"PRINCIPLES AND PRACTICE OF FOREST RESTORATION WORKSHOP FOR CHINESE GROUP" 16 -25 JUNE 2005, FORRU, CHIANG MAI, THAILAND

BY THE FOREST RESTORATION RESEARCH UNIT (FORRU)
SPONSORED BY DARWIN INITIATIVES, U.K.

Title	**"Principles and Practice of Forest Restoration Workshop for Chinese Group"**
Date:	16 – 25 June 2005
Venue:	FORRU nursery and demonstration plots at Mae Sa Mai and Chiang Mai University, Chiang Mai, Thailand
Sponsored by:	The Darwin Initiative
Organised by:	The Forest Restoration Research Unit (FORRU), East Malling Research and ICRAF-China

Introduction

In Novemeber 2002, FORRU ran a small workshop on forest restoration techniques for a group of various foresters from Yunan Province in China, at the request of ICRAF-China (International Centre for Research on Agroforestry). This sparked some interest in FORRU's approach to reforestation and the techniques it had successfully developed to restore evergreen forest in Doi Suthep-Pui National Park. One of FORRU's co-directors, Dr. Steve Elliott was invite to Yuanan to follow on some of the points raised in the workshop and to advise on possible establishment of a similar research unit in China.

In 2005, with support from the Darwin Initiative, FORRU, together with East Malling Research and Wildlife Landscapes, began a project to facilitate restoration of forest ecosystems for biodiversity recovery in Indochina, by transferring skills and proven technologies to key forest stakeholders in China, Laos, and Cambodia. Policy makers and forestry department officials are specifically targeted. This project is assisting these countries to design research tree nurseries and experimental plots to adapt FORRU-Thailand's framework species method of forest restoration to local ecological and socio-economic conditions, and demonstrate it to local people. This knowledge and skills transfer is being achieved partly through a series of workshops, both at FORRU's demonstration sites in Thailand, and at participating organizations.

The workshop reported on here: **"Principles and Practice of Forest Restoration Workshop for Chinese Group"** was the first workshop to be run under the current project and built upon the contacts that had been developed previously with ICRAF-China and with various forest agencies in Yunan. In addition, this time, some participants from Sichuan Province also joined the workshop as well as representatives from East Malling Research.

Objectives

1. To pass on the concepts and research protocols developed by FORRU-CMU to enable the participants to establish an effective FORRU in China.
2. To prepare the participants to run a workshop to plan a FORRU in China.
3. To plan adaptation and translation of forest literature into Chinese.

Participants – Total 14 participants, one extra translator

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Mr. Liang Weizhong	Guangyuan City Forestry Bureau, Sichuan	Liangweizhong@126.com

Program

Day	Date	Time	Subject	Location	Facilitator(s)
Thursday	16/06/05	7:00 PM	Arrive and book into UNISERV	Airport	Sudarat
Friday	17/06/05	Morning	Objectives of the workshop. Introduction to FORRU and the framework species method. Why are FORRUs needed?	CMU	Steve and Kunakorn
		Afternoon	Presentations by participants about their own views/experience of tree planting.	CMU	Kunakorn
Saturday	18/06/05	Morning	Joining tree planting event at Ban Mae Sa Mai	BMSM	Steve
		Afternoon	Framework species plots - what can be achieved	BMSM	Steve
Sunday	19/06/05	All day	Free for sight seeing	Chiang Mai	Sudarat
Monday	20/06/05	Morning	Phenology and seed collection in natural forest	Doi Suthep	Cherdsak
		Afternon	Phenology data analysis and genetic considerations of seed collection	CMU	Steve and Greuk
Tuesday	21/06/05	Morning	Germination, monitoring seedling growth and nurturing wildlings in the nursery	Doi Suthep	Cherdsak
		Afternoon	Continue and Wat Pratat temple visit	Doi Suthep	Sudarat and Kunakorn
Wednesday	22/06/05	All day	Analyzing seed germination experiments and seedling growth experiments. Dormancy and seed collection times. Production schedules.	Chiang Mai	Sudarat and Steve
Thursday	23/06/05	Morning	Montioring tree performance. Vegetation monitoring - field work. Direct seeding. Community motivation for forest restoration.	BMSM	Sudarat and Maxwell
		Afternoon	Community motivation for forest restoration - session with BMSM natural resources committee.	BMSM	Kunakorn
Friday	24/06/05	Morning	Planning - time, labour and costs Role Play Scenario for Community A and B	CMU	Sudarat and Kunakorn
		Afternoon	Woodland Restoration in U.K. Analysing field data.	CMU	Steve and David
Saturday	25/06/05	Morning	Final discussion - planning exercise to set up your own FORRU - location design admin staffing funding	CMU	David
		Afternoon	Other project components - organizing the in-country workshop,	CMU	David
Sunday	26/06/05		Departure		Sudarat

REPORT ON EVENTS

Welcome Remarks and Introduction on Friday 17th June 2005

Welcome remarks were presented by Dr. Araya Jatigastien, Vice Head of Biology Department. Later, Dr. Steve presented the objectives of the workshop and why a Forest Restoration Research Unit is needed in China. In addition, forest restoration techniques from FORRU experiences were presented, such as Accelerated Natural Regeneration (ANR) and the Framework Species Method. The participants discussed a lot about the Framework Species Method and tried to compare it with their planting techniques in China. Much of the discussion focused on which species might be Framework Species and why? The process of site capture was also discussed, together with site locations with respect to existing forest.

