



มูลนิธิแม่ฟ้าหลวง ในพระบรมราชูปถัมภ์
Mae Fah Luang Foundation under Royal Patronage

MAE FAH LUANG DEVELOPMENT MANUAL

Cultivate Land, Cultivate People:
Forest Surveying





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FOREWORD

In its extensive experience in sustainable development, the Mae Fah Luang Foundation has worked to “cultivate people,” to foster within them an understanding of the critical role of forests and other natural in their lives and give them incentives to preserve their natural environment. One clear way to do so is by raising the community’s awareness of the value of preserving and sustainably managing these resources to their lives and economic well-being. Other more complex issues, such as the importance of biodiversity, should also be discussed with people to ignite within them a genuine desire to preserve nature, encouraging them to work toward a true “harmonious coexistence between humans and nature.”

According to the fundamental principles of the Mae Fah Luang Foundation, sufficient and accurate data is central to any development program; and community leaders and local residents need to take part in every step of the program. The forest survey methodology of the Mae Fah Luang Foundation adheres to both guidelines, and is intended to provide development planners with comprehensive information on the species that have potential to be promoted as economic plants. Meanwhile, factual data, acquired by field observations and

through interviews with indigenous experts and local residents in the communities, provides the basis for preparing a development plan to meet the economic and social needs of the local community, while helping preserve the environment and managing the area to assure a thriving forest. Furthermore, by employing survey methods that emphasize local people joining in field observations and providing data, the process encourages their participation from the start of the program and provides many opportunities for all involved to learn more. It helps open the opportunity for the communities themselves to share and have a better understanding of their own surroundings, the planned program, and their potential, opportunities, choices and limits — a pragmatic approach to “cultivate people” to “cultivate land” and assure the future production of economic plants and sustainable management and conservation of the forests.

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PREPARATION

1.1. Reaching understanding with local leaders

As with other programs of the Mae Fah Luang Foundation, Forest Surveying requires participation of local leaders and other villagers from the very start of the program. Not only does this provide in-depth information from those villagers joining in the survey, but it also gives the community the opportunity to confirm the veracity of the data with field team and helps contribute to sustainable planting and management of the economic forests.

The main objective of the in-depth forest survey is to gain a clear understanding of the existing forest conditions, in particular the current forest stock and its quality, so as to prepare development plans for the forest. The forest survey should be done after carrying out participatory surveys to collect socio-geographic information of the area, providing that information back to the community, and determining the needs of the community have all been completed.

Prior to conducting the forest survey, the field team leader needs to inform local leaders about the proposed activities as well as the importance of surveying the forest and the purpose of planting an economic forest, and most important to understand the benefits the villagers will gain by planting and maintaining an economic forest. After that, the team leader should invite the local leaders to join in the forest survey and select at least 2 villagers with knowledge of plant species and experience in hiking through the forest to join the survey teams. If even more villagers are interested to join the survey, the team leader can assign them responsibilities in the teams according to each person's capability. .

In addition, the team leader should invite representatives from government agencies, such as staff from the Royal Forest Department, the Department of National Parks, Wildlife and Plant Conservation, and the local administrative authorities, to join the survey teams, either with specific duties or as observers. This gives them the opportunity to learn the data first hand from the start and so become important partners supporting future activities.

1.2 Setting Up the Forest Survey Team

After the community leaders and villagers have sent representatives to join the survey, the development worker should set up the team to conduct the forest survey. The team should consist of at least 7 people:

1. Team Leader

Should be an expert in forestry and plant species, able to identify species and their uses and potential dangers. The team leader must be able to assess the health of the forest. Furthermore, the team leader must have good relations with people in the local area. His/her responsibilities include determining the area to be surveyed and the boundaries of the survey plots, supervising the survey, reporting progress, and resolving any problems that may arise during the survey.

2. Tree Measurement Staff

Have responsibility for stretching the ropes and placing the stakes to delineate the survey plots, and to measure the width, height, and canopy of the trees and other species.

3. Data Recorders

Have the responsibility to record the names and details of all trees and other species observed.

4. Forest Mapper

Has the responsibility to map the location of trees and the forest density during the survey, and summarize the data in maps after the survey is completed.

5. GPS Reader and Photographer

Has the responsibility to record the GPS reference points of the survey area and of any rare species, as well as photographing the survey work.

