



## 1<sup>ST</sup> WORKSHOP ON:



# “INTRODUCTION TO FOREST RESTORATION - GENERAL CONCEPTS AND SKILLS”

## FOR KEY STAKEHOLDERS IN THE DOI MAE SALONG REFORESTATION PROJECT

<b>Date</b>	9 <sup>th</sup> – 11 <sup>th</sup> November 2007
<b>Location</b>	Department of Biology, Faculty of Science, Chiang Mai University, Thailand
<b>Sponsored by</b>	IUCN - The World Conservation Union, Bangkok, Thailand
<b>Organized by</b>	Forest Restoration Research Unit (FORRU), Department of Biology, Faculty of Science, Chiang Mai University



## Workshop Program

Date/Time	Session/Activity
<b>9/11/07</b>	<b>CMU Biology Department and Doi Suthep Forest Trail</b>
08.30	Registration
09.00	Introduction to FORRU – PowerPoint
09.30	Basic concepts - ANR and The Framework Species Method
10.20	Q&A
10.30	Coffee Break
10.45	Tree species selection
11.45	Q&A
12.00	Leave for Doi Suthep
12.40	Lunch
13.30	Forest trail - target forest type (phenology, vouchers, seed collection)
17.00	Back to CMU
18.00	Planning - time, labour, costs
19.30	Welcome dinner at UNISERV restaurant
<b>10/11/07</b>	<b>FORRU Research Nursery, Doi Suthep-Pui National Park</b>
08.30	Herbarium – importance of species identification.
09:00	Leave for Doi Suthep nursery
09.30	Building and running a nursery for growing native forest trees
10.30	Coffee Break
10.45	Seed preparation, Germination, etc
11.30	Potting, media containers
11.45	Q&A
12.00	Lunch
13.00	Nursery Work Stations – Care of seedlings in the nursery (watering, fertilizer, disease/pest control, pruning, grading and hardening off)
14.45	Coffee Break
15.00	Group Discussion - production scheduling
16.00	Doi Suthep Temple Visit
17.00	Back to CMU
<b>11/11/07</b>	<b>Ban Mae Sa Mai community tree nursery and experimental field plots</b>
08.00	Leave for Ban Mae Sa Mai
09.30	WWF 2007 young plot observations - (plantation design, site preparation, spacing, species mixes etc.) and walk to 98.3 PLOT (9 yr) (recovery of forest structure, function and biodiversity)
10.45	WWF 2006 plot observations – achievements after 1.5 yrs.
12.00	Lunch in the village nursery
13.30	Discussion with BMSM Conservation Committee – socio-economic aspects and motivation for forest restoration - Refreshments
15.30	Participants Depart

## Participants

Name	Position / Organization
Coln. Chaluay Yamphochai	Head of Doi Mae Salong Forest Restoration Project, Doi Mae Salong, Chiang Rai
Mr. Parinya Ninyok	Forestry Officer, Mae Chan watershed management, Chiang Rai
Mr. Kitti Jungdilok	Forestry Officer, National Park, Wildlife and Plant Conservation Department (Chiang Rai office), Chiang Rai
Mr. Channarong Paphochan	Deputy, Sub-district Administration of Organization Doi Mae Salong, Chiang Rai
Mr. Amnart Muangprem	Teacher, Ban Santikeeree school
Mr. Surachai Khamkong	Teacher, Ban Santikeeree school
Mr. Yothin Pinitchantakarn	Teacher, Ban Klang school
Mr. Kriengsak Pasajang	Teacher, Ban Klang school
Mr. Prachitchai Chantakad	Teacher, Ban Phanasawan School
Mr. Jeerawat Kantayod	Teacher, Santikeeree Wittayakom School
Mr. Somsak Udomprasit	Teacher, Ban Mai Santi School
Mr. Arsue Yaebaekoo	Member of SAO council (Moo.5), Sub-district Administration of Organization Doi Mae Salong , Chiang Rai
Mr. Tienfoo Sae-Jang	Member of SAO council(Moo.6) , Sub-district Administration of Organization Doi Mae Salong, Chiang Rai
Mr. Subin Chevincharatruang	Member of SAO council (Moo.9), Sub-district Administration of Organization Doi Mae Salong, Chiang Rai
Mr. Narongchai Sae-lee	Head of Tong Ja Sai village, Doi Mae Salong, Chiang Rai
Miss. Armornrat Rattanachai	Head of SAO council, Sub-district Administration of Organization Doi Mae Salong, Chiang Rai
Mr. Arsor Sermerkoo	Member of Ban Santisook, Doi Mae Salong, Chiang Rai
Mr. Arto Baesekoo	Head of Jieng Ja Sai village assist, Doi Mae Salong, Chiang Rai
Mr. Pisit kattikul	Head of villagers volunteers, Doi Mae Salong Forest Restoration Project
Mr. Shukieat Wongtong	Agricultural officer, Doi Mae Salong Community forest department
Dr. Stephen Elliott	FORRU, Chiang Mai University
Dr. Prasit Wangpakapattawong	FORRU, Chiang Mai University
Mr. Cherdasak Kuarak	FORRU, Chiang Mai University
Ms. Sudarat Sangkam	FORRU, Chiang Mai University
Ms. Tidarach Toktang	FORRU, Chiang Mai University
Ms. Dutsadee Nilubol	FORRU , Chiang Mai University