Afternoon presentations made by Chinese Participants on Friday 17th June 2005

1. Yunnan Forestry College by Mr. Wu Xunfeng

- The college is developing a training program in ecosystem restoration
- They initiated the project in September 2004 with support from ICRAF.
- The work scheme has 2 parts;
    - 1) Forest ecology and restoration,
    - 2) Develop teaching materials for Yunnan Forestry College.
- Standard methods are applied, such as collecting voucher specimens of seed trees, 45 spp., 18 families.
- Some work has been started, including setting up a nursery in February 2004 and germinating 27 species, as well as potting some seedlings.
- The nursery is being used for teaching local schools.
- There are some problems 1) no source for seeds, 2) Fagaceae seeds eaten be rodents, 3) need extension for the project.
- Teaching materials and textbooks are lacking. FORRU could help with this.
- Tropical forests in China are located in Yunnan, Hainan, Kwang Tung, Kwang Si, and Taiwan
- Problems in tropical forests in China include: weed problems caused by vine-plants in Hainan; degraded tropical forest lands in Kwang Si; poverty around forested areas puts pressure to deforestation; mono-culture plantations of pines and Eucalyptus invading forested areas and bring about soil erosion; exotic plant species from Europe brought in during 1950s; mismanagement of forested areas.
- Some suggested economic tree species to be included in planting projects could add economical value, such as *Dipterocarpus alatus, Pterocarpus marsupium, Pterocarpus santalinus, Xylia xylocarpa, Dalbergia odoratum, Chokrasia* sp.
- Suggestion: a forest restoration and planting project to improve secondary forests ecosystems in China should be accompanied with social work to solve the problem of poverty. Some projects like growing non-timber economic plants, i.e., medicinal plants, rattan and ginger, under forest storey were recommended.

2. Gaoligongshan Nature Reserve by Mr. Wang Tiencan (accompanied with a VDO introduction)

- The Gonligonchan Mouintain Range runs north-south along the edge of the Tibeten plateau.
- Gonligonchan has a vertical climate. It is possible to experience 4 seasons at different heights.
- The mountains are rich in flora and fauna with 2,000 plant species and 581 animals; serves as natural museum and gene bank for China.
- Habitats vary from grasslands to rainforest
- World famous home of Azelia spp. Three tallest ones are here. Mr. Fowler, the British botanist described one species which was reproduced in Kew Gardens, U.K.
- Plan for Experimental Vegetation Restoration located at Lingar in Tengchong County.
- Dr. Steve visited the area in 2004. Preliminary surveys of potential tree spp. Were carried out within local communities.
- The mountains are home of the Red Panda and has support from WWF.
- Problems: deforestation by the surrounding communities invading protected areas; forested areas turned into farmlands; forest fire caused by farming activities;, weed problem, i.e., *Eupatorium odoratum*.
- Field investigations are need to identify possible Framework Species and training in seedling production, and planting techniques are needed.

3. State Forestry Administration by Li Jie

- The forestry department project is planting 2 species, pine and Eucalyptus.
- They plan to change cropland into forest areas.
- They have problems due to lack of diversity of tree species selected.

4. Yunnan Forestry Department by Mr. Li Shigang

- Local poverty should be considered and solved properly.
- 200,000 hectares were assigned as planting area for a reforestation project supported by the German government.
- There were already two demonstration plots; 1) an American supported project "Forest to Help Improvement" aiming to create healthy forested areas through ecological work, as well as, stimulating local social economics supported by World Bank; 2) forest management at the village/community level, aiming to find out and develop sustainable development protocols with the goal to decentralize administration to local authorities.
- An International symposium was held with lots of comments received, showing that both projects have practical results.
- Most species planted originated from the German project e.g. *Alnus nepalensis*, *Quercus spp.*, and *Pinus spp*; 17 species in total.

5. Baoshan Forestry Bureau & Yangliu by Mr. Yang Yanping

- Since 1980, Pine mono-culture plantations have caused problems of biodiversity loss, pest invasion and fire prevention failure.
- A reforestation project was established at Baoshan Prefecture/Province.
- Forest technology was applied by choosing quality seeds and using effective nursery techniques to produce quality seedlings.
- Field investigations to develop potential seed sources were carried out.
- The project work is related to and cooperates with the work of Gaoligongshan Nature Reserve, where some seeds are collected.
- 10 studies (surveys & investigations) for baseline information gathering have been carried out.
- Fast-growing species were selected and tested and seedlings of some tree species were produced by tissue culture, which was locally developed and practiced.
- Soil development and preparation for forest planting is planned, together with improving silviculture techniques.

6. Sichuan Forestry Department by Mr. Liang Weizhong

General Information

Located in the upper reaches of Yangtze River, Sichuan province is regarded as an important ecological shelterbelt of the Yangtze catchment. The area of the province is 48,500 km^2, 5% of the total area of China. Its population is 85 million, 7% of the total for China. Sichuan province includes 18 prefectures and 3 autonomous prefectures, and these prefectures include 180 cities/counties/districts.

The main terrain of Sichuan includes the western plateau area and east basin area. The plateau in the west part is an extension of Tibetan plateau, where the average elevation is above 4,000 m. 80% of the area is mountains and plateau terrain; while the basin in the east part consists mainly of shallow hills and plains, in which plain area is 3 %. The main rivers in the province are the Yangtze River and its branches, namely: Minjiang River, Tuojiang River, Jialing River, Daduhe River and Yalong River.