6. Villager Familiar with the Forest

A local resident familiar with the forest, such as someone who used to hunt in the area, who would serve as a guide.

7. Villager Familiar with Local Species

A local resident who can give the names, uses and potential dangers of the various species observed.

1.3 Establishing the Survey Area and Planning

3.1.1 Equipment Needed to Set the Survey Area

1. A map with a ratio of 1:50,000 to demarcate the survey area.
(Remarks: the map should be up-to-date)
2. Pens and paper to take notes.

3.1.2 Steps to Determine the Survey Area

Forest surveys do not cover the entire forest, but rather by surveying sample plots and using this data to estimate the species and how healthy and abundant is the entire forest. The number of plots to survey depends on the size of the entire forest to be assessed. For example, a forest of about 20,000 Rai (3,200 ha) should have at least 8 survey plots, with each plot 5x40

metres or 10x20 metres in size, and located approximately 500 to 1,000 metres from each other. The criteria for setting the plots are:

1. If the area to be surveyed is in mountainous terrain, the survey plots should be chosen at different elevations to collect data from the different types of forests found at various elevations. For example, if the survey area ranges in elevation from a low valley to over 1,000 meters above sea level, the plots selected for survey might be:
 - 2 plots at > 1,000 metres above sea level (ASL)
 - 2 plots at < 700 metres ASL
 - 2 plots at < 500 metres ASL
 - 2 plots at < 300 metres ASL

2. If the area to be surveyed has a relatively flat terrain, the survey plots should be selected according to the type of forest or density of trees. One example would be:
 - 2 plots in a tropical moist forest, or a relatively unspoiled forest with high tree density of 200 per Rai (0.16 hectare). Wildlife such as birds and squirrels can still be found in this forest.
 - 2 plots in a restored forest, or an area where the forest had been encroached and the land used to grow crops or raise livestock, but has been left fallow for the forest to regenerate for at least 1 year. Forest density should be 120 trees per Rai, with the trees no taller than 20 metres.
 - 2 plots in a deteriorated forest, which is an encroached forest at the time of the forest survey. Mainly domesticated animals will be found in a deteriorated forest, such as oxen and water buffalo. Forest density would be 50-70 trees per Rai

- 2 plots on the banks of a stream or spring, where economic species are often found that are gathered for food or sold. These forest areas often have a great variety and diversity of species.
- 3. For highly dense forests, survey plots should be selected in areas where clusters of trees are found and along streams, with the plots located in areas with different tree densities.

1.4 Training and Equipment

Before conducting the forest survey, the team leader should call for a meeting of the team to confirm the role of each team member and prepare the equipment, as well as set the place and the day and time to conduct the survey. The survey teams should avoid days of inclement weather, since rain will not only be an obstacle to walking for the survey, but it will also interfere with the GPS signal.

Equipment Required for Forest Surveys

1. A field guide of plant and tree species: to confirm the species found
2. Tape measure: to measure distance and trees
3. Rope: to set the boundaries of the plots
4. Spray paint: to set the boundaries of the plots
5. Magnifying glass: to examine special characteristics of the species
6. Pen and paper: to take notes
7. Forest Survey Form: to record data
8. GPS reader: to record reference points, especially of trees with high potential to be economic plants. This will enable people to return to the plants later to collect seeds for propagation
9. Camera: to take photographs

10. Portable radio transceiver: for communication in case there is no telephone signal
11. Measuring tape: to measure the diameter of trees
12. Other essential items
 - Food and water
 - Raincoats
 - First-Aid kit

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FOREST SURVEY PROCEDURES

2.1 Planning the Survey Route

Before conducting the forest survey, the team needs to establish the survey route by taking into consideration the following two matters:

1. Safety of the proposed route
2. The elevation of the area to be surveyed. The forest survey should begin at the lowest elevation of the survey; then proceed along the most feasible and least time-consuming route. An example is provided in Figure 1, in which the route starts from the first plot and goes to the highest plot on the left side of the mountain (from plot 1 to 2, 3 and 4). The route then moves to the right side of the mountain and proceeds to the lowest plot on the right (from plot 4 to 5, 6 and 7). This route requires less time than if the plots at each elevation were to be surveyed before moving to the next elevation (in this example, 1 and 7, then 2, followed by 3 and 6, and finally 4 and 5).