## Introduction

FORRU-CMU hosted this 1<sup>st</sup> workshop, entitled “Introduction To Forest Restoration - General Concepts And Skills” from 9<sup>th</sup> – 11<sup>th</sup> November 2007, with the aim of introducing the concepts and some of the technical methods developed by FORRU-CMU’s research program, to increase the capacity of key stakeholders in the Doi Mae Salong Reforestation Project to plan and carry out effective forest restoration over 9,000 rai. A diverse range of participants, from planners and implementers to local community members joined the workshop. These included the on-site project manager, 7 local community representatives, 7 teachers from government schools 3 local government representatives, 2 forestry officers and 6 FORRU staff – listed below.



Dr. Steve runs through the workshop schedule.



Participants from the Doi Mae Salong Reforestation Project at the opening ceremony.

## DAY 1

### Opening Remarks

Associate Professor Dr. Narit Sritasuwan, Head of Biology, Faculty of Science, Chiang Mai University, welcomed the participants and thanked the IUCN and workshop organisers. Each participant then briefly introduced themselves and the work of their organisation.

Associate Professor Dr. Narit Sritasuwan, Head of CMU Biooogy Department welcomed all the participants



### Accelerated Natural Forest Regeneration (ANR) and the Framework Species Method of Forest Restoration – Basic Concepts

Dr. Prasit Wangpakapattanawong (PW) introduced the research work of the Forest Restoration Research Unit by PowerPoint. He outlined the principles of ANR, which techniques can be employed under what circumstances, and the site conditions where ANR may be suitable. He then detailed the principles of Framework Tree Species Method, presented the advantages and drawbacks of the method and described the activities needed to implement it.



Dr. Prasit Wangpakapattanawong outlined the methods that FORRU uses.

**Question from the floor:** There are no data about the tree species that grow on Doi Mae Salong - how can we know which framework species grow there?

**Answer (PW):** Undertake a forest survey on Doi Mae Salong and set up a phenology monitoring trail in remnant forest with assistance from a botanist or look for data already published. From FORRU-CMU, Dr. J.F Maxwell could help survey the tree flora and identify the species present. Phenology means to study the seasonal cycles of flowering and fruiting of each tree. Doi Mae Salong has a similar elevation range to Doi Suthep National Park, so both mountains probably have similar tree floras – so start with species listed in Part 9 of “How to Plant a Forest” and modify your list, as local data become available. FORRU took 3 years to screen about 350 species (out of 660 indigenous to Doi Suthep) that can rapidly restore forest structure and function. I suggest that initially you use FORRU’s research data for species you know occur in your area and at the same time collect local data and modify your approach accordingly – this is one of the central principles of forest landscape restoration – “adaptive management”.

### Tree species selection

Using another PowerPoint show, Tiderach Toktang explained the groups of framework tree species and the diversity that should be added to the planting sites. She provided a list of 10 main indigenous framework tree species recommended for highland forest, which occur in the project area. She then ran a participatory exercise, during which participants suggested which trees, indigenous to the mountain, should be planted.