Affected by the special terrain system, the climate patterns of the 2 parts are very different. The east is in the subtropical monsoon zone, with a warm and humid climate. Average temperature is 16 - 17 °C; yearly rainfall 800 – 1200 mm. In contrast, the west has a dry and cold climate, with an average temperature 6-12 °C, and annual rainfall less than 600 mm.

Forest Resources

Sichuan is an important forest area and the province is prioritized for forestry development. There are 23 million ha of forestland, and closed forest accounts for 13 million ha (39.7%). Stand volume is 1.6 billion m^3. Forest includes both natural forest and artificial forest. Forest species are diverse. Natural forests are mainly on the western plateau and southwest mountain areas, accounting for just 7% of the total area; artificial forests in the basin area accounts for 24% of forests.

Sichuan has abundant wildlife species. The province is an important bio-diversity gene storeroom of China, There are more than 10,000 higher plants, which includes angiosperm 8,543, gymnosperm 88, and ferns 670. There are 1,240 woody species, in which 460 only exist in Sichuan. Sichuan has 101 prioritized protected plant species. Animal species are also diverse, including 959 terrestrial vertebrates. The most famous species is the giant panda. The province hods more than 80% of the entire panda population.

Development History

Sichuan has been following a policy to reafforest whilst utilizing natural forest resources. The province has experienced 3 main phases; exploitation of the western natural forest, regional reafforestation and comprehensive rehabilitation of forest ecosystems. In 1998, the Natural Forest Protection Project (NFPP) first implemented a 300,000 ha pilot area. These established the foundation for development of a well-designed, multifunctional ecological shelterbelt in the upper reach Yangtze River. Since then, a campaign, which aims to rehabilitate the whole ecosystem has started.

Ecosystem Rehabilitation

Led by the Upper Reach Yangtze River Shelterbelt Project (URYRSP), a number of reafforestation projects have been implemented. From 1989 to 2000, URYRSP established 1.9 million ha artificial forest in 79 counties; in the period from 1981 to 2000, 690,000 ha were planted. Fast Growing and High Yield Forest were established in 90 counties. Up to year 2000, the Air-Seeding Project, which started in 1958 has preserved 780,000 ha forest. From 1980s, the province implemented mainly international projects, such as World Bank Loan Afforestation Project, FAO Aided Afforestation Project, Sino-Japanese Afforestation and Nature Conservation Project in Upper Reach Minjiang River, Sino-German Afforestation and Nature Conservation Project in Upper Reach Jianling River, etc. through these international projects, 300,000 ha high quality forest have been established. Since 1979, all the people in China have to undertake obligatory tree planting every year; up to now in Sichuan more than 300,000 ha forest and 3.6 billion single trees have been planted under this campaign.

In September 1998, NFPP was first implemented in Sichuan, which meant that a Logging Ban became effective in the whole province. Through this project, some 1,038 m^3 natural forest resources are saved every year. The project plans to support ranger protection for 19 million ha forest (of which 10 million ha is natural forest), and from 2000 to 2010, conduct 18 million ha of reafforestation, apply air seeding in 26 million ha, apply mountain closure in a 13 million ha area.

In 1999, again as pilot province, Sichuan implemented 200,000 ha in a Grain to Green Project. The project plans to cover another 667,000 ha steep-sloping area by 2010.

Biodiversity

Since the 1960s, 115 wildlife and wetland nature reserves have been set up in Sichuan: 10 at the national and 345 at the provincial level. Nature reserves cover 7.4 million ha, or 15.3% of the total province. Among them, Wolong and Jiuzhaigou and Huanglongsi have been listed as World Natural Heritage Sites.

Since 1992, Sichuan has been implementing projects for protection of the Giant Panda and its habitat. Besides continuing the works on the original 11 Giant Panda Protection Projects, 7 new panda nature reserves are being set up. The Endangered Species Protection System was improved, and 25 local laws including the "Local Implementation of the National Wildlife Protection Law" were formulated and so a sound law system for wildlife protection has been built up.

Through international exchange and co-operation in the field of forest biodiversity protection, we implemented nature conservation projects aided by KFW, a biodiversity protection and sustainable utilization project in Ruergai by the Global Environment Foundation (GEF) and research on Giant Panda artificial rearing by WWF.

Development Plan

Overall Goal:

To build up an ecological shelterbelt in the upper reaches of Yangtze River.

Master Strategy

Take the opportunity of the West Development Program to rehabilitate forest ecosystems and develop forest industry systems through reinforcement on protection and cultivation of forest resources. At the same time, strengthen forestry technical infrastructure development so as to facilitate the change from traditional forestry to modern forestry.

Guiding Principles:

Prioritized ecological benefits, and at the same time give consideration to ecological and social benefits to realize balanced development.

Adjust measures to local conditions, manage different forestry resources separately based on stand-classification and area-subdivision.

Objectives:

By year 2010, build up an initial forest ecosystem and a forest industry system; forest cover reaches above 30%; forest projects become large scale and start to show integrated benefits.

By year 2030, forest cover reaches above 40%; rehabilitate a beautiful forest landscape and a functioning ecosystem, which matches the economic development and meets people's living requirements.

Problems & challenges

The area has some difficulties, including; high elevation with harsh climatic conditions, almost like temperate zone; poor soil conditions; which might require a very long period, and could be expensive. High population densities could also be problematic.

Tree Planting Session on Saturday 18th June 2005

The participants planted an area of 1.5 Rai (1 Rai =1,600 m^2) with potential framework tree species at Ban Mae Sa Mai, joining with more than 200 local Hmong villagers, forest department officials and CMU students. These trees will be monitored in future years.

