



# **Natural Resources Conservation and Development**

## **Level II**

# **Learning Guide-42**

**Unit of Competence: Facilitate Agro-forestry Practices**

**Module Title: Facilitating Agro-forestry Practices**

**LG Code: AGR NRC2 LO1-LG-42**

**TTLM Code: AGR NRC2 M10 TTLM 0919v1**

**LO 1: Classify Agro forestry systems**



<b>Instruction Sheet</b>	<b>Learning Guide #42</b>
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This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Identifying Agro forestry systems based on components
- Identifying Agro forestry systems based on benefit
- Identifying Agro forestry systems based on Arrangements

This guide will also assist you to attain the learning outcome stated in the cover page.

Specifically, **upon completion of this Learning Guide, you will be able to:**

- Identify Agro forestry systems based on components
- Identify Agro forestry systems based on benefit
- Identify Agro forestry systems based on Arrangements

Following up and evaluating Rehabilitation activity progress

**Learning Instructions:**

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, Sheet 2 and Sheet 3
4. Accomplish the “Self-check 1, Self-check 2, and Self-check 3” in **page -6, 8, and 10** , respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1,” in **page -11**.
6. Do the “LAP test” in **page – 11** (if you are ready).



<b>Information Sheet-1</b>	Identifying Agro forestry systems based on components
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## 1.1. Identifying Agro forestry systems based on components

### **Concepts of Agroforestry**

**Agro forestry** is a collective name for land-use systems in which woody perennials (trees, shrubs etc.) are grown in association with herbaceous plants (crops, pastures) and/or livestock in a spatial arrangement, a rotation, or both and in which there are both ecological and economic interactions between the tree and non-tree components of the system.

The above definition implies:

- Agro forestry normally involves two or more species of plants at least one is the woody components
- AF system always has two or more outputs
- The cycle of AF system is always more than one year and even the simplest AF system is more complex ecologically (structural and functional) and economically, than a mono cropping system.

Basically, agroforestry involves the deliberate growing of trees and shrubs, collectively called woody perennials, on the same unit of land as agricultural crops or animals/pastures, in some form of either spatial mixture or temporal sequence.

In agroforestry there is significant interaction (ecological and economical) between the woody and the non woody components. There are three attributes which, theoretically all agroforestry systems possess, these are:

1. **Productivity** (Output per unit of input) most if not all agroforestry systems aim to maintain or increase production.

Agroforestry can improve productivity in many different ways, this includes: increased output of tree products, improves yield of associated crops, reduction of cropping system inputs, and increased labour efficiency

2. **Sustainability**: by conserving the production potential of the resource base, mainly through the beneficial effects of woody perennials on soils, agroforestry can achieve and indefinitely maintain conservation and fertility goals.



Agroforestry can play a key part in enabling a farming system to produce crops and other products sustainably.

3. **Adoptability:** The word adopts here means accept (acceptance of the practice by the farming community). This implies that the merits of agroforestry systems are not only assessed in terms of production (quantities), but also based on the extent to which the resource base is sustained, and the practice is adopted by the local land users.

### **Agroforestry systems and practices**

The words Agroforestry systems and Practices are often used synonymously in agroforestry literatures.

### **Agroforestry practice**

An agroforestry practice is a general term which would be used to describe land use practices with a tree component. Specific species need not be described. Agroforestry practices can usefully be broken down into those practices with a predominantly 'productive' or those with a predominantly 'protective' function.

### **Agroforestry system**

An agroforestry system is a cropping or livestock system which contains agroforestry practices. An agroforestry system describes the specific components (species, tools, management practices) observed on a particular farm and may require a detailed description of each. There may be many hundreds of different agroforestry systems but they can all be generally described by about 20 agroforestry practices.

According to Reid and Wilson (1985) cite in Dechasa (2006), the five major components from which agroforestry definition developed are the following.

- Land
- Environment
- Agriculture (livestock + crop) component
- Forestry component
- Management strategy

