

A CAPACITY-BUILDING CURRICULUM ON FOREST MANAGEMENT AND RESTORATION FOR KAWTHOOLEI FORESTRY DEPARTMENT (KFD) STAFF

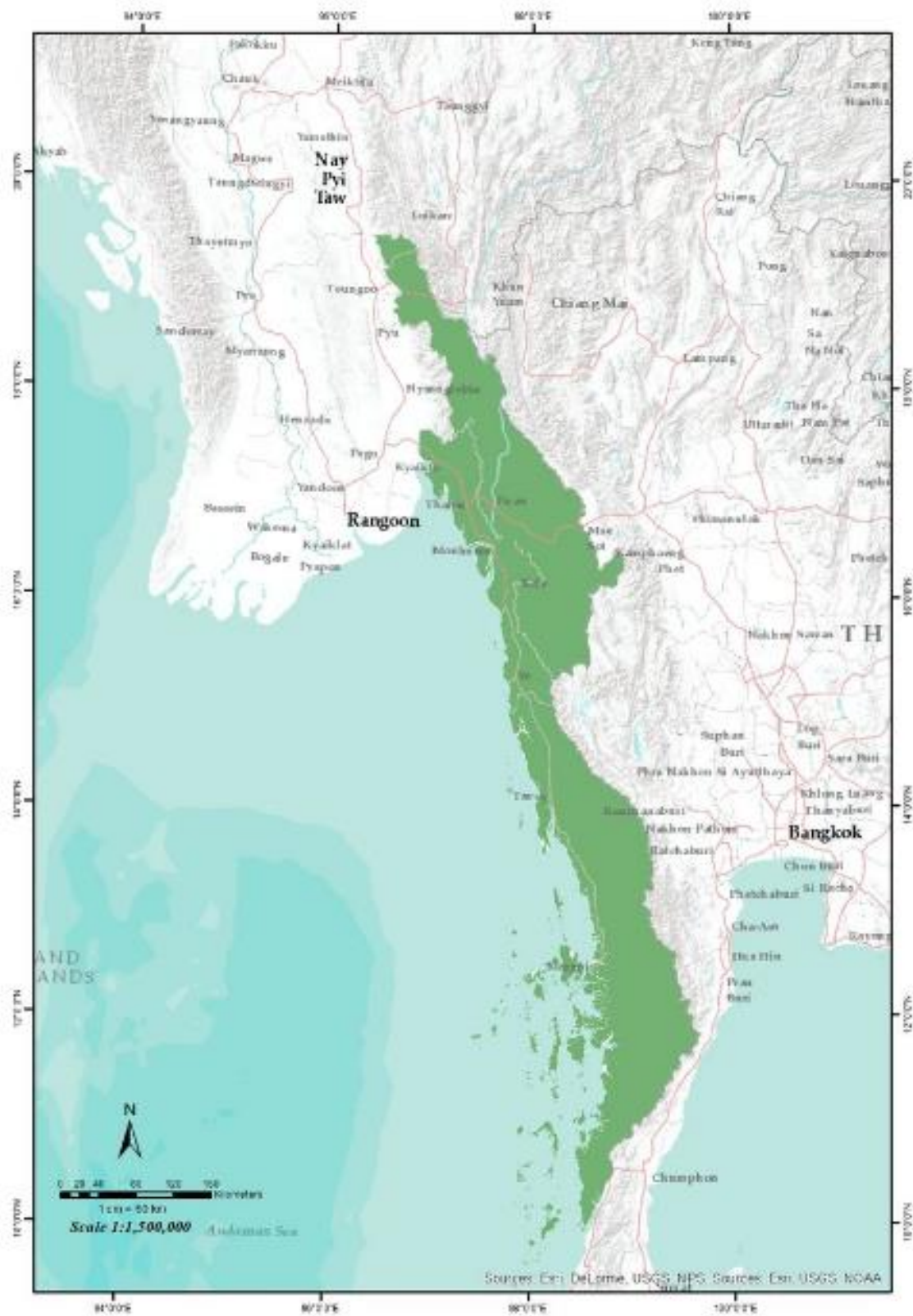
Project Title:	A Capacity-Building Curriculum on Forest Management and Restoration for Kawthoolei Forestry Department (KFD) Staff
Project Duration:	1/8/21 – 31/12/21
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Background and rational