Topics covered included planting techniques and the logistics of tree planting. In the afternoon participants examined the results of framework species plantings from previous years. They observed rate of canopy closure, elimination of weed cover and the individual characteristics of various recommened framework tree species.

FORRU Field Day on Monday 20th June 2005

The participants were taught how to monitor the phenology of flowering and fruit of native forest tree species in evergreen forest in Doi Suthep-Pui National Park. Additional sessions of seed collection and how to collect a voucher species for species identification were also run.

Herbarium and Tree Flora Database, Monday 20th June 2005

Chiang Mai University Herbarium Visit

The Chiang Mai University Herbarium stores 25,000 specimens and about 4,000 species. More than 2,200 specimens are from Doi Suthep-Pui National Park. Mr. Maxwell, the curator showed participants the voucher specimens, both dry and preserved in alcohol. They received FORRU's Production Schedule Poster which displayed photos of fruits and seeds of selected framework species. The participants were made aware of the utmost importance of accurate tree species identification in forest restoration projects. In an area which has no herbarium or institution that helps to identify trees, they appreciated the value of setting up an herbarium.

Herbarium Database

The herbarium database comprises taxonomic, ecological, and preliminary nursery production information. The database has helped FORRU to identify potential Framework Species. In addition, the database has now been published in the book *"The Vegetation and Flora of Doi Suthep and Northern Thailand."* A demonstration was run during which participants were taught how to use easily obtained data to narrow down their search for framework species suitable for their own areas.

Another data analysis session covered how to convert phenology data into easily understood graphs and charts. Participants were shown how to use these to schedule when and where to collect seeds.

Finally, Dr. Gruek Pakkad presented his research about genetic considerations of seed collection. Genetic diversity and variation were the main issues of discussion.

Nursery Techniques at FORRU's Research Nursery on Doi Suthep, Tuesday 21st June 2005

Establishment of a Research Nursery

Mr. Kunakorn facilitate a group discussion about nursery establishment and design with the participants. The topics discussed included:

- Construction
- Legalization
- Location
- Access
- Light
- Working space
- Storage
- Nursery office
- Outdoor Area
- Water Supply
- Disposal Management

Germination Trials

Mr. Cherdsak demonstrated various nursery processes from seed treatments through to germination and pricking out.

Monitoring Seedling Growth

Monitoring seedling growth is a major task for the research nursery. The seedling growth rate is very important for calculating a production schedules. The participants learned how to measure the growth of seedlings, and discussed management of production schedules.

Caring for Seedling in Nursery

Nursery management factors such as weed control, fertliser treatments, quality control etc were discussed. In this session, information was also presented on potting and caring for wildlings.

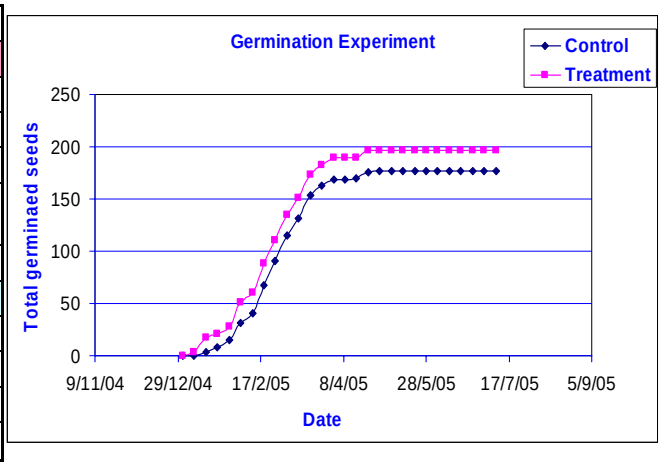
Production Schedules and Nursery Data Analyses, Wednesday 22nd June 2005

Analysing Seed Germination Experiments

This exercise allowed the participants to analyse the seed germination data that they had collected the previous day. An excel program was demonstrated which allowed relatively easy statistical analysis to be performed. The participants were able to process the analysis and produce the germination graphs.

T-Test: Paired Two Sample for Means

Final Germination	*Control*	*Treatment*
Mean	**59**	**65.666667**
Variance	37	49.333333
Observations	3	3
Pearson Correlation	0.93624368	
Hypothesized Mean Difference	0	
df	2	
t Stat	**-4.588314677**	**Significant**
P(T<=t) one-tail	0.022181517	
t Critical one-tail	**2.91998731**	
P(T<=t) two-tail	0.044363035	
t Critical two-tail	**4.302655725**	



Dormancy and Seed Collection Times

Rerlationships between length of dormancy and seed collection times were presented by PowerPoint. The presentation concentrated on how ecological knowledge can be used to help paln nursery operations and select appropriate species

Production Schedule

Examples of production scheduling were demonstrated by Dr Elliott. This tells the nursery manager how to produce plants on time, ready for dispatch at optimum planting time. It utilizes information on fruiting phenology, germination, etc for each species, to provide all the information required to schedule the production of the plants.

Field Monitoring Exercises, Thursday 23rd June

Seedling Performance

Standard tree monitoring methods implemented by FORRU were demonstrated, together with the effectiveness of various silvicultural treatments. Later the participants used these methods to monitor the seedlings which they planted on Thursday 18th June. They measured growth, health, canopy width etc.

