

# *Rainforestation Farming*



A farmer's guide to sustainable forest  
biodiversity management

PACIENCIA PO MILAN  
Second Edition  
2009

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VISAYAS STATE UNIVERSITY



FOUNDATION FOR THE PHILIPPINE ENVIRONMENT

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A Farmer's Guide to Sustainable  
Forest Biodiversity Management

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# Introduction

Since long past, reforestation efforts in the Philippines were undertaken using narra (*Pterocarpus indicus*) and foreign or exotic tree species. In the most recent practice, more and more exotic species were being introduced, thus, the native and indigenous tree species that are usually favored by loggers and poachers have been wiped out except in difficult to reach forest pockets in some islands of the country.

Hence, reforestation can be described as a failure in terms of restoring the original vegetation of our forest ecosystem. With this scenario, the Visayas State University, formerly Visayas State College of Agriculture (ViSCA) and Leyte State University (LSU), through a joint-research project with the Philippine-German Applied Tropical Ecology Programme funded by GTZ, developed the technology well-known as "Rainforestation Farming". It is a concept in forest restoration wherein only indigenous and native tree species are used.

Rainforestation farming is applied to reduce the destructive impact of logging in the environment. Considered as a sustainable farming system, this prevents further environmental degradation by using appropriate forestry strategies and preserves wildlife. Local fauna were even observed to re-colonize rainforestation farms. Birds, fruit bats, reptiles and amphibians were seen after four years from planting of mixed native species. The advantages in the adoption of rainforestation as a strategy to bring back the original forests, their ecological functions as well as biodiversity have long been the battle cry of Rainforestation advocates especially by VSU and HARIBON. At the policy level, HARIBON had been active in the consultation for the drafting of Department of Environment and Natural Resources Memo Circular 2004-2006 made in August 2004. The Memo Circular pushes for the integration of Rainforestation in the development of open and denuded areas within protected areas and other appropriate forestlands.

In an effort to disseminate rainforestation farming not only to advocates but also to farmers, this guide was faithfully produced. This guide recommends how to reconstruct the natural vegetation of the forest, making farmers adjust to a new scheme of sustainable farming system. This also emphasizes cooperation and leadership in the community as farmers themselves become "rainforest-farmers". This starts with all you need to know about how to establish a Rainforestation Farm starting with nursery establishment to taking care of the Rainforestation farm.

# What is Rainforestation Farming?

**Rainforestation Farming** is a sustainable farming system used as a strategy for forest restoration using native or indigenous tree species in combination with agricultural crops.

## Why Rainforestation Farming?

The Philippines is one of the most megadiverse countries in the world. But soon, with continued negligence, it might become the least diverse place on earth.

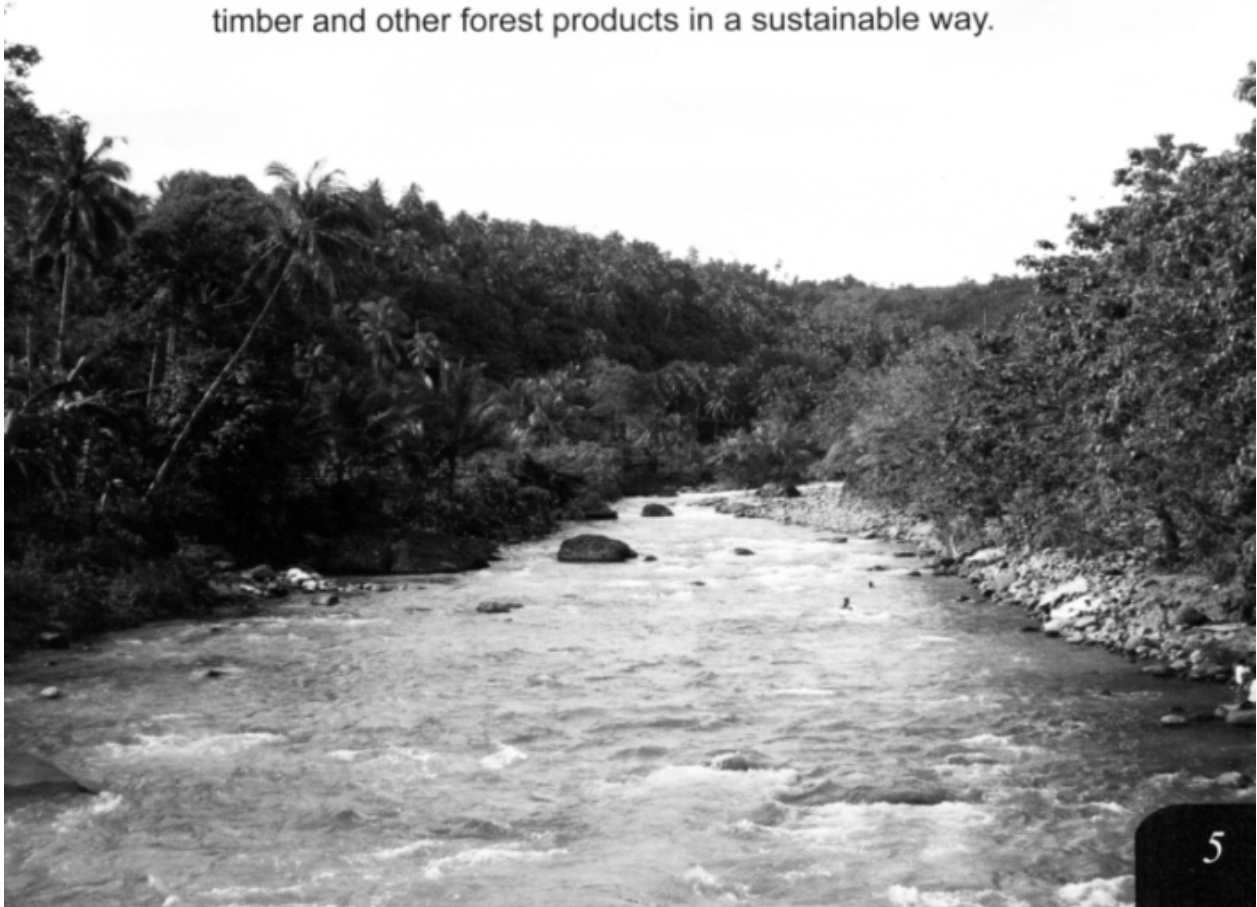
The country likewise remains to be the hottest of the hot spots in terms of most threatened biodiversity. Influx of several infrastructures, mining projects and even rapid population growth have placed the Philippine forest in an alarming state. The continuing depletion of its biodiversity has taken a heavy toll in the forest ecosystem. The consequences are no science fiction and the reality is truly grim.

