# UNIT 4 BASIC PRINCIPLES OF FOREST MANAGEMENT

**CONTENTS**



## 1.0 INTRODUCTION

Forest resources of use to man and other living organisms are not inexhaustible. This therefore, implies the need to introduce several approaches for managing the forest ecosystems. Effective forest management will not only sustain the product and service benefits of forests, but it will also protect and restore the ecosystems through the best forestry practices as well as maximally exploit the forest land and environment for man's development. Forestry practices which serve these purposes include ecoforestry, agroforestry, forest gardening and certified forestry.

## 2.0 OBJECTIVES

By the end of this unit, you should be able to discuss the principles of forest management, their advantages and limitations.

## 3.0 MAIN CONTENT

### 3.1 Forestry

This is defined as the art, science and practice of studying and managing forested land, plantations and associated natural resources such as waters and wasteland, primarily for harvesting timber but also, for conservation and recreational purposes. It is related to silviculture, which involves the growing and tending of forests. Forestry involves the production (tree planting and maintenance), distribution and consumption of forest products and services. The activities involved in forestry are tree breeding, reforestation and deforestation (the conversion of natural forests or plantations to non-forest lands and non-vegetated lands).

### 3.2 Silviculture

This is defined as the theory and practice of controlling the establishment, composition and growth of stands of trees for any of the goods (including timber, pulp, energy, fruits and fodder) and benefits (water, wildlife habitat, microclimate amelioration, carbon sequestration) for which trees are desired. Alternatively, it can be defined as the art and science of controlling the establishment, growth, composition, health and quality of forests to meet diverse needs and values of land-owners and society.

### 3.3 Forest Management

This is defined as a range of interventions that affect forest ecosystems. They include policies for cutting trees for timber, planting and replanting of various species, cutting roads and pathways through forests and techniques for preventing or controlling outbreaks of fire. It also involves emphasis on watershed management, wilderness and recreation. The goal of forest management plans is to provide logs as raw material for timber, veneer, plywood, paper, wood fuel and other industries. Post-harvest site plans reforestation (tree planting by species) weed control, fertilization, thinning (spacing of young trees that are crowding one another), prevention and control of insect infestation, disease infections and forest and grassland fires, forest mensuration, wildlife conservation and watershed protection.

### 3.4 Ecoforestry

This is forestry that emphasizes holistic practices which strive to protect and restore ecosystems rather than maximize economic productivity. Practitioners of ecoforestry avoid practices like clearcutting, high

grading and pesticides. Ecoforestry is considered by some to be a traditional practice, whereby people tend to an area of forest, helping it to grow sustainably over many years. Practitioners of ecoforestry claim that their techniques promote self-regulating forest ecosytems with a diversity of species and natural habitats in harmony with landscape, weather, soil, water flows, and animals living there. It is rooted in family homesteads selectively cutting trees for home use.

## 3.5 Plantation Forestry

Plantation is a forest either by planting or sowing of trees primarily for timber production. Characteristically, plantations are usually monocultures (one tree species) or a mixture of only two or three species, compared to conventional forests which usually contain a far more diverse range of tree species. Plantations are always young forests in ecological terms, typically grown and harvested after 10 to 60 years, rarely up to 120 years. Plantations may include tree species that would not naturally occur in the area, especially hybrids and genetically-modified species; these are usually trees that are best suited to industrial applications for wood or pulp production. Plantations are usually of regular shape with fixed or clearly defined boundaries. Trees are usually planted at regular spacing, even-aged and more uniform in size and with a single-layered canopy structure. Plantations can either be industrial/home/farm plantations or environmental plantations.

i. Industrial plantations are those established for the production of a high volume (commercial) of wood in a short period of time, for making wood-based products.

ii. Home plantations are those typically established for the production of lumber and fire wood for home use, and sometimes for sale.

iii. Ornamental plantations are those established for watershed or soil protection, such as erosion control, landslide stabilization and windbreaks. Tree species for different plantation types include Gmelina arborea, Tectona grandis, Terminalia ivorensis (industrial); Acacia nilotica, Rhizophora spp., Azadirachta indica (farm/home).

## 3.6 Certified Forestry

Several organizations offer auditing services to certify or verify that a forest management operation is employing best practices in sustainable forestry. The **Forest Stewardship Council**, based in Bonn, Germany, issues global standards for sustainable forestry based on stakeholder input from industry, communities and environmental organizations. The FSC then **accredits** certification bodies to carry out audits. If a

forestland passes the audit, the certification body awards a "seal of approval" which can be used as leverage in the marketplace. The Sustainable Forestry Initiative (SFI) and Woodmark and Rainforest Alliance are similar organizations.