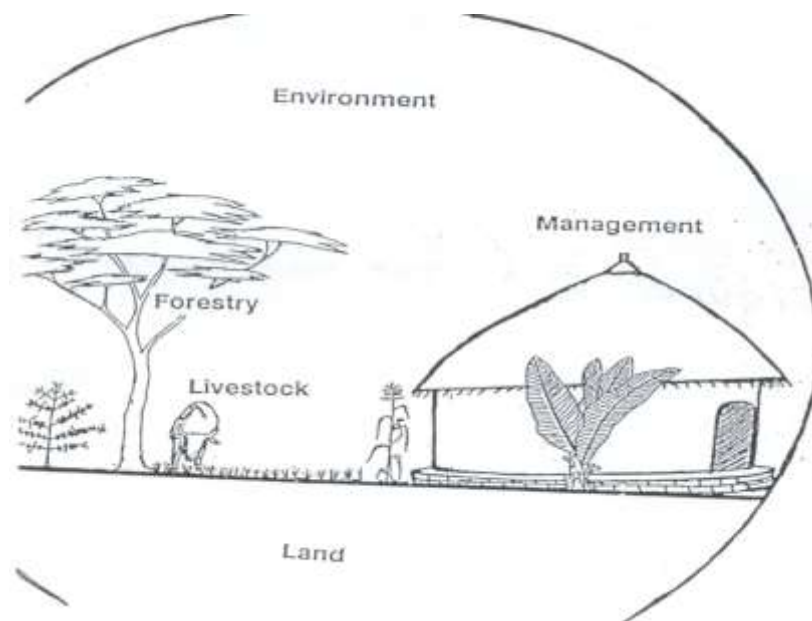


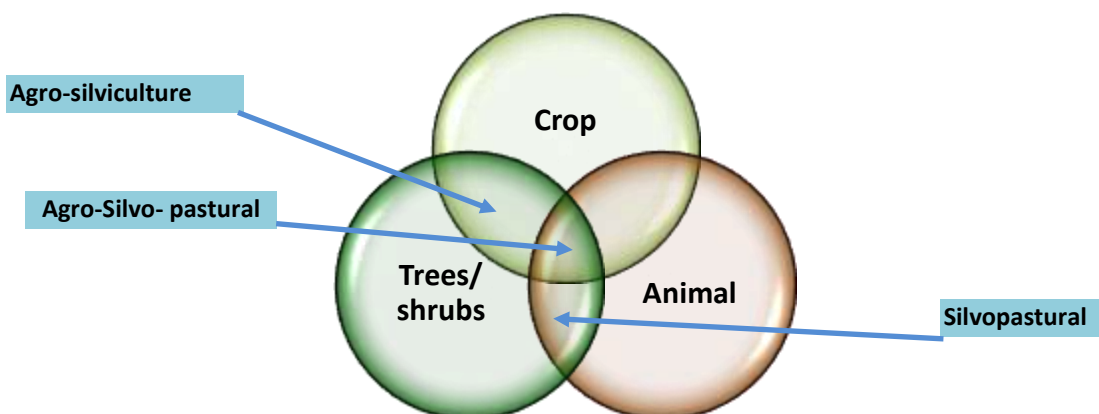
Figure 1.1. Component of agro forestry

**Based on the nature of components**

One can base the classification on the kinds of the components in the systems. Figure 1.2 shows such a classification of system and subsystems.

**i. Agro- silviculture systems:** crops (including shrubs/ vines) and trees.

Practices included in this system are: Alley cropping, Cultivated fallows, Mixed planted crops, etc.



**Figure 1.2. Combination of any two or all the three components**

**ii. Silvopastoral systems:** pasture/ animals and trees.

✓ Includes practices such as Forage hedges, Tree, shrubs and bushes for pasture; Integrated woody perennial and animal production, Protein bank etc...

**iii. Agro- silvo- pastoral systems:** crops, pasture/animals and trees

✓ Multipurpose woody hedges, Crop/animal/woody perennial mix around dwellings, etc... are some practices in this system.

Other systems: multipurpose tree lot, aqua-silviculture



<b>Self-Check -1</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Define the term agroforestry? (1 pts)
2. **what is the difference between agro forestry systems and agro forestry practices?** (2pts)
3. List component of agro forestry (5pts)
4. Discuss classification of **agro forestry based on components** (2pts)

**Note: Satisfactory rating - 5 points**

**Unsatisfactory – below 5 points**

You can ask you teacher for the copy of the correct answers.

### Answer Sheet

Score = \_\_\_\_\_

Rating: \_\_\_\_\_

Name: \_\_\_\_\_

Date: \_\_\_\_\_

### Short Answer Questions

1. \_\_\_\_\_  
\_\_\_\_\_
2. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
3. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
4. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



<b>Information Sheet-2</b>	Identifying Agro forestry systems based on benefit
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## 1.2. Identifying Agro forestry systems based on benefit

This refers to the major function or role of the system, usually furnished by the woody components (these can be of a service or protective nature, e.g., windbreak shelterbelt and soil conservation)

### **Socio economic basis**

This refers to the level of inputs of management (low input, high input) or intensity or scale of management and commercial goals (subsistence, commercial, intermediate)

### **Ecological basis**

This refers to the environmental condition and ecological suitability of systems based on the assumption that certain types of systems can be more appropriate for certain ecological conditions; i.e. there can be separate set of Agroforestry systems for arid and semi arid lands , tropical low lands, highlands of humid.