Vegetation Monitoring

Vegetation monitoring is part of monitoring biodiversity recovery. Mr. Maxwell demonstrated the circular ploy method in which all ground flora plants under 1 metre tall in a circle are recorded, and given a Braun Blanquet score. The saplings, both planted and natural are measured, including their height and diameter. The participants carried out such a survey, recorded the plants species names in Chinese and Mr. Maxwell re-identified and confirmed the scientific names. The participants shared their experiences with Mr. Maxwell and FORRU staff about plant use and plant identification.

Community Motivation Session, afternoon Thursday 23rd June

The environmental conservation committee of Ban Mae Sa Mai hosted particioants for discussion of social aspects of forest restoration in their village.

Minutes of Meeting

1. **History and Background**

- Hilltribe village – Hmong
- The village is situated in Doi Suthep-Pui Natinal Park
- Main income from Lychee orchards
- Tree planting program, works with the community and jointly with the national park authority
- Due to decentralization policy, now the Sub District Administration Office is involved more in community activities. Now, the community has been separated into 2 sub-villages Mae Sa Mai and Mae Sa Noi.

2. **Rationale of BMSM Natural Resource & Environmental Conservation Voluntary Club**

- Mae Sa Mai Conservation Club was established on 10th August 1995 by some village committee members and was originally supported by the Royal Project. The original idea was to change the perception of people, that Hmong hill tribe people destroy the forest. In addition, their vision is to develop the quality of life of MSM villagers and change their lifestyle from forest-based agriculture to more alternative sources of income.
- Another aim is to protect the tradition and culture of **"Dong Seng"** Sacred Tree and Forest, which leads to forest conservation.
- A better understanding of conservation and forest restoration must be raised amongst the communty. Campaigns and demonstrations help. Moreover, VIP guest visits could generate interest among people.

3. **Collaboration between FORRU and the MSM committee**

FORRU was first acting as a buffer between the government and the local community. By meeting with all stakeholders who had different interests but shared the same goal, an agreement was reached. FORRU undertook the tree planting project and initiated the local nursery, which is also the Mae Sa Mai Conservation Club Office. Since then, FORRU has worked closely with villagers to generate the man-made forest and introduce awareness among villagers and people. Furthermore, forest restoration activities can generate income to both individuals who work with the project and the community.

4. **Outputs from Community's motivations for forest restoration works**

- The public and governmental organizations have a better attitude towards the villagers and they can prove that they can restore forest and manage their community in a sustainable way.
- The community awareness of conservation was strengthened by various activities e.g. firebreak cutting, fire control, tree planting, etc.
- The tree planting demonstration plots act as a study site for education and also ecotourism.
- The environmental benefits are perceived, such as water crisis decreasing, more wildlife, and better atmosphere.

Discussion

Q: Hill tribe people in China do shifting cultivation? Do you still apply shifting cultivation here?

A: Since Mae Sa Mai village was included in a national park, shifting cultivation was reduced and prohibited by the law enforcement. The area for agriculture is limited according population size. Now partial shifting for Lychee orchards is applied, but in a zoning system.

Q: When the agriculture area is decreasing but population is increasing, how do you manage to survive?

A: We tried to generate more alternative sources of income. The main income for Mae Sa Mai is Lychee orchards, which are annually harvested. Other income comes from cash crops such as cabbage, carrot, and potato, casual labor in town, and traditional silver and handicrafts sales. In addition, eco-tourism is promoting conservation and culture visits. Furthermore, the new generation has higher levels of education, so they can go to work in the town and change their careers from forest-based agriculture to a variety of jobs.

Q: How much is earnt from the Lychee orchards?

A: The income depends on production each year. If production is high in a given year, Lychee prices will fall, and vice versa. Now, Lychee price have become lower year by year. Five years ago, 100 Lychee trees generated 100,000 Baht. Nowadays the price is down 40%. So at the present time, 100 Lychee trees would generate only 40,000 Baht. According to the government, the country wide income from Lychees is 172 million baht per year.

Q: How much is the population here? Do you have a birth control policy?

A: Now the population is about 1,800, but increasing slowly. The rate is only 2 % per year. In the past, each family had about 10 children, mainly for labor purposes. Nowadays, they have less than 4 children, and try to have both genders in a family. Birth control is promoted by the government but applied voluntarily.

Planning,Friday 24th June

Time, Labour and Budgetting

This PowerPoint session, presented by Sudarat dealt with time scheduling of forest restoration tasks, labour planning and deciding on responsibilities and cost effective budgeting of tree planting events, maintenance and monitoring. Emphasis was on planning the logistics of community forest restoration projects.

Community Planning - Role Play Scenario on Friday 24th June 2005

Mr. Kunakorn led a role play scenario in which everyone had to adopt a certain role (e.g. village head, forest officer etc.) and negogiate to produce joint action plans for the communities they represented. The role play was very successful and stimulated a lot of discussion of both environmental and socio-economic issues.

Basic Information provided

Community A

Basic information:
About 25 km away from the nearest local town (B); highland elevation about 800-1200 meters from sea level; population about 600; occupation mainly agriculture with seasonal cash crops and small tourist related jobs as local trekking tour guide in national park area and selling forest products.