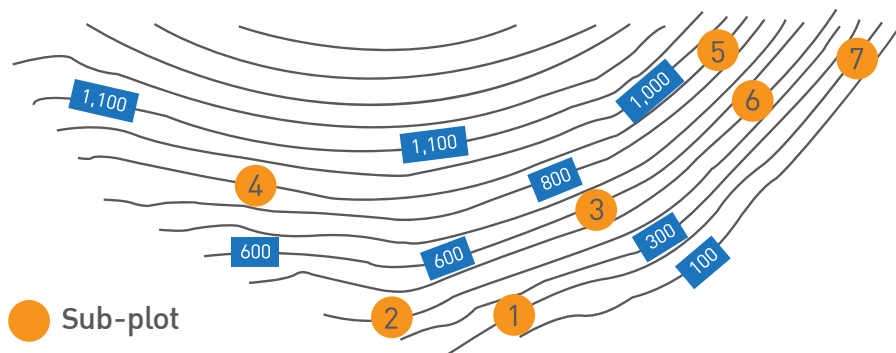


Figure 1:

Example of a survey in a mountainous terrain, and the proposed survey route. The team should always consult with local residents in detail to determine the best route.

Advice and Warnings:

1. If it is raining or if it appears rain is expected above the site being surveyed, the survey team should suspend the survey. They should also avoid camping near waters in case of flood.
2. Tropical rain forests and streams are natural habitats of leeches. The survey teams should always wear long pants and long socks pulled over the pants legs, to prevent leeches from attaching themselves to the feet.
3. Beware of poisonous plants and poisonous or venomous animals, always being sure to ask local residents in advance about the presence of any such plants or animals.
4. Always carry water, food and first aid kits.
5. Always inform the local communities of the dates and times the survey will be conducted as well as the direction and route of the survey.
6. Beware of forest fires during the dry season. Collect information, ask, and notice conditions in the area before starting the survey.
7. Coordinate with the agencies responsible for the area, such as the National Parks or the Royal Forest Department, every time you survey. If the area is along national borders or supervised by the military, advance notice must be given to the relevant authorities, or their staff be asked to join the survey. .

2.2 Marking Plot Boundaries

When the survey teams go to the designated survey sites on their maps, they will need to select the location to set up the survey plot and mark its boundaries according to the following steps:

1. Select an area for the survey plot where biological diversity is greater than elsewhere in the vicinity.
2. The plots sizes should be 5x40 metres or 10x20 metres, which is large enough to be representation of the forest in the vicinity.
3. Stretch out a rope to mark the plot boundaries. Mark the trees in the 4 corners of the plot with spray paint. Record the GPS reference points of each corner to be entered later in the map.



Figure 2:

Marking the plot boundary with nylon rope

2.3 Walking Through the Survey

To ensure thorough data collection, the survey plot should be divided into equal sections the length of the plot and 2.5 metres wide. For the 5x40 metre plots, two sections of 2.5x40 metres (and for the 10x20 metre plots, four sections of 2.5x20 metres) should be clearly marked to prevent overlapping and duplicate tree count. The surveyors should walk

lengthwise in one section, collecting thorough data from that section; then when finished turn 180° and walk lengthwise to survey the next section. Team members should perform the duties assigned them by the team leader.

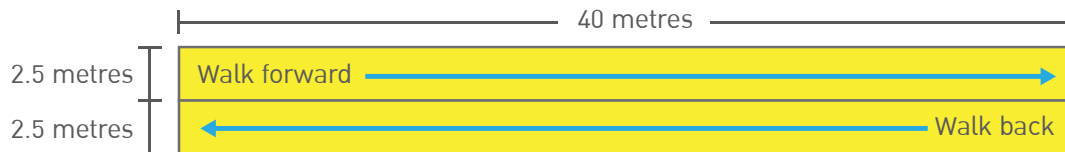


Figure 3:

Example of a survey plot divided into two equal sections and how the survey team should walk through the sections to ensure thorough data collection..

2.4 Data Collection

During the survey, the team leader and local resident who is expert on plant species will provide details on the tree species found in the plot, including the common names, local name, type of species, benefits and potential harm. If uncertain, the field guide to plants and trees should be referred to. Data recorders must enter the details provided by the team leader and the local expert, and the tree measurements provided by the tree measurement staff on the forest inventory form.¹ The data recorders should inform the team if any of the species are repeated, to assure they are distinct plants and avoid counting any of them twice.

