

<b>COURSE CODE:</b>	FRM 501
<b>COURSE TITLE:</b>	MULTIPLE LAND USE (MLU)
<b>NUMBER OF UNITS:</b>	2 UNITS
<b>COURSE DURATION:</b>	2 Hours per week

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### COURSE DETAILS:

**Course Coordinator:** Dr. M.F. Adekunle *B.For, MF, PhD*  
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**Office Location:** COLERM  
**Other Lecturers:** Dr. Oduntan and Dr. Shoaga

### COURSE CONTENT:

Nigerian land resources; uses of land; multiple land use and its concept / practices; stages in MLU conflict resolution; factors of MLU; socio-economic factors engendering MLU; advantages of MLU; disadvantages of MLU; land evaluation.

### COURSE REQUIREMENTS:

This is a core course and compulsory for all final year students in Forestry and Wildlife department. In view of this, students are expected to participate in all the course activities and have minimum of 75% attendance to be able to write the final examination.

### READING LIST:

Adeyaju, S. K. (1975), Forestry and The Nigerian Economy, Ibadan University Press.

2. Etukudo, I. G. et al (1994): Elements of Forestry

3. Gbile, Z. O. (1979): Exploitation of Nigeria's economic non-timber plant species in the wild – progress and prospects. An invited paper for the 9<sup>th</sup> Annual conference of the Forestry Association of Nigeria, November 1979.
4. Hill, Albert F. (1951): Economic Botany. McGraw – Hill Book Company, Inc.
5. M. B. Shrivastava 2004. Department of Forestry The Papua New Guinea University of Technology Lae. Vikas Publishing House PVT Ltd 576, Masjid Road, Jangpura, New Delhi – 110 014

## LECTURE NOTES

### NIGERIAN LAND RESOURCES

Land distribution in Nigeria is as follows:

1. 12,782Km<sup>2</sup> – Mangrove and coastal vegetation about 1.3% of total land area of Nigeria.
2. Fresh water swamp – 25,563 km<sup>2</sup> or 2.6% of the country.
3. Lowland forest area – 95,372 km<sup>2</sup> or 9.7% of land area.
4. Shifting belt of derive savanna – 75,707km<sup>2</sup> or 7.7% of total kind area. The largest is the guineas savanna made up of the southern and Northern guinea savanna. The bulk of Nigeria land is under one form of Savanna or another. The Southern and Northern guinea savanna is about 400,168km<sup>2</sup> or 40.7%.
5. About 342,158km<sup>2</sup> or 34.8% - Sudan Savanna.

The sahel is found in the extreme Northern part of the country of about 31,463km<sup>2</sup> or 3.2% of Nigerian land area.

Land administration in Nigeria distinguishes between government or native authority land, forest reserve or communal land. It is part of native authority lands that are constituted into a forest reserve. Communal lands are subdivided into two. (1) Those managed by the community (2) Those managed by the family as their heritage. Communal lands under forestry are termed free areas.

Although since the early 1970s, the Nigeria economy has become highly dependent on the export of crude petroleum, land is the country's most

important long term resource base for the support of plant and animals including humans both directly and indirectly.

### Uses of Land

1. It provides physical support and food for plants which is turn form the basis of animal nourishments.
2. It provides sites for which may and may not be favourable for various human activities such as crop agriculture, grazing and the establishment of settlements.
3. It also provides a source of raw materials for industrial production and construction.

The ability to perform these functions suitably depends on:

- (i) The characteristics of relief and soils
- (ii) The way it is owned and used.

### Land Tenure System

Practically everywhere in Nigeria, Nigerians share land as a common denominator where in lies most of their hopes and most of their problems. Land means many things and the manner it is acquired, owned used and transferred is referred to as Land tenure system.

#### Land acquisition and Transfer

Before rights can be exercised over land, it has to be acquired in one way or the other. The principal methods of land acquisition in Nigeria are:

1. Inheritance
2. Purchase
3. Lease, pledge exchange, and gift.

### Multiple Land Use (MLU) and its concept/ practices

Definition – MLU can be defined as a land use aimed at generation of more than one type of product and or service. It can also be defined as when more than one kind of use is made simultaneously of the same piece of land.