There have been efforts to preserve the biodiversity of the Philippine forests and simultaneously sustain human food production. One simple way to achieve this is to adopt **Rainforestation Farming**.

The concept of **Rainforestation Farming** is to plant trees native to their forest. It is believed and tested that the forest becomes more sustainable and increasingly diversified if local trees are planted instead of foreign tree species. Its intent is to recreate an ecosystem as close as possible to the original state of the forest, with most of the physical structure and productivity matching the original ecosystem and biodiversity. To simply put, **Rainforestation Farming** is planting trees native to home.

**Rainforestation Farming** aims to replace the destructive forms of “kaingin” or slash and burn practice, form a buffer zone around the primary forests, protect their biodiversity, and help maintain the water cycle. More so, **Rainforestation Farming** can provide farmers with stable and higher income.

With these objectives in mind, we are not only thinking of saving our forest ecosystems but also want to address the needs of our farmers in terms of food and timber and other forest products in a sustainable way.



## Chapter 1. Forest Resources Inventory and Site Selection

Forest inventory is important prior to all activities needed to be done in establishing a **rainforestation farm**. It is the preliminary inspection of the forest to obtain needed information such as original forest type or vegetation.

### Things to look out for in site selection

What are the things you should watch out for in site selection?

You have to check the distance from the target nursery site. Ideally, the nursery site should be located next to or near the restoration site in order to facilitate the transfer of the wildlings later.

The location of the site near an old growth or secondary forest should also be considered. The forest will be the source of your wildlings.

Don't forget to ask local people near the area who are knowledgeable about the native tree species in the site. They can be a big source of information on what tree species existed in the area before. This is to avoid planting exotic species.

Remember, only those that are native to that area must be used.

## Chapter 2. Nursery Establishment

After looking through the site and identifying the local tree species in the area, you may now start the **rainforestation farm**. It is best to begin with your own nursery. Seed collection, treatment and care for the seedlings must be given much attention so that it will give you a good head start for a successful rainforestation farm. To start your farm, here are some steps to follow.

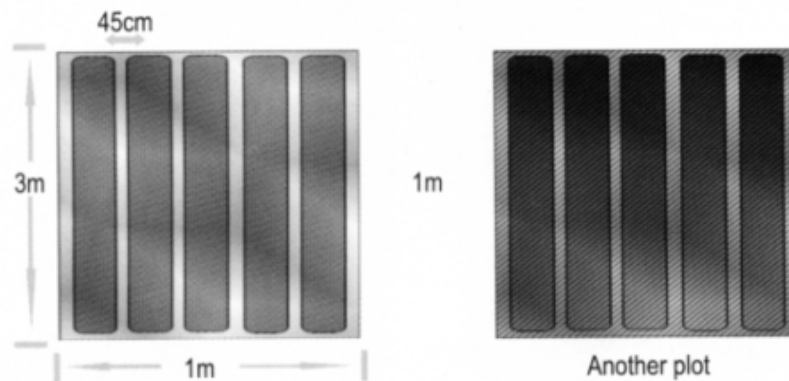
- 1 Scout for an area with good source of water and temperature. A shaded place is the best site for nursery establishment. It must also be near the areas to be reforested.



2 Clean the area from solid wastes and non-biodegradable materials.

3 Make a canal for good drainage. Leave standing trees if present.

4 Make a seed plot measuring 1m x 3m. The distance in between seed plots must be 45 cm and between rows of seed plots should be 1 meter. Below is an illustration of how it will look like.