The GPS reader and photographer should record GPS reference points of important plants or species with high economic value, such as Agarwood, and take photos of those trees for reference. The photographers should also take pictures of the various stages of the fieldwork.²

¹ See the Forest Inventory Form in the Annex

² For bamboo species, the survey team should identify and categorise the species accurately, as different species can have different uses. Bamboo species commonly found in Northern Thailand include *Dendrocalamus strictus* (Solid Bamboo), *Dendrocalamus hamiltonii* (Hamilton's Bamboo), *Dendrocalamus longispathus* (Long-sheath Bamboo), *Cephalostachyum pergracile* (Tin-wa Bamboo), and *Gigantochloa albociliata* (Burmese Stripe Bamboo). Solid Bamboo is known for its strength and commonly used in construction. Hamilton's Bamboo is used for food. Bengal Bamboo is used in basketry and its shoots pickled for food. Tinwa Bamboo is also used for weaving and the joints of its stems for cooking a glutinous rice mixture (Khao Lam). Burmese Stripe Bamboo is used for food as well as to make handles for scythes and sickles, hoes and spades, and as a pole for growing beans and other vegetables on vines. Bamboo grows new canes from its rhizomes for about 80 years, then will die off with a mass flowering of the plants in the vicinity. If a large area of flowering bamboo is found during the survey (usually occurring during the hot season around March and April), the team should inform local leaders to be vigilant in preventing forest fires that could harm the bamboo. The mass flowering releases a large amount of seed, which will germinate and grow new bamboo in 3 years. If it is desired to grow bamboo elsewhere, the seeds can be collected from the forest floor during the rainy season after the flowering and taken for planting in the new area.



Figure 4:

Data recorders entering data provided by the team leader, local expert and tree measurement staff into the forest survey form.

2.5 Tree Measurement

The tree measurement staff must measure all plants in the survey area: trees, shrubs, climbers, and underbrush. The measurement should include girth, height, and the tree crown. For climbers and vines such as rattan, only the diameter needs to be measured.



Figure 5:

A GPS reader records reference points of important plants, with photographs of the plants, and the survey procedure.

2.5.1 Measuring Tree Girth

For smaller plants with a diameter of less than 10 cm, the diameter should be measured at 6-8 cm from the ground. For climbers and vines, the diameter should be measured at the base of the plant. The diameter of larger trees should be measured at 100 cm above ground. To measure the diameter of a tree, hold the tape on one side of the trunk (left), then pull the tape out perpendicular to the tree and measure the point on the other side of the trunk (right) and read the measurement in centimetres. Alternatively, the circumference of the tree can be measured, then divided by 3.14 to obtain the diameter.

For smaller bamboo species such as *Dendrocalamus longispathus*, *Cephalostachyum pergracile* and *Gigantochloa albociliata*, measurement should taken at 10 cm above ground; whereas larger species such as *Dendrocalamus strictus* and *Dendrocalamus hamiltonii* should be measured at 100 cm above ground, using the same methodology as for other trees and plants. For the larger bamboo (with diameters above 10 cm), the tree measurement staff should also count the number of stems per cluster.



Figure 6:

For trees with diameters less than 10 cm, the measurement should be taken at 6-8 cm above ground.



Figure 7-8:

The diameter of climbers and vines should be measured at the plant base.



Figure 8



Figure 9-12:

For trees with a diameter greater than 10 cm, the measurement should be taken at 100 cm above the ground.



Figure 10



Figure 11:



Figure 12:

2.5.2 Measuring Tree Height

For smaller trees, height should be measured from the base of the tree to the top of the crown with a measuring tape. For trees taller than 2 metres, the 2-metre height on the trunk should be identified and clearly marked. One of the measurement staff should then move 15-20 metres away from the tree, the distance at which the most accurate estimate of the height can be made. With one hand, the person measuring the tree height should make a C shape with their forefinger and thumb, so the tips of the fingers represent the 2 metres height. Keeping that gap between the 2 fingers, the person should then move the C-shaped fingers up along the tree in consecutive steps and count the total number of steps to the top of the tree.



Figure 13-14:

Measuring a plant less than 2-metres high, using a measuring tape from the ground to the top of the plant.



Figure 14:



Figure 15-16 (left to right):

To measure the height of trees over 2 metres high, the point on the trunk 2 metres above ground should be clearly marked. One of the measurement staff then moves 15-20 metres away from the tree, making a C shape with the index finger and thumb, so the distance between the tips of the fingers represents the 2 metre height.