This project addresses the need for capacity building, to improve management and restoration of forest ecosystems and resources, in the region currently controlled by the Karen National Union, in eastern Myanmar, known locally as Kawthoolei. It fulfills one of the goals of the Kawthoolei Forestry Department’s [\(KFD\) forest policy](#) “...the Karen Forestry Department shall be responsible for building capacity among its staff”. It also supports other KFD forest policy goals to i) improve local livelihoods and ii) human security, iii) conserve biodiversity, iv) promote ecosystem services, v) encourage sustainable development vi) empower local participation in decision making and vii) promote public awareness of environmental issues in forest areas.

After Burma gained independence from Britain (1948), the Karen Agriculture and Forestry Department was created (1949), to manage and administer forest land across 7 administrative areas, controlled by the KNU, as a governing entity. In 1980, agriculture and forestry were assigned to separate departments and the KFD was founded to manage forest resources. The department operates at 3 administrative levels: central, district and township. The central level, comprises 5 units focused on: i) awareness, ii) survey, iii) protection & demarcation, iv) restoration and v) projects. At district and township levels, there are 5 units namely: i) awareness, ii) tax & revenue, iii) protection & demarcation, iv) restoration and v) project.

One of the major problems facing KFD staff, has been lack of access to forestry education since, before the Nationwide Ceasefire Agreement (NCA) of 2015, many KFD staff were involved in defending Karen lands against the Myanmar armed forces. Following the implementation of the NCA, KFD staff have experienced difficulty in carrying out their duties in line with the KFD policies outlined above, due to lack of skills, knowledge and experience.



Recognizing the need for easy access to forestry education, the KFD proposes to establish a formal forestry school, to educate and build capacity of its existing staff, as well as the younger generation, who have a passion and commitment to contribute towards forest restoration and wildlife conservation across Kawthoolei (Karen Land).

Forest restoration is central to the achievement of several of the KFD policies listed above, with the immediate goal of restoring at least 2 sq km of forest across 7 KNU districts over the next 5 years. Restoration will involve not only planting teak, but also diverse mixes of native forest tree species, for recovery of biodiversity and watershed functions and to contribute towards climate change mitigation. Achievement of this goal will depend on KFD having the skills and knowledge to run tree nurseries and make sensible decisions about species choices, plantation design, maintenance of planted trees, nurturing of natural regeneration and monitoring results for adaptive management.

Chiang Mai University's Forest Restoration Research Unit (FORRU-CMU) was asked to assist KFD and other stakeholders with capacity building to enable them to implement their forest restoration and sustainable management aims. Initially, the project proposal had included curriculum development, preparation of teaching materials and training of teachers in Chiang Mai over a 2-year period. However, due to funding issues and travel restrictions (as a result of COVID19), the project was eventually pared down to address only a "Needs Assessment" and curriculum development.

Aim

To enhance capacity of KFD staff to implement improved forest restoration and sustainable forest management of the forest lands under their control.

Specific Objective

1. Produce a curriculum, appropriate for local conditions, for training KFD personnel and the younger generation in forest restoration and sustainable management.

Further objectives from the original proposal—to produce teaching materials and appropriate media to implement the curriculum and to provide training to key KFD staff, responsible for teaching the curriculum—were dropped from the current project period, to be included in Phase II (i.e., from January 2022), depending on funds becoming available).