5 Construct a shed house measuring 5m wide and 8m long. Part of the shed house must be open as a working area, while the other half can be utilized as tool/storage room.

## Tools and Materials

- |                      |                      |
|----------------------|----------------------|
| 1. Bolo (brushknife) | 11. Shovel           |
| 2. Lever             | 12. Pick             |
| 3. Rake              | 13. Wheel borrow     |
| 4. Hammer            | 14. Saw              |
| 5. Nails             | 15. Wires            |
| 6. File              | 16. Sharpening stone |
| 7. Chisel            | 17. Seedbox          |
| 8. Hose              | 18. Pail             |
| 9. Poly bags         | 19. Cutter           |
| 10. Potting soil:    |                      |
| Humus soil           |                      |
| Top soil             |                      |
| River sand           |                      |
- (Note: Top soil and river sand are mixed to 50-50% proportion)

## Soil Mixture Preparation

The soil mixture or potting media should be as follows: Garden or forest soil and river sand. You can even mix the normal soil in your area with compost soil. The ratio of the garden or forest soil and river sand should be 2:1. Mix soil thoroughly.



normal soil

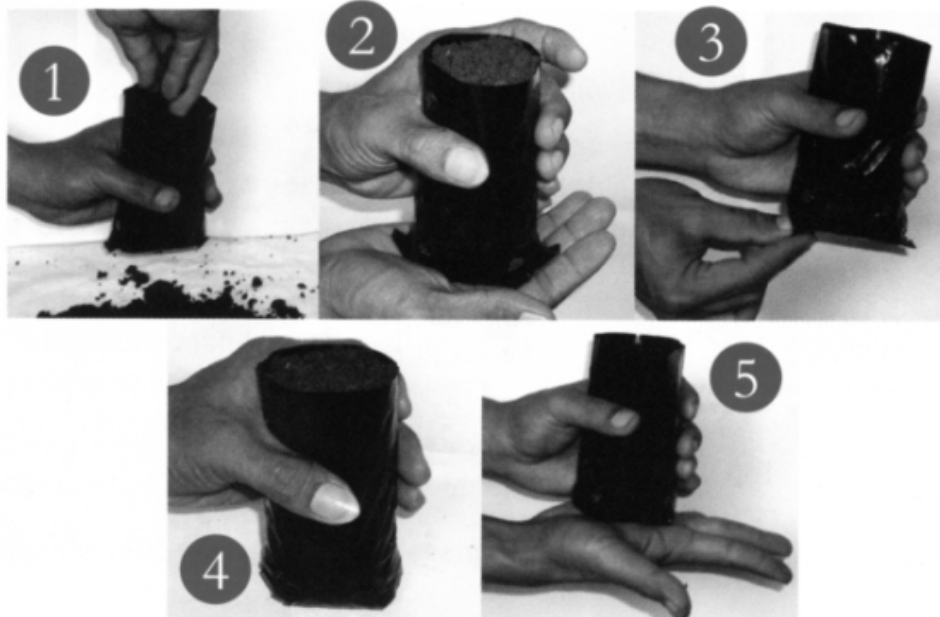
compost soil



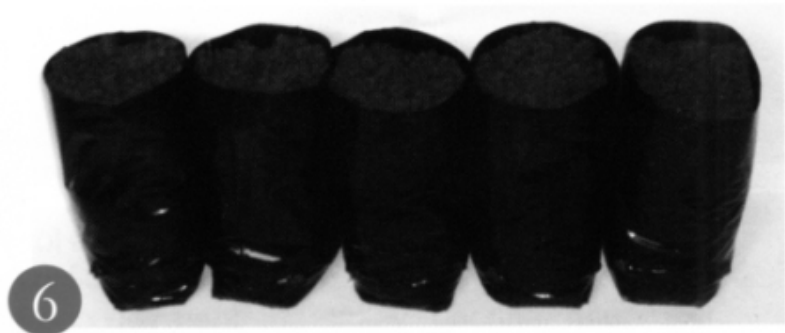
Remember: Do not cook or sterilize the soil or compost because some microorganisms add fertility to your soil.

## Bagging the Soil

Once your soil mixture is ready, it is now time to bag it in either cellophane, abaca bracts, coconut leaves or food wrappers or tetrapacks.



Place the ready bags into upright position in a wooden tray for easy transport to the potting site and to their final place in the nursery.



Remember:

It is important to know the mother trees in your areas. Collect seeds from mother trees in your area. Most Philippine trees are seeding during the first months of rainy season.

You have to visit the mother trees every week during fruiting season because fallen seeds have to be brought back to your nursery immediately as some seeds have short viability period.

The tree should be healthy, with straight trunk and balanced branches with plenty of leaves. The height should not be less than four meters and the age is between fifteen to thirty years old.

## Chapter 3. Seed Collection

Some Examples of Seeds from Dipterocarps



White Lauan

Red Lauan

Apitong

Yakal Kaliot

Dipterocarp species will bear fruit every five to ten years depending on the species. Since there are around 52 species of dipterocarps there would be different dipterocarp species that flower every year.