The agroforestry system in Guragie highland predominantly is line planting of Eucalyptus tree for windbreak in home garden “*inset*” is an example of environmental functional base where the trees can ultimately be used for construction and fuel function. In the Rift Valley on the other hand, intensive livestock farming combined with deliberate retention *Acacia tortolis* for livestock shade and ultimately for charcoal production for cash income. Thus in agroforestry there are always a multiple basis or roles that a given plant plays.

The variation here is dictated by differences in land location Environmental type, Agricultural production system, Socio economic and Ethnological differences. The management system also varies accordingly.

**Production role-** This implies that agroforestry systems have a productive function yielding one or more products that usually meet basic needs of local peoples or social objectives.

**Protection role** - Protecting and maintaining the production of food, energy, shelter, raw materials, and cash, etc.

Therefore, all agroforestry systems have both productive and protective roles, though in varying degrees. Depending on the relative dominance of the particular role, the system can be termed productive or protective.



<b>Self-Check -2</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is the function of agro forestry? (3pts)

**Note: Satisfactory rating - 3 points**

**Unsatisfactory - below 3 points**

You can ask you teacher for the copy of the correct answers.

### Answer Sheet

Score = \_\_\_\_\_

Rating: \_\_\_\_\_

Name: \_\_\_\_\_

Date: \_\_\_\_\_

### Short Answer Questions

1. \_\_\_\_\_  
\_\_\_\_\_.

<b>Information Sheet-3</b>	Identifying Agro forestry systems based on Arrangements
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### 1.3. Identifying Agro forestry systems based on Arrangements

The arrangement of components refers to the plant components of the system (especially if the system involves plant and animal components) . Such plant arrangements in multispecies combinations can involve the dimensions of space and time.

1. **Spatial arrangements-** of plants in agroforestry mixtures vary from dense mixed stands (as in homegardens) to sparsely mixed stands (as in most silvopastoral systems) . In spatial systems, the association is primarily one of trees and crops together on the same land management unit. Spatial systems are divided into mixed and zoned.
  - a) In spatial mixed arrangements, the trees and other components are grown as intimate mixture, with the trees distributed over more or less the whole of the land area.
  - b) In spatial zoned arrangements, the trees are either planted in some systematic arrangement, such as rows, or are grown on some element in the farm, like field boundaries or soil conservation structures.





**Temporal arrangement** - of plants in agroforestry can also take various forms. An extreme example is the conventional shifting cultivation cycles involving 2 to 4 years of cropping followed by more than 15 years of fallow cycle when a selected woody species or mixture of species is planted or is allowed to regenerate naturally. In agrosilvopastoral systems, the association between trees and crops (or pastures) takes place primarily over time, although there may also be some degree of overlap.

The relative arrangement of the components can be taken as a basis for classification. The arrangement can be considered spatially:

- Densely mixed systems, such as home garden;
- Scattered mixed systems, such as tree on agricultural field
- Strip system, such as contoured wooded strips on bench terraces or terraces,
- Edge systems; such as a line of trees bordering a grazing plot.

Or, one can consider the arrangement in time instead of in space (Table 1).

Table 1.1 Arrangement of the components of agroforestry system in time

Temporal Arrangement	Schematic illustration	Examples
Coincident		Coffee under shade trees, pasture under trees
Concomitant		Taungya
Intermittent (space dominant)		Annual crops under trees
Interpolated (space and time dominant)		Homegarden
Separate (time dominant)		Improved fallow species in shifting cultivation

(time scale will vary for each combination)

Woody \_\_\_\_\_ Non-woody .....



<b>Self-Check -3</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page: 2 pts each choice question

**Match Column "B" with Column "A" (2 points each)**

**A**

1. Coincident
2. Concomitant
3. Space and time dominant
4. Time dominant

**B**

- A. Coffee under shade trees, pasture under trees
- B. Home garden
- C. Taungya
- D. Improved fallow species in shifting cultivation

**Note: Satisfactory rating - 4 points**

**Unsatisfactory - below 4 points**

You can ask you teacher for the copy of the correct answers.

**Answer Sheet**

Score = \_\_\_\_\_

Rating: \_\_\_\_\_

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Short Answer Questions**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_



<b>Operation Sheet 1</b>	Identify the component of AF system in your environment.
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Objective To identify the component of AF.

To demonstrate AF Practices in the college

**Materials, tools and equipment:** Paper, pen note pad

**Procedure:**

- Wear safety cloths
- Collect all tools, materials and equipment used AF classification.
- Survey the environment and collect data.
- Identify the interactions .
- List the classification of AF and use of AF,

<b>LAP Test</b>	<b>Practical Demonstration</b>
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Name: \_\_\_\_\_ Date: \_\_\_\_\_

Time started: \_\_\_\_\_ Time finished: \_\_\_\_\_

**Instructions:** Given necessary templates, tools and materials you are required to perform the following tasks within --- hour.

**Task 1-** Identify the component of AF system in your environment



## Reference:

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