8 January 2025.

Activity 2.2 Conduct training on sustainable livelihood development activities and income generation to local people and Myanmar refugees on the following subjects: 1) cultivation, harvesting, processing and commercialization of bamboo and NTFPs, 2) improvement handicraft products, and 3) study visit to Pha Taem National Park on domesticated wild orchid in the buffer zone to reduce illegal collection in the park

2.2.1 Cultivation, harvesting, processing and commercialization of bamboo and NTFPs:

Konjac known as konjaku, konnyaku potato, devil's tongue, voodoo lily, snake palm, or elephant yam, is a vegetable species native to Yunnan Province in south-western China and northern Thailand, which has an edible corm. It is cultivated in warm subtropical China and Japan to tropical areas of East and Southeast Asia, to Indonesia and Vietnam. It is a perennial plant, growing large corm up to 25 cm (10 in) in diameter.

The food made out of the konjac is widely known in English by its Japanese name konnyaku, it is cooked and consumed in China, Vietnam, Japan and Korea (Figure 20).

Figure 20. Konjac plant (upper left), Konjac potato (upper right) and food products of Konjac.

The project team had a discussion with a Chinese middleman buying Konjac at Mae Sariang district. The Konjac prices vary from 17-25 THB per kg. After preliminary pre-processing. it is exported to China. The factory capacity is 50 tons per day (Figure 21). In addition, we also discussed with the Director of Huai Singh School about the possibility to host the tissue culture lab for the training session and the Director agreed to host the tissue culture lab.



Figure 21. Investigate Konjac silo and discussion with the school Director for the possibility to host tissue culture lab for training session.

- The project engaged Dr. Phruet Racharak, Assistant Professor at KUFF, as a resource person for the domesticated cultivation, harvesting, processing, and commercialization of bamboo and Konjac (*Amorphophallus konjac*). Mr. Noppadol Kamolthammachat from Mae La Noi District, Mae Hong Son Province, experienced in growing Konjac from shoots, was also invited as a resource person.

The project conducted a two-day plant tissue culture training on January 25-26, 2025, at Ban Huai Sing School, Mae Sariang District, Mae Hong Son Province. The training focused on basic knowledge and techniques in plant tissue culture to help participants apply the skills effectively in both commercial production and conservation initiatives (Annex 11). Therefore, the objectives of this training are as follow**s:**

1. To explain the definitions, basic principles, and fundamental procedures of plant tissue culture.
2. To apply basic tissue culture knowledge for solving plant propagation challenges.
3. To adapt plant tissue culture techniques according to the specific requirements of different plant species for propagation.

- The contents of this training included 1) knowledge about Konjac and its valuable; 2)

preparation of tissue culture media; 3) sub-culture & transfer of plant propagules ; 4) sterilization techniques; 5) transplanting techniques; and 6) focus group discussion and training summary (Figure 22).

- There were 29 participants from 4 community forests, teachers and students from 2 nearby schools (Annex 12). Asst. Prof. Dr. Phruet Racharak and Mr. Noppadol Kamolthammachot served as Instructors, together with 2 assistant students.
- Although tissue culture is recognized as sophisticated and complicated technology to understand, the training evaluation showed that more than 70% of participants are highly satisfied with the training contents, while 20% evaluated it as good (Figure 23). The participant's opinion on this activity are: 1) They gained new knowledge, which they could introduce to their younger siblings and friends, 2) They were able to integrate the knowledge into teaching causes and learning system in school. 3) Gained knowledge in experimentation, which they could apply in the future. 4) The knowledge they gained was in line with the intended purpose of their participation, and usefulin their careers and communities. They also provided suggestions for promoting appropriate areas of diverse topic, and wanted to explore more opportunities in other professions.

The project also provided additional financial support for essential equipment to establish a tissue culture laboratory at Tor Pae Witthaya Community School in Khun Yuam District. This initiative benefits science education for students and offers local people a space to enhance agriculture production and apply skills gained from training. Additionally, the school's participation in the training highlights the potential for future development of similar laboratories in the future.

Figure 22. Training on plant tissue culture techniques at Ban Huai Sing School and additional support for Tor Pae Witthaya Community School (lower right)

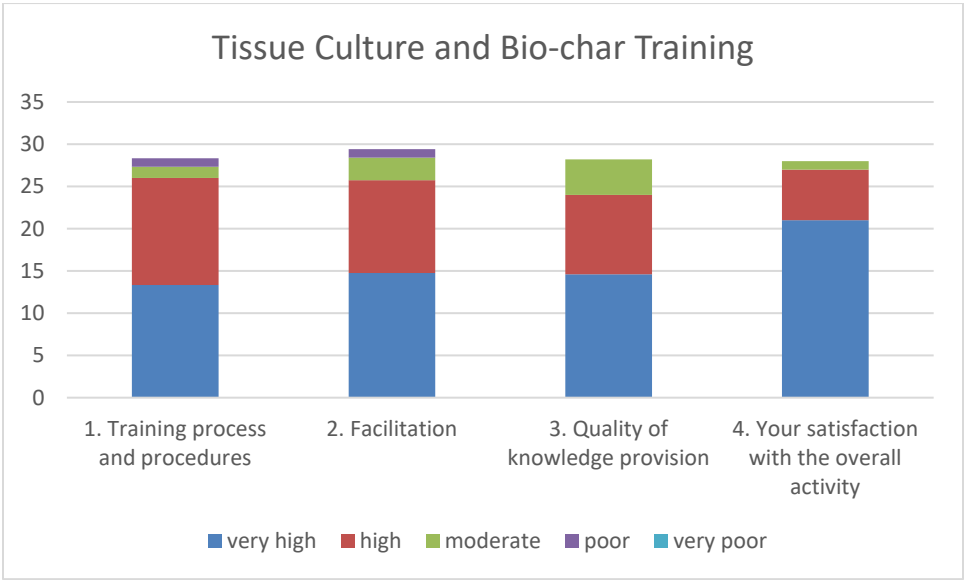


Figure 23. Plant tissue culture and bio-char training results.

2.2.2 Training on bamboo utilization and the production of Biochar

Mae Hong Son province, a northern province in Thailand is rich in forest resources and diverse ethnic cultures. However, the per capita income of the province in 2024 was 64,665 THB per year or USD 1,850, which was the lowest in Thailand or one fourth of the average income in Thailand. In addition, Mae Hong Son has the highest poverty rate in the country, with 24.6% of its population living below the poverty line as of 2024.

- The project sub-contracted Mr. Sapol Boonsermsuk, a leading bamboo expert in Asia, to support and organize a training workshop on bamboo utilization and Biochar production, held at Huai Sign School on 27 January 2025 (Annex 11). The training aimed to 1) to provide knowledge on bamboo, and its innovative modern applications, 2) introduce bamboo Biochar production and its uses, 3) teach participants the Biochar production process for their own use, 4) promote communities to use Biochar to improve soil and boost agricultural productivity, and 5) help communities generate additional income from bamboo and Biochar (Figure 24).
- The contents of this training included 1) presentation on bamboo utilization, 2) presentation on Biochar, and 3) demonstration on Biochar production. There were 29 participants coming from 4 participating forest communities and nearby schools (Annex 12).
- Participants gained new knowledge bamboo utilization, particularly biochar. This training, especially on biochar supports Thailand's policies on sustainable agriculture and circular economies, while also strengthening community resilience. Its success, however, requires overcoming logistical barriers, ensuring inclusive participation, and providing ongoing support. When well implemented, bio-char initiatives offer a comprehensive path to climate resilience, economic growth, and social well-being, with positive impacts on agriculture and environmental benefits, economic opportunities and public health.

- The combined tissue culture and bamboo training evaluation showed that more than 70% of the participants ranked both the trainings as excellent while 20% evaluated it as good (Figure 25).

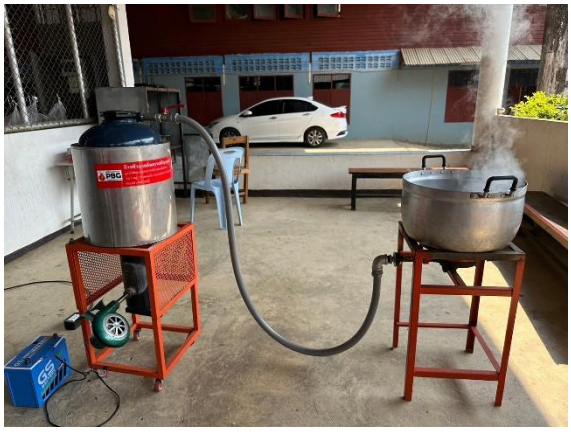


Figure 24. Training on bamboo utilization and biochar production.

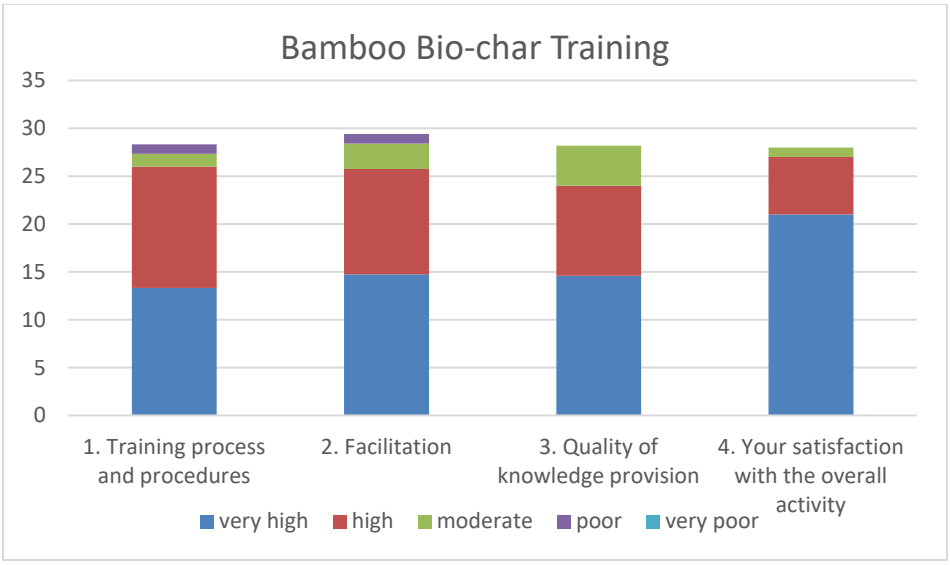


Figure 25. Bamboo training evaluation results.

2.2.3 Study visit to Pha Taem National Park

The project recruited Assoc. Prof. Dr. Naris Bhumphakpan from KUFF to s upport the study visit for community forest and other stakeholders at Pha Team National Park, Ubon Rachathani Province on 21-23 February 2025(see Annex 13). Dr. Naris a former Consultant for the ITTO Emerald Triangle Protected Forest Project (Thailand and Lao PDR, 2012-2015), funded by the Government of Japan, is familiar with the site and involved in a domesticated wild orchid project activity.

- Specific objectives of this activity included the following:
  1) To provide background information for local communities and stakeholders from Mae Hong Son on the use of minor forest products via its domestication in the buffer zones of the Pha Taem Forest Complex.
  2) To provide knowledge and information of natural resources, conservation and protection of natural resources and park.

3) To create future collaboration and networks between the participants from Mae Hong Son and local communities in PTFC of Ubon Rachathani for mutual benefits for both the communities.

- There were 16 participants from the participating forest communities led by the Field Coordinator. Besides, the program visit was facilitated by Dr. Naris Bhumpakphan and lecturers: Yongyut Trisurat, Suchart Kalayawongsa, Sapol Boonsermsuk and Chakrit Na Takuathung (Annex 14).
- The participants visited 10 study sites during the 3 days in three districts of Ubon Ratchathani, namely Kong Chiam, Nacharuay District and Nam Yuen Districts. Key activities included short lectures on Bamboo and Malva nut tree plantation, orchid nursery and orchard, raising stingless bee and Eastern honeybee in dairy lives and generating some incomes to families, as well as re-introduction of bamboo and wild orchids into the wild habitat (national parks and wildlife sanctuaries). Bamboo handicrafts and cotton clothes were included (Figure 26).

Figure 26. Field visit to Pha Team National Park, Ubon Ratchathani province.

Activity 2.3 Produce, share and disseminate information, knowledge management, and outreach to other community forests

2.3.1 Organize a Project launch meeting in Bangkok to inform policy makers, authorities and the public about the project objectives. Target audiences include the RFD, representative of Japan Government, ITTO, KU, UNHCR, NGOs, and media.

The project arranged a Hybrid Inception Meeting on 26 July 2024 at Best Western Nada Don Mueang Airport, Bangkok. There were 10 online and 24 on-site delegates attended the meeting. Besides, the NCAP events were published by the Regional Forest Management Office (Mae Hong Son Branch) (Figure 27).

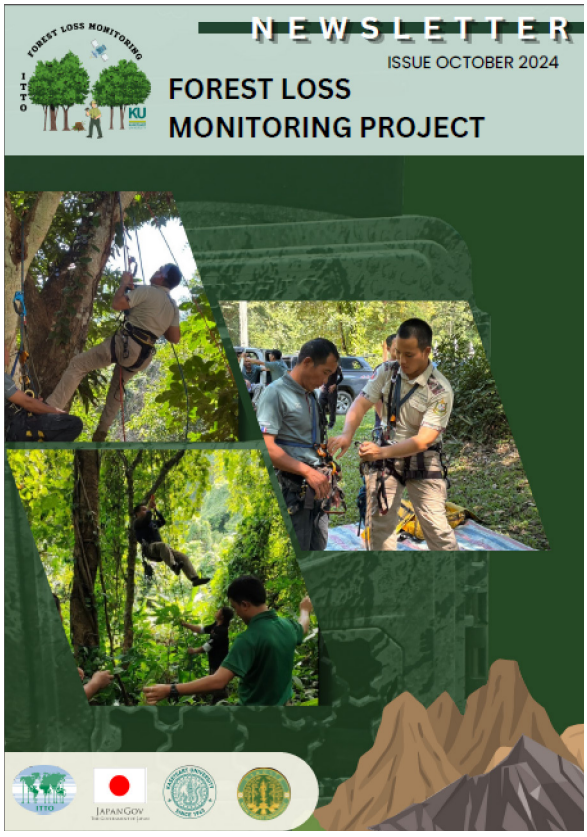
Figure 27. A one-page publication via website of the Regional Forest Management Office (Mae Hong Son Branch) to all targeted sites.

2.3.2 Widely publicize the results and lessons learned from the implementation activities on the websites of ITTO, RFD and Kasetsart University, project social media and newsletters.