## Treatment/Method of Seed Germination

Once you have collected the seeds for your nursery, it is important to treat them in the appropriate method. However, if the seeds are big like lauan, apitong, yakal, etc. then you can plant them directly into the prepared bags.

### Germinating Hard Seeds

Examples of hard seeds:

DAO, MOLAVE, KALUMPIT and BAGALUNGA

1

Collect well ripened and good seeds. Let it stand for 2-3 days.

5

Dry seeds again under the sun for one day and then soak in cold water for 24 hrs.

2

Clean seeds and air dry for 2 days.

6

Gather seeds. Wrap the sack with plastic for 3 days to produce heat.

3

Sun-dry for 3 days.

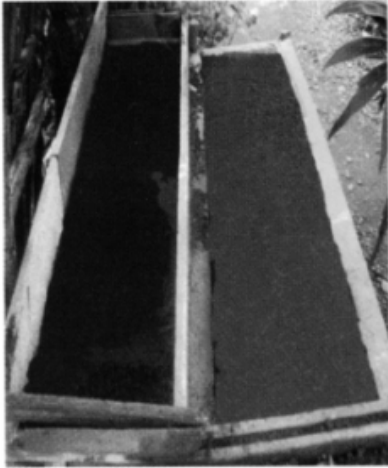
7

Sow the seeds in the seed plot or in the polybag. Germination will occur in 18-27 days.

4

Put dried seeds in a sack and store for 5-8 days.

## Germinating Seeds in a Seedbox



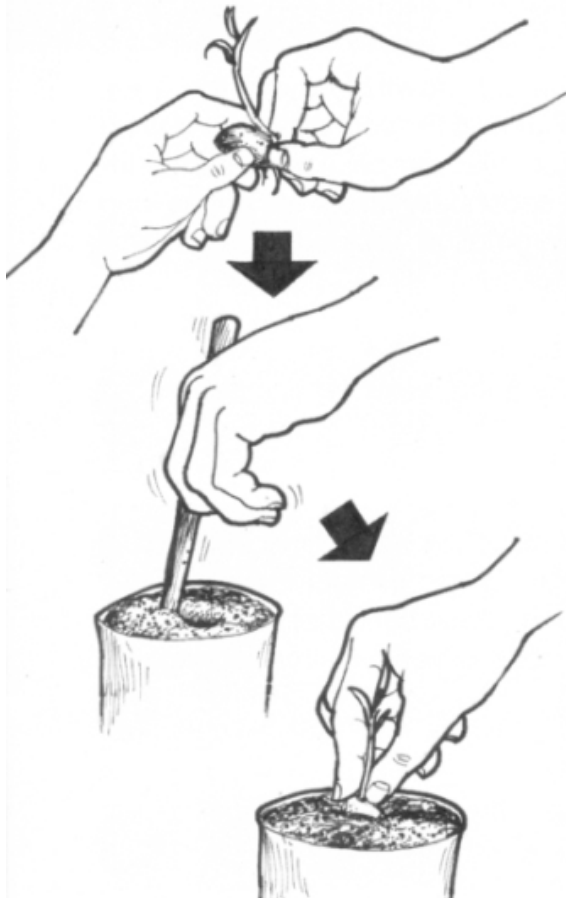
The elevated seedbox is designed to control water/rainwater from seedlings. This is different from seeds germinated in plots since watering is uncontrollable especially during heavy rain.

Place the seed germination bed/box inside the shed house.

The mixture of the soil in the seedbox is preferably 75% river sand and 25% topsoil.

Remember: The seedlings will be ready for potting when their height reaches at 2.5 - 5 cm.

## Potting the Seedling



The seedlings must be transferred to the bags as soon as they unfold their first leaves.

Use a stick to put a hole in the poly bags.

Place the seedling carefully in the poly bag through the hole.

## Caring for the Seedling



The seedlings must be watered daily.

Keep them under half-shade light conditions.

Regularly move them every two months to prevent establishment/penetration of the roots in the soil.

Repot them into bigger bags if they have to stay in the nursery for one year.

Remember: Bagalunga, kalumpit, dao, narra and molave need to be placed under full sunlight.

## Chapter 4. Wildling Collection

Wildling collection should be in an old growth forest in the area. This is because an old-growth forest is cool and the forest floor is devoid of grass so the wildlings can be easily identified. In case where the old growth forest is nonexistent in the area, a secondary forest will do, as long as the trees are not exotics like mahogany, gmelina, tectona, etc., and it is dominated by indigenous species.

- 1 It is best to collect wildlings from the months of November to February when the season is cooler.
- 2 Use a sharp bolo to uproot the wildlings. Soil should be placed along with the wildlings in the banana stalk to protect the water from the roots from transpiring too much. Make sure that the roots of the wildlings are intact so the damage is very minimal during the collection.
- 3 Once you've taken the wildlings, sprinkle them with water to prevent them from drying up.

## Chapter 5. Growth Chamber Construction



1

Using the 2x2-inch lumber, make a rectangular frame with a length of 8 meters and 2 meters width. On midway of each of the 2 meters, a 1-meter piece of lumber should be nailed vertically. This would serve as post and base to the frame of the lumber on top of the two protruding poles.