Implementation

1. In August 2021, a Needs Assessment questionnaire was drafted in English, covering various options for the type, nature and content of a course on forest restoration and sustainable management.
2. A Zoom meeting with stakeholders was held on 20/8/21 to reach a consensus on the contents of the needs assessment questionnaire, how to distribute it and how deal with the results. Minor changes to the questionnaire were implemented accordingly.

3. A translator was engaged to produce Karen and Burmese versions of the questionnaire. The translations were completed by 4/9/21.
4. KFD and KECD distributed the questionnaires to stakeholders and the final batch of responses was received back on 26/10/21.
5. The completed questionnaires were sent to the translator and English translations of Karen and Burmese text entries were received back on 18/11/21.
6. Respondents' data were then collated into a spreadsheet, ready for the Needs Assessment workshop.
7. An online stakeholders' workshop was held on 3/12/21, including CMU, KFD, KECD and other stakeholders, using the collated questionnaire data to reach a consensus on the level, length and type of course(s) and topics to be covered by the curriculum(s), and to ensure appropriate combination of scientific and indigenous knowledge, based on results from the questionnaire. **The main outcome was identification of the need for 2 different curricula: one for practical training of KFD staff (10-day intensive course) and one for a Junior College lower division 3-credit academic course (2 lecture hours and a 3-h practical er week over an 18-week semester).** A Needs Assessment report, covering both the questionnaire results and other conclusions from this workshop, is submitted separately.
8. The first drafts of two curricula, were completed by 16/12/21 and sent for translation into Karen and Burmese. The translations were received back on 24/12/21 and sent out to the stakeholders.
9. On 13/1, a final workshop with stakeholders was held by ZOOM. The main conclusions were:
 - a. There was general consensus among all stakeholders regarding the nature and content of the two draft curricula for the two main stakeholder groups. Only minor changes were suggested. **The curricula finalized according the feedback are appended.**
 - b. The site selected for first testing of the academic course was **Htoo Lwee Wah Junior College** (18.818295° N, 96.565956° E). College administrators said that a classroom would be dedicated to forestry education, and the college has all necessary field needs for the proposed practical sessions (natural forest, potential restoration sites and a tree nursery) within walking distance, as well as a student dormitory and a reliable power supply.
 - c. The site selected for first testing of the practical training course for KFD staff was the **Central KFD HQ**, situated opposite Mae Salid on the west bank of the Moei River (17.439734° N, 98.054678° E). This site has accommodation for trainees and nearby access to a tree nursery, natural forest and degraded forest sites in need of restoration. Power is provided by solar panels and generators.
 - d. Preparation of **teaching/training materials** and their translation in Burmese and Karen languages and subsequent evaluation by Junior College and KFD staff were identified as the next steps.
 - e. Workshop participants also confirmed the subsequent need for a **teacher/trainer course** for 5 Junior College staff and 5 KFD senior staff, preferably in Chiang Mai, to familiarize the potential trainers/teachers with the teaching materials and provide training in practical demonstrations necessary to implement the curricula.

- f. **Materials needed** to implement the curricula were identified as follows:
- i. Laptops – needed to perform data analysis
 - ii. Wi-Fi access
 - iii. Nursery materials and equipment (media, wheelbarrow, forks, trowels, watering, secateurs etc.).
 - iv. Field survey equipment (e.g., measuring tapes/poles, clinometer, digital calipers etc.)

Follow-on activities recommended for Phase 2 of the project (subject to additional funding becoming available)

1. Development of teaching materials to implement the curricula - including written handbooks (lecture notes and suggestions for supporting activities and exercises) for each course proposed and other media (video lesson etc.) as needed.
2. Circulation of teaching materials among stakeholders and online workshops with Junior College and KFD staff to review them.
3. Revision of the teaching materials according to feedback from the workshop,
4. A training course for 5 Junior College teachers and 5 KFD trainers (10 days), including practical hands-on activities in FORRU's nurseries and field plot systems – concentrating on how to use and interpret the teaching materials developed.
5. Implement the curricula for 1 term or year.
6. Follow up (after 1st term or year of teaching) – FORRU-CMU staff visit Htoo Lwee Wah and KFD Central HQ to provide a monitoring and evaluation service and to provide additional on-site training as needed.