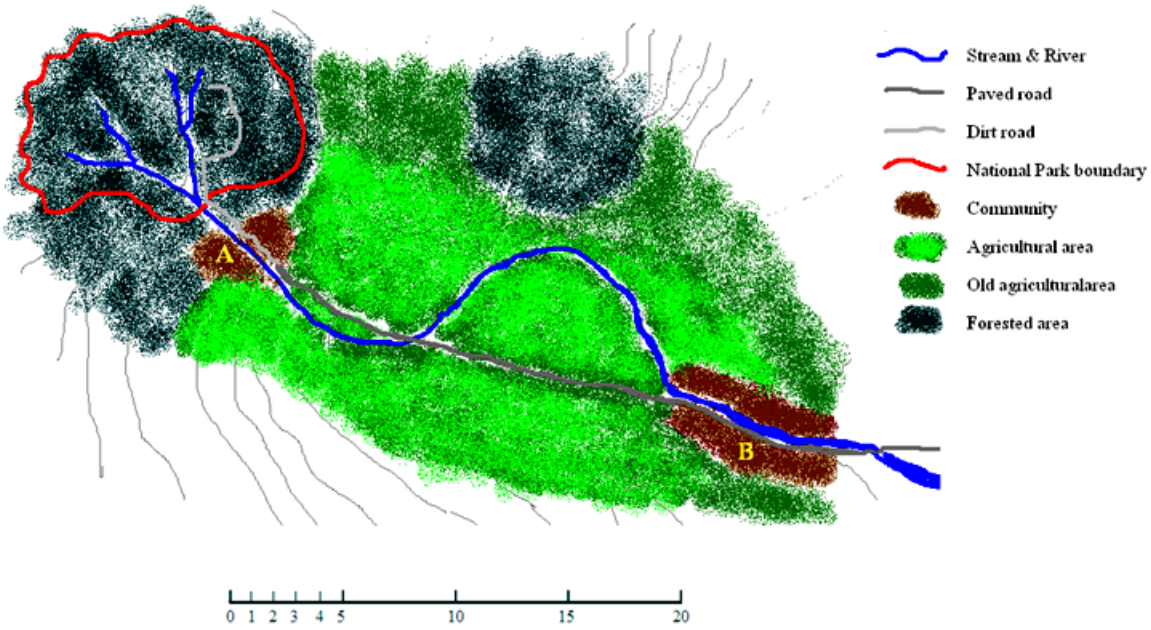
Community's concerns:
No health center and hospital; older children travel far to secondary school in town B; unstable economics causing some poverty problems; although having some buffer areas being used as community forest, there are still some conflicts between governmental forest officers and villagers about agricultural land invading into protected area, and losing forested area in and around national park effect local tourism.

Community B

Basic information:
About 150 km away from the nearest city; lowland elevation about 500-800 meters from sea level; population about 2,500; occupation mainly mono-crop agriculture and fruits plantation as orange and lychee; wood carving and handicraft are also well known; infrastructures include paved road; primary and secondary schools; 60-bed hospital; a post office; a television relay station; local radio station; supply shops.

Community's concerns:
High population growth rate, health problems related to chemicals used in agricultural fields. There is some interest in establishing eco-tourism related businesses since all the tourists traveling to the national park in community A have to stop to get some supplies here.

Topography Map: A is located Community A and B is located Community B



Appointed Task

Two researchers from a forest research unit of a university in the city have invited all the presented characters (see below) for an informal meeting to discuss the feasibility of setting up a local forest restoration research unit and implementing a forest restoration project. The meeting will be chaired by one of these two researchers.

Given Characters

- A leader of community A
- A farmer from community A
- A local trekking tour guide from community A
- 2 government forest officers working at the national park above community A
- A teacher from primary school in community A
- A committee leader of community B
- A committee member of community B
- A farmer from community B
- A businessman (wood carving & handicraft) from community B
- An NGO worker/environmentalist from community B
- A teacher from secondary school of community B
- 2 researchers from a forest research unit of a university in the city (visitors)

Afternoon Sessions

England Case Study by Dr. David Blaksley, Wildlife Landscapes, U.K.

Dr. David Blakesley presented a seminar which showed how the principles of forest restoration and framework species could be applied even in the temperate woodlands of Britain.

Field Data Analysis

Dr. Elliott presented a demonstration of how to analyse the type of field data that the participants has collected the previous day. The demonstration included statistical analyses using Excel on how to determine tree growth and survival rates and to compare these values among species to select appropriate framework species.

Final Discussion - How to apply FORRU in China

The final day was devoted entirely to discussion. The morning session was designed to generate initial ideas about establishing a FORRU in China. The afternoon session concentrated on generating the other outputs of this Darwin Project including publications, in-country workshop and project impelementation plans.

Discussion of Group 1

(Gaoligongshan National Nature Reserve, Management Station in Tenchong County, Yunnan Forest Vocational College)

1. Where would you locate a FORRU?
   - Gaoligongshan National Nature Reserve in Yunnan Province (Linjiapu Village in Tengchong County), the forest type here is subtropical evergreen broadleaf forest. This nursery is supported by ICRAF and is in its first year.
   - Second location is Yunnan Forestry Vocational College, the specific location is Changsongyuan forest farm in Songming County of Yunnan province. This is also supported by ICRAF, but this funding ends in September 2005, so it will need further funding.

2. How would you organise/administer it?
   - A FORRU Established in Tengchong County to manage forest restoration in the local area
   - Administered by the forestry college

3. Who should be involved?
   - To get a effective result, as many stakeholders as possible should be involved in a local FORRU project, such as local community, villagers' committee, local school (both elementary school and secondary school), forestry bureaus in county and township level and also the administrative bureau of Gaoligongshan National Nature Reserve.