2

When the frame is finished, attach the bamboo strips from one side of the base to the other side. Make sure that the bamboo strips are securely nailed to the lumber.



3

Place the potted wildlings/seedlings inside the frame.



4

Cover the frame with gauge 14 plastic. Start from one side, and then move to the other side. Do not cut the plastic. Use thumb tacks to fasten the plastic to the bamboo strips and lumber. Cover each of the heads of the thumb tacks with a clear plastic adhesive tape twice to ensure that no air would escape from the chamber.

Leave about 10 to 12 inches of plastic "hanging" from the base of the frame of the growth chamber.

## Chapter 6. The Rainforestation Farm

Grassland, cogonal or limestone areas can be converted into Rainforestation Farm.

The best time to prepare the area is during the drier months so work is faster and not hampered by too much rain.

Fence the whole area. A five meter of fire line should be made around the area.

Plant the fire line with sweet potatoes, taro, eggplant, pepper, etc. towards the rainy season.

Once the area is cleaned, it is now ready for staking bamboo splits. A rope is needed to align the sticks.

For one hectare cogonal area:

Distance of bamboo sticks must be 1x1x2m spacing

For the area with existing trees:

Distance of bamboo sticks must be 2x2m spacing

For coconut area:

Distance must be 2x2x8m spacing

### Planting

Make a hole on each staked area. It must be deep enough to accommodate the seedlings. Recommended size is 1 foot square and 1 foot deep for the seedlings. For fruit trees, it is 1mx1mx1m. If the soil in your land is very poor, dig a bigger hole and add some compost.

Plant only on rainy days.





## Transplanting

When transplanting, you can do the following:



Remove the plastic or potting bag.



Press the soil firmly after transplanting



## Most Recommended Timber Species

Here is a list of some of the recommended timber species for ecological reforestation on islands with no pronounced dry season.

### ***Sun demanding local forest tree species of Leyte recommended for Rainforestation Farming on volcanic soils***

- Dao (*Dracontomelon dao*)
- Lamio (*Dracontomelon edule*)
- Amugis (*Koordersiodendron pinnatum*)
- Banai-banai (*Radermachera pinnata*)
- Bogo (*Garuga floribunda*)
- Tindalo (*Azelia rhomboidea*)
- Ipil (*Intsia bijuga*)
- Agoho (*Casuarina equisetifolia*)
- Mtn. Agoho (*Casuarina nodiflora*)
- Bitangol (*Calophyllum blancoi*)
- Talisay gubat (*Terminalia foetidissima*)
- Kalumpit (*Terminalia microcarpa*)
- Kamagong (*Diospyros blancoi*)
- Bahay (*Ormosia calavensis*)
- Narra (*Pterocarpus indicus*)
- Toog (*Petersianthus quadrialatus*)
- Bagalunga (*Melia dubia*)
- Danupra (*Toona sureni*)
- Kariskis (*Albizia lebbekoides*)
- Akleng-parang (*Albizia procera*)
- Gumihan (*Artocarpus sericicarpus*)
- Hindang (*Myrica javanica*)
- Malabayabas (*Tristanopsis decorticata*)
- Malogai (*Pometia pinnata*)
- Molave (*Vitex parviflora*)
- Lingo-lingo (*Viticipremna philippinensis*)

### **Shade tolerant local forest tree species recommended on volcanic soils**



Dipterocarps such as Apitong hagakhak like to grow under the light shade of trees

- Palosapis (*Anisoptera thurifera*)
- Apitong (*Dipterocarpus grandiflorus*)
- Hairy Apitong (*Dipterocarpus philippinensis*)
- Hagakhak (*Dipterocarpus validus*)
- Bagtikan (*Parashorea malaanonan*)
- Manggachapui (*Hopea accuminata*)
- Dalingdingan (*Hopea foxworthyi*)
- Gisok-gisok (*Hopea philippinensis*)
- Yakal-kaliot (*Hopea malibato*)
- Almon (*Shorea almon*)
- White Lauan (*Shorea contorta*)
- Guijo (*Shorea guiso*)
- Yakal-malibato (*Shorea malibato*)
- Red lauan (*Shorea negrosensis*)
- Mayapis (*Shorea palosapis*)
- Tangile (*Shorea polysperma*)
- Kamagong (*Diospyros blancoi*)
- Talakatak (*Castanopsis philippinensi*)
- Ulaian (*Lithocarpus solerianus*)
- Dungon (*Heritiera sylvatica*)
- Kulatingan (*Pterospermum olivum*)
- Balobo (*Diplodiscus paniculatus*)

### **Sun demanding local forest tree species recommended on limestone hills**

- Kalumpit (*Terminalia microcarpa*)
- Anislag (*Securinega flexuosa*)
- Bagalunga (*Melia dubia*)
- Dao (*Dracontomelon dao*)
- Ipil (*Intsia bijuga*)
- Mtn. Agoho (*Casuarina nodiflora*)
- Kamagong (*Diospyros blancoi*)
- Bahay (*Ormosia calavensis*)
- Molave (*Vitex parviflora*)
- Lingo-lingo (*Viticipremna philippinensis*)