**Answers:** The participants listed 58 tree species in their area, which they considered suitable and divided them into 4 groups depending on criteria they considered important. They would like to grow these species in their nurseries to plant in 2008-09. The list included species recommended by FORRU and additional ones with similar characteristics.

Rapid Growth	Long life
1. <i>Cassia spectabilis</i>	1. <i>Cassia fistula</i>
2. <i>Gmelina arborea</i>	2. <i>Dillenia obovata</i>
3. <i>Prunus cerasoides</i>	3. <i>Terminalia bellirica</i>
4. <i>Pterocarpus macrocarpus</i>	4. <i>Thunbergia grandiflora</i>
5. <i>Erythrina subumbrans</i>	5. <i>Quercus kingiana</i>
6. <i>Garcinia bancana</i>	6. <i>Dracontomelon dao(Blanco)</i>
7. <i>Flacourtia indica</i>	7. <i>Michelia champaca</i>
8. <i>Bauhinia glauca</i>	8. <i>Shorea obtuse</i>
9. <i>Melientha suavis</i>	9. <i>Shorea siamensis</i>
10. <i>Azelia xylocarpa</i>	10. <i>Bauhinia variegata</i>
11. <i>Mitrephora maingayi</i>	11. <i>Dipterocarpus tuberculatus</i>
12. <i>Toona ciliata</i>	12. <i>Bischofia javanica</i>
13. <i>Cananga latifolia</i>	13. <i>Chukrasia velutina</i>
14. <i>Calophyllum inophyllum</i>	14. <i>Cratoxylum formosum</i>
15. <i>Bombax ceiba</i>	15. <i>Magnolia baillonii</i>
16. <i>Melia toosendan</i>	16. <i>Dillenia obovata</i>
	17. <i>Cinnamomum bejolghota</i>
	18. <i>Bauhinia variegata</i>
	19. <i>Sapindus rarak</i>
	20. <i>Castanopsis tribuloides</i>

Attractive to Animals	Economical Benefit Use
<ol style="list-style-type: none"> <li>1. <i>Spondias pinnata</i></li> <li>2. <i>Diospyros glandulosa</i></li> <li>3. <i>Canarium sublatum</i></li> <li>4. <i>Syzygium cumini</i></li> <li>5. <i>Eugenia oblata</i></li> <li>6. <i>Phyllanthus imbricatus</i></li> <li>7. <i>Mangifera pentandra</i></li> <li>8. <i>Musa acuminata</i></li> <li>9. <i>Artocarpus heterophyllus</i></li> <li>10. <i>Ficus auriculi</i></li> <li>11. <i>Ficus religiosa</i></li> <li>12. <i>Baccaurea ramiflora</i></li> <li>13. <i>Ficus annulata</i></li> </ol>	<ol style="list-style-type: none"> <li>1. <i>Tamarindus indica</i></li> <li>2. <i>Tectona grandis</i></li> <li>3. <i>Acer calcaratum</i></li> <li>4. <i>Prunus persica</i></li> <li>5. <i>Malpighia glabra</i></li> <li>6. <i>Camellia sinensis</i></li> <li>7. <i>Bambusa nutans</i></li> <li>8. <i>Shorea robusta</i></li> <li>9. <i>Leucaena leucocephala</i></li> </ol>

### Planning your Forest Restoration project

During an evening pre-dinner session, Sudarat Sangkam presented a PowerPoint on planning and logistics of forest restoration – time, labour and costs. She listed the main types of stakeholders usually involved in forest restoration projects and recommended involving all of them all stages of project planning and implementation, and carefully resolving any disagreements that may arise from differences of opinion. She provided an action timeline for preparing for planting events, outlined maintenance and monitoring activities, and explained how to calculate the costs of restoration.

### Forest Trail

In the afternoon on the first day, the participants went to FORRU-CMU’s research tree nursery and walked along a nature study trail with FORRU-CMU’s nursery manager, Cherdasak Kuarak (CK). Topics covered during this session included defining the target forest, seed collection, phenology scoring and collection of voucher specimens.