An example is livestock grazing within a tree crop plantation. It is a deliberate action hence the incidental production of another product or

service by a forester will therefore not qualify to be described as MLU. Similarly compactmentisation do not qualify to be described at as multiple land use.

From the foregoing it is expected that two or more crops must be grown at the same time on the same piece of land but may not be necessarily harvested at the same time. MLU is aimed at maximizing the net return in terms of crops and services of the land. The concept of MLU is in conclusive and very controversial as varying meanings are read into its practical applications. Some other thought is that MLU connotes the use of different adjacent land for different purposes bearing in mind geomorphological conditions of the land.

In this wise MLU can be described as the deliberate and simultaneous use of a land mapping (mgt) unit for the generation of one or more products or services Land mapping unit can be defined as an area of land with specific characteristics. Any area of land with some degree of homogeneity can be classified as a land mapping unit (LMU). What ever might be the case, the most important thing is that land should be carefully used to maximize profit.

The numbers of uses to which land can be put are three (3)

1. Product/product
2. Product/service
3. Service/service.

Since land is a limited resource, and since mans needs are insatiable, there is bound to be conflicts between resource producers where spatially coincidental land uses are involved. The usual solution to resolve the conflict is to regard one use as primary and thus integrates in as much as there which are compatible with the efficient management and production of the primary resource.

It is generally believed that it is wasteful to concentrate on the production of one product or service where two or more can be produced. Hence in the past, foresters in developing countries careless about accommodating other land using sectors apart from timber production. The advent of industrialization and rapid urbanization has brought to the knowledge of the foresters that there is no hope of

getting substantial increase in forest areas. This development has led to the evolution of multiple land use concept such as tanngua system and agrisilviculture.

A decision has to be made as to which the products or service should be regarded as primary. In resolving this conflict the following stage has to be passed.

#### Stages in MLU conflict resolution

1. There is the need for an assessment of the needs of the people for goods and services. That is the goods and services required from the forest.
2. There is the need for an assessment of the available area or areas that should supply these goods and services on the basis of multiple uses.
3. There is also the need for an assessment of the area or areas which would produce these goods and services on a single use basis. If the land can be supplying the goods and services on a single use basis, the decision will be a single use management and if not it should be on a multiple use management but with emphasis on the production of the primary products. E.g. the Eleyele (Ibadan) teak plantation could be to salvage the water catchments area for water production while the secondary function is to produce wood for fuel or poles, also Arakanga plantation in Abeokuta, Ogun State.

#### Agric and Forestry crop combination

A typical example of MLU is tanyu or agrisilviculture these systems have evolved as a result of some factors.

1. Land hunger
2. Suitability of the land
3. Large population of unemployed
4. Low standard of living
5. Little or no alternative employment other than farming
6. Farmer unable to maintain the fertility of the soil
7. Mutual confidence

## 8. Choice of species.

### Factors of MLU

#### 1. Land hunger

Land hunger and the suitability of the soil for Agric are apparently the most important factors. Farmers take considerable task to clear the farm area only these factors can force them to do so.

In Benin area for e.g. land hunger exist doing to the presence of a large area of gazetted forest reserve and planting with rubber of most of the ungazetted areas around the villages.

#### 2. Suitability of soil for Agric – The long presence of the forest cover has influence on the forest land. It enriches especially the Benin sands thus making them suitable for agric purposes.

#### 3. Accessibility – The land should be accessible in terms of roads, transportation, and other essential infrastructure, and within markable distance.

#### 4. Large population of the unemployed – Little of no other forms or alternative employment.

### Socio-economic factors engendering MLU.

#### 1. Rising population

#### 2. Highly skewed distribution of increase in human population such that the burden is more on developing countries which have very weak economy. That is, human population is increasing but not global.