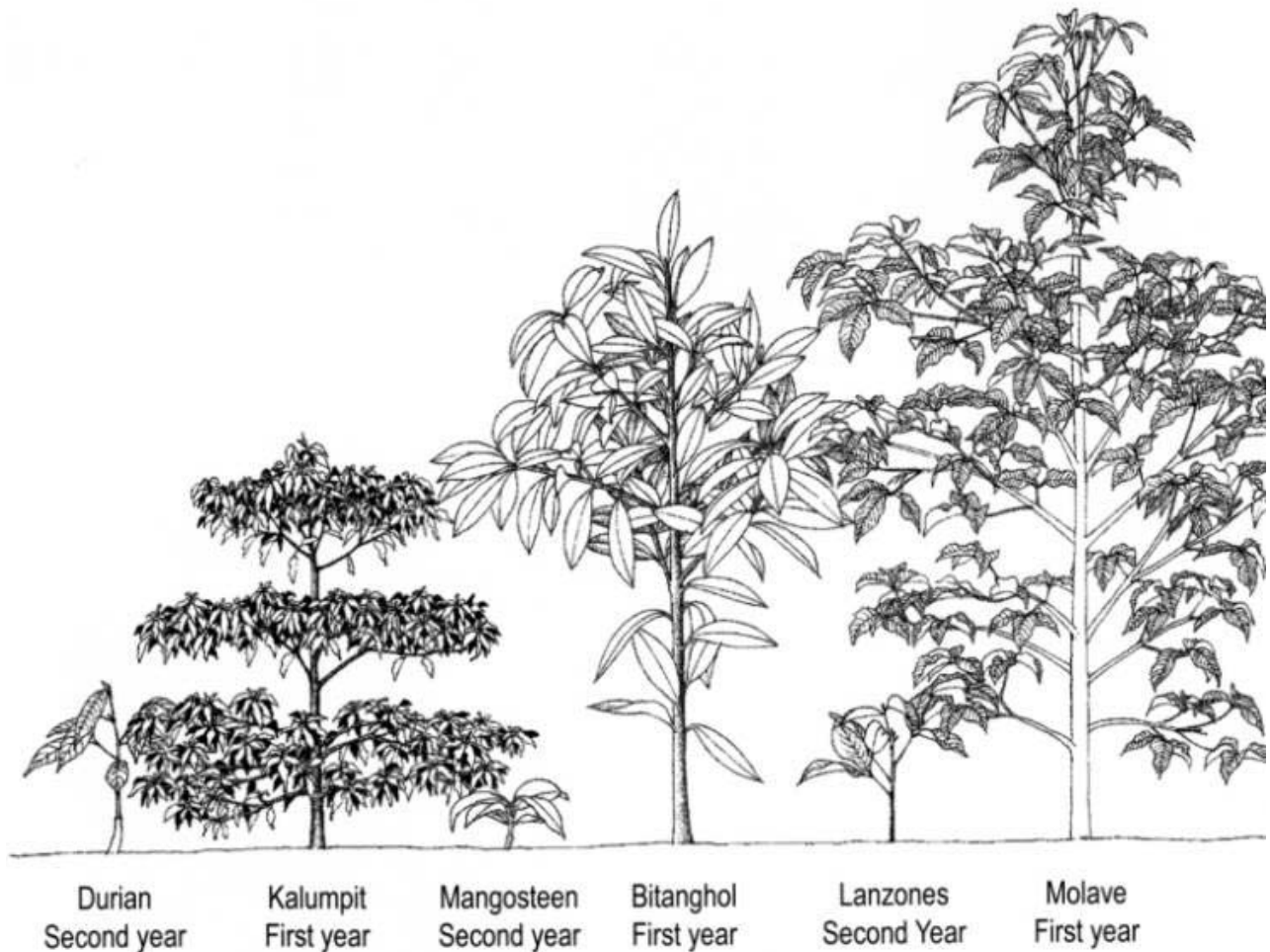


Bagalunga trees still allow light to penetrate and favor the growth of dipterocarps.

Because it is never certain if the planted seedlings love sunlight or prefers shaded conditions, planting must be done in two steps:

### For the first year:

You can include: kalumpit, bitaog, molave, hindang, anabiong, bagalunga, bitanghol, dao, lingo-lingo, agoho, talisay, narra, or fruit trees like mango, avocado, santol, or sampalok



***Examples of species combination with shade tolerant fruit trees.***

## For the second year:

When the first planted trees are already providing shade to the soil, the high valued hardwood trees can be planted under them.

You can include: apitong, almon, red lauan, white lauan, yakal, dalingdingan or fruit trees like durian, mangosteen, rambutan, and lanzones.



Hindang Laparan  
First year

Apitong Hagakhak  
Second year

Anabiong  
First year

White Lauan  
Second year

Bagalunga  
First year

Yakal  
Second year

***Examples of species combination with shade tolerant hard wood lumber trees.***

## Maintaining the Rainforestation Farm

Visit your area frequently. Remove vines.