The Project has published three issues of bi-monthly Forest Loss Monitoring Newsletter in August 2024, October 2024 and December 2024 (https://itto-forestloss.org/wp-content/uploads/2024/10/Forest-Loss-Monitoring.pdf) (Figure 28). The 1st issue contained information about the Inception meeting organized on 26 July 2024, background and objectives of the project, and consultation meeting held with local communities and local government during 3-5 August 2024. The consultation meetings with community leaders and selection on suitable sites to install NCAP cameras was the content of 2nd issue of the newsletter. The 3rd issue disseminated results of the 1st PSC meeting and NCAP training series held in Mae Hong Son province. The last issue (4th issue) is scheduled to be published before the project termination in March 2025. It would contain information about SMART patrol and Drone monitoring, tissue culture training and study visit to Ubon Ratchathani province.

The project also developed a website (Figure 29) to showcase its work, with four main menus: Who We Are, Project Approach, Outputs and Activities, News and Events. The project website is periodically updated whenever key activities are held or planned.

Issue 3



Issue 4

Figure 28. Bi-monthly ITTO Forest Loss Monitoring Newsletters.

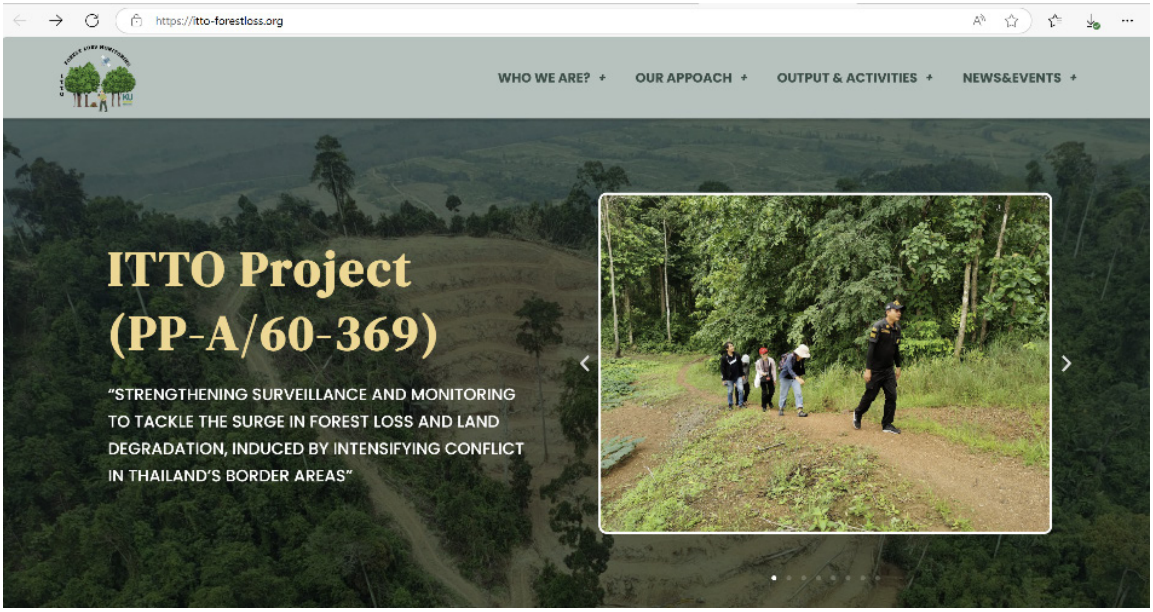


Figure 29. Project website (https://itto-forestloss.org/).

2.3.3 Support sharing lessons in robust forest monitoring system

The project initially planned to present the project results at the 2024Annual Forestry Conference (Thailand) and the XVI FAO World Forestry Congress 2025 (South Africa) or

other international events. However, these were not permitted due to funding restrictions following the project's termination on 31 March 2025. As a result, alternative events were held (Figure 30).

(1) Prof. Yongyut Trisurat (Project Advisor) attended the **16th AOGEO Symposium**, and the Thematic Group session (**TG2): APBON session on "Observations, Data, and EBVs for biodiversity assessment** held at the Tokyo International Exchange Center Plaza HEISEI, Tokyo, Japan during 3 to 5 September, 2024. He presented the project to over 80 delegates from 20 countries and discussed potential collaboration with the Japan Aerospace Exploration Agency (JAXA) on modeling vulnerable deforestation areas.

(2) Prof. Yongyut Trisurat (Project Advisor) attended the **16th Asia-Pacific Biodiversity Workshop** in Philippines on 29-31 January 2025. He presented the project outputs to delegates of 14 countries attending the workshop held at the ASEAN Center for Biodiversity (ACB). The APBON workshop focused on aligning these efforts with ongoing regional and global initiatives, particularly the application of Essential Biodiversity Variables (EBVs) developed by GEO BON. In addition, the workshop aligned with KM Global Biodiversity Framework (GBF).

(3) Dr. Chakrit Na Takuathung, Project Coordinator, presented the project objective and its outputs during the **study visit to the Faculty of Bioenvironmental Sciences, Kyoto University of Advanced Science (Kameoka campus),** Japan. More than 50 faculty members and graduate students of Kasetsart University and Kyoto University attended this meeting.

Figure 30. Dissemination of project outputs in various international meetings/workshops: 16th AOGEO (upper left); upper right (16th APBON); KU study visits in Japan (bottom).

2.3.4 Organize tailored training and workshops on community forest protection and sustainable forest management practices for local authorities and communities in Mae Hong Son and Tak provinces

As mentioned in the previous section, this project is RFD's first attempt to implement NCAP technology and the SMART PATROL system in community forests and national forest reserves under its administration. The project held a workshop on **"Revitalizing Community Forests in the Border Areas using Surveillance Monitoring System",** alongside the 2nd PSC meeting on 25 March 2025, to share lessons learned and promote adoption in community forests, especially in Mae Hong Son, Tak and potentially other provinces (Figure 31). Detailed activities and target audiences are attached in Annex 15.

Figure 31. The workshop on "Revitalizing Community Forests in the Border Areas using Surveillance Monitoring System" and field visit

4.2 Involvement of project beneficiaries and related stakeholders

The project collaborated with all primary, secondary and tertiary stakeholders at local, provincial, national and international levels. Locally, it worked intensively with 4 target community forests - Pra Tu Muang, Le Koh, Tor Pae, and Thung Paem -located in Khun Yuam, Sop Moei, and Mae Saring districts, as well as the Salawin National Reserved Forest in Khun Yuam and Sop Moei districts. Lessons learnt will be shared with 279 and 191 community forests in Mae Hong Son and Tak provinces, respectively along the Myanmar-Thailand borders, and with over 11,000 community forests in Thailand, covering about 1 million ha (6.2 million rai), through the workshop on **"Revitalizing Community Forests in the Border Areas using Surveillance Monitoring System"**. Community forests support for the rural livelihoods by providing food, water, and shelter, while also serving as habitats for plants and animals, migratory corridors and refuges in human-dominated landscapes.

Besides supporting local people and community forests, the project also builds the knowledge and capacity of local schools, teachers, youth, and students through various activities and training. In Mae Hong Son province, or example, local people and displaced Myanmar people rely heavily on bamboo for shelter, wood for cooking and non-timber forest products, especially Konjac for consumption and earning income. However, current practices are not sustainable or eco-friendly. The provided training on tissue culture and domestication of wild plants and konjac to boost income and reduce poverty in Mae Hong Son, which has the lowest income in Thailand. After the training, local people from other districts visited the project site to learn bio-char production.

In addition, a tissue culture laboratory was established at Huai Sigh School in Khun Yuam District to enhance school students knowledge, with additional support provided to Tor Pae Witthaya Community School. Both laboratories have strong potential to share project-derived knowledge and skills with over 170 schools and 35,000 interested individuals across four districts in Mae Hong Son province. Participants also gained experience from livelihood improvement activities under the Emerald Triangle project (2012-2016), funded by the Government of Japan during a field visit in Ubon Ratchathani province.

This is the RFD's first project to use a surveillance monitoring system combining ground technologies (NCAP and SMART Patrol) and earth observation (drone and satellite images) to detect and monitor forest loss and degradation in real time via a mobile application. RFD officials from the Regional Forest Management Office in Mae Hong Son province attended a series of training sessions to learn technology use, maintenance and how to train their colleagues. The Workshop on "Revitalizing Community Forests in the Border Areas using Surveillance Monitoring System" also allowed them to share experiences with other forest communities and forest protection units in Thailand. Opportunities and challenges for expanding the technology and approach were also discussed at the workshop.

Furthermore, several training sessions were arranged to increase the capacity of relevant agencies and individuals in close cooperation with the RFD. There were over 200 domestic participants and over 180 international participants attending these events and gained direct knowledge and benefits from the project. List of training sessions and meeting events, as well as the number of participants is shown in Table 12.

Table 12. Summary of training and workshop conducted during the project period

Training/meeting title	Date	No of participants
Domestic events		
NCAP training sessions		
Tor Pae Community Forest	25 October 2024	8 participants (community forest committee)
Thung Paem Community Forest	27 October 2024	5 participants (community forest committee)
Le Koh Community Forest	28 October 2024	5 participants (community forest committee)
Baan Rai Community Forest	29 October 2024	4 participants (community forest committee)
Salawin National Reserved Forest, Forest Protection section (Khun Yuam Forest Protection Unit)	25 October 2024	5 participants (RFD officials)
Salawin National Reserved Forest, Forest Protection section (Sob Moei Forest Protection Unit)	26 October 2024	7 participants (RFD officials)
Salawin National Reserved Forest, Forest Protection section (Mae Sariang Forest Protection Unit) attended 4 days of training	26-29 October 2024	1 participant (RFD officials)
RFD officials of Community forest Division (attended all session)	25-29 October 2024	2 participants (RFD officials)
SMART System		
Ban Pratu Muang, Khun Yuam District	7 January 2025	5 participants (community forest committee)
Ban Tor Pae and Unit 3 (Khun Khueam), Khun Yuam District,	8 January 2025	11 participants (community forest committee and RFD officials)
Ban Tung Pam, Mae Sariang District	9 January 2025	5 participants (community forest committee)
Ban Leko, Sop Moei District	10 January 2025	5 participants (community forest committee)
Defense Unit, Huai Pho, Sop Moei District	11 January 2025	5 participants (community forest committee, RFD officials, civil servant)
Training workshop on Plant Tissue Culture		
Huai Singh School, Khun Yuam District	2-26January 2025	27 participants (17 from community forests, 5 teachers from 3 schools, and 5 students from 3 schools)
Training workshop on bamboo utilization and bio-char		
Huai Singh School, Khun Yuam District	27 January 2025	15 participants (4 school teachers, 2 staff from Royal Forest Department and 9 leaders of local communities)
DRONE training		
Mae Hong Son Central Stadium	8 January 2025	5 participants (RFD officials)
Study visit on livelihood improvement		
Ubon Ratchathani province	24-26 February 2025	15 participants (4 school teachers, 2 staff from Royal Forest Department, 9 leaders of community forest)
Exhibition/The World Forest Day		
Bangkok	15 March 2025	Sri Nakhon Huean Khan Park, Bangkok
Workshop on “Revitalizing Community Forests in the Border Areas using Surveillance Monitoring System		

Maruay Garden Hotel, Bangkok	25 March 2025	74 participants (27 staff from Royal Forest Department, 32 leaders of community forest, 4 PTC , 12 PSC, 1 ITTO staff and 2 representatives of the government of Japan)
International workshops/meetings		
16th AOGEO Symposium		
Tokyo International Exchange Center Plaza HEISEI, Tokyo, Japan	3-5 September 2025	Over 80 participants from 20 countries
16th APBON workshop		
ASEAN Center for Biodiversity	29-31 January 2025	40 scientists and practitioners from 8 countries
KU study visit in Japan		
Faculty of Bioenvironmental Sciences, Kyoto University of Advanced Science (Kameoka campus), Japan	11 March 2025	60 participants (10 Professors and graduate students from Kyoto University and 50 Professors from Kasretsart University)
8 events	3 international events	>200 domestic participants and >180 international participants

4.3 Project sustainability

The sustainability of the project activity will be achieved through the following measures:

4.3.1 Social sustainability:

The project involves active participation of local government, including the Mae Hong Son Regional Forest Management Office, community forest leaders and local residents. Key activities include identifying target community forests, selecting suitable sites for NCAP cameras, and conducting joint SMART patrols. Training workshops aims to build capacity in using modern technology for monitoring forest loss and forest degradation, while also fostering interaction and information exchange among participants and RFD officials in a friendly environment.

In addition, various activities have been designed to ensure sustainable outcomes, emphasizing strong community and local authority participation and ownership for long-term success. For example, a study visit to Pha Taem National Park focused on domesticated wild orchids and livelihood improvement in the buffer zone to reduce illegal collection in the park. Group assignments mixed up with community forest representatives, schoolteachers and local governments had opportunities for collaboration and knowledge sharing lessons gained by the project. The Ban Tor Pae forest community has already established a Learning Center for Biochar (Figure 32), which has attracted visitors from nearby communities and formed a partnership with Pha Pang Energy Community Enterprise (PBG) in Mae Prik district, Lampang province for knowledge exchange. Similar social networks and collaboration on NCAPs and SMART patrols across community forests are expected soon. Moreover, line groups were created after the training session. Project newsletters and websites were established to share activities

Figure 32. Biochar Learning Center at Tor Pae community (left) and visit of interested individuals (right).

4.3.2 Environmental sustainability

At the national level, the project supports national forest policy and biodiversity conservation, aligning with the Thai Government's goal to increase forest cover to 40% of the country's land area - 25% for conservation and 15% for production forests. It also contributes to the BCG

model, Nationally Determined Contributions (NDCs), Sustainable Development Goals (especially SDG 15), and the Global Forest Goals under the United Nations Strategic Plan for Forests (UNSPF) committed by Thailand.

At the local level, the project empowers communities to protect remaining forest from growing threats caused by displaced Myanmar people crossing into Thai border areas after the Myanmar coup seeking safer areas. This influx has led to increased large-scale deforestation, illicit trade, and loss of food security and livelihoods for 25 vulnerable communities. The situation has worsened with the recent withdrawal of US Government funding support for humanitarian assistance to refugee camps.

The enhanced capacity of local government and communities has helped reduce illegal wildlife poaching and collection of non-timber forest products (NTFPs) collection. Since installing NCAP cameras, numerous photos of illegal activities have led to the confiscation of illegal timbers and NTFPs, and the arrest of poachers. During a field visit on 27 March 2025, following the final workshop, the project team, PSC members, and an ITTO delegate observed a clear difference in forest conditions between Thung Paem Community Forest with NCAP cameras and a nearby natural forest reserve (Figure 33).

The project analyzed recent and current forest loss and degradation along the Myanmar - Thailand border, and provided recommendations to address challenges and enhance effective protection with the involvement of relevant authorities and local communities. Regular drone monitoring will help safeguard intact forests in high-risk deforestation areas. It is hoped that experiences from the five target areas will be scaled up to other vulnerable communities along the border areas.