**Question from the floor:** Why did you base the FORRU research nursery in the national park HQ?

**Answer (CK):** The nursery was built at an elevation of 800 - 1,200 a.s.l. It is at the transition between Mixed Deciduous Forest and Evergreen Forest, so the nursery can be used to experiment on native tree species from both types of forest. In addition, the National Park has more than 660 forest tree species to study; the nursery has a reliable water supply and is easy to accessible by motor vehicle for visitors and outreach activities.



## Seed Collection and Tree Phenology

Along the forest trail, Cherdsak taught participants how to label mature trees and record their flowering, fruiting and leafing phenology and also how to carry out efficient seed collection, minimizing losses and maximizing genetic diversity. He also demonstrated the correct method of voucher specimen collection to confirm species identification.

**Question from the floor:** Why did you collect phenology data every 3 weeks?

**Answer (CK):** Based on FORRU's experience, observations once per month often miss short flowering events, so intervals of 3 weeks record more flowering events.

Cherdsak explains the phenology scoring system.



Participants practice phenology scoring along the nature trail.

## Voucher specimen production

Cherdsak explained the importance of voucher specimen collection to ensure correct species identification and maintain an indisputable record of species names. He demonstrated the four basic steps for preparing vouchers for botanical identification and herbarium storage.



## Day 2 – Nursery Methods

### Chiang Mai University Herbarium

The second day began with a visit to CMU Herbarium. The Curator, J.F Maxwell outlined the history of the herbarium and showed some of the 20,000 plant specimens in the collection, including voucher specimens and seedling specimens from FORRU's early work. He emphasized the importance of voucher specimens, why they are needed, and he outlined the steps that must be followed to prepare plant specimens ready for mounting, labelling and storage.



Various herbarium specimens; fleshy fruits in alcohol in jars; adult vouchers and seedlings grown in the nursery from seeds of the voucher, mounted on sheets with descriptive labels.

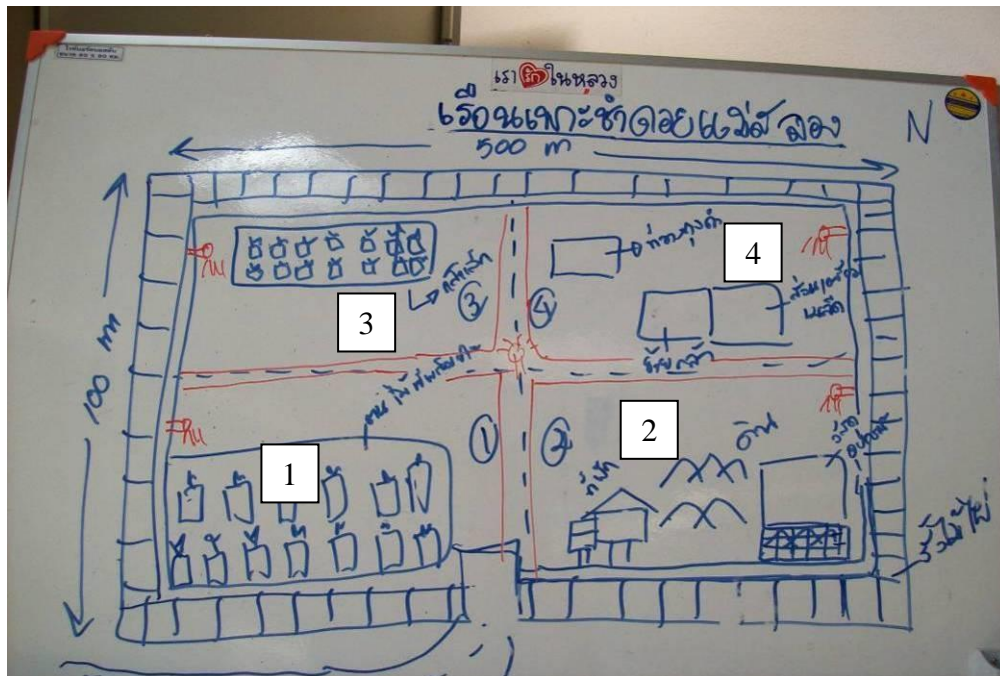
### Building and running a nursery for growing native forest trees