Reference

Kawthoolei Forestry Department's, 1990. [Kaw Htoo Lei Forest Policy – draft.](#)

Course Syllabus

1 Program

Junior College Undergraduate Program

2 Course details

Course name: "Forest Restoration and Sustainable Management"

Number of credits (hours/week): 3 credits (2h lecture and 3h practical /week x 18 weeks)

Course type (tick the appropriate box): Required, Elective,
 Other, if other please explain

Pre-requisites: High School certificate - satisfying entrance requirements of Junior College

Semester, in which the course is taught: to be decided

Year 1		Year 2	
Semester 1	Semester 2	Semester 1	Semester 2
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3 Responsible department

4 Course description

The course opens with recognition of forest types, as defining targets for restoration and management. Next the socio-economic aspects of restoration and sustainable management are explored, including the use and value of restored/sustainably managed forests, addressing the drivers of deforestation, incentivizing stakeholders, including human-rights issues associated with land-use changes. The next section deals with selected ecological-science topics, as the basis for restoration/management decisions—forest phenology, propagule morphology, as it determines treatments to break seed dormancy, as well as forest dynamics and the principles of ecological succession, which are mimicked during restoration. The final section deals with the theoretical basis for forest restoration—matching restoration strategies with degradation level, species selection and the design and interpretation of nursery and field experiments, to refine restoration techniques and species choices and evaluate recovery of biodiversity and carbon storage. The field course at the end of the semester (as a substitute for weekly lab sessions) teaches practical skills, putting theories learned in class into practice — implementing phenology studies, seed collection and germination experiments, care of seedlings in nurseries and production scheduling, rapid site

survey techniques, implementing tree planting/direct seeding and assisted natural regeneration, tree maintenance and monitoring, measuring biomass accumulation and biodiversity recovery.

5 Course objectives

Knowledge: ability to recognize forest types; socio-economics of forest restoration; human rights issues; sustainable harvesting; ecological succession; restoration approaches appropriate for each level of degradation.

Skills: how to design a restoration plan; seed collection and nursery skills needed to grow robust planting stock; field skills – tree planting, direct seeding, assisted natural regeneration; maintenance and monitoring trees, assessing recovery of bird diversity, calculation of carbon sequestration by forest restoration.

Application of theories to practice: matching restoration protocols with successional status; matching nursery practices and silvicultural treatments with plant/site requirements.

Social knowledge and skills: how to implement participatory restoration planning (using rapid site assessment) and monitoring to demonstrate progress.

6 Course teaching methods

The course is conceived as a Lower Division, required course for 1st- year Junior College students, consisting of 2 lecture-hours and one 3-h practical session per week, either field- or classroom-base, consisting of hands-on activities in forest, nursery and restoration to acquire practical skills, over an 18-week semester (totally 90 hours contact time), with desk-work literature/web-based assignments.

7 Material Needs

Lectures – lecture room with audio visual capability and internet access. Field course - field station with teaching room (including electricity and projector) and accommodation for teachers and students, within easy access or transportation (<1hr drive) to natural forest (least disturbed), tree nursery and restoration sites. Laptop computers or data analysis. Basic field equipment: metal poles, 50-m and 1.5-m tape measures, tree-measuring poles, camera, clip boards, plastic bags, gloves, GPS capability. Regular nursery materials and equipment: containers, media, shovel, wheelbarrow, forks, trowels, watering cans, secateurs.

