



FOREST LANDSCAPE RESTORATION PROJECT

ACIAR ASEM/2016/103 Enhancing Livelihoods through Forest & Landscape Restoration



AGROFORESTRY SYSTEMS FOR FOREST LANDSCAPE RESTORATION

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AGROFORESTRY SYSTEMS FOR FOREST LANDSCAPE RESTORATION PROJECT

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ACIAR FOREST AND LANDSCAPE RESTORATION
PROJECT



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INTRODUCTION

Deforestation and forest degradation are major challenges which call for global action. Among these actions is the Bonn Challenge, a global effort aimed to bring 150 million hectares of the world's deforested and degraded land into restoration by 2020, and the New York Declaration on Forests by 350 million hectares by 2030. Underlying the Bonn Challenge is the forest landscape restoration (FLR) approach, which aims to restore ecological integrity as well as improving human well-being through multifunctional landscapes. The Philippine Government responded to the challenge by implementing the National Greening Program (NGP) in 2011 and extended until 2028. The program aims to reduce poverty, promote food security, environmental stability and biodiversity conservation, and enhance climate change mitigation and adaptation.

The success of reforestation programs in the Philippines is fraught with various challenges including harmonizing production and conservation functions of forestlands. The government aims at restoring vast areas of denuded forests but forest communities are practicing subsistence food production rather than forestry as their main activity. Apparently, planting trees alone can jeopardize their main source of livelihoods. Introduction of agroforestry farming system in line with the Philippine reforestation program can alleviate their main problem on food production while restoring the said landscape with trees of several species.

This manual is intended to enhance the knowledge and skill of upland communities on combining tree crops, agricultural crops and/or animals in the lands they are cultivating. A number of options shown can be applied both in lowland or upland settings.

WHY AGROFORESTRY?

Agroforestry, as a production system, stresses the planning and improving the traditional shifting cultivation to maximize sustained production on less well-endowed land, whether the produce is food, feed, fuel, building material, or products of commercial value. It is a technique for rural development in devastated, deforested areas as well as in areas still covered by tree vegetation where population densities are high and increasing.

WHY AGROFORESTRY?

Agroforestry is a collective name for land-use systems and technology where woody perennials (trees, palms, bamboos, etc.) are deliberately used on the same land management unit as agricultural crops and/ or animals, either in some form of spatial arrangement or temporal sequence. In agroforestry systems, there are both ecological interactions, in time and/or space, between the tree and crop and/or livestock components. There should also be both ecological and economic interaction between the woody plants and other components of the system such as pasture, arable crops, and/ or animals on the same land unit, integrated either simultaneously or in short sequence. The two main objectives of this form of land use are: productivity, which involves a multiplicity of output; and sustainability, which implies the conservation or improvement, of the environmental aspects of the system.



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Aquasilviculture Systems

It is a multiple-use system that promotes a harmonious co-existence between fishery species and mangrove tree species in a semi-enclosed system while providing coastal protection and maintenance to the ecosystem. Wouters (1994) mentioned other terms used for this practice of land-use systems like silvoaquaculture, silvipisciculture, aquaforestry, and aquasilviculture.

Systems dominated by fish

Trees on dikes/ levees/ bunds of fishponds using nipa (*Nypha fruticans*) and Dapdap (*Sesbania spp*)

Areas considered for aquasilviculture development in the Philippines

- Open/ denuded mangrove areas with settlers
- Unproductive/ abandoned fishponds
- Areas under Presidential Proclamation 2152 which have been fully/ partially developed prior to the effectivity of such proclamation
- A and D mangrove areas whose owners are willing to adopt the technology

Species for aquasilviculture (pond culture)

Fish

Bangus (*Chanos chanos*), Tilapia (*Tilapia mozambica* and *Tilapia nilotica*), Apahap (*Lates calcarifer*), Lapu-lapu (*Epinephelus sp.*), Banak (*Mugil sp.*), and Kitang or Rabbit fish

Shrimp

Tiger prawn (*Penaeus monodon*) and White shrimp (*P. mergulensis*)

Crab

Alimango (*Scylla serrata*)