- Besides the aforementioned stakeholders, multi-disciplinary experts from provincial forestry bureau, planning and designing bureau, and scholars from botany, ecology in universities and colleges in Kunming should be involved.

4. Which of the concepts that you have learnt about during this workshop would you consider adapting to running a FORRU in China?

- The training should be adapted for different target groups, and the training schedule and content arranged according to the background of the target group (trainee and participants), such as for forestry officials, technicians, villagers and students from the forestry college. Question not fully answered

5. Are there any forest restoration concepts that you want to explore that have not been covered in this workshop?

- Timber potential of framework species

6. Which research methods demonstrated in this workshop would you use when running a FORRU?

- Everything learned here can be applied in our current work, such as the concept of forest restoration, and its corresponding methods and practices.

7. What other research techniques would you like to have seen included in the workshop?

- tissue cultivation, cuttings, direct seedling/live broadcast.

8. Can you name any local Chinese forest tree species that you think are worth testing as framework species?

- *Alnus nepalensis* D.Don
- *Castanea lamellosa*
- *Manglietia insignis*
- *Michelia doltsopa* huch
  Betula luminifera

Most species are climax species in local forest. Except *Alnus nepalensis*, which is a pioneer.

9. How might you use the lessons learned during this workshop over the next 6 months?

- Tengchong management station
  - Phenology observation
  - Collection of seed and herbarium, processing of seed
  - Nursery construction and seedling experiment
  - Establish the herbarium room of tree species
  - Forest restoration training for local villagers, staff in the nursery, staff from the nature reserve management bureau and so on.
- Yunnan Forestry Vocational College
  - Compiling and publishing the teaching material with the title of “forest restoration”

10. What other comments would you like to make about the contents or running of this workshop?

- Prepare bilingual training materials for the participant from different countries (Dr. Steve commented that this was already one of the aims of this Darwin project)

Discussion from Group 2

(Forestry Departments & Bureaus)

1. Where would you locate your FORRU?
   a) Yunnan:
      - **Lijiang Prefecture** includes the catchments of 3 important rivers, and is listed as a world natural heritage site. It is a prioritized area for forestry development of the province, and eco-rehabilitation is of enormous significance. It has a mixed temperate and sub-tropical mixed climate along a vertical gradient. The Yunnan FORRU could be combined with 2 on-going projects which are plantation oriented, to serve as trial/demonstration part of these projects and thereby get funds supports. In the past, afforestation of Yunnan mainly used pure conifer species which now have various ecological problems and biodiversity problems which could be addressed by application of Framework Species Method.

   - **Sichuan:** Two areas are considered suitable for FORRU's research direction:

      - **Minshan Mountain System**, reasons are:
         - The area is one of the 25 prioritized global biodiversity conservation regions, the area includes 6 national nature reserves and is the main habitat of Giant Panda;
         - Important area for provincial biodiversity gene abundance;
         - Economy development backward, deforestation pressure is high;
         - FORRU concepts and methods are suitable to be applied in the area;

      - **South Mountainous Area:**

      Since 1970s, large area of pure species stands has been established. These forests now are vulnerable to disease, pests, and fire. Bio-diversity and forest productivity are low. In these stands, the framework species method could be applied to increase biodiversity, improve stand quality and increase productivity.

2. How would you organize/administer it?
   - Administered and organized by the FCCB office, whose project purpose is similar to the research direction of FORRU; Supported by local forestry units; Rely on mass participation and cooperation of the communities (planting, protection, maintenance, fire control…etc)

3. Who should be involved?
   - International organizations (Darwin, ICRAF, WWF, CI, etc)
   - Forestry research units: Academy of Forestry Science; Academy of Forestry Planning and Survey; Universities and Colleges;
   - Local governments;
   - Forestry technique extension units;
   - Communities, schools.

4. Which of the concepts that you have learnt about during this workshop would you consider adapting to running a FORRU in China?

- Human intervention to accelerate forest natural restoration process;
- Framework species method.

5. Are there any forest restoration concepts that you want to explore that have not been covered in this workshop?

- Interests and livelihood of the communities – multi-functions and benefits of forests;
- Direct-sowing for tree establishment
- Application of different forest restoration scenarios for different types of site conditions.

6. Which restoration methods would you use?
(Methods new to us)

- Phenology observation;
- Establishment of study nursery;
- Framework species concept/method;

7. Methods desired but not covered:

- Soil/water conservation control method/techniques;
- Afforestation techniques/methods suitable for sites that can hardly be afforestated by traditional measures;
- Baseline study survey method for the experiment plots and the control plots;
- Survey details about biodiversity restoration rate: is there a detailed monitoring standard?
- David Blakesley pointed out that forest vegetation survey is important but the surveys should cover other fauna: birds, other animal and insect species. If there is no special expert, this survey may only cover tree species and bird species; if yes, may cover other species (grass, animal, insects, etc).

8. Proposed framework species:

- **Yunnan:**
  - *Pinus yunnanenisis, Pinus armandi, Quercus acutissima, Ferinani coburgii, D. lotus, L. flavinervia, Ph. nanmu*
  - Betulaceae, Cherry, Indian azalea

- **Sichuan:**
  - *Robinia pydoacacia, Alnus, betula,*
  - Minjiang cypress, Green poplar

- Steve pointed out that the emphasis on traditional commercial species was too great, and that for the framework species to be successful, more native species must be selected for their biodiversity value, and ability to provide ecological services which attract wildlife into the new forests.