The participants brainstormed to design their own community nursery plans. In 2008, they plan to plant tree seedlings in an area of about 2,000 rai, so they decided on the following:

- Establish nurseries for tree production of total combined area 50,000 m<sup>2</sup> (100 x 500 m) to produce about 1,000,000 tree seedlings (500 seedlings per rai) because the degraded planted sites are clear land and don't have many natural seedlings, stumps or saplings for natural regeneration.
- Ensure adequate access to the nursery to transport the seedlings and nursery equipment.
- Make a bamboo fence to surround the nursery to keep out cattle, dogs etc.
- Cover most of the standing down area with 50% Slan except the area that will be used to take care of seedlings that are ready for planting (hardening off).
- In the nursery make paths inside and divide it into 4 areas
- Supply water into the nursery by pipes and sprinklers.



- **Area 1:** Standing-down area for trees ready for planting and hardening-off.
- **Area 2:** Sheltered area for workers, including a toilet, medium store, lockable equipment store and seed collection shelter that is protected from animals.
- **Area 3:** An area for taking care of young seedlings in germination trays or plastic bags.
- **Area 4:** Work space for potting and seed germination trays protected from animal seed predators.



### Seed preparation, destruction and germination

Cherdsak explained the concept and causes of seed dormancy and the five main techniques to use to break dormancy and accelerate and maximize germination.

### Potting, media containers

Cherdsak discussed the design and use of germination trays, potting containers, and potting media. He demonstrated the potting technique including the 5 points for perfect potting and then participants practiced the techniques.

### Seedling monitoring and maintenance

Cherdsak discussed monitoring methods for seedlings growing in the nursery and the principle maintenance procedures including fertilizer application, watering, pest control etc. as well as some of the particular problems which are associated with growing some of the main framework species.

## Production scheduling

Cherdsak outlined the importance of species production schedules for growing trees of the right size, health and vigour by the optimal planting time (4-6 weeks into the rainy season i.e. mid-June for N. Thailand). He provided a few examples of how different species need different techniques to ensure that they are all ready at the right time.



- Top Left: A display of different fruit and seed types
- Left: Successfully potted seedlings
- Above: FORRU-CMU nursery officer Ms Thonglaw Srithong explains pre-sowing seed treatments
- Below: A basket of perfectly potted seedlings!



## Day 3

### Ban Mae Sa Mai Community Tree Nursery and Experimental Field Plots Visit

Dr. Stephen Elliot provided an introduction to this upper watershed area and outlined the history of the Ban Mae Sa Mai village's forest restoration collaboration with FORRU.

#### Experimental plot planted in 2007 (sponsored by WWF)

At this recently planted plot, the participants learnt about planting design (spacing and species mixes), maintenance (fertilizer and weeding etc.), monitoring and fire prevention in the dry season. Dr. Steve outlined the participation of local villagers in these activities, and the financial support FORRU provides in return.

**Question:** How big does the tree planting hole need to be?

**Answer:** Dig a hole about double the size of the containers in which the trees are grown (usually black plastic bags) to allow the root system to develop completely. Use a hoe to clear weeds around planted trees but try to avoid damaging the tree's roots.



FORRU-CMU staffs pose by *Erythrina subumbrans* trees 5 months after being planted in June 2007.

#### Experimental plot planted in 1998

The participants compared the recently planted 2007 plot with the more developed 9-year -old plot. In this plot, discussion focused on canopy closure, biodiversity recovery, particularly recruit tree species establishment and soil development. The most successful framework species were identified and their principle framework characteristics explained. The participants compared the planted plot with the adjacent non-planted "control plot".



### Experimental plot planted in 2006 (sponsored by WWF)

In this 18-month old plot, Dr. Steve explained about the rapid growth rates of the trees and the results of recent plot monitoring. Tree maintenance and fire prevention activities were also discussed. On the way down, the concept and basic principles of Forest Landscape Restoration (FLR) were briefly introduced at the view point.

Participants pose by the information board in the 2006 plot.



### Discussion with the Environment and Conservation Club Committee

After lunch, an afternoon forum was held in FORRU-CMU's community tree nursery in the village of Ban Mae Sa Mai, to address specifically the socio-economic aspects of forest restoration and to explore motivational factors. This session, chaired by Tiderach Toktang, involved Q&A and exchanging of experiences among DMSL participants and key members of the BMSM Natural Resources Conservation Committee.