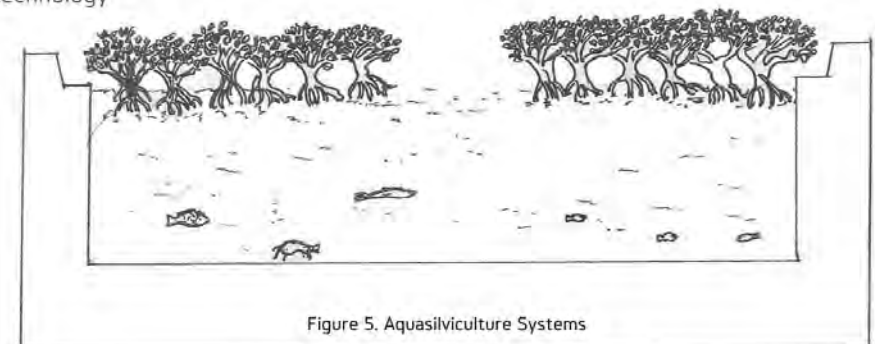


Figure 5. Aquasilviculture Systems

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Apiculture/ Sericulture Systems

Systems dominated by
insects

Beekeeping - production of honey in
areas surrounded by trees

Sericulture -
production of silk in areas with
mulberry (*Morus spp*) trees

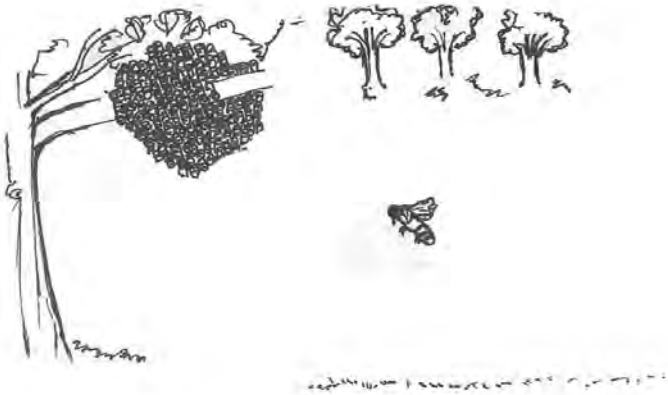


Figure 5. Apiculture/ Sericulture Systems

CLASSIFICATION OF AGROFORESTRY SYSTEMS

1. Agrisilvicultural Systems

- Systems Dominated by Natural Forests Trees
- Systems Dominated by Planted (Timber) Trees
- Systems Dominated by Fruit Trees or Cash Crops
- Systems with Scattered Trees or Trees in Rows

2. Silvopastoral Systems

- Systems Dominated by Natural Forest Trees
- Systems Dominated by Timber Trees
- Systems Dominated by Fruit Trees or Cash Crops

3. Agrosilvipastoral Systems

- Systems Dominated by Fruit Trees or Cash Crops

4. Apiculture/Sericulture Systems

- Systems Dominated by Insects

5. Aquasilviculture Systems

- Systems Dominated by Fish

1

Agrisilvicultural Systems

Systems Dominated by Natural Forests Trees

Shifting cultivation is an example but is discouraged due to its effects on the environment which is largely attributed to slash and burn practice

Systems Dominated by Planted (Timber) Trees

Shifting cultivation with planted fallow like Palasan (Rattan) fallows, Peas (Prosopis) fallows

Taungya - combining trees and agricultural crops during establishment of forest stands for 1 - 3 years. When trees are large enough that will not allow the growth of crops in between trees, cultivation will stop

Intercropping in forest plantations - Cultivation of medicinal crops or other agricultural crops in forest plantations

Systems Dominated by Fruit Trees or Cash Crops

Multistorey cropping

usually in the form of forest gardens, mixed gardens, home gardens with mixtures of timber trees, fruit trees, cash crops, vegetables and/ or root crops. In more open systems, also staple crops such as rice, cassava, and sweet potatoes including bananas and pineapples.

(See figure 2)

Interplanting under commercial crops

common especially under coconut, abaca (*Musa textilis*), cacao (*Theobroma cacao*) and coffee mixed with compatible species like bananas (*Musa spp*), pineapples (*Ananas comosus*), ginger (*Zingiber officinale*) and black pepper (*Piper nigrum*)

Shade trees over commercial crops

includes cultivation of coffee species and cacao. Main tree genus: Kakawate (*Gliricidia*), Ipil-ipil (*Leucaena*), and Dapdap (*Erythrina*)

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Agrosilvipastoral Systems

Systems dominated by fruit trees or cash crops

Livestock in multi storey cropping systems

Common in home gardens. E.g. poultry, goats, pigs, sometimes also fishponds.

Livestock in intercropped commercial plantations-

Example is coconut, arable crops and cattle or poultry.