Ring-weeding must be done every two months.  
After three to five years, do ring-weeding only every three months.

## Branch Cutting

Branch cutting is recommended only if a young shade-tolerant tree is disturbed by leaves and lower branches of fast growing trees or plants like banana.

Some reasons why branch cutting should be limited:

- They help shade out weeds.
- Trees grow better and stay healthier.
- Wounds from cuts may cause pathogenic organisms to enter the trunk.



## Enrichment with Shade-tolerant Crops

- The rainforest farm can always be enriched with crops.
- Bananas or cassava may be grown along with young trees.
- Climbing root crops like ube can be planted later.
- Ginger could be grown if there are still open spaces in between trees.
- Orchids may also be planted on tree stems and anthurium on the shaded ground.
- You can also culture mushrooms under the shade of trees.
- Rattan also grows well along tall trees.
- Intercrop abaca plants, jathropa and fruit bearing trees.



Rattan is an additional enrichment plant wherein it uses trees to climb up. The smaller species should be preferred over the big ones as the latter might be too heavy for some trees.

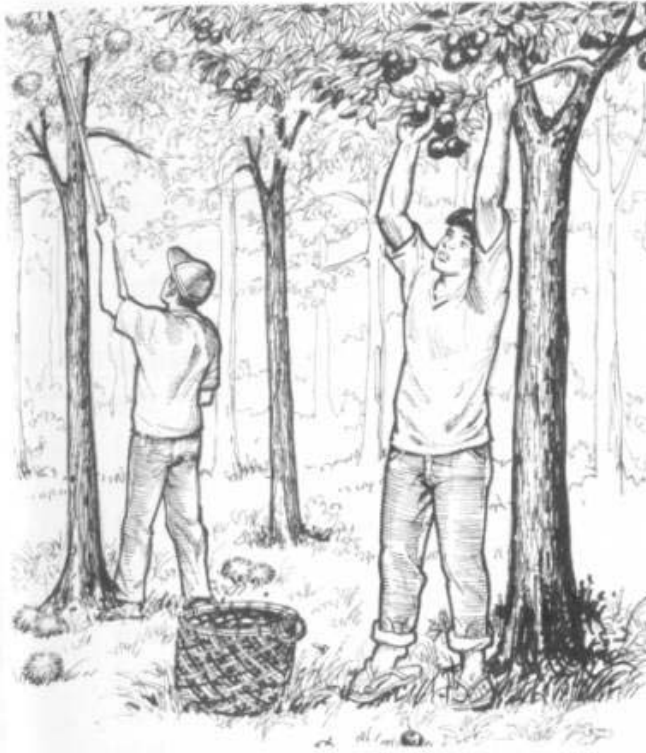


Ube varieties are also ideal crops for rainforestation farming. This is one of the aerial yam, a variety that produces its tubers up in the tree.



High value orchids and anthuriums also grow well under the shaded environment like the Rainforestation Farm. Picture shows anthurium which can be grown under the shade of trees.

## Harvesting and Marketing of Fruits



Mangosteen and durian are two of the best fruits to be planted under the shade of forest trees.



These fruits can be processed into candies, marmalades and other products that can be additional source of income.

## Harvesting of Pioneer Trees and Marketing of Lumber

When the trees reach a diameter at breast height of 40-50 cm, they are ready for marketing.

Avoid harvesting all trees at the same year.

Cut only 10% per year and replace them immediately on the gaps created from cutting. Don't replant in areas without sunlight.





## Advantages of Rainforestation Farming

Many Filipinos have indeed practiced various forms of **Rainforestation Farming** for many years. Since 1990, researches at Visayas State College of Agriculture (ViSCA) sponsored by Philippine-German Tropical Ecology Program has focused on the understanding of natural and agro-ecosystems in order to discover elements of sustainability in traditional and conventional farming systems and to eventually find innovative approaches to farming in the Visayas. In 1992, the Tropical Ecology Program started a demonstration farm and nursery in a cooperative undertaking with the Department of Environment and Natural Resources (DENR) and several other departments at ViSCA. After its successful implementation, the **Rainforestation Farming** technique proved to be a promising alternative in rehabilitating the degraded land as well as overcome the distinct economic inequalities among Visayan farmers especially those that depend on the uplands for their livelihood.