#### 3. The rising demand for wood.

Natural vegetation has been altered by man for primary production, development of industries and infrastructure. In the process of economic development in Nigeria, most land resources plants, animals, soils and water resources were depleted due to poor land use system that were in opposition to the stability of the environment. As a result the forests cannot meet the requirements for wood products which rose

from 46.4 million m<sup>3</sup> in 1975 to 58.3 in m<sup>3</sup> in 1995 (IBRD 1983). Consequently Nigeria witnessed a growth rate of industrial wood deficit which was projected to rise from 0.26mil m<sup>3</sup> in 1980 to 1.8million m<sup>3</sup> by year 2000 (Popoola 1984). While regeneration rate was found to be between 1,500 ha and 1700 ha because of low budgetary allocation to forestry.

4. Increase in demand for food – This is as a result of teaming population.
5. Increasing demand for non-wood forest products for consumption. E.g. Fruit and food trees for compound farms Irvingia gabonenbis, Dacryoides edulis, Chrysuollum albidum and Cola spp.
6. Expanded need for water – For domestic agricultural and industrial purposes. In the last 40 years some governments have expanded water projects e.g. Ogun State.
7. Need for water shed and soil protection – Establish a total of 15 million ha of plants comprising of planting for various purposes such as shelter belt, water shed. Conservation, rehabilitation of degraded sites, forest fruit trees, gun Arabic e.t.c.
8. Declining forest cover: In tropical countries the decline is not counter balance by increase in forest cover where forest establishment has improved towards the last century.
9. Because of pressure and unregulated fellings, there is an alarming rate of biodiversity loss owing to forest declination, science and economy.
10. Loss of productive land through water H<sub>2</sub>O and wind erosion, toxification e.g. oil producing areas has been affected by toxic rains (acid rains) thereby impoverishing nutritive lands.
11. Increasing demand for energy – Energy is coming from only one source i.e. fossil fuel.
12. Declining site productivity as a result of carbon-monoxide built-up, consequent upon fossil fuel use and the depletion of the ozone layer.
13. Demand for tourism, recreation and landscape management. This demand will fuel the multiple use of land.
14. Unregulated fuel wood cutting which aggravated fragile ecology particularly in tropical developing countries e.g. Northern

Nigeria use of cow dung for cooking leading to nutrient to be unavailable to the soil.

15. Conflicts in developing worlds leading to increase warfare, militarism, unrest, erode the meager resources of developing economy – This apart from creating ecological problems which results in land degradation, environmental abuse and collapse, this act of militarization create sociological problems, loss of means of income, societal esteem, self worth, social status and economic freedom.
16. Available land is finite except where land reclamation is possible.

### Advantages of MLU

The multiple use of land is often presented as one with unlimited advantage. Some of the benefits derivable from MLU especially forest lands are:

1. The maximization of the productive potentials of land without compromising the interest and requirements of future generations. In other words people are equating land use with sustainable land management.
2. The accommodation of the needs of poor members of the community.
3. It acts as an insurance against crop failures.
4. It enhances self sufficiency by small holder farmers who intend to grow most of what they need for substance.
5. It encourages intensive use of land.
6. It promotes proper land conservation and management through continuous site protection as a result of regular tending operations of various crops.
7. Under MLU, there is a reduction in the spread of pest and diseases out break especially where mixed crops are not alternative host of the pest or parasites of one another.
8. It ensures availability of harvest throughout the year. This is because the crops do not mature at the same. This empowers the farmer economically who will be able to generate revenue continuously throughout the year from the sale of harvests.

9. It equally reduces site degradation and loss of site fertility. The continuous cover of the site will reduce erosion. Also soil fertility is enhanced by continuous nutrient recycling. This is enhanced by the multiplicity of crops which varies in their phenology.
10. It ensures a continuous food availability especially at the subsistence level and thus reduces dependence on food aids.
11. It reduces environmental hazards.