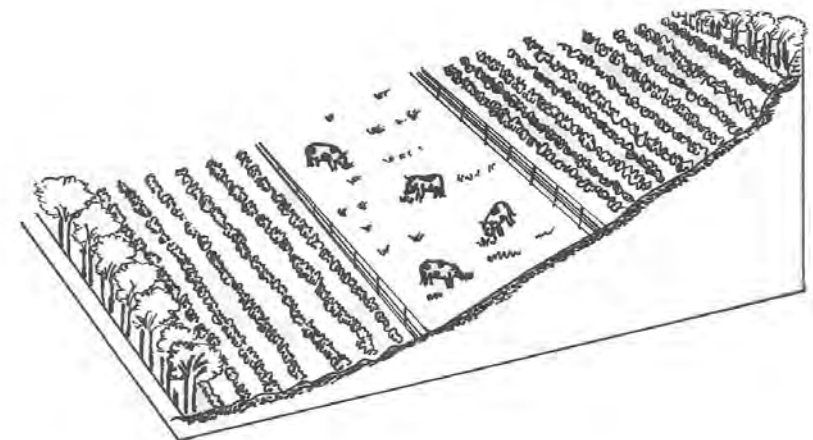


Figure 4. Agrosilvipastoral system

2

Silvopastoral Systems

It is the growing of grasses (e.g. Guinea grass, Para grass, Napier grass), legumes (e.g. Cowpea (Vigna unguiculata)), shrubs (e.g. Kadios (Cajanus cajan)), and trees (e.g. Sesbania spp, Kakawate, and Ipil-ipil) together in an integrated manner using appropriate scientific management, incorporating trees and pasture with or without livestock for improved productivity of degraded lands

Systems dominated by natural forest trees

Forest grazing is a system with livestock grazing within natural forest

Systems dominated by planted timber trees

Pasture in forest plantation- a system where livestock are integrated with forest trees like cattle grazing in teak and eucalyptus forests.

Fodder plantations- Zero grazing systems under plantations, and fodder tree plantations, being developed.

Systems dominated by fruit trees or cash crops

Pasture under commercial crops-

Cattle grazing under coconuts which is common in humid regions including animal raising under rubber trees (Hevea braziliensis).

Trees in pastures-

Commercial trees, shade trees or fruit trees are allowed to grow in pasture lands like Acacia or rain trees (Samanea), Alibangbang (Bauhinia), and Leucaena in the Philippines.

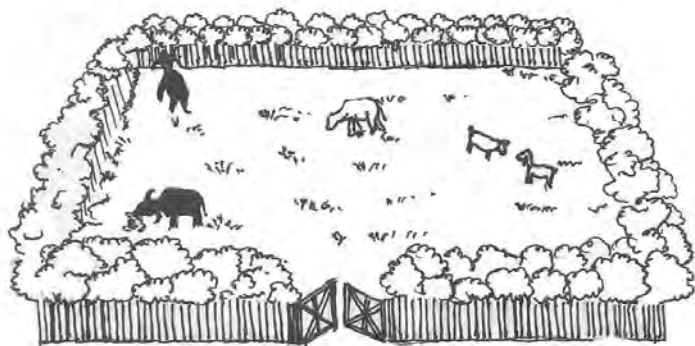


Figure 3. Silvopastoral system

1

Agrisilvicultural Systems

Systems with scattered trees or trees in rows

Trees among crops Widely practiced in the whole region in the form of scattered fruit and shade trees in agricultural fields with staple crops.

Alley cropping - is a cropping system with agricultural crops on the alleys in between rows of trees (fruit trees and forest trees). Commonly observed are combinations of coconuts in rows; pineapple, bananas, ginger, peanuts, and sweet potatoes on the alleys, and Kakawate or Ipil-ipil on the borders (See Figure 1)

Live fences

trees in rows using Gliricidia, Leucaena, Kamatchile and Katuray (Sesbania) as fence for crops

Windbreaks and shelterbelts

applicable in areas with strong prevailing winds using Eucalyptus and other tree species along irrigation canals and fields or farm boundaries



Figure 1. A simple alley cropping system

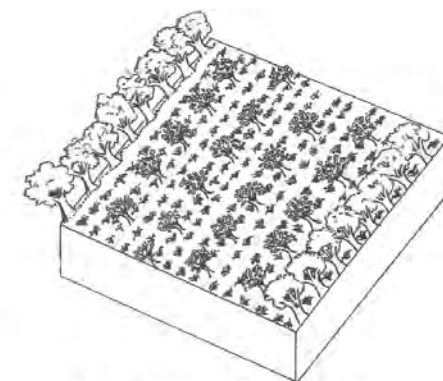


Figure 2. Multistorey cropping system