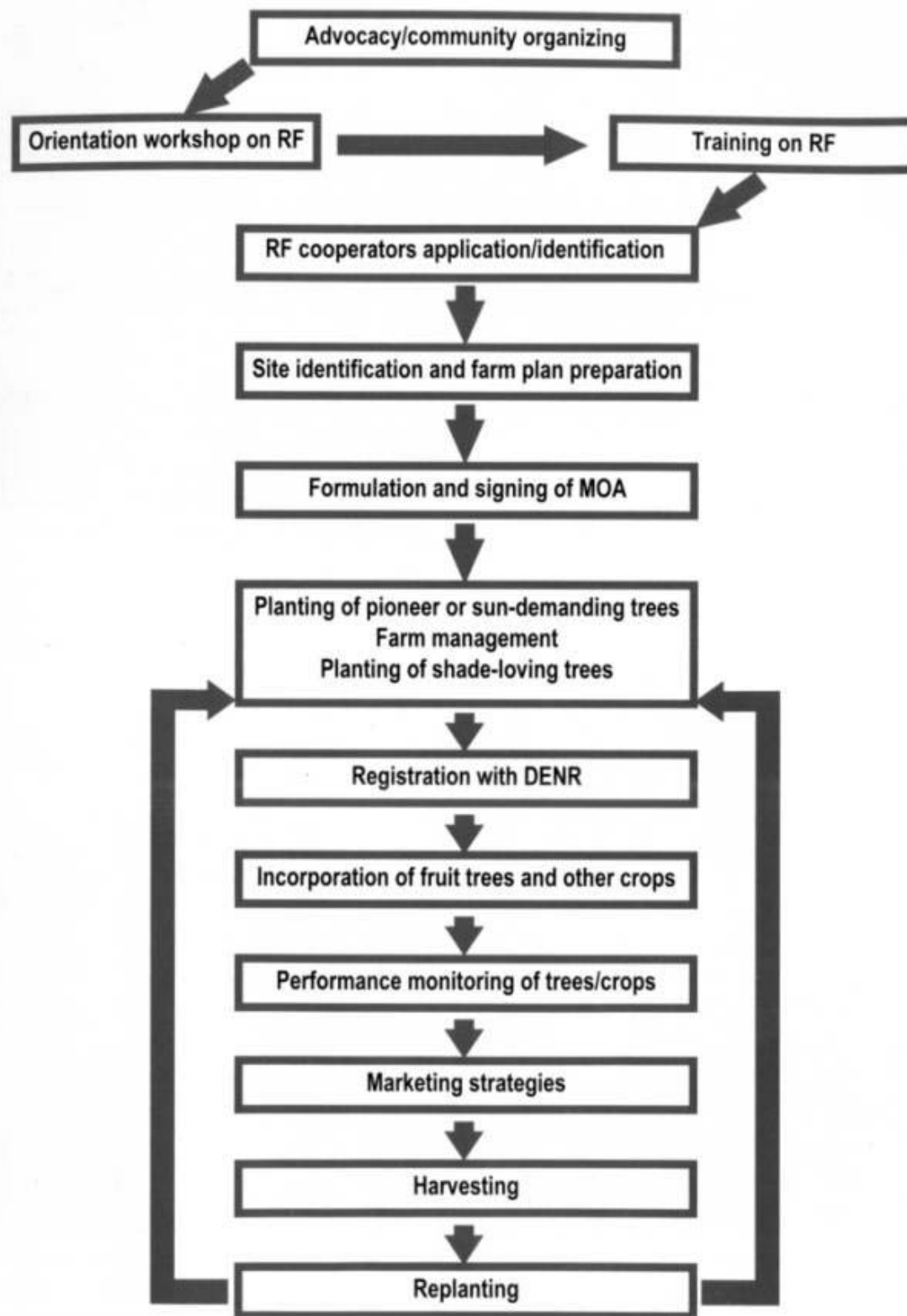
Consequently, a number of rainforestation sites had been established in Leyte, Palawan, Antique, Romblon, Mindoro, Cebu, Panay, Negros, Bohol and other places in Mindanao. One of the most recent **Rainforestation Farming** projects is in Southern Leyte, more specifically in the mud-slide stricken Guinsaugon, St. Bernard where an entire barangay was buried due to heavy rain causing one side of the mountain to erode.

Following the diagrammatic flow of strategies on page 25, communities of rainforest farmers were established in seven barangays in St. Bernard, Southern Leyte. In the process of adopting this **Rainforestation Farming** methodology, the farmers were able to select elements of the proposed system and combine them with their own farming practices.

Another advantage of adopting this scheme is that the watershed and the forest ecosystem remain intact and the water supply for human consumption also remains sufficient and healthy. The communities are united in their desire to restore their forest and in managing their forest and farmland.

Through the development of this training guide, it is envisioned that the adoption of **Rainforestation Farming** shall be widespread. In the not so distant future, the original vegetation of our forest shall be restored and once again we will see our native trees flourish in our forest instead of exotic or introduced species.

## Diagrammatic Flow of Strategies in Implementing RF in Cooperators' Farm



## The Rainforestation Farm



This picture shows a Rainforestation Farm on degraded limestone after one year. The grasses do not disturb the newly established seedlings.



The same site two years later. The roots of the trees have reached more fertile depths so that they grow fast without much need for further maintenance like weeding.

## Rainforestation Farming Supports Forest Biodiversity

Many soil organisms help potential decomposers such as fungi and bacteria speed up decomposition of solid wastes in the environment. Their presence in the ecosystem plays an important role. With a cool, moist soil condition in the **Rainforestation Farm**, their efficiency to decompose is enhanced.



The famous tarsier is found in Leyte especially in rehabilitated areas.

Many Philippine birds and insects depend on the forest ecosystem for survival.



Frogs and other amphibians and reptiles are also part of the biodiversity whose existence depends on the forest ecosystem.