**Question:** How many households are there in Ban Mae Sa Mai and what is the population size?

**Answer:** In the past there was only one village: Ban Mae Sa Mai. Now there are two, as we divided up the growing population. The new village is named Ban Mae Sa Noi. There are 130 households and 1,300 people in Ban Mae Sa Mai. Ban Mae Sa Noi is smaller, with 80 households and 650 people. In total there are about 1,950 people.

**Question:** What are the livelihoods of the villagers?

**Answer:** Most villagers work in Chiang Mai town especially the younger people. The other 20% have vegetable farms and orchards.

**Question:** What made the villagers want to establish the environmental conservation club?

**Answer:** Because we had a critical problem about the lack of water for household and agricultural use, especially in 1989, we had social conflict amongst water users. Some villagers established the conservation club to address this problem, and it was suggested to try to avoid using the upland areas for agriculture, and restoring and conserving forest in those areas to improve the water source.

**Question:** Do most villagers agree or support the environmental conservation club? Is there social conflict amongst the villagers still? How do you resolve land conflicts?

**Answer:** At the beginning of the conservation club establishment (in 1990), some of the villagers supported and some disagreed with the club. Those supporting it thought that forest restoration would help to create more rain and water resources. Those against it didn't want to lose their own land for cultivation to restore the forest, because they would lose income also. The social conflict between these groups was significant. The club members at that time were vigorous in their targets and tried to make villagers understand the usefulness of forest restoration. They allowed them to move to the lowlands gradually, within 3 years. They reduced agriculture in the uplands gradually. This changing of opinions took more than 5 years, but there is a much better acceptance now that they can see the benefits.

**Question:** Does the village have rules for environmental conservation, and punishments?

**Answer:** There are many village rules to protect the forest. In the conservation forest it is forbidden to cut trees or use timber. In the cutting of branches is allowed for fire wood but tree felling is illegal because the area is within Doi Suthep-Pui National Park. Hunting is forbidden and the village committee can impose fines on those caught hunting. In upland areas, clearing new land to grow vegetables is forbidden and setting of fires is also not allowed. Punishments for offenders are fines, the size of which depends on the severity of the activity.

**Question:** What about fire prevention?

**Answer:** We establish a fire watching and warning team in the dry season every year from mid-January until the beginning of the rainy season. One member of each family joins a work team to cut fire breaks around planted sites and be on watch to prevent fires all day and night. In later years many organizations support the budget for fire prevention, e.g. the Pong Yang sub-district administration organization has provided 10,000 baht a year since 1994, FORRU about 50,000/yr since 1997 and the Forestry department has provided about 5,000 baht per year since 2005 for food, gasoline fuel etc. The fire prevention team has

about 10–15 people at a time, including a head of fire prevention. There is also a nominated head of tree planting activities.

**Question:** What is the usefulness of forest restoration?

**Answer:** After restoring the forest here for 10 years we found that:

- There is an increase in wildlife returning to the forest, such as civets, hog badgers, barking deer, wild boar etc.
- There is an increase in rainfall in the area.
- There is more water in the Mae Sa river and it flows all year.



Clockwise: 1) BMSM Natural Resources Conservation Committee explains why they got involved in forest restoration; 2) workshop participants field questions; 3) community nursery officer Kuhn Naeng explains how he produces trees for planting each rainy season and 4) participants receive their certificates during the closing of the workshop.

## **Workshop Feedback**

From this workshop the participants emphasized the following areas as being most useful:

1. Learning about phenology and voucher specimens.
2. Learning about the framework species method of forest restoration
3. Learning about seed collection and germination, seedling and production scheduling.
4. Learning about community motivation.

## **Workshop conclusion**

Participants resolved to use knowledge and techniques gained from this training workshop and apply them to 2008 forest restoration activities in Doi Mae Salong with the assistance of IUCN and FORRU-CMU, and to look for ways forward to increase cooperation with the villagers and raise environmental conservation awareness.

**Stephen Elliott**  
**3/1/8**