8 Teaching plan

Week	Topic	Method	Hours	Location
	LECTURES			
1	Recognizing and understanding forest types	Lecture	2	JC
	<i>Social Aspects</i>			
2	The value of forest ecosystems	Lecture	2	JC
3	Traditional uses of forest products – economic and cultural	Lecture	2	JC
4	The drivers of deforestation	Lecture	2	JC
5	Incentivizing forest restoration and sustainable forest management	Lecture	2	JC
6	Ecological principles of community forestry and sustainable harvesting	Lecture	2	JC
7	Human rights and forest restoration/sustainable management	Lecture	2	JC
	<i>Essential Ecological Science</i>			
8	Phenology - seasonal cycles of flowering and fruiting	Lecture	2	JC
9	Fruit and seed morphology, dispersal and predation - role of wildlife	Lecture	2	JC
10	Seed germination, dormancy and predation	Lecture	2	JC
11	Tree seedling establishment - requirements for growth	Lecture	2	JC
12	The theory of ecological succession	Lecture	2	JC
	<i>Forest Restoration Principles and Practices</i>			
13	Forest restoration – matching techniques with degradation level	Lecture	2	JC
14	Tree species selection for forest-restoration	Lecture	2	JC
15	Seed collection and storage	Lecture	2	JC
16	Tree nursery design and management - planting stock production	Lecture	2	JC
17	Field trial design and monitoring tree performance	Lecture	2	JC
18	Monitoring biodiversity recovery - birds and trees	Lecture	2	JC
	TOTAL LECTURE HOURS		36	
Week	PRACTICALS		Session*	
1	Reference forest survey - defining restoration targets - biomass and tree species (profile diagram)	Field exercise	2	Forest
3	Rapid site assessment - determining degradation level	Field exercise	2	Restoration site
5	Designing an effective restoration strategy	Practical	1	Lab
6	Selecting tree species for forest ecosystem restoration	Practical	1	Lab
8	Forest phenology - data collection and seed collection	Field exercise	2	Forest
9	Tree nursery techniques - seed germination and seedling growth experiments	Field exercise	2	Nursery
11	Field trials - data collection	Field exercise	2	Restoration site
13	Biodiversity monitoring - bird diversity & vegetation surveys	Field exercise	2	Restoration site
15	Data analysis - germination tests, tree survival and growth	Practical	1	Lab
16	Data analysis - tree and bird species richness	Practical	1	Lab
17	Restoration planning logistics - timing, costing and labour	Practical	2	Lab
	TOTAL PRACTICAL SESSIONS*		18	

9 Reading

9.1 Main course textbook

Elliott, S.D., D. Blakesley & K. Hardwick, 2013. Restoring Tropical Forests: A Practical Guide. Royal Botanic Gardens, Kew; 344 pp. <https://www.forru.org/library/0000152>

Forest Restoration Research Unit, 2008. Research for Restoring Tropical Forest Ecosystems: A Practical Guide. Chiang Mai University, Forest Restoration Research Unit, Thailand. 144 pp. www.forru.org/library/0000156

9.2 Other recommended reading

Di Sacco, A., K. Hardwick, D. Blakesley, P.H.S. Brancalion, E. Breman, L.C. Rebola, S. Chomba, K. Dixon, S. Elliott, G. Ruyonga, K. Shaw, P. Smith, R.J. Smith & A. Antonelli, 2021. Ten guidelines for tree planting initiatives to optimise carbon sequestration, biodiversity recovery and livelihood benefits. *Global Change Biology* 27:1328-1348. doi.org/10.1111/gcb.15498

Elliott, S., P. Navakitbumrung, C. Kuarak, S. Zangkum, V. Anusarnsunthorn & D. Blakesley, 2003. Selecting framework tree species for restoring seasonally dry tropical forests in northern Thailand based on field performance. *Forest Ecology & Management* 184: 177-191 <https://www.forru.org/library/0000056>

Elliott, S. & C. Kuaraksa, 2008. Producing Framework Tree Species for Restoring Forest Ecosystems in Northern Thailand. *Small Scale Forestry*: 7, 403-415, www.forru.org/library/0000022

Elliott, S., S. Chairuang Sri, C. Kuaraksa, S. Sangkum, K. Sinhaseni, D. Shannon, P. Nippanon & B. Manohan. 2019. Collaboration and conflict - developing forest restoration techniques for northern Thailand's upper watersheds whilst meeting the needs of science and communities. *Forests* 10(9): 732; doi.org/10.3390/f10090732.