In addition to protection measures, training on cultivating of bamboo, Konjac (*Amorphophallus* spp.) and other NTFPs has helped reduce illegal collection in community forests and natural forest reserves. This approach was proven effective by the Emeral Triangle project for transboundary conservation along Thailand, Cambodia and Lao PDR borders. Previously, locals harvested illegally wild orchids and bamboo from protected areas, but after the training and intensive engagement by the project staff, they began cultivating these species in their backyards. The products are now sold in nearby provinces and domestic markets, with 80% of raw materials for bamboo products are sourced from local cultivation. They also introduce young orchids and bamboo into the wild.

Figure 33. Forest condition outside the target areas and confiscated timber poacher from the project site after receiving real time photo (left) and forest inside the project area (upper right) and bamboo plantation intercropped with rubber for bamboo products (lower right).

4.3.3 *Technical sustainability*

This project is the first pilot project to apply advanced technologies such as satellite data, NCAP cameras and SMART Patrol with mobile apps - used community forests. It supports the RFD's long-term goals while providing opportunities for local authorities, community forests, and interested groups to enhance forest monitoring and protection in high-risk areas. To ensure sustainability, the project engages local people in all technical steps of installing and setting up NCAP cameras and SMART patrol. Training evaluations show participants are confident in setting up and maintaining the equipment, requiring only minimal advice from project staff, if needed.

For long-term sustainability, the project aims to develop and share learning materials on effective on-ground forest monitoring system and sustainable livelihoods for local communities, relevant agencies, and other partner institutions for further dissemination and update. These resources are available for download as a references to support upscaling and future interventions beyond the 5 target areas, benefiting other interested individuals and organizations.

Prof. Yongyut Trisurat (Project Advisor), Dr. Chakrit Na Takuathung (Project Coordinator) and Dr. Laddawan Riantakool are faculty members affiliated at the Faculty of Forestry, Kasetsart University. These three professors usually present project achievements at various conferences and meetings. In addition, the lessons learned, and knowledge gained during the project activities are embedded into the regular curriculum for undergraduate, post-graduate studies of the Faculty of Forestry, Kasetsart University. It is to be noted that consultants and project staff are also collaborating with Kasetsart University. If local government and local people face any difficulty related to technical issues, they can contact professors and project staff at Kasetsart University to obtain technical support.

The project established tissue culture laboratories at Huai Hong and Tor Pae Community Schools leveraging existing biology labs and experienced teachers. Funded by the project, the labs are primarily used by high school students for biology classes. Both school directors are committed to continuing tissue culture activities for school children and interested local people in nearby districts. Trained students and participants have also become trainers for peers and and community members (Figure 34).

Figure 34. Trained students on tissue culture and biochar participants become trainers

4.3.4 Political and institutional sustainability

The Royal Forest Department (RFD) has registered nearly 11,000 community forests across the country, covering about 4% of the country land area. This project is the first pilot project that enhances community forest management and forest protection using modern surveillance and monitoring system through participatory approaches. The results of this project has proven that modern monitoring system and engagement of local government and local people can safeguard the community forests which are otherwise vulnerable to deforestation and poaching.

The project offers many opportunities to share lessons learned at international, national and local levels, aligning with the National Forest Policy (2019) and the Forestry Development Strategy (2017 – 2036). These lessons will be shared not only in in Mae Hong Son community forests but also with other community forests. A workshop titled "Revitalizing Community Forests in the Border Areas using Surveillance Monitoring System Plans" was organized, bringing together RFD officials from headquarters, Regional Forest Management Offices and community leaders, NGOs, consultants and project staffs. pKey findings, opportunities, and challenges for upscaling and mainstreaming into the RFD system were presented and discussed.

The Director of Community Forest Management Office and the Director of Mae Hong Son Regional Forest Management Office accepted the project approach and realized the advantages of the modern monitoring technology to improve and transform experiences and knowledge to protect the remaining forest cover and that promote sustainable local development. They RFD will mainstream activities and embed knowledges in its policies for implementation in the remaining community forests. In addition, the participating community leaders in the project are also committed to continuing the project activities.

4.3.4 Financial and economic sustainability

Although expensive equipment items were purchased with the project funds and the SMART application is in place for expansion, financial sustainability may be an issue after the termination of project in March 2025. To avoid this, the project with the approval of ITTO is

committed to allocate funds to purchase battery and other consumable items, as well as chemical substances for tissue culture laboratory to maintain activities at least for 3 months after termination of the project in March 2025.

The source of budget was approved by the ITTO according to the budget modification suggested. Accordingly, the local government (Regional Forestry Management Office, school and village leaders) has to prepare a budget proposal at least 1 year in advance to support the continuing project activities.

Project staff discussed with the forest community leaders, who confirmed they had raised this matter with district officers and relevant agencies the need for financial support to sustain the activities. The Regional Forest Management Office in Mae Hong Son province and Thung Paem Community Forest have experience developing proposals to request funding from private companies for climate change mitigation efforts. The NCAPs and SMART patrolling system can also be expanded to include forest fire prevention. A similar public and private partnership (PPP) approach is planned, with proposals to companies and the Provincial Administration Organization under biodiversity conservation or forest fire prevention schemes. The Regional Office also informed local communities and the project team of a substantial budget available for forest fire monitoring.

In addition to financial support for maintaining the monitoring system, training on livelihood improvement and sustainable use of bamboo, Konjac (*Amorphophallus* spp.) and other NTFPs will enhance local capacity to generate sustainable income. This is due to Konjac and bamboo are in very high demand both in domestic and international markets (Figure 35).

Figure 35. Discussion with community leaders and RFD officials on project sustainability (left) and factory to buy konjac at Khun Yuam district

5. Assessment and Critical Analysis

Overall, the project was well-designed and aligned with the four emergency criteria set by the Government of Japan (urgency, necessity, irreplaceability and unpredictability) to address the immediate loss of local livelihoods and rising illegal wildlife poaching and collection of non-timber forest products (NTFPs) collection due to the influx of displaced Myanmar people into

Thai' border areas. It also supports Pillar 2 of Japan's new "Free and Open Indo-Pacific" plan, promoting cooperation with ASEAN countries to strengthen resilience in agriculture and food supply chains.
The project also supports key global forest-related objectives, including the UN Sustainable Development Goals-particularly SDG 1 (No Poverty), SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action), and SDG 15 (Life on land)- as well as the Global Forest Goals (GFGs) and other forest related global agendas. It alignswith ITTO's overarching objectives: 1) to promote the expansion and diversification of international trade in tropical timber from sustainably managed and legally harvested forests; and 2) To promote sustainable management of tropical timber-producing forests. It also conforms with the Strategic Action Plan (SAP 2022-2026) for sustainable management of natural and plantation teak forests in the Mekong region.

The following specific findings were made internally by the project team:

- **The project rationale and identification process** were sound, and the stakeholder identification and analysis adequate.
- **The project objective and outputs** were well defined, and the problem analysis adequate. The effective engagement of local communities, and local governments in Mae Hong Son province contributed to the sustainability of the project. The project achievements are relevant and contribute to the designed measurable outputs as indicated in the project Log Frame.
- **The project duration** was quite short. The project was delayed by over 3 months due to the late announcement, leading to the agreement between ITTO and Kasetsart University being signed on 8 June 2024. Although it was scheduled to start on 1 April 2024 (the first day of Japanese fiscal year), the implementation began on 1 July 2024 and ran for 9 months (1 July 2024 – 31 March 2025) to align with the Japanese fiscal year. Livelihood activities and study visits were carried out almost at the end of the project, but all planned activities were successfully completed.
- **The project implementation strategy** was sound through four principles: 1) local participation; 2) SMART technologies; 3) capacity building; and 4) local livelihood improvement. To effectively implement advanced-technology oriented surveillance and monitoring to address forest loss and land degradation in conflict-affected Thai border areas, the project collaborate with multi-stakeholders at local, provincial and national levela. It strengthens the capacity of local communities and local governments inclusive training, demonstration support, and a cooperative framework built on trust, confidence of all stakeholders and proactive engagement..
- **The project inputs** were adequate for both activity and non-activity-based expenses. The proposed budget modifications were carefully reviewed and approved by ITTO in a timely manner. The achievements and outcome of this project are possible with valuable guidelines and strong & constant support from the Government of Japan, ITTO, and valuable suggestions from PSC and PTC members.
- **The project performance** was made in accordance with the proposed workplan and yearly plan of operation. The proposed output dissemination at the Annual Forestry Conference 2024 (Thailand) and the XVI FAO World Forestry Congress 2025 (South Africa) was not

possible due to budget regulations; however, alternative conferences and meetings were attended instead. See more details in the next section. The project participation with stakeholders was facilitated by a series of training workshops in all target forest communities. To deliver the training sessions effectively, we changed the venue and strategy from a centralized location to conducting sessions at each site, reducing transportation barriers. In addition, Field Coordinators played a key role in mobilizing, connecting and engaging with local communities to ensure efficient communication between local and national stakeholders.

- **The project assumptions** were adequately mitigated during the project duration. The project faced low risk of COVID-19 resurgence and received strong commitment from the RFD to expand the technology to other forest communities. There was a moderaterisk related to adapting modern surveillance monitoring tools, such as remotely sensed data, requiring sufficient incentives, resources and local community willingness to adjust their livelihoods and cultural practices sustainably. Training workshop evaluations showed that both local communities and local government gained knowledge and skills to use modern technology and mobile apps for forest monitoring. Local communities expressed commitment to continue the activities with limited project support, while collaborating with local authorities to seek other funding sources. The nationwide adoption of this modern technology was further emphasized and discussed during the sharing lessons-learned workshop.

The project exit-strategy was sound, based on building the capacity of local people and local government to deliver cost-effective and hand-on practices rather than theories through strengthening operational systems. Although face-to-face training, awareness and support services were limited during the training session, downloadable training materials were provided. Networking among participants, instructors and project staff was established to maintain communication and build capacity during and after the project period.

6. Lessons Learned

The ITTO Forest Loss Monitoring Project aims to address the rising deforestation, land degradation and food insecurity in the disturbed Thailand-Myanmar border areas. Key lessons learned from the implementation of project's activities are shown below:

Project implementation and performance

- ***Community Adaptability to Technology*.**
  Before project implementation, the project team was concerned about the community's ability to use modern technology. However, the training workshop evaluations showed that the new technologies were well received by the community. Their readiness suggests future technological adoption can proceed smoothly without major resistance in Mae Hong Son province and other provinces. The widespread use of mobile phone and various digital applications in Thailand over the past decade has supported this transition.
- ***Selection of Relevant Training Topics and hand-on practices*.**
  Consultation meetings and reconnaissance surveys were conducted to assess the needs and to identify target forest communities, including suitable sites to install cameras. Training programs tailored to community needs led to higher engagement,

enthusiasm, and project sustainability. Importantly, the focus was on hands-on practice over theory and technical terms.

- ***Close and Continuous Community Engagement and Partnership***
  The project recruited Field Coordinators to engage regularly with local people and local government. Selecting Field (local) Coordinators with strong mobility and connections greatly accelerated project implementation and improved stakeholder communication. In addition, ongoing close collaboration with the community was key to smooth coordination.
- ***Impact of Agricultural Calendar on Participation.***
  Since most community members either in Mae Hong Son or other provinces are engaged in agriculture, their first priority is for living. Thus, their participation in forest protection typically declines during planting and harvesting seasons. The NCAPS system and mobile apps help address this constraint by allowing real-time monitoring anytime, anywhere.
- ***Excellent support from the Government of Japan and ITTO both in terms of technical and administration***
  ITTO Projects Manager (Dr. Tetra Yanuariadi) and the Government of Japan (Mr. SAITO Hiroyuki) promptly provided technical advice and excellent support for the project implementation. The project duration was shortened to 9 months from 12 months to align with the financial calendar of the Government of Japan. The project proposed two budget modifications. Both organizations provided timely coordination regarding budget disbursement and adjustment approvals. With their excellent support, the project did not have any interruption during project execution and financial concerns. This excellent administration is suggested to be applied for other internally funded projects and regular projects funded by the Government of Thailand.
- ***Comprehensive PSC and PTC Establishment.***
  Setting up a well-structured PSC and PTC enhanced both advisory support and coordination efforts, contributing to the overall success of project activities. All PSC and PTC members provide valuable recommendations and advice, not only in the official meetings but anytime if the project team requests. Moreover, few members also accompanied and joined the training sessions.

Project sustainability

- ***Establishing Community-Led Learning Centers.***
  Establishing community- or school-led learning centers supported reskilling and upskilling, enhancing local capacity for long-term sustainability.
- ***Cross-Community Study Visits for Networking.***
  Study visits to various areas fostered networks that supported future knowledge exchange and advisory collaboration among communities. ***Extended Support for Long-Term Learning Activities.***
  Activities that require extended learning and familiarization should receive additional budgetary support to ensure successful implementation.
- ***Sustainability of Technology Implementation.***
  Communities are willing to bear fixed costs (e.g., batteries, servers, apps), if the technology proves beneficial. For long-term sustainability, the Royal Forest Department should adopt the system and offer continuous support.

Matters that could be improved

- ***Early implemented activities***
  Livelihood training and study visits were held in February and March 2025, 5-6

months before project completion, allowing the project team to reinforce and monitor ongoing activities. Due to the shortened project duration, these events occurred late the end of the project period. Earlier adjustments to the activity sequencing could have improved operational efficiency. However, communication networks were established among participants in Mae Hong Son and Mae Hong Son and Ubon Ratchathani provinces for continued knowledge sharing experiences.

- ***Community Forest Management Leadership Transition.***
  Community forest management operates through a committee system with a certain period of rotation prescribed for the Chairperson and members. During the 1st consultation meeting, the Chairperson of Le Kho Community Forest collaborated with the project. However, when the new Chairperson took over the position, he was reluctant to join the project. Nevertheless, few members showed interest to join the project. Right now, a few Chairpersons will complete their term soon. To ensure continuity, it is crucial to get involved as many community forest members as possible to raise awareness of the benefits. This approach will help sustain the activities when leadership transitions occur.
- ***Uncertain border situations***
  The ongoing armed conflicts and unexpected influx of displaced Myanmar nationals seeking safety along Myanmar-Thailand borders have severely impacted impacted biodiversity, food security and livelihoods of both local Thai communities and refugees from Myanmar. As mentioned earlier, the refugee influx poses significant threats to deforestation, food security and livelihoods of 25 vulnerable communities across four districts in Mae Hong Son Province. The recent suspension of US support to refugee camps has worsened the situation. This emergency project is therefore timely to address the immediate loss of livelihoods and curb the rise in illegal wildlife poaching and non-timber forest products (NTFPs) collection.