## 3.7 Sustainable forestry

This is a **forest management** practice which primarily aims at ensuring that the amount of goods and services yielded from a forest is at a level the forest is capable of producing without degradation of the soil, watershed features or seed source for the future. It differs from **Sustained Yield Forestry** and **Sustainable forest management** according to the sets of forest goods and services that are intended to be "sustained". The concept also assumes that human use will not detract from or degrade the use of forests by other organisms, that human use is ultimately subordinate to healthy ecosystems. The word 'forestry' implies use for human benefit, but to 'sustain' forests means to manage for healthy ecosystems, the by-products of which are "goods and services" like timber, recreation, wildlife and other resources that humans have come to expect from forests.

## 3.8 Woodland Management

This is practice of managing woodlands, either for the maximization of timber production or for the conservation of wildlife. A well-managed woodland can produce a steady supply of timber and also maintain a wide variety of environments for woodland species of birds, insects and flowers. Woodland management techniques are coppicing, pollarding and shredding.

## 3.9 Agroforestry

This is a land use system that involves the deliberate retention, introduction or mixing of trees or other plants into crop and animal production systems in order to increase profitability, sustainability, protection of the environment and social acceptance. It implies the combination of forest trees with crops or with domestic animals, or both. The aim of agroforestry is to increase crop yields through emphasis on the forest (silviculture) and managing grazing (pasture land). The system is intentional, intensive, integrated and interactive in implementation. Agroforestry systems can be classified on the basis of

i. components associated with the woody perennials (agrosilvicultural, silvopastoral, agrosilvopastoral);
ii. spatial distribution of the components such as woody perennials, crops and livestock (compound farms, farmers' plots);

iii. temporal distribution of components (e.g. relay cropping of trees with crops);
iv. productivity and sustainability (taking into consideration the service role of agroforestry such as soil erosion, shelterbelts, etc.);
v. socio-economic criteria (scale of production, level of technology input and management) such as commercial, intermediate and subsistence agroforestry.

## 3.10 Forest Farming

In forest farming, high-value specialty crops are cultivated under the protection of a forest canopy that has been modified and manged to produce This is neither forestry nor farming in the traditional sense. It is an agroforestry practice characterized by intentional, integrated, intensive and interactive management of an existing forested ecosystem wherein forest health is of paramount concern. Forest farm management principles constitute an ecological approach to forest management through efforts to find a balance between conservation of native biodiversity and wildlife habitat within the forest and limited, judicious utilization of the forest's varied resources. It attempts to bring secondary growth forests that have been overused and dsrupted back into ecological balance through careful, intentional manipulation over time, emulating natural processes to restore original, natural diversity of species. In some instances, the intentional introduction of species for use as botanicals, medicinals or food products is added in combination with native species. The five categories of specialty crops are foods (mushrooms, nuts, vegetables, honey from bee plants, herbs, fruits, edible flowers, sap products), botanical products (e.g. Broom, liquorice), decoratives (e.g. mosses, ferns, *Eucalyptus*), handicrafts (basketry materials), and wood products (fuelwood, charcoal, specialty woods for carving, incense, garden mulches from clipped wooss and coppice). The methods of forest farming include

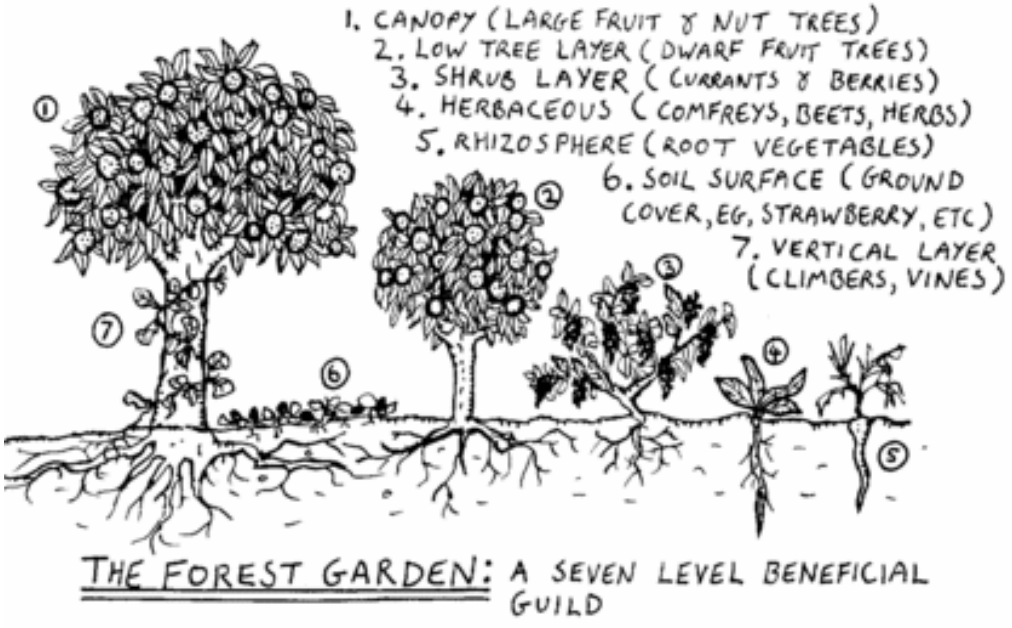
i. intensive, but cautious thinning of overstocked, suppressed tree stands; and
ii. multiple integrated entries to accomplish thinning of healthy trees and shrubs of all ages and species, rather than a monoculture of timber species.