Gardner, S., P. Sidisunthorn & V. Anusarnsunthorn, 2007. A Field Guide to Forest Trees of Northern Thailand. Kobfai Publishing Project, Bangkok, Thailand. www.forru.org/library/0000227

10 Assessment of students

Standard examination procedures as stipulated by Junior College regulations.

Karen PDF Version is available here: <https://www.dropbox.com/s/0obt7l7cfe2jyvk/JUNIOR-COLLEGE-COURSE-Karen-Translating.pdf?dl=0>

Burmese PDF version available here:

<https://www.dropbox.com/s/hd6um9m2649iiez/JUNIOR-COLLEGE-COURSE-Burmese-Translating.pdf?dl=0>

Course Syllabus

1 Program

Capacity-building for Kawthoolei Forestry Department (KFD)

2 Course details

Course name: "Best Practices for Restoring Forest Ecosystems"

Number of credits (hours/week): 10 days practical training (60 hours)

Course type (tick the appropriate box): Required, Elective,
 Other, if other please explain: As required by KFD administration

Prerequisites courses: High School education and/or high level of indigenous local knowledge; a minimum of 3-years' service with KFD.

Semester, in which the course is taught: As needed, following intake of new staff recruits

3 Responsible unit

Kawthoolei Forestry Department (KFD)

4 Course description

This course will present relevant ecological principles of forest degradation and succession, as well as socio-economic considerations (including costs and benefits), as a basis for planning and designing restoration interventions. Subsequently, the tasks required for successful forest-ecosystem restoration will be covered by practical demonstrations and hands-on exercises: species selection, phenology, seed collection and germination, care of seedlings in nurseries and production scheduling, rapid site survey, implementing tree planting and assisted natural regeneration, tree maintenance and monitoring, measuring biomass accumulation and biodiversity recovery.

5 Course objectives

Knowledge: the concept of ecological succession; restoration approaches appropriate for each level of degradation; costs and benefits of restoration

Skills: how to design a restoration plan; seed collection and nursery skills needed to grow robust planting stock; field skills – tree planting, maintenance and monitoring; monitoring tree and bird diversity, calculation of carbon sequestration by forest restoration

Application of theories to practice: matching restoration protocols with successional status; matching nursery practices and silvicultural treatments with plant/site requirements.

Social knowledge and skills: how to implement participatory restoration planning (using rapid site assessment) and monitoring to demonstrate progress.

6 Course teaching methods

The course is conceived as a residential practical course at a field station lasting 10 working days, using lectures to cover theoretical topics and hands-on activities in forest, nursery and restoration to acquire practical skills.

7 Teaching plan

Specify the teaching plan for each week of the course, including the methods used to relay information to the students and the number of hours spent on the subjects

Day	Time	Topic	Method	Location	ITEM #
1	am	Forest ecosystem restoration definition; Forest degradation and ecological succession	Lecture	Classroom	1
	pm	Costs and benefits of forest ecosystem restoration	Lecture	Classroom	2
	pm	Drivers of deforestation and incentives for forest ecosystem restoration	Guided discussion	Classroom	3
2	all day	Rapid site assessment - determining degradation level	Hands-on field exercise	Deforested site	4
3	all day	Reference forest survey - defining restoration targets - biomass and tree species (profile diagram)	Hands-on field exercise	Undisturbed forest	5
4	am	Designing an effective restoration strategy	Lecture	Classroom	6
	pm	Tree species selection for forest ecosystem restoration - general principles	Lecture	Classroom	7
5	all day	Forest phenology and seed collection	Hands-on field exercise	Undisturbed forest	8
6	all day	Tree nursery techniques - nursery design, seed germination/dormancy, growing planting stock, production scheduling	Hands-on field exercise	Tree nursery	9
7	all day	Tree planting, maintenance and monitoring	Hands-on field exercise	Restoration site	10
8	all day	Biodiversity monitoring - tree species diversity and bird diversity	Hands-on field exercise	Restoration site	11
9	am	Data analysis - germination tests, tree survival and growth	Hands-on field exercise	Classroom	12
	pm	Data analysis - tree and bird species richness	Hands-on field exercise	Classroom	13