7. Conclusions and Recommendations

The implementation of the project successfully achieved all planned activities, contributing significantly to forest conservation, monitoring, and community capacity building. Below are the key accomplishments:

Output 1: Robust forest monitoring system installed to assist local authorities and communities in monitoring forest loss and degradation through the application of using satellite and drone data.

- Land use/forest cover maps from 1990 and 2023 showed minimal forest area changes, with an annual rate of about 0.1%. Forest cover consistently remained above 90% of the provincial area. Predictive analysis identified deforestation-prone areas are those located at low altitudes; near roads, streams, villages, and camp sites, but far from ranger stations. These are target areas for intensive monitoring using drones.

- Fifteen NCAP Cameras were installed in four target community forests and one natural reserve forest in four districts of Mae Hone Son province. The camera enabled real-time forest monitoring transmit images and videos to mobile devices, enhancing surveillance. Over 6,000 photos have been recorded.

The mobile-based patrol system, SMART patrol system empowered villagers to systematically record and share forest data, facilitating efficient tracking by RFD officials. The NCAPs and SMART Patrol technologies play a significant role in forest loss and land degradation.

Output 2: Fulfilled requisite capacity enhancement of local authorities, community groups and youth in community forest protection and sustainable livelihood development.

The project organized 3 training sessions as follows:

- *Low-cost tissue culture training***:** Conducted training on affordable propagation techniques for economically valuable plant species like konjac and bamboo to reduce pressure on its wild harvesting.
- *Biochar training***:** Introduced and promoted the use of bamboo and agricultural waste for biochar production, offering a sustainable alternative resource and assist villagers to replace consumption of chemical fertilizers.
- *Livelihood diversification study visits***:** Organized exposure trips to Ubon Ratchathani province, where participants explored alternative income-generating activities such as stingless beekeeping, bamboo handicrafts, agroforestry, natural dyeing, orchid cultivation, and reforestation. These visits were aimed at fostering networks and support sustainable economic practices.

Training evaluations showed high level of satisfaction among the 124 participants from local communities, local governments, and schools, who attended the training sessions.

Dissemination of project results and lessons learned:

The outcomes and lessons learned from the project were disseminated through various channels, including the project and RFD websites, bi-monthly newsletters, international conferences/ exhibitions, and a tailored workshop on "***Revitalizing Community Forests in the Border Areas***." There are about 70 participants comprising RFD representatives from central and regional offices and community forests across the country who attended the workshop, showed interest in the surveillance monitoring system developed. In addition, community leaders are committed to sustaining project activities and expanding collaboration with other communities and interested individuals. The project successfully enhanced forest surveillance, involved local communities in conservation efforts, and introduced sustainable livelihoods. Modern monitoring tools and community-driven conservation strategies support long-term forest protection and reduced deforestation risks in Thailand's border areas. Ongoing stakeholder collaboration and knowledge-sharing are key to sustaining these positive gains.

Recommendations

1. To sustain and scale up the project activities at national level, the project team, workshop participants, ITTO and the Japanese representative offered the following valuable recommendations: The successful implementation of NCAPs and SMART Patrol showed that local villagers and remote forest protection units effectively learned and applied new technologies, suggesting future tech-based forest protection initiatives can be introduced for conservation with minimal barriers. The selection of training topics for livelihood development should align with villagers real needs and interests, as relevant topics boost their engagement and deepen learning.

2. Due to the diverse cultural backgrounds, learning levels, and environment of target sites, Field Coordinator play a crucial role. They must communicate effectively with villagers, local authorities, and project staff for smooth implementation of project activities. Building trust and establishing partnerships early is also essential for smooth implementation. Project activities should be implemented continuously to maintain momentum. Gaps may weaken communications with the villagers, and require extra effort to re-engage them.

3. As agriculture is the villagers' primary livelihood, their availability often depends on the planting and harvesting calendar. Project planning should account for this to ensure full participation and effectiveness.

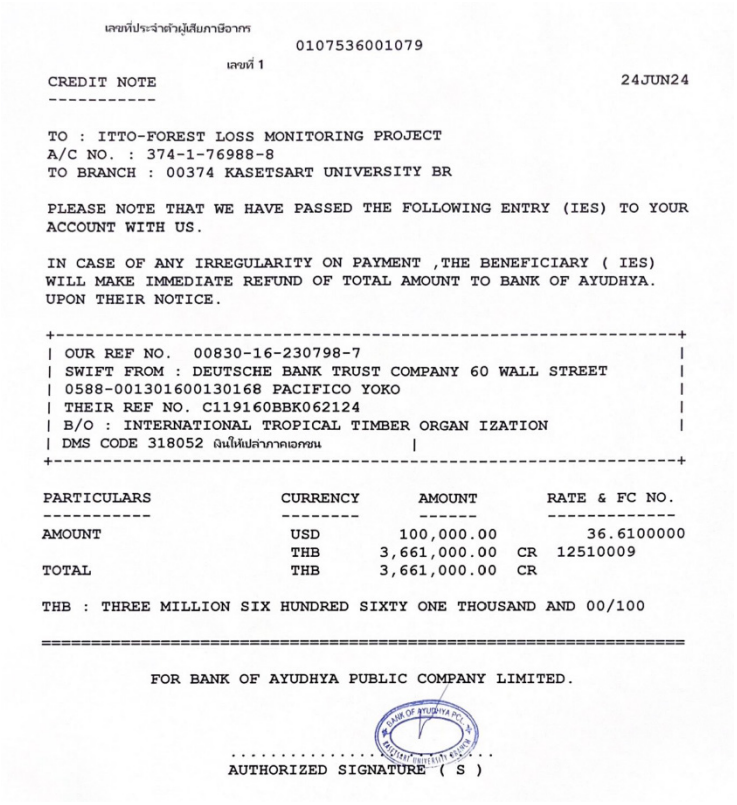
4. Study visits showcasing previous project successes not only boosted local community confidence but also provided opportunities for engagement and exchange experiences. Additionally, Learning Centers and living laboratories (e.g., tissue culture and biochar) are key to sustaining knowledge and activities beyond the project period. These centers support reskilling for participants and upskilling for other villagers and school students. Two tissue culture laboratories were established under this project in two local schools, and a biochar learning center was set up in Tor Pae village. Community networks formed through field visits and training sessions support ongoing knowledge exchange and collaboration, fostering long-term benefits for the communities. At least two such networks were established -Ubon Ratchathani and Mae Hong Son for livelihood development, and biochar network between Tor Par and Pha Pang in Lampang. Further networks and collaboration are encouraged.

5. Future operational costs for technologies- such as battery replacements, internet connectivity, and NCAPS server maintenance- should be included in local authorities regular budgets . The provincial administrative office, with access to forest fire prevention funds, can expand NCAPS and SMART Patrol activities in collaboration with local communities, aligning with its mandate. In addition, the P-P-P and ESG (Environmental, Social and Governance) approaches offer potential funding sources. Leadership changes may shift interest in community forest management policies. To ensure continuity, it is important to involve a broad range of community members in project activities regardless of leadership transitions. Emergency or uncertain conditions should also be considered during and after project termination.

6. The knowledge and practices developed from this project can be expanded through livelihood- focused learning centers. The SMART Patrol system server is ready, and interested community forests or the Royal Forest Department (RFD) only need to purchase the NCAP cameras to connect automatically to the existing system. Minimal hardware upgrades are required for upscaling to national implementation.

Annexures

Annex 1. The 1st Transferred fund from ITTO and remaining fund in the bank account



เลขที่ประจำตัวผู้เสียภาษีอากร
0107536001079
เลขที่ 1

CREDIT NOTE 24JUN24

TO : ITTO-FOREST LOSS MONITORING PROJECT
A/C NO. : 374-1-76988-8
TO BRANCH : 00374 KASETSART UNIVERSITY BR

PLEASE NOTE THAT WE HAVE PASSED THE FOLLOWING ENTRY (IES) TO YOUR ACCOUNT WITH US.

IN CASE OF ANY IRREGULARITY ON PAYMENT ,THE BENEFICIARY (IES) WILL MAKE IMMEDIATE REFUND OF TOTAL AMOUNT TO BANK OF AYUDHYA. UPON THEIR NOTICE.

OUR REF NO. 00830-16-230798-7
SWIFT FROM : DEUTSCHE BANK TRUST COMPANY 60 WALL STREET
0588-001301600130168 PACIFICO YOKO
THEIR REF NO. C119160BBK062124
B/O : INTERNATIONAL TROPICAL TIMBER ORGAN IZATION
DMS CODE 318052 ฝ่ายให้บริการเอกชน

PARTICULARS	CURRENCY	AMOUNT		RATE & FC NO.
AMOUNT	USD	100,000.00		36.6100000
	THB	3,661,000.00	CR	12510009
TOTAL	THB	3,661,000.00	CR	

THB : THREE MILLION SIX HUNDRED SIXTY ONE THOUSAND AND 00/100

FOR BANK OF AYUDHYA PUBLIC COMPANY LIMITED.

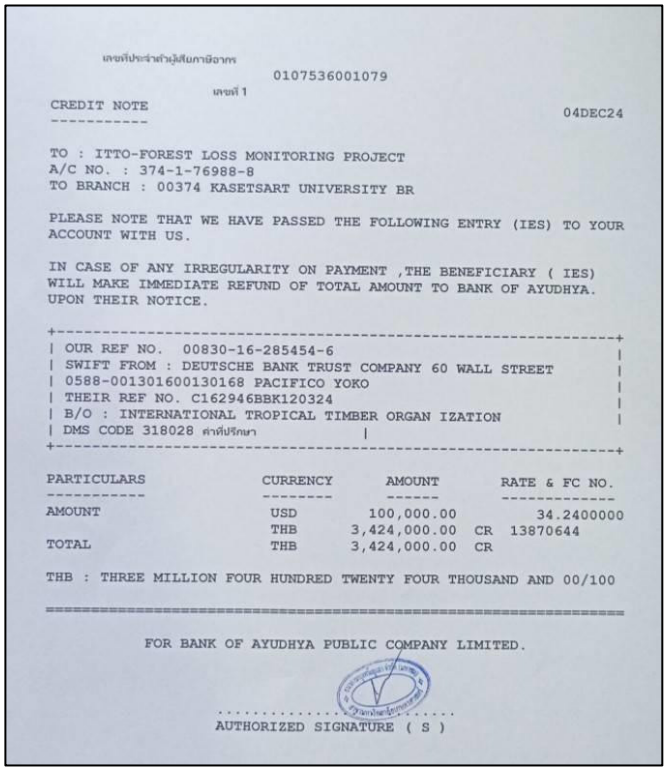
AUTHORIZED SIGNATURE (S)

วันที่ Date	รายการ Transaction	ถอน Withdrawal	ฝาก Deposit	คงเหลือ Balance	หมายเลขผู้ทำรายการ Teller ID
12/06/24	DB		**********1,000.00	**********1,000.00	ZMYCA0374
24/06/24	TN		******3,661,000.00	******3,662,000.00	0001F0700
27/06/24	IN		*********90.39	******3,662,090.39	0003A
26/07/24	WB	*********458,614.00		******3,203,476.39	ZIREJ0374
20/08/24	WB	********456,881.00		******2,746,595.39	WCTMA0374
27/08/24	WB	********250,177.00		******2,496,418.39	ZGVZA0374
12/09/24	WB	*********57,654.00		******2,438,764.39	ZGVZA0374
27/09/24	WB	********360,068.00		******2,078,696.39	ZGVZJ0374
30/09/24	WB	**********20,000.00		******2,058,696.39	ZIREA0374
17/10/24	WB	********277,100.00		******1,781,596.39	WCTMA0374
29/10/24	WB	********162,812.00		******1,618,784.39	ZGVZA0374

krungsri กรุงศรี

เลขคู่ฝากเลขที่ Serial No. 0037605780

Annex 2. The 2nd transferred fund from ITTO and remaining fund in the bank



0107536001079

CREDIT NOTE 04DEC24

TO : ITTO-FOREST LOSS MONITORING PROJECT
A/C NO. : 374-1-76988-8
TO BRANCH : 00374 KASETSART UNIVERSITY BR

PLEASE NOTE THAT WE HAVE PASSED THE FOLLOWING ENTRY (IES) TO YOUR ACCOUNT WITH US.

IN CASE OF ANY IRREGULARITY ON PAYMENT ,THE BENEFICIARY (IES) WILL MAKE IMMEDIATE REFUND OF TOTAL AMOUNT TO BANK OF AYUDHYA. UPON THEIR NOTICE.

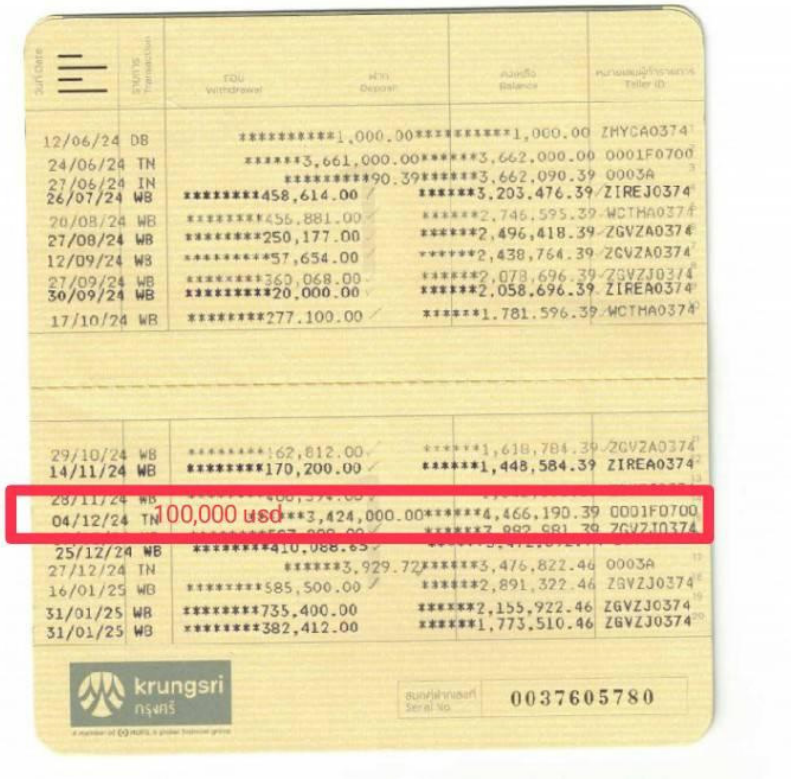
| OUR REF NO. 00830-16-285454-6
| SWIFT FROM : DEUTSCHE BANK TRUST COMPANY 60 WALL STREET
| 0588-001301600130168 PACIFICO YOKO
| THEIR REF NO. C162946BBK120324
| B/O : INTERNATIONAL TROPICAL TIMBER ORGAN IZATION
| DMS CODE 318028 ค่าที่ปรึกษา

PARTICULARS	CURRENCY	AMOUNT	RATE & FC NO.
AMOUNT	USD	100,000.00	34.2400000
	THB	3,424,000.00 CR	13870644
TOTAL	THB	3,424,000.00 CR	

THB : THREE MILLION FOUR HUNDRED TWENTY FOUR THOUSAND AND 00/100

FOR BANK OF AYUDHYA PUBLIC COMPANY LIMITED.