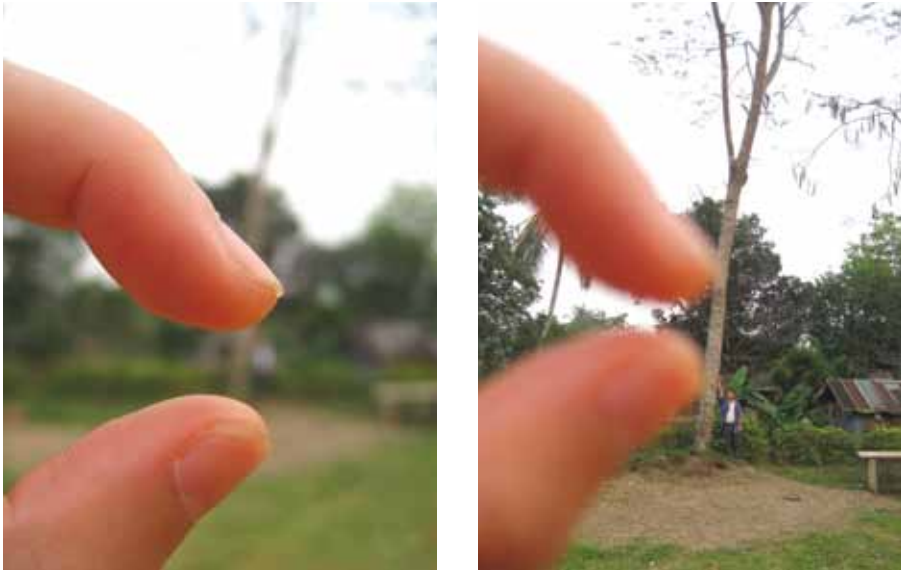


Figure 17-18 (left to right):

To measure the tree height, move the C-shaped fingers upward in consecutive steps along the trunk and count the total upward moves required.

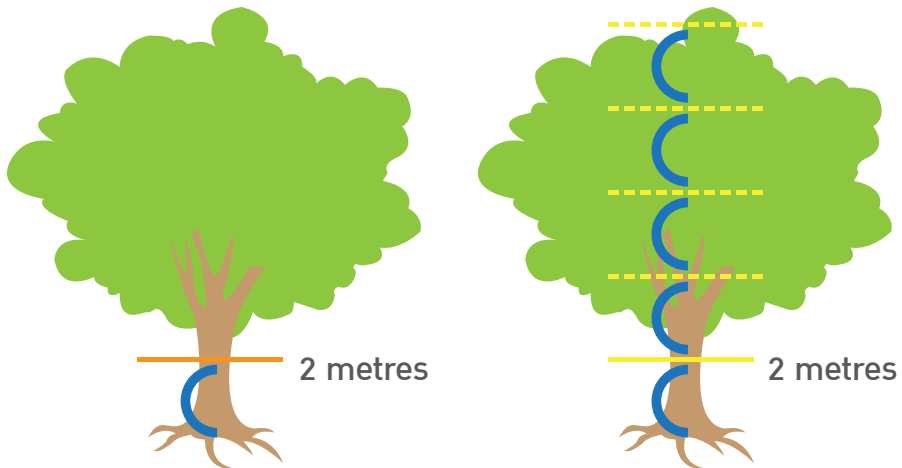


Figure 19:

For trees over 2 metres high, estimating the height using fingers as a measure of 2 metre intervals, in this example, the tree is 5 intervals from bottom to top; therefore, the tree is 10 metres high.

2.5.3 Measuring the Tree Crown

To measure width of the tree crown, measure the longest distance parallel to the crown from one outer edge to the opposite outer edge.

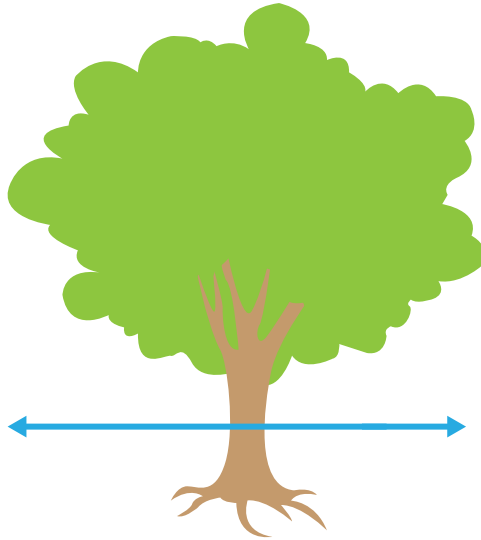


Figure 20:

Measuring the crown from one outer edge to its opposite edge.