Forest farm management is a type of forest stewardship ethic whose objective is to restore and maintain the health of the forest land's many and varied ecosystems. The benefits include economic benefits (e.g. sale of ginseng, logs, floral decoratives), modification of the ecosystem without ecosystem disruption, and provision of opportunities for short-term income from existing woodlands. The drawbacks include the

higher requirement of entrepreneurial attitude from farmers and landowners, need for research to locate potential buyers of specialty products, and high labour requirement.

## 3.11 Forest Gardening

Also known as 3-Dimensional Gardening, this is a food production and land management system based on replicating woodland ecosystems, substituting trees (such as fruit or nut trees), bushes, shrubs, herbs and vegetables which have yields directly useful to mankind. The crops which are produced often include fruits, nuts, edible leaves, spices, medicinal plant products, poles, fibres for tying, basketry materials, honey, fuelwood, fodder, mulches, game and sap products. It is based on the principle of companion planting, these can be intermixed to grow on multiple levels in the same area often 0.1-1 ha in size (as shown below), as do the plants in natural forest. It involves a series of agrosilvicultural systems such as improved shifting cultivation, alley cropping (hedgerow intercropping), multistory cropping, shade trees for plantation crops, mixture of plantation crops, taungya and shelterbelts. Forest/home gardens are an ancient gardening practice in tropical regions but more recent innovation in temperate regions. Woodland gardening is a variation of forest gardening. The benefits include creating a log-term biologically-sustainable system for growing food and other products for a household and little maintenance work after establishment. The main drawback is that planting out and establishment usually requires large numbers of plants and substantial work.




## 3.12 Sericulture

This is the rearing of silkworms for the production of raw silk. Although there are several commercial species of silkworms, *Bombyx mori* is the most widely used and intensively studied. According to Chinese records, the discovery of silk production from *B. mori* occurred about 2700 BC. Today, China and Japan are the two main producers, together manufacturing more than 50% of the world production each year. Silkworm larvae are fed cut-up mulberry leaves, and, after the fourth moult, they climb a twig placed near them and spin their silken cocoons. The silk is a continuous-filament fibre consisting of fibroin protein, secreted from two salivary glands in the head of each larva, and a gum called sericin, which cements the two filaments together. The sericin is removed by placing the cocoons in hot water, which frees silk filaments and readies them for reeling. The immersion in hot water also kills the silkworm larvae. Single filaments are combined to form yarn, which is drawn under tension through several guides and wound onto reels. Finally, the yarn is dried, and the now raw silk is packed according to quality.

## 3.13 Deforestation

This is defined as the conversion of natural forests or plantations to non-forest and non-vegetated lands. It involves the cutting down and removal of forest trees and other vegetative cover without replacement. Causes of deforestation include:

i. growing rate of population thus leading to higher demand for forest goods, services and forestlands;
ii. fiscal and development policies of the government;
iii. high cost of other sources of power (petroleum products, electricity) which discourages the use of alternative fuels to firewood;
iv. conversion of forestland into commercial agriculture and subsistence slash-and-burn farming system;
v. overgrazing and cattle ranching;
vi. indiscriminate logging and forest exploitation;
vii. fuelwood collection;
viii. mining and petroleum exploration; and
ix. infrastructure development and urbanisation.

The impact of deforestation include loss of biodiversity, disruption of hydrological cycle, soil erosion, disruption in the carbon cycle and ozone layer, desertification, potential losses in revenue and socio-economic benefits, and global warming.

## 4.0 CONCLUSION

In this unit, you have learned that forest management involves well-defined practices and strategies which aim at maximum exploitation of the plantations and forest environment for man's development.

## 5.0 SUMMARY

Several practices and strategies are employed in forest management, and these largely ensure forest conservation and sustainable provision of products and services to Man.

## 6.0 TUTOR-MARKED ASSIGNMENT

1) Define the following terms as applied to forest management:
(a) forestry, (b) silviculture, (c) ecoforestry,
(d) sustainable forestry, and (e) woodland management.

2) Write short notes on "sericulture".

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