AUTHORIZED SIGNATURE (S)



Annex 3. The 3rd Transferred fund from ITTO and remaining fund in the bank

เลขที่ประจำตัวผู้เสียภาษีอากร
0107536001079
เลขที่ 1

CREDIT NOTE 19MAR25

TO : ITTO-FOREST LOSS MONITORING PROJECT
A/C NO. : 374-1-76988-8
TO BRANCH : 00374 KASETSART UNIVERSITY BR

PLEASE NOTE THAT WE HAVE PASSED THE FOLLOWING ENTRY (IES) TO YOUR ACCOUNT WITH US.

IN CASE OF ANY IRREGULARITY ON PAYMENT ,THE BENEFICIARY (IES) WILL MAKE IMMEDIATE REFUND OF TOTAL AMOUNT TO BANK OF AYUDHYA. UPON THEIR NOTICE.

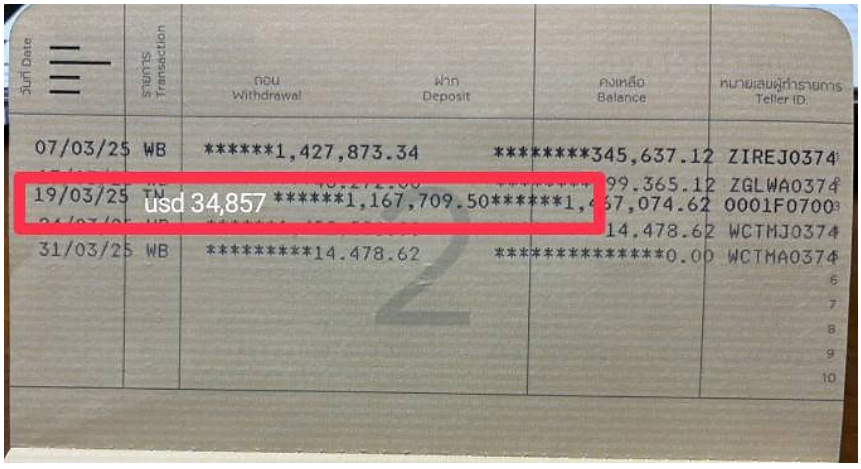
OUR REF NO. 00830-16-319922-7
SWIFT FROM : DEUTSCHE BANK TRUST COMPANY 60 WALL STREET
0588-001301600130168 PACIFICO YOKO
THEIR REF NO. 93582440c8ef45bd
B/O : INTERNATIONAL TROPICAL TIMBER ORGAN IZATION
DMS CODE 318028 ค่าที่ปรึกษา

PARTICULARS	CURRENCY	AMOUNT		RATE & FC NO.
AMOUNT	USD	34,857.00		33.5000000
	THB	1,167,709.50	CR	14737774
TOTAL	THB	1,167,709.50	CR	

THB : ONE MILLION ONE HUNDRED SIXTY SEVEN THOUSAND SEVEN HUNDRED AND NINE AND 50/100

FOR BANK OF AYUDHYA PUBLIC COMPANY LIMITED.

AUTHORIZED SIGNATURE (S)



Annex 4. Budget modification 1

Annex 2 MODIFY PROJECT BUDGET OVERVIEW AND EXPENDITURES (1 July - 31 October 2024) _25 Nov 2024

Project No. PP-A/60-369 **Period ending on:** 31 March 2025

Project Title Strengthening Surveillance and Monitoring To Tackle the Surge in Forest Loss and Land Degradation, Induced by Intensifying Conflict in Thailand's Border Areas

Implementing Agency: Kasetsart University in collaboration with the Royal Forest Department, Thailand

Component			Project budget overview (USD)	Modify Project budget overview (USD) 25 Nov 2024	budget increase (+ blue color) / decrease (- blue color)	Total Expenditures (USD) Jul-Oct 2024	Balance (USD)	% of total budget	Planned budget Nov 2024-Mar 2025	Remaining
10.	**Project Personal**								**USD**	**USD**
	11.	11.1 Project Manager [1/]	30,000.00	22,500.00	- 7,500.00	10,000.00	12,500.00	44	12,500.00	-
		11.2 Project Secretary [1/]	9,000.00	6,750.00	- 2,250.00	3,000.00	3,750.00	44	3,750.00	-
		11.3 Project Finance [1/]	7,800.00	5,850.00	- 1,950.00	2,600.00	3,250.00	44	3,250.00	-
		11.4 Field Coordinator [2/]	7,200.00	4,500.00	- 2,700.00	1,639.80	2,860.20	36	2,860.20	0.0
	19.	**Sub total**	**54,000.00**	**39,600.00**	**- 14,400.00**	**17,239.80**	**22,360.20**	**44**	**22,360.20**	**0.0**
20.	**Sub contracts**						-		-	-
	21.	Sub-contract for image mapping)	8,000.00	8,000.00	-	4,000.00	4,000.00	50	4,000.00	-
	22.	Sub-contract (SMART Patrol &NCAPs)	5,000.00	5,000.00	-	2,000.00	3,000.00	40	3,000.00	-
	23.	Sub-contract (resource persons)	4,500.00	4,500.00	-	-	4,500.00	-	4,500.00	-
	29.	**Sub total**	**17,500.00**	**17,500.00**	**-**	**6,000.00**	**11,500.00**	**34**	**11,500.00**	**-**
30.	**Duty travel**					-	-		-	-
	31.	Daily subsistence allowance				-	-		-	-
		31.1 DSA National experts/ consultants [3/]	19,000.00	21,700.00	2,700.00	3,399.34	18,300.66	14	18,300.66	- 0.0
		31.2 Provision of incentive to local communities	12,000.00	12,000.00	-	-	12,000.00	-	12,000.00	-
	32.	International travel			-	-	-		-	-
		32.1 International travel for national expert	4,000.00	4,000.00	-	-	4,000.00	-	4,000.00	-
	33.	Local transportation			-	-	-		-	-
		33.1 Local transport costs	25,000.00	25,000.00	-	2,197.16	22,802.84	9	22,802.84	0.0
	39.	**Sub total**	**60,000.00**	**62,700.00**	**2,700.00**	**5,596.50**	**57,103.50**	**9**	**57,103.50**	**- 0.0**
40.	**Capital items**						-		-	-
	44.	Computer equipment					-		-	-
		44.1 Computer	3,000.00	3,000.00	-	2,976.51	23.49	99	23.49	-
		44.2 SMART mobile system	20,000.00	20,000.00	-	6,399.00	13,601.00	32	13,601.00	-
		44.3 Printer and camera	1,507.00	1,507.00	-	125.38	1,381.62	8	1,381.62	-
		44.4 NCAP cameras and accessories	13,800.00	13,800.00	-	9,108.32	4,691.68	66	4,691.68	0.0
	49.	**Sub total**	**38,307.00**	**38,307.00**	**-**	**18,609.20**	**19,697.80**	**49**	**19,697.80**	**0.0**

		Component	Project budget overview (USD)	Modify Project budget overview (USD) 25 Nov 2024	budget increase (+ blue color) / decrease (- blue color)	Total Expenditures (USD) Jul-Oct 2024	Balance (USD)	% of total budget	Planned budget Nov 2024-Mar 2025	Remaining
50.	**Consumable items**						-		-	-
	51.	Materials [4/]	13,850.00	10,850.00	- 3,000.00	1,255.32	9,594.68	12	9,594.68	0.0
	53.	Utilities (supplies for livelihood development after training) and office supplies [5/]	11,000.00	8,000.00	- 3,000.00	-	8,000.00	-	8,000.00	-
	54.	Exhibition (Annual Forest conference)	1,500.00	1,500.00	-	-	1,500.00	-	1,500.00	-
	59.	**Sub total**	**26,350.00**	**20,350.00**	**- 6,000.00**	**1,255.32**	**19,094.68**	**6**	**19,094.68**	**0.0**
60.	**Miscellaneous**						-		-	-
	61.	Training/workshop/meeting [6/]	15,700.00	33,400.00	17,700.00	6,292.52	27,107.48	19	27,107.48	-
	62.	PSC meeting and audit	20,000.00	20,000.00	-	-	20,000.00	-	20,000.00	-
	64.	Information, media, publications and other contingencies	11,000.00	11,000.00	-	819.45	10,180.55	7	10,180.55	0.0
	69.	**Sub total**	**46,700.00**	**64,400.00**	**17,700.00**	**7,111.97**	**57,288.03**	**11**	**57,288.03**	**0.0**
70	**Total Project**		**242,857.00**	**242,857.00**	**-**	**55,812.79**	**187,044.21**	**23**	**187,044.21**	**0.0**
80.	**Project monitoring and administration**					-	-		-	-
	81.	ITTO monitoring & evaluation	12,000.00	12,000.00		-	12,000.00	-	12,000.00	-
	83.	ITTO program support costs (lump sum)	23,221.48	23,221.48		-	23,221.48	-	23,221.48	-
	89.	**Sub total**	**35,221.48**	**35,221.48**	**-**	**-**	**35,221.48**	**-**	**35,221.48**	**-**
100.	**GRAND TOTAL**		**278,078.48**	**278,078.48**	**-**	**55,812.79**	**222,265.69**	**20**	**222,265.69**	**0.0**

Note.

1/ The physical project implementation period is shorten from 12 months (April 2023 - March 2024) to 9 months (Julu 2023 - March 2024). Thus, the salary of project staff (items 11.1-11.3) was reduced accordingly.

2/ Paymet for Field Coordinator is reduced from USD 7,200 to USD 4,500 according to the TORs and ITTO NOL Ref No. 24-0054

3/ Item 31.1 DSA National experts/ consultants increases USD 2,700 (from item 11.4) due to conducting a series of training session in target coomunity forests

4/ Budget for Materials (item 51) was reduved USD 3,000 due to the project period is shorten from 12 months (April 2023 - March 2024) to 9 months (Julu 2023 - March 2024).

5/ Budget for Utilities (supplies for livelihood development after training) and office supplies (Item 53) is reduced USD 3,000. This is due to the project conduct a back-to-back trainings on domesticated wild plant and NTFP and improved handicraft products (Activity 2.2)

6/ It is proposed to increase budget for Training/workshop/meeting (item 61) of USD 17,700. This is due to the project hs to conduct a series of training session rather 1 session for all participants because of remoteness areas. In addition, pre suvey and consultation meeting with stakeholders before the actual training (tissue culture and visit to Pha Taem NP) are needed.

Annex 5. Budget modification 2

Project No. PP-A/60-369

Project Title: Strengthening Surveillance and Monitoring To Tackle the Surge in Forest Loss and Land Degradation, Induced by Intensifying Conflict in Thailand's Border Areas

Implementing Agency: Kasetsart University in collaboration with the Royal Forest Department, Thailand

		Component	Project budget overview (USD)	Modify Project budget overview (USD) 25 Nov 2024	budget increase (+ blue color) / decrease (- blue Rad)	Modify Project budget overview (USD) 10 Mar 2025	budget increase (+ blue color) / decrease (- blue Rad)	Expenditures (USD)			Balance (USD)	% of total budget	Planned budget Mar 2025 (USD)	Remaining (USD)
								Jul-Dec 2024	Jan-Feb 2025	Total				
10.	**Project Personal**													
	11.	11.1 Project Manager	30,000.00	22,500.00	- 7,500.00	22,500.00	-	15,000.00	5,000.00	20,000.00	2,500.00	89	2,500.00	-
		11.2 Project Secretary	9,000.00	6,750.00	- 2,250.00	6,750.00	-	4,500.00	1,500.00	6,000.00	750.00	89	750.00	-
		11.3 Project Finance	7,800.00	5,850.00	- 1,950.00	5,850.00	-	3,900.00	1,300.00	5,200.00	650.00	89	650.00	-
		11.4 Field Coordinator	7,200.00	4,500.00	- 2,700.00	4,500.00	-	2,732.31	1,176.00	3,908.31	591.69	87	591.69	- 0
	19.	**Sub total**	**54,000.00**	**39,600.00**	- 14,400.00	**39,600.00**	-	**26,132.31**	**8,976.00**	**35,108.31**	**4,491.69**	89	**4,491.69**	**- 0**
20.	**Sub contracts**				-		-							
	21.	Sub-contract for image mapping)	8,000.00	8,000.00	-	8,000.00	-	4,000.00	4,000.00	8,000.00	-	100		-
	22.	Sub-contract (SMART Patrol &NCAPs)	5,000.00	5,000.00	-	5,000.00	-	2,000.00	3,000.00	5,000.00	-	100		-
	23.	Sub-contract (resource persons) [7/]	4,500.00	4,500.00	-	4,507.00	7.00	-	4,507.00	4,507.00	-	100	-	-
	29.	**Sub total**	**17,500.00**	**17,500.00**	-	**17,507.00**	7.00	**6,000.00**	**11,507.00**	**17,507.00**	**-**	100	**-**	**-**
30.	**Duty travel**				-		-	-						
	31.	Daily subsistence allowance			-		-	-						
		31.1 DSA National experts/ consultants	19,000.00	21,700.00	2,700.00	21,700.00	-	3,575.53	10,171.46	13,746.99	7,953.01	63	7,953.01	0
		31.2 Provision of incentive to local communities [1/]	12,000.00	12,000.00	-	8,290.00	3,710.00	-	4,106.62	4,106.62	4,183.38	50	4,183.38	-
	32.	International travel			-	-	-	-	-	-	-			-
		32.1 International travel for national expert [2/]	4,000.00	4,000.00	-	307.00	- 3,693.00	-	307.00	307.00	-	100		-
	33.	Local transportation			-	-	-	-	-	-	-			-
		33.1 Local transport costs [5/]	25,000.00	25,000.00	-	27,339.00	2,339.00	7,590.82	11,235.70	18,826.52	8,512.48	69	8,512.49	- 0
	39.	**Sub total**	**60,000.00**	**62,700.00**	2,700.00	**57,636.00**	- 5,064.00	**11,166.35**	**25,820.78**	**36,987.13**	**20,648.87**	64	**20,648.88**	**- 0**
40.	**Capital items**				-		-							
	44.	Computer equipment			-		-							
		44.1 Computer [7/]	3,000.00	3,000.00	-	2,977.00	- 23.00	2,976.51	-	2,976.51	0.49	100		0
		44.2 SMART mobile system	20,000.00	20,000.00	-	20,000.00	-	12,399.00	7,601.00	20,000.00	-	100		-
		44.3 Printer and camera [7/]	1,507.00	1,507.00	-	1,471.00	- 36.00	125.38	-	125.38	1,345.62	9	1,345.96	- 0
		44.4 NCAP cameras and accessories	13,800.00	13,800.00	-	13,800.00	-	13,451.39	348.61	13,800.00	- 0.00	100		- 0
	49.	**Sub total**	**38,307.00**	**38,307.00**	-	**38,248.00**	- 59.00	**28,952.28**	**7,949.61**	**36,901.89**	**1,346.11**	96	**1,345.96**	**0**
50.	**Consumable items**				-		-							
	51.	Materials	13,850.00	10,850.00	- 3,000.00	10,850.00	-	4,172.05	5,992.00	10,164.05	685.95	94	685.95	- 0
	53.	Utilities (supplies for livelihood development after training) and office supplies [3/]	11,000.00	8,000.00	- 3,000.00	6,283.00	- 1,717.00	817.37	5,466.12	6,283.49	- 0.49	100		- 0
	54.	Exhibition (Annual Forest conference)	1,500.00	1,500.00	-	1,500.00	-	-	1,500.00	1,500.00	-	100		-
	59.	**Sub total**	**26,350.00**	**20,350.00**	- 6,000.00	**18,633.00**	**- 1,717.00**	**4,989.42**	**12,958.12**	**17,947.54**	**685.46**	96	**685.95**	**- 0**
60.	**Miscellaneous**				-		-							
	61.	Training/workshop/meeting [6/]	15,700.00	33,400.00	17,700.00	41,661.00	8,261.00	15,137.26	18,457.60	33,594.86	8,066.14	81	8,066.00	0
	62.	PSC meeting and audit	12,000.00	12,000.00	-	12,000.00	-	4,649.00	306.66	4,955.66	7,044.34	41	7,044.34	- 0
	64.	Information, media, publications and other contingencies [4/]	11,000.00	11,000.00	-	9,572.00	- 1,428.00	1,667.58	5,161.30	6,828.88	2,743.12	71	2,743.00	0
	69.	**Sub total**	**38,700.00**	**56,400.00**	17,700.00	**63,233.00**	6,833.00	**21,453.84**	**23,925.56**	**45,379.40**	**17,853.60**	72	**17,853.34**	**0**
70	**Total Project**		**234,857.00**	**234,857.00**	-	**234,857.00**	-	**98,694.20**	**91,137.07**	**189,831.27**	**45,025.73**	81	**45,025.82**	**- 0**
80.	**Project monitoring and administration**				-		-	-						
	81.	ITTO monitoring & evaluation			-		-	-	-					
	83.	ITTO program support costs [lump sum]			-		-	-	-					