2.6 Preparing the Draft Maps

During the forest survey, the forest mapper should prepare a sketch of the location of the plants in the survey plot, as an overhead view, by using symbols such as circles to denote the locations. Information that should be presented includes crown size and tree height. After completing the survey, the forest mapper should prepare a transect view of the plot, recording the species name and height of each plant, as shown in Figure 21.



Figure 21:

A transect map of the survey plot based on the overhead sketch, showing tree names.

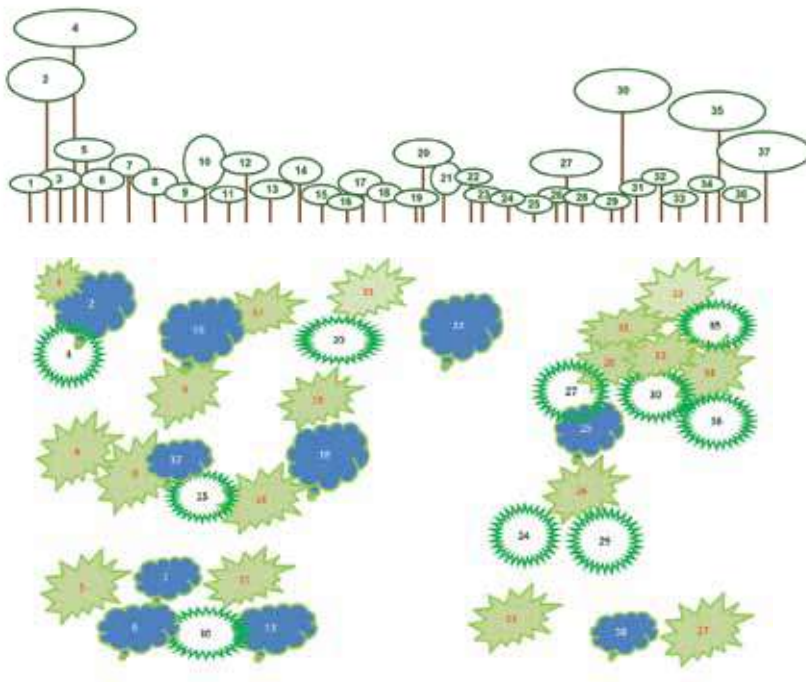


Figure 22-23:

Sketch maps of survey plot in Dong Hor Forest, Song Kwaë district, Nan Province.
(Top) Transect view / (Bottom) Overhead view

1. *Cleidion javanicum* Blume 2. *Cleidion javanicum* Blume 3. *Flueggea virosa* 4. *Dracontomelon dao* 5. *Cleidion javanicum* Blume 6. *Debregeasia velutina* Gaud. 7. *Ostodes paniculata* Blume 8. *Ostodes paniculata* Blume 9. *Diospyros coaetanea* 10. *Ehretia timorensis* Decne. 11. *Baccaurea ramiflora* 12. *Musa acuminata* Colla 13. *Flueggea virosa* 14. *Eugenia formosana* 15. *Baccaurea ramiflora* 16. *Calotropis gigantea* 17. *Flueggea virosa* 18. *Dracontomelon dao* 19. *Linociera ramiflora* 20. *Eugenia formosana* 21. *Baccaurea ramiflora* 22. *Cleidion javanicum* Blume 23. *Baccaurea ramiflora* 24. *Linociera ramiflora* 25. *Linociera ramiflora* 26. *Linociera ramiflora* 27. *Cleidion javanicum* Blume 28. *Chukrasia tabularis* 29. *Flueggea virosa* 30. *Chukrasia tabularis* 31. *Cleidion javanicum* Blume 32. *Linociera ramiflora* 33. *Linociera ramiflora* 34. *Linociera ramiflora* 35. *Cleidion javanicum* Blume 36. *Linociera ramiflora* 37. *Knema laurina*

[03]

COMPILING AND ANALYSING THE DATA

3.1 Data Compilation

After conducting the forest survey, the team needs to compile all the data it collected to create a database on the conditions of the forest in the project area. The data should be compiled according to elevation, and include:

1. Plant Species
2. Tree Volume
3. Average Tree Density per Rai or hectare

For elevations where only one plot was surveyed, tree density for that plot will be used for the average tree density of the forest at that elevation. If more than 1 plot was surveyed at an elevation, the tree density will be calculated as the average of all the plots at that elevation. Note that tree density will have to be converted from the plot area (each plot measures 200 m²) to either Rai (1 Rai = 1,600 m²) or hectare (1 ha.= 10,000 m²).