9. How might you use the lessons learned during this workshop over the next 6 months?

- **Yunnan:**
  If funds are available, training could be based at the nursery already built in Tengchong county, using mainly methods and contents of this workshop, replicating a training / workshop in Tengchong county. Participants could be: forestry academics, forestry technical staff, forestry project staff and FORRU experts from Thailand. International organizations concerned could also be invited. Outcome: concepts extension staff training, forestry working method enrichment. Most importantly, this training will gather feedback towards to a Yunnan FORRU initiative.

- **Sichuan:**
  - Brief the training contents to relevant parties so that the forestry administrators, staff and researchers will have a basic understanding of this workshop.
  - In training of all kinds of relevant forestry project, the framework species method will be introduced to the trainees as appropriate.
  - Assign the framework species method as a main topic in academic study/workshop activities conducted by the Sichuan Forestry association.
  - Based on feedback from the above-mentioned activities, develop an initial plan for a Sichuan FORRU.

10. Other comments:
- Through a combination of different forms of training activities (visualization, practice after lecture, learning by playing, etc.), the workshop was very effective. Organization and logistic works were well arranged and very considerate.
- Suggestion: could be longer time period if considering the intensive content; participants could be from a broader background, and more in number
- Looking forward to having lectures by FORRU experts in China, and to more communications and co-operations on this topic between Thailand and China.
- Many thanks to everything that FORRU and EMR have done for us!

Conclusion

After lunch the participants wrote up an initial plan for hosting workshop in China and taking the work forward on the other outputs.

AGENDA OF THE WORKSHOP IN CHINA

Title: "Forest Restoration & Biodiversity Conservation"

Objectives:

- To formulate comprehensive integrated FORRU plan for China.
- To write up proposal to establish the Forest Restoration and Research Project (FORRP) in China.

Major Content:

- FORRU-CMU presents the introductions about Framework Methods and Practices of Forest Restoration in Thailand.
- Introduction about problems and situation about forest degradation in China
- Present forestry projects in China include;
  - Natural Forest Protection
  - Slope Area Conservation
  - National Nature Reserves Establishment
  - Ecological Forest Restoration around dams and river banks
- How to improve ecological conditions in China with adaptations and combinations of FORRU techniques and concepts with China's forestry programs.
- How to set up the Forest Restoration and Research Project in China

Venue: Kunming, Yunnan

Organized persons:

- Yunnan Forestry College & Gongligonchan Nature Reserve

Participants:

- FORRU-CMU Experts
- Forestry Department/Bureau Officers from 6 forestry programs.
- Chinese Academy of Science Experts
- Chinese Academy of Forestry Experts
- Kunming Botanical Institute, Tropical Botanical Gardens Experts
- Others

Duration: In November 2006, 2 –3 Days, possible to run for 2 sessions

- Open for general agenda
- Closed session for proposal write-up

Budget: Maybe co-funding with other donors.

- Main cost is traveling allowances for experts from other provinces.
- Match requirements of participants to workshop venue, Hotel or University Hostel

Expected Outputs:

- A proposal for an integrated FORRU plan for China.
- How to combine the FORRU concept with ongoing ecological reconstruction
- Publications;
  - Fieldguide – **"How to Plant a Forest."**

The fieldguide will be translated and adapted to Chinese version include literatures case studies of Forest Restoration techniques and which has been published by Chinese researchers. The first draft of the Chinese version will be ready in April 2006.

- Manual – **"How to establish Forest Restoration and Research Project"**
  The publication in Chinese will be adapted to Chinese style, especially the structure of contents. The suggestion of changes would benefit to other countries version. The outline is in process of adapting.
- E-Books will be posted or linked in website of FORRU or ICRAF.

- The Forest Restoration and Research Project could be established in Yunnan Forestry Vocational School.
  - The president of the Yunnan Forestry Vocational School is supportive of the Forest Restoration Project.
  - The school is under the Yunnan Department Forestry with strong connection to other forestry units.
  - The school has a network with other forest research units, so provides a forum for people who are interested in forestation.
  - The school has developed teaching materials before and started a research nursery.
  - Strong connection and co-operation with Gonligonshan National Nature Reserve.

EVALUATION REPORT

Workshop Program	Satisfaction score			
	Excellent	Good	Moderate	Poor
17/6/05 - Introduction to FORRU and the framework species method. Why are FORRUs needed?	12	1		
18/6/05 - Joining tree planting event at Ban Mae Sa Mai	8	4		1
18/6/05 - Framework species plots - what can be achieved	9	4		
20/6/05 - Phenology and seed collection in natural forest	10	3		
20/6/05 – Phenology data analysis & genetics consideration	7	4	1	
21/6/05 - Germination, monitoring seedling growth, Nursery care and nurturing wildlings in the nursery at FORRU	10	3		
22/6/05 - Dormancy and seed collection times. Analyzing seed germination experiments. Production schedules.	13			
23/6/05 - Monitoring tree performance. Vegetation monitoring at Ban Mae Sa Mai	9	4		
23/6/05 - Community motivation for forest restoration	8	5		
24/6/05 - Planning - time, labor and costs Role Play Scenario for Community A and B	10	3		
24/6/05 - Woodland Restoration in U.K. Analyzing field data	13			
25/6/05 - Selecting framework species. Final discussion - planning exercise to set up your own FORRU	12	1		

 # Any subject do you think FORRU should provide more information? Why?

Statistical Analysis for foresters, which should provide more information for research studies.

 # Comments and Suggestion?

Get more examples about cases from other countries to form their own analysis to make it is more interesting and vivid.