Component			Project budget overview (USD)	Modify Project budget overview (USD) 25 Nov 2024	budget increase (+ blue color) / decrease (- blue Rad)	Modify Project budget overview (USD) 10 Mar 2025	budget increase (+ blue color) / decrease (- blue Rad)	Expenditures (USD)			Balance (USD)	% of total budget	Planned budget Mar 2025 (USD)	Remaining (USD)
								Jul-Dec 2024	Jan-Feb 2025	Total				
	89.	Sub total	-		-		-	-	-					
100.	GRAND TOTAL		234,857.00	234,857.00	-	234,857.00	-	98,694.20	91,137.07	189,831.27	45,025.73	81	45,025.82	- 0

Installments received from ITTO:	
Installment number	Amount (USD)
#1	100,000.00
#2	100,000.00
#3	
#4	
Total	200,000.00

1. 1st, 2nd installments	200,000
2. Expenditures	189,831
3. Balance	10,169
4. Bank interest earn	145
5. Balance + Bank interest	10,313
6. Planned budget	45,026
7. 3rd installment	34,857

1/ The budget for provision of incentive to local communities (item 31.2) reduces USD 3,710 due to the late start of smart patrol in the forest which could not start before the SMART system finished.

2/ The budget for international travel for national experts (item 32.1) reduces USD 3,693 due to the less travel than expected.

3/ The budget for utilities (supplies for livelihood development after training) and office supplies (Item 53) is reduced USD 1,717. This is due to the project conducting the back-to-back trainings on domesticated wild plant and NTFP and improved bamboo products (Activity 2.2).

4/ The budget for Information, media, publications and other contingencies (item 64) reduce USD 1,428 due to the less consumption than expected.

5/ The budget for local transportation costs (item 33.1) increases USD 2,339 due to the broadening of participants of the workshop which would like to have representatives from all regions.

6/ The budget for training/workshop/meeting (item 61) increases USD 8,261 due to the series of training and broaden participants of workshop.

7/ The small modifications for some items are due to the exchange rate and remain budget. Computer (item 44.1), and printer and camera (item 44.3) reduce USD 23 and USD 36, respectively. The sub-contract (resource persons) (item 23) increases USD 7.

Annex 6. Results of logistic regression model

	None 2023	Forest2023	Sum 1990
None 1990	24863	16795	41658
Forest 1990	55813	1179030	1234843
Sum 2023	80676	1195825	1,276,501

Dependent variable = Deforest area between 1990 and 2023

0 = no deforestation

1 = deforestation

Independent variables (location factors)

DEM or altitude (sc1gr0.fil)	Numeric
% slope (sc1gr1.fil)	Numeric
Distance to road (sc1gr2.fil)	Numeric
Distance to stream (sc1gr3.fil)	Numeric
Soil class (sc1gr4.fil)	Category
Geology (sc1gr5.fil)	Category
Distance to village (sc1gr6.fil)	Numeric
Population density (sub-district territory) (sc1gr7.fil)	Numeric
Distance to ranger station or forest protection unit (sc1gr8.fil)	Numeric
Distance to refugee camp (sc1gr9.fil)	

Numb er of samples (balance samples)

Dependent variable = 12,394 (0 = 6,229; 1 = 6175)

Independent variables (location factors) = 12,394

Pearson correlation analysis

Correlations

		sc1gr0.fil	sc1gr1.fil	sc1gr2.fil	sc1gr3.fil	sc1gr6.fil	sc1gr7.fil	ranger2.asc	sc1gr9.fil
sc1gr0.fil	Pearson Correlation	1	.103**	-.099**	.036**	.017	-.020*	.019*	.078**
	Sig. (2-tailed)		.000	.000	.000	.053	.023	.037	.000
	N	12394	12394	12394	12394	12394	12394	12394	12394
sc1gr1.fil	Pearson Correlation	.103**	1	.058**	.039**	-.001	.000	.047**	-.061**
	Sig. (2-tailed)	.000		.000	.000	.940	.956	.000	.000
	N	12394	12394	12394	12394	12394	12394	12394	12394
sc1gr2.fil	Pearson Correlation	-.099**	.058**	1	.119**	.311**	.007	.346**	.241**
	Sig. (2-tailed)	.000	.000		.000	.000	.459	.000	.000
	N	12394	12394	12394	12394	12394	12394	12394	12394
sc1gr3.fil	Pearson Correlation	.036**	.039**	.119**	1	.162**	-.022*	-.011	-.201**
	Sig. (2-tailed)	.000	.000	.000		.000	.012	.238	.000
	N	12394	12394	12394	12394	12394	12394	12394	12394
sc1gr6.fil	Pearson Correlation	.017	-.001	.311**	.162**	1	-.016	.016	-.015
	Sig. (2-tailed)	.053	.940	.000	.000		.073	.067	.085
	N	12394	12394	12394	12394	12394	12394	12394	12394
sc1gr7.fil	Pearson Correlation	-.020*	.000	.007	-.022*	-.016	1	-.004	-.035**
	Sig. (2-tailed)	.023	.956	.459	.012	.073		.656	.000
	N	12394	12394	12394	12394	12394	12394	12394	12394
ranger2.asc	Pearson Correlation	.019*	.047**	.346**	-.011	.016	-.004	1	.326**
	Sig. (2-tailed)	.037	.000	.000	.238	.067	.656		.000
	N	12394	12394	12394	12394	12394	12394	12394	12394
sc1gr9.fil	Pearson Correlation	.078**	-.061**	.241**	-.201**	-.015	-.035**	.326**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.085	.000	.000	
	N	12394	12394	12394	12394	12394	12394	12394	12394

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Block 1: Method = Forward Stepwise (Wald)

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	2803.759	1	.000
	Block	2803.759	1	.000
	Model	2803.759	1	.000
Step 2	Step	385.136	19	.000
	Block	3188.896	20	.000
	Model	3188.896	20	.000
Step 3	Step	286.058	1	.000
	Block	3474.953	21	.000
	Model	3474.953	21	.000
Step 4	Step	300.291	39	.000
	Block	3775.245	60	.000
	Model	3775.245	60	.000
Step 5	Step	153.960	1	.000
	Block	3929.205	61	.000
	Model	3929.205	61	.000
Step 6	Step	90.135	1	.000
	Block	4019.340	62	.000
	Model	4019.340	62	.000
Step 7	Step	63.145	1	.000
	Block	4082.485	63	.000
	Model	4082.485	63	.000
Step 8	Step	12.010	1	.001
	Block	4094.496	64	.000
	Model	4094.496	64	.000

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	14377.643[a]	.202	.270
2	13992.506[a]	.227	.302
3	13706.448[a]	.244	.326
4	13406.157[b]	.263	.350
5	13252.197[b]	.272	.362
6	13162.061[b]	.277	.369
7	13098.917[b]	.281	.374
8	13086.906[b]	.281	.375

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

b. Estimation terminated at iteration number 20 because maximum iterations has been reached. Final solution cannot be found.

Classification Table[a]

Observed			Predicted		
			deforest.asc		Percentage Correct
			.000000	1.000000	
Step 1	deforest.asc	.000000	3845	2384	61.7
		1.000000	1358	4807	78.0
	Overall Percentage				69.8
Step 2	deforest.asc	.000000	4060	2169	65.2
		1.000000	1383	4782	77.6
	Overall Percentage				71.3
Step 3	deforest.asc	.000000	4177	2052	67.1
		1.000000	1346	4819	78.2
	Overall Percentage				72.6
Step 4	deforest.asc	.000000	4232	1997	67.9
		1.000000	1303	4862	78.9
	Overall Percentage				73.4
Step 5	deforest.asc	.000000	4280	1949	68.7
		1.000000	1276	4889	79.3
	Overall Percentage				74.0
Step 6	deforest.asc	.000000	4306	1923	69.1
		1.000000	1298	4867	78.9
	Overall Percentage				74.0
Step 7	deforest.asc	.000000	4326	1903	69.4
		1.000000	1279	4886	79.3
	Overall Percentage				74.3
Step 8	deforest.asc	.000000	4322	1907	69.4
		1.000000	1280	4885	79.2
	Overall Percentage				74.3

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	sc1gr6.fil	-.001	.000	1762.705	1	.000	.999
	Constant	1.527	.039	1540.032	1	.000	4.605

Step 8[h]	sc1gr0.fil	.000	.000	11.976	1	.001	1.000
	sc1gr2.fil	.000	.000	196.988	1	.000	1.000
	sc1gr3.fil	.000	.000	60.021	1	.000	1.000
	sc1gr4.fil			292.688	39	.000	
	sc1gr4.fil(1)	-19.889	16126.490	.000	1	.999	.000
	sc1gr4.fil(2)	1.340	32676.913	.000	1	1.000	3.818
	sc1gr4.fil(3)	-40.699	28249.873	.000	1	.999	.000
	sc1gr4.fil(4)	-18.784	16126.490	.000	1	.999	.000
	sc1gr4.fil(5)	-18.270	16126.490	.000	1	.999	.000
	sc1gr4.fil(6)	-19.735	16126.490	.000	1	.999	.000
	sc1gr4.fil(7)	-19.629	16126.490	.000	1	.999	.000
	sc1gr4.fil(8)	-19.093	16126.490	.000	1	.999	.000
	sc1gr4.fil(9)	-19.431	16126.490	.000	1	.999	.000
	sc1gr4.fil(10)	-19.463	16126.490	.000	1	.999	.000
	sc1gr4.fil(11)	-19.965	16126.490	.000	1	.999	.000
	sc1gr4.fil(12)	-19.719	16126.490	.000	1	.999	.000
	sc1gr4.fil(13)	-19.346	16126.490	.000	1	.999	.000
	sc1gr4.fil(14)	-19.360	16126.490	.000	1	.999	.000
	sc1gr4.fil(15)	-19.336	16126.490	.000	1	.999	.000
	sc1gr4.fil(16)	-19.521	16126.490	.000	1	.999	.000
	sc1gr4.fil(17)	-19.229	16126.490	.000	1	.999	.000
	sc1gr4.fil(18)	-19.475	16126.490	.000	1	.999	.000
	sc1gr4.fil(19)	-20.088	16126.490	.000	1	.999	.000
	sc1gr4.fil(20)	-19.544	16126.490	.000	1	.999	.000
	sc1gr4.fil(21)	-19.243	16126.490	.000	1	.999	.000
	sc1gr4.fil(22)	-19.500	16126.490	.000	1	.999	.000
	sc1gr4.fil(23)	-19.590	16126.490	.000	1	.999	.000
	sc1gr4.fil(24)	-19.598	16126.490	.000	1	.999	.000
	sc1gr4.fil(25)	-19.467	16126.490	.000	1	.999	.000
	sc1gr4.fil(26)	-18.969	16126.490	.000	1	.999	.000
	sc1gr4.fil(27)	-19.695	16126.490	.000	1	.999	.000
	sc1gr4.fil(28)	-19.537	16126.490	.000	1	.999	.000
	sc1gr4.fil(29)	-19.603	16126.490	.000	1	.999	.000
	sc1gr4.fil(30)	-19.780	16126.490	.000	1	.999	.000

sc1gr4.fil(31)	-19.620	16126.490	.000	1	.999	.000
sc1gr4.fil(32)	-21.437	16126.490	.000	1	.999	.000
sc1gr4.fil(33)	-20.526	16126.490	.000	1	.999	.000
sc1gr4.fil(34)	-19.598	16126.490	.000	1	.999	.000
sc1gr4.fil(35)	-18.718	16126.490	.000	1	.999	.000
sc1gr4.fil(36)	-19.735	16126.490	.000	1	.999	.000
sc1gr4.fil(37)	-38.819	43307.488	.000	1	.999	.000
sc1gr4.fil(38)	-39.127	43307.488	.000	1	.999	.000
sc1gr4.fil(39)	-19.097	16126.490	.000	1	.999	.000
sc1gr5.fil			412.667	19	.000	
sc1gr5.fil(1)	1.308	.497	6.929	1	.008	3.700
sc1gr5.fil(2)	.717	.484	2.193	1	.139	2.048
sc1gr5.fil(3)	.762	.479	2.527	1	.112	2.142
sc1gr5.fil(4)	1.242	.495	6.294	1	.012	3.461
sc1gr5.fil(5)	2.197	.490	20.117	1	.000	8.995
sc1gr5.fil(6)	1.347	.479	7.898	1	.005	3.848
sc1gr5.fil(7)	1.281	.486	6.946	1	.008	3.599
sc1gr5.fil(8)	1.465	.482	9.221	1	.002	4.328
sc1gr5.fil(9)	3.204	.774	17.140	1	.000	24.639
sc1gr5.fil(10)	-.054	.993	.003	1	.957	.948
sc1gr5.fil(11)	.495	.513	.930	1	.335	1.641
sc1gr5.fil(12)	2.147	.478	20.145	1	.000	8.560
sc1gr5.fil(13)	.553	.635	.758	1	.384	1.738
sc1gr5.fil(14)	.930	.478	3.792	1	.051	2.535
sc1gr5.fil(15)	1.541	.478	10.381	1	.001	4.669
sc1gr5.fil(16)	.447	.777	.332	1	.565	1.564
sc1gr5.fil(17)	1.042	.513	4.127	1	.042	2.836
sc1gr5.fil(18)	.700	.659	1.127	1	.289	2.014
sc1gr5.fil(19)	1.563	.523	8.934	1	.003	4.775
sc1gr6.fil	-.001	.000	1193.826	1	.000	.999
sc1gr9.fil	.000	.000	121.214	1	.000	1.000
ranger2.asc	.000	.000	81.488	1	.000	1.000
Constant	19.280	16126.490	.000	1	.999	236125968.1

a. Variable(s) entered on step 1: sc1gr6.fil.

b. Variable(s) entered on step 2: sc1gr5.fil.

c. Variable(s) entered on step 3: sc1gr9.fil.

$$Log\left(\frac{Pi}{1-Pi}\right) = \beta 0 + \beta 1X1i + \beta 2X2i + \cdots + \beta nXni$$

where Pi is the probability of a grid cell (100 x 100 m or 1 ha) for the occurrence of deforestation during 1990-2023 on location i and the X's are the location factors. The coefficients (β) are estimated through logistic regression using the actual deforestation as dependent variable.