4. Average Tree Height

3.2 Data Analysis

3.2.1 Analysing the Class of Forest

The survey team can identify the Forest class at each height by assessing the dominant species, tree density and the average height of the trees. The following need to be considered when identifying forest classes:

1. Tropical moist forests have high tree density of 200 trees per Rai (1,250 per hectare). Average tree height is over 20 metres.
2. Restored forests have a lower tree density of 120 trees per Rai (750 per hectare), with an average tree height of below 20 metres.
3. Deteriorated forests have a tree density of 50-70 trees per Rai (300 to 450 per hectare).
4. A stream-way forest can be identified by its terrain, with a natural stream running through it.
5. “Usable” forests have plants (trees or bamboo) that can be used for construction of houses or other structures. Many of the plants in this forest type are fast-growing.
6. Economic forests have plants that can create income. They can either be consumed or sold.

3.2.2 Analysing the Forest Ecosystem

The data entered in the forest survey form and the forest maps can be used to assess whether the forest at different elevations is healthy or not. The presence of vines, plants like pepperwood (*Piper interruptum Opiz*), lichen, moss or orchids are indicators of a healthy ecosystem. The amount of groundcover can also indicate moisture, as there are more groundcover plants with higher moisture.

3.2.3 Analysing the Uses of the Forest

In order to have sufficient information to prepare a development plan to promote economic plants, knowing what plants and how many of them to grow, the survey team should assess the existing uses of the forest by answering the following questions:

1. What plants were found? How many species? Which ones are they? How much is available? Is it enough for the needs of the local people or not?

2. What other plants that can be used were found? How many species? Which ones are they? How much is available? Is it enough for the needs of the local people or not?
3. What economic plants were found? How many species? Which ones are they? How much is available? Is it enough for the needs of the local people or not?

3.2.4 Analysing Data from the Needs Assessment of the Local Community

In addition to the forest survey data, the survey team should include information from the assessment of the needs of local community in the forest database. The needs assessment gives local residents the opportunity to provide their views about various matters concerning their area, including the quality of the forest. The Mae Fah Luang Foundation development workers usually ask these questions when learning about an area:

1. What types of economic plants can be found in the area? How many?
2. Which economic plants can be further processed? What are the steps in planting and processing?
3. What types of plants are in the forests within and around the community, both in the past and at present?
4. What types of wild animals are in the forests, both in the past and at present?
5. What is the condition of the watershed, in the past and at present?

3.3 Preparing the Forest Survey Report

The survey team is bring together all the data about the forest, obtained from the forest survey, discussions with local experts, and exchanges of information with local residents, for compilation and analysis, to be presented in a forest survey report. This data is to be used in preparing a development plan to promote planting of economic trees by local residents. It can also be used to evaluate the project's impact on the environment.

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We would like to thank the people in all the local communities where we worked, who have shared their ideas and worked together in the development efforts, which has led to the knowledge distilled in this book. Our sincere thanks to the community development volunteers in Song Khwae, Tha Wang Pha, and Chaloem Phra Kiat Districts of Nan Province who reviewed the first drafts of these manuals. We would also like to thank everyone who supported the production and devoted their time and energy to the creation of the Mae Fah Luang Handbook series.

BIBLIOGRAPHY

Prayong Srisatjai. 2011, Field Team Staff, Special Projects, Mae Fah Luang Foundation under royal patronage, Interview, 3 September.

"What works, record it
for use as a guide in the future.
Whatever is a failure,
record it as well, so as not to repeat it."

King Bhumbol Adulyadej



A series of horizontal dotted lines spanning the width of the page, intended for handwritten notes or reflections.

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King Bhumbol Adulyadej

A series of 26 horizontal dotted lines for writing notes.



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