10	am	Restoration planning logistics - timing, costing and labour	Hands-on field exercise	Classroom	14
	pm	Working with local communities Exam & course evaluation	Group discussion	Classroom	15

8 Material Needs

Field station with teaching room (including electricity and projector) and accommodation for teachers and students (suggest maximum of 20 students per time), within easy access or transportation (<1hr drive) to natural forest (least disturbed), tree nursery and restoration sites. Laptop computers or data analysis HAVE.

Basic field equipment: metal poles, 50-m and 1.5-m tape measures, tree-measuring poles, camera, clip boards, plastic bags, gloves, GPS capability. Regular nursery materials and equipment: containers, media, shovel, wheelbarrow, forks, trowels, watering cans, secateurs.

9 Reading

9.1 Main course textbook

Forest Restoration Research Unit, 2005. How to Plant a Forest: The Principles and Practice of Restoring Tropical Forests. Compiled by Elliott, S., D. Blakesley, J.F. Maxwell, S., Doust & S. Suwannaratana. Biology Department, Science Faculty, Chiang Mai University, Thailand, 200 pp. www.forru.org/library/0000153.

9.2 Other recommended reading

Di Sacco, A., K. Hardwick, D. Blakesley, P.H.S. Brancalion, E. Breman, L.C. Rebola, S. Chomba, K. Dixon, S. Elliott, G. Ruyonga, K. Shaw, P. Smith, R.J. Smith & A. Antonelli, 2021. Ten guidelines for tree planting initiatives to optimise carbon sequestration, biodiversity recovery and livelihood benefits. *Global Change Biology* 27:1328-1348. (doi.org/10.1111/gcb.15498)

Elliott, S. & C. Kuaraksa, 2008. Producing Framework Tree Species for Restoring Forest Ecosystems in Northern Thailand. *Small Scale Forestry*: 7, 403-415, www.forru.org/library/0000022

Elliott, S., S. Chairuangri, C. Kuaraksa, S. Sangkum, K. Sinhaseni, D. Shannon, P. Nippanon & B. Manohan. 2019. Collaboration and conflict - developing forest restoration techniques for northern Thailand's upper watersheds whilst meeting the needs of science and communities. *Forests* 10(9): 732; (doi.org/10.3390/f10090732)

Forest Restoration Research Unit, 2008. Research for Restoring Tropical Forest Ecosystems: A Practical Guide. Chiang Mai University, Forest Restoration Research Unit, Thailand. 144 pp. www.forru.org/library/0000156

Gardner, S., P. Sidisunthorn & V. Anusarnsunthorn, 2007. A Field Guide to Forest Trees of Northern Thailand. Kobfai Publishing Project, Bangkok, Thailand, www.forru.org/library/0000227

10 Assessment of students

Oral exam and written test on final day of the course. Certificate of technical competence.

Karen PDF Version is available here:

<https://www.dropbox.com/s/154jzmkk9ile3m4/PRACTICAL-KFD-COURSE-Karen-translating.pdf?dl=0>

Burmese PDF version available here:

<https://www.dropbox.com/s/dc6mbba17pjh8qd/PRACTICAL-KFD-COURSE-Burmese-Translating-2.pdf?dl=0>