= 19.28 - 0.00027DEM -0.000058road -0.000169Stream + 1.308sc1gr5(1) +1.242sc1gr5(4) +2.197sc1gr5(5) +1.347sc1gr5(6) + 1.281sc1gr5(7) + 1.465sc1gr5(8) + 3.204sc1gr5(9) + 2.147sc1gr5(12) + 1.541sc1gr5(15) + 1.042sc1gr5(17) + 1.563sc1gr5(19) -0.0008village +0.000016camp + 0.000043ranger2

Model Accuracy Assessment or Goodness of Fit using Area Under Curve (AUC)

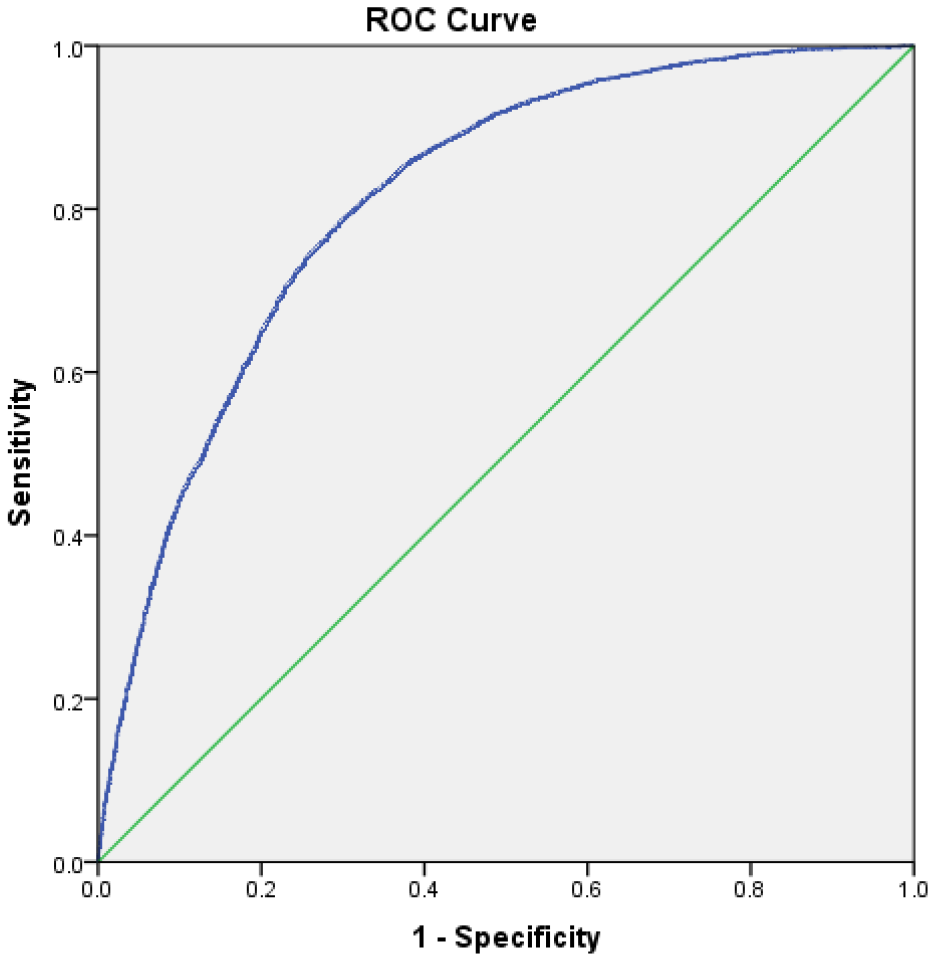
The ROC characteristic is a measure for the goodness of fit of a logistic regression model similar to the R2 statistic in Ordinary Least Square regression. A completely random model gives a ROC value of 0.5; a perfect fit results in a ROC value of 1.0.

Case Processing Summary

deforest.asc	Valid N (listwise)
Positive[a]	6165
Negative	6229

Larger values of the test result variable(s) indicate stronger evidence for a positive actual state.

a. The positive actual state is 1.000000.



Area Under the Curve

Test Result Variable(s):

Area
.813

Annex 7. The provisional NCAPs training agenda

Time	Activitiy	Authority
October 25, 2024 at Tor Pea Community Forest, Khun Yuam District		
8:00 - 9:30 น.	Leaving Mae Hong Son, Heading to Tor Pea Community Forest, Khun Yuam District	1. Project Team 2. Phu Kheio's Team 3. The stuffs of RFD 4. The representative of community forest
9:30-10:00	Opening of training	
10:00 -12:00	Lecture part: 1. Opening and background of the Project By Dr. Chakrit Na Takuathung, Project Coordinator 2. Introduction of the Project Team 3. Principle of NCAP, data collection template, and mobile application By Mr. Sitthichai Jinamoy (Consultant#2) 4. Case study and NCAP installation at Phu Khieo Wildlife Sanctuary, Phu Khieo Team 5. Component of NCAP camera, camera setting and camera management application, Phu Khieo Team 6. Problems and resolutions Phu Khieo Team	
12:00-13:00	Lunch Break	
13:00-16:00	Practicing Part: 1. Practice on installation of NCAP camera Phu Khieo Team and local community 2. Actual installation of NCAP camera (3 units) and the target sites Phu Khieo Team and local community	
16:00 - 18:00	Heading to Mae Sariang District	
18:00 – 20:00	Dinner and check in at the Hotel	
October 26, 2024 at Salawin National Forest Reserve, Sop Moei District		
7:30 - 10:00	Heading to Salawin National Reserve Forest	1. Project Team 2. Phu Kheio's Team 3. The stuffs of RFD
10:00 -12:00	Lacture part: 1. Opening and background of the Project By Dr. Chakrit Na Takuathung, Project Coordinator 2. Introduction of the Project Team 3. Principle of NCAP, data collection template, and mobikle application By Mr. Sitthichai Jinamoy (Consultant#2) 4. Case study and NCAP installation at Phu Khieo Wildlife Sanctuary, Phu Khieo Team 5. Component of NCAP camera, camera setting and camera management application, Phu Khieo Team 6. Problems and resolutions Phu Khieo Team	
12:00-13:00	Lunch Break	
13:00-16:00	Practicing Part: 1. Practice on installation of NCAP camera	

	Phu Khieo Team and local community 2. Actual installation of NCAP camera (3 units) and the target sites Phu Khieo Team and local community	
16:00 - 18:30	Heading Back to Mae Sariang District	
18:30- 20:30	Dinner and check in at the Hotel	
October 27, 2024 at Thung Peam Community Forest, Mae Sariang District		
8:00 - 10:00	Heading to Thung Peam Community Forest	1. Project Team 2. Phu Kheio's Team 3. The stuffs of RFD 4. The representative of community forest
10:00 -12:00	Lacture part: 1. Opening and background of the Project By Dr. Chakrit Na Takuathung, Project Coordinator 2. Introduction of the Project Team 3. Principle of NCAP, data collection template, and mobikle application By Mr. Sitthichai Jinamoy (Consultant#2) 4. Case study and NCAP installation at Phu Khieo Wildlife Sanctuary, Phu Khieo Team 5. Component of NCAP camera, camera setting and camera management application, Phu Khieo Team 6. Problems and resolutions Phu Khieo Team	
12:00-13:00	Lunch Break	
13:00-16:00	Practicing Part: 1. Practice on installation of NCAP camera Phu Khieo Team and local community 2. Actual installation of NCAP camera (3 units) and the target sites Phu Khieo Team and local community	
16:00 - 18:00	Heading Back to Mae Sariang District	
18:00-20:00	Dinner and check in at the Hotel	
October 28, 2024 at Le Koh Community Forest, Sop Moei District		
8:00-9:00	Heading to Le Koh Community Forest	1. Project Team 2. Phu Kheio's Team 3. The stuffs of RFD 4. The representative of community forest
9:00 -12:00	Lacture part: 1. Opening and background of the Project By Dr. Chakrit Na Takuathung, Project Coordinator 2. Introduction of the Project Team 3. Principle of NCAP, data collection template, and mobikle application By Mr. Sitthichai Jinamoy (Consultant#2) 4. Case study and NCAP installation at Phu Khieo Wildlife Sanctuary, Phu Khieo Team 5. Component of NCAP camera, camera setting and camera management application, Phu Khieo Team 6. Problems and resolutions Phu Khieo Team	
12:00-13:00	Lunch Break	

13:00-16:00	Practicing Part: 1. Practice on installation of NCAP camera Phu Khieo Team and local community 2. Actual installation of NCAP camera (3 units) and the target sites Phu Khieo Team and local community	
16:00 - 17:00	Heading Back to Mae Sariang District	
17:00-20:00	Dinner and check in at the Hotel	
October 29, 2024 at Mae Tha Lu Community Forest, Sop Moei District		
7:30-9:00	Heading to Mae Tha Lu Community Forest	1. Project Team 2. Phu Kheio's Team 3. The stuffs of RFD 4. The representative of community forest
9:00 -12:00	Lacture part: 1. Opening and background of the Project By Dr. Chakrit Na Takuathung, Project Coordinator 2. Introduction of the Project Team 3. Principle of NCAP, data collection template, and mobikle application By Mr. Sitthichai Jinamoy (Consultant#2) 4. Case study and NCAP installation at Phu Khieo Wildlife Sanctuary, Phu Khieo Team 5. Component of NCAP camera, camera setting and camera management application, Phu Khieo Team 6. Problems and resolutions Phu Khieo Team	
12:00-13:00	Lunch Break	
13:00-15:00	Practicing Part: 1. Practice on installation of NCAP camera Phu Khieo Team and local community 2. Actual installation of NCAP camera (3 units) and the target sites Phu Khieo Team and local community	
15:00 - 15:30	Closing the training	
15:30 -18:00	Heading back to Mae Hong Son	

Annex 8. Location of NCAP training sessions and number of participants

Location	Date and no of participants	Participant names
Local communities		
Tor Pae Community Forest	25 October 2024, 8 participants	Mr. Chaidet Suttinakorn Ms. Aunruen Klahiran Mr. Praiboon Koetsaraphet Mr. Prayoon Eumsak Mr. Suphan Prapaiwit Lt. Wichian Saengsrichan Mr. Sathit Kanta Mr. Chuchai Ongstan
Thung Paem Community Forest	27 October 2024, 5 participants	Mr. Kongpoon Bunyuang Mr. Sawat Thepsao Mr. Khamphai Thongkaew Mr. Swat Chaima Mr. Narongdet Rattanarin
Le Koh Community Forest	28 October 2024, 5 participants	Mr. Chaiyan Yokratanapong Mr. Manit Ramkhunkap Ms.Aranya Sutchailaichampi Mr. Rapin Prapapiman Mr. Kriangdet Thammasat
Baan Rai Community Forest	29 October 2024 4 participants	Mr. Weera Sriboonma Mr. Somchai Yatathum Mr. Sathit Purasarn Ms. Busaba Bunyuang
RFD officials		
Salawin National Reserved Forest, Forest Protection section (Khun Yuam Forest Protection Unit)	25 October 2024 5 participants	Mr. Wichit Kantha Mr. Piboon Krasaesachan Mr. Jakree Noichai Mr.Sitthichai Wittayawatthanakun Mr. Prakan Nilaong
Salawin National Reserved Forest, Forest Protection section (Sob Moei Forest Protection Unit)	26 October 2024, 7 participants	Mr.Khammoon Singkhacharnbanjong Mr. Surasit Sathatu Mr. Udom Paload Mr. Niruth Thanasarn Mr. Supachai Panyasil Mr.Surat Singkhacharnbanjong Mr. Swat Kwangphu
Salawin National Reserved Forest, Forest Protection section (Mae Sariang Forest Protection Unit) attended 4 days of training	26-29 October 2024 1 participant	Mr. Suphamit Jaiman
RFD officials of Community forest Division (attended all session)	25-29 October 2024 2 participants	Mr. Methas Panyayong Mr. Athiwath Sripramul

Annex 9. List of participants in the patrol training (SMART SYSTEM) between 7 - 11 January 2025 and information received in SMART Mobile

January 7, 2025 at Ban Pratu Muang, Khun Yuam District, Mae Hong Son Province			
SMART MOBILE NUMBER		095-6944801	Mr.Suphachai
ID SN (SMART MOBILE)		KK8241007049872	
No.	Name	Position	Tel.
1	Mr.Suphachai Kwangthu	Community Forest Committee	086-4672142
2	Mr. Niyom Chailangka	Community Forest Committee	-
3	Mr. Charoen Prakongnit	Community Forest Committee	-
4	Mr. Swat Pakornpongsiri	The Chief Community Forest	-
5	Ms. Kotchakorn Prakongnit	Community Forest Committee	080-7944002
January 8, 2025 at Ban Tor Pae and Unit 3 (Khun Khueam), Khun Yuam District, Mae Hong Son Province			
Ban Tor Pea			
SMART MOBILE NUMBER		095-7549610	Mr.Chaidech
ID SN (SMART MOBILE)		KK8241007049894	
1	Mr. Chaidet Suttinakorn	The Chief Community Forest	081-9807743
2	Ms. Aunruen Klahiran	Community Forest Committee	097-9487399
3	Mr. Prayoon Eumsak	Community Forest Committee	084-4816355
4	Mr. Satit Kanpa	Community Forest Committee	093-1676937
5	Mr. Suphan Prapaiwit	Community Forest Committee	081-3865610
6	Mr. Wichian Saengsrichan	Community Forest Committee	086-4403323
Defense Unit 3, Khun Yuam			
SMART MOBILE NUMBER		063-8693278	Mr.Wichit
ID SN (SMART MOBILE)		KK8241007049878	
1	Mr. Wichit Kanpha	The Unit Chief	081-9610132
2	Mr. Sathit Nayyom	Officer of Unit	087-1833638
3	Mr. Sitthichai Wittayawatthanakun	Officer of Unit	085-7140179
4	Mr. Boonchuay Ketsachaisakun	Officer of Unit	088-7836967
5	Mr. Atthachai Narongrungruang	Officer of Unit	061-6800893
January 9, 2025 at Ban Tung Pam, Mae Sariang District, Mae Hong Son Province			
SMART MOBILE NUMBER		065-8390160	
ID SN (SMART MOBILE)		KK8241007049877	
1	Mr. Kongpoon Bunyuang	The Chief Community Forest	089-8505615
2	Mr. Sawat Thepsao	Community Forest Committee	092-9026121
3	Mr. Khamphai Thongkaew	Community Forest Committee	093-1766301
4	Mr. Narongdet Rangsirinthorn	Community Forest Committee	089-5588372
5	Mr. Swat Chaima	Community Forest Committee	093-0433723
January 10, 2025 at Ban Leko, Sop Moei District, Mae Hong Son Province			
SMART MOBILE NUMBER		095-8398763	Ms.Aranya
ID SN (SMART MOBILE)		KK8241007049876	
1	Mr. Chaiyan Yokratanapong	The Chief Community Forest	064-7513508
2	Ms. Aranya Sutchailaichampi	Community Forest Committee	064-8508969
3	Mr. Rapin Prapapiman	Community Forest Committee	096-3365422
4	Mr. Manit Ruamkhamhaai	Community Forest Committee	064-7287894
5	Mr. Kriangdet Thammasanti	Community Forest Committee	064-8704871
January 11, 2025 Defense Unit, Huai Pho, Sop Moei District, Mae Hong Son Province			

Officers from the 9th Infantry Regiment's Defense Unit, Huai Pho			
SMART MOBILE NUMBER		095-2434969	Mr.Khammoon
ID SN (SMART MOBILE)		KK8241007049954	
1	Mr. Khammoon Singkhonbanjong	The Unit Chief	094-2868229
2	Mr. Thiap Wongsa	Officer of Unit	081-0333619
3	Mr. Udom Pajot	Officer of Unit	082-1899625
4	Mr. Swat Duangfu	Officer of Unit	096-2823797
5	Mr. Surasit Sadatu	Officer of Unit	062-2712840
6	Mr. Surat Singkhonbanjong	Officer of Unit	098-7024313
7	Mr. Supachai Panyasilp	Officer of Unit	089-9952963
8	Mr. Nirut Thanasarn	Officer of Unit	093-1690040
9	Mr. Prasert Phingphalet	Officer of Unit	-
Officials from the Community Forest Division, SJP.1, Mae Sariang Branch			
1	Ms. Patcharath Suthakwan	Forestry academic	099-1456251
2	Mr. Athiwath Sripramul	Civil servants	085-7199229

Annex 10. List of participants in the DRONE training on 8 January, 2025 at the Mae Hong Son Central Stadium

No.	Name	Affiliation
1	Mr. Suan Kham Chonsarn-Saowarot	Forest Resource Management Office 1, Mae Hong Son Branch
2	Mr. Nitisak Khemnaphasak	
3	Mr. Athiwath Sripramul	
4	Ms. Patcharath Suthakwan	
5	Mr. Warun Sakolwittayanon	

Annex 11. The provisional Plant Tissue Culture training agenda

Time	Activitiy	Authority
January 25, 2025 Knowledge about Konjac (Mr. Nopadol) Plant tissue culture (Professor Phrit Racharak and team)		
8:30 - 9:00	Register	1. Project team 2. Lecturer team 3. Representatives from the 4 community forests participating in the project 4. Representatives from Tor Pae Witthaya School 5. Representatives from Huai Sing School
9:00 -10:30	Knowledge about Konjac and its values	
10:30-10:45	Coffee Break	
10:45 – 12:00	Principles and preparation of tissue culture media	
12:00 -13:00	Lunch	
13:00-15:15	Principles and preparation of tissue culture media	
15:00 – 15:15	Coffee Break	
15:15 – 16:30	Principles and preparation of tissue culture media	
January 26, 2025 Plant Tissue Culture (Continued) (Professor Phrit Racharak and team)		
8:30 - 9:30 น.	Sub-culture & transfer and transplanting techniques	1. Project team 2. Lecturer team 3. Representatives from the 4 community forests participating in the project 4. Representatives from Tor Pae Witthaya School 5. Representatives from Huai Sing School
9:30 -10:45	Sterilization techniques	
10:45 – 11:00	Coffee Break	
11:00 – 12:00	Sterilization techniques (cont.)	
12:00-13:00	Lunch	
13:00-14:30	Transplanting techniques	
14:30 – 14:45	Coffee Break	
14:45- 15:45	Transplanting techniques (cont.)	
15:45 - 16:30	Focus group discussion and training summary	
January 27, 2025 Training on the use of bamboo and making Biochar as an alternative for increasing value (Director S.P.L. and lecturers from Lampang)		
8:30 - 10:30	Lecture on bamboo and its uses	1. Project team 2. Lecturer team 3. Representatives from the 4 community forests participating in the project 4. Representatives from Tor Pae Witthaya School 5. Representatives from Huai Sing School
10:30 – 10:45	Coffee Break	
10:45 – 12:00	Lecture on bamboo and its uses (cont.)	
12:00-13:00	Lunch	
13:00 -14:30	Knowledge of Bio-char	
14:30 – 14:45	Coffee Break	
14:45 – 16:00	Demonstration of Bio-Char production	
16:00 - 16:30	Closing the training	

Annex 12. List of Participants on Plant Tissue Culture Training, bamboo utilization and production of Biochar

No.	Name	Affiliation	Position	Remark
1	Ms. Waankarn Saengsrichan	Ban Tor Pae Community Forest	Community Forest Committee	
2	Ms. Aunruen Klahiran		Community Forest Committee	
3	Ms. Thitapha Rangsrichan		Community Forest Committee	
4	Ms. Wichit Plianthongdeang		Community Forest Committee	
5	Ms. Laeng Phanbut		Community Forest Committee	
6	Ms. Suphalak Suriya	Tor Pae Wittaya Community School	Techer	
7	Master Phakhin Thongkham		Student	
8	Master Akdech Jai Nu		Student	
9	Miss Arisara (no surname)		Student	Holding an ID card for a person who is not a Thai national (a person from a highland area)
10	Master Thitichot Phanrit		Student	
11	Mr. Supachai Kwangthu	Pratu Muang Community Forest	Community Forest Committee	
12	Mr. Niyom Chailangka		Community Forest Committee	
13	Ms. Kotchakorn Prakongnit		Community Forest Committee	
14	Mr. Sombat Sriudomkarn		Community Forest Committee	
15	Ms. Wan (no last name)		Community Forest Committee	Holding an ID card for a person who is not a Thai national (a person from a highland area)
16	Mr. Worawet Kirimasaphudong	Lekoh Community Forest	Community Forest Committee	
17	Mr. Rapin Prapapiman		Community Forest Committee	
18	Ms. Narisara Hanpradit	Lekoh School	Techer	
19	Ms. Suda Praipanarak		Techer	
20	Ms. Chuthathip Bunyuang	Thung Pham Community Forest	Community Forest Committee	
21	Ms. Kesorn Jommani		Community Forest Committee	
22	Ms. Buaphan Nokkaew		Community Forest Committee	
23	Ms. Khampan Sunantha		Community Forest Committee	
24	Ms. Jai Phutthasen		Community Forest Committee	
25	Ms. Supattra Duangdee	Ban Huai Sing School	Techer	
26	Ms. Amporn Chengsa-ad		Techer	
27	Miss Tawan Phanaleewiman		Student	

28	Master Nadech (no last name)		Student	Holding an ID card for a person who is not a Thai national (a person from a highland area)
29	Master Chanwit Ngamdeandao		Student	

Annex 13. Provisional agenda of study visit to Pha Taem National Park

Time	Activitiy	Authority
February 21, 2025 Visit the area at Yod Dom Wildlife Sanctuary and Phu Chong Na Yoi National Park		
09:00 - 12:00	Study visit at the beekeeping and crocodile breeding pond at Yod Dom Wildlife Sanctuary.	1. Project staff Team (8 people) 2. Participants from Mae Hong Son (15 people)
12:00 – 13:00	Lunch	
13:00 – 14:30	Visit the beekeeping of the Tai Yoi village group at Ban Mae Suwan Phan Sawang.	
14:40 – 16:00	Study visit the orchid cultivation at Mae Ramphueng Orchid Garden	
16:30 – 17:30	Study visit the areca nut seedling and areca nut crab nursery at Huai Luang Charoentham Forest Monastery.	
18:00	lecture about Phu Chong Na Yoi National Park by the park chief and Check in to the accommodation at Phu Chong Na Yoi National Park.	
February 22, 2025, visit the work area in Buntharik District.		
08:00 – 09:30	Travel to Buntharik District, Ubon Ratchathani Province.	1. Project staff Team (8 people) 2. Participants from Mae Hong Son (15 people)
09:30 – 12:00	Observe the use of weaving, bamboo planting and natural forest restoration by the Ban Kham Sombun people group, Ko Lan Subdistrict, Buntharik District, Ubon Ratchathani Province.	
12:00 – 13:00	Lunch	
13:00 – 16:00	Visit the tree restoration project in Buntharik-Yotmon Wildlife Sanctuary. Stop by Phu Phrao Temple to worship Buddha in Khong Chiam District.	
17:00	Lecture about Pha Taem National Park by the park chief and check into the accommodation at Pha Taem National Park.	
February 23, 2025, visit the work area in Khong Chiam District.		
08:00 – 10:00	Historical study at Pha Taem National Park viewpoint.	1. Project staff Team (8 people) 2. Participants from Mae Hong Son (15 people)
10:00 – 12:00	Study visit Ban Tamui, using bark to dye cloth and weave cloth.	
12:00 – 13:00	Lunch	
13:00 – 16:00	Study visit to Ban Tha Long, weave rice baskets and Pandanus weaves. Summarize the results of the visit and exchange opinions.	
16:00 – 17:30	Travel to Ubon Ratchathani Airport	
20:55 – 22:00	Travel from Ubon Ratchathani Airport to Don Mueang Airport (Thai Air Asia FD 3373)	

Annex 14. List of Participants: Ubon Ratchathani

The Mae Hong Son participants comprises 4 school teachers, 2 staff from Royal Forest Department and 9 leaders of local communities who have responsibilities to Community Forest Areas from 4 Districts in Mae Hong Sorn Province.

No.	Name	Affiliation
1	Mr. Chaidech Suthinnakron	Ban Tor Pae Community Forest
2	Mrs. Aunruan Konhiran	
3	Mr.Kongpool Boonyoung	Thung Pham Community Forest
4	Mrs.Jutathip Boonyuang	
5	Mr.Suphachai Kwangthu	Pratu Muang Community Forest
6	Miss Kodchakorn Prakhongnit	
7	Mr.Rphin Praphaphiman	Lekoh Community Forest
8	Mr. Worawet Khirimatphadung	
9	Miss Supattra Duangdee	Ban Huai Sing School
10	Mrs.Amporn Choengsaard	
11	Mrs. Supaluk Suriya	Tor Pae Wittaya Community School
12	Miss Arphatsara Supichathirakun	
13	Miss Phachtheerat Sutthawan	Forest Resource Management Office 1, Mae Hong Son Branch
14	Mr. Ativut Srepramoon	
15	Mr.Naphon Phonrungreuengkit	
16	Miss Worarampa Prodpannam	Project Field-Coordinator

Annex 15. Provisional agenda of workshop on "*Revitalizing Community Forests in the Border Areas using Surveillance Monitoring System*"

Date	Topics
Tuesday, 25 March 2025	
08:30-09:00	**Registration**
09:00-09:30	**Opening Session (MC: Mr. Montree Intasen)** • Welcome remarks by ITTO Representative (*Dr. Tetra Yanuariadi, ITTO Projects Manager*) • Welcome remarks by Dean of the Faculty of Forestry, Kasetsart University (*Prof. Prateep Deungkae*) • Opening remarks by RFD (TBD) **Group photo**
09:30-10:30	**Keynote Presentation (15 minutes each) (MC Dr. Chakrit Na Takuathung)** • Community Forests management in Thailand *(Director of Community Forest Management, RFD)* • Introduction of ITTO- **Strengthening Surveillance and Monitoring to Tackle the Surge in Forest Loss and Land Degradation, Induced by Intensifying Conflict in Thailand's Border Areas** (*Prof. Yongyut Trisurat, Advisor and PSC member*)
10:30-10.45	**Coffee/Tea break**
10:45-11:30	**Project Outputs and Beneficiaries Involvement (10 minutes each) Chair: Prof. Yongyut Trisurat** • NCAPs and SMART monitoring (*Mr. Sitthichai Jinamoy, Consultant*) • Livelihood improvement: Challenges and opportunities (Mr. *Sapol Boonsermsuk*) • Land uses changes and vulnerable areas for deforestation (*Dr. Laddawan Rianthakool, KUFF*) • Study visit to Pha Taem National Park on domesticated wild orchid (*Dr. Naris Bhumpakphan*)
	Discussion: Lessons Learned, Sustainability and Recommendations
11:30-12:45	**Moderator: Mr. Suchat Kalyawongsa** **Panelists:** • Director of Community Forest Management, RFD • Dr. Chakrit Na Takuathung (Project Coordinator) • Mr.Chaidet Sutinakorn (Chair of Tor Pae Community Forest) • Chair of Community Forest in Ubon Ratchathani Province
12:45-13:00	**Closing Session** • Closing Remarks (Dean of KUFF)
13:00 – 14:00	**Lunch**

Faculty of Forestry, Kasetsart University
50 Ngamwongwan Road, Chatuchak, Bangkok 10900 Thailand.

Royal Forest Department
61 Phaholyothin Road, Chatuchak, Bangkok 10900 Thailand.