#### Disadvantages of MLU

1. Optional yield per crop is not visible.
2. It imposes reduced individual crop yield.
3. There may be loss of crop yield as a result of several factors which include crop incompatibility, allelopathy.
4. It does not encourage mechanization such as mechanized planting and application of herbicides.
5. Some crops act as alternative hosts of pest and diseases. E.g. Gmelina and Cassava should not be planted together e.g. Cassava harbors a pest called Zonozelus variegates and this will be transmitted to Gmelina.

#### Some Specific Examples of MLU

1. Agroforestry – This is a very good and universally growing example of MLU. In its original concept, agf. encompasses the simultaneous production of forest trees, agric crops and animals on the same land management unit with the aim of obtaining greater outputs on a sustained yield basis. It is a land use system which enables the land to remain productive throughout the entire year, resist plagues and infestations that monoculture cannot and minimize soil erosion. The microclimate within the farm is modified and minerals are recycled through natural processes that include organic matter from dead leaves, branches, and manure from livestock. Yields are diverse and include nutritious fruits, fuel wood, construction poles, timber and resins. This diversity of products makes the farmer more self-sufficient and protects him from the market fluctuations which are disastrous to small farmer's producing only one kind of products. Wood products

have also the great advantage that can be kept when the market price is low without losing their values.

2. Traditional Shifting Cultivation – Under this system some relics of forest tree spp are retained on the land. These are intercropped with staple foods, while animals free ranged. This system today due to increase in population and the resulted shorter fallow periods on the same land which continuously loose fertility, is becoming ineffective.
3. Traditional home gardens – This involved the planting of individual trees in the yards or garden of village or urban homes. Fruit trees are of priority for this scheme followed by ornamental trees, shade trees, and forage.
4. Taungya System – This is a form of quasi – MLU because the food production aspect is restricted to only the 1<sup>st</sup> two or three year of the rotation of tree crops. While animals however continuously free range within the established plantations. That is, under Taungya system, forest trees and food crops are jointly produced.

Other examples include forest reserves, game reserves, conservation plots, national parks e.t.c which are set aside for diverse uses including watershed protection, conservation of fauna, flora (biodiversity), education and research as well as provision of wood and non-wood forest products.

Others are Dams – there are dams constructed for multiple uses such as water transportation, generation of hydroelectricity, production of fish, animals and aquatic organisms, erosion and flood control. Irrigation for farming and municipal water supply.

In many advanced countries/economies, e.g. USA, Canada, Australia and New Zealand, the issue of MLU has been critically debated and assessed. In the publication entitled “The rise and fall of MLU forest management in New Zealand, it is clearly indicated that MLU should involve the identification of a 1<sup>o</sup> or dominant use and then accommodate other uses that do not distract from the dominant use.

In Australia, the new south Wales forestry practitioners claimed that regardless of the level of sophistication of MLU organization, the separation of cost and revenue is an essential prerequisite to proper accounting particularly in commercial and non-commercial forestry activities, this is fundamental to the development of use pays for granted. It is imperative to note that it is often difficult under MLU enterprises to separate forests into those managed for market products e.g. timber, pulpwood and those set aside for non-market goods.

In many develop countries such as Nigeria and Cameroon, NWFP actually generate more revenue/unit land area than macro product. It is therefore necessary that these products are brought under recognized accounting and appraisal systems. Under normal conditions forest lands and other forest resources should be revaluated regularly owing to changing human sociology and needs. This may further promote the adoption of MLU in forest management.

For example senic beauty is imagined as an important forest resource in many countries. In British, Columbia, Canada, the forest landscape is regarded as a part of the heritage and treated as the resource base for the country's tourism. In fact in the late 1970's, the concept of forest landscape management (FLSM) was formerly introduced in British Columbia as an integral part of forest management in that province. The forest service hand book of 1981 expressed forest service landscape alteration in terms of visual quality objectives (VQO).

There are 5 of VQO.

1. Preservation – That is, no physical activity like timber harvesting will be allowed because of tourism potential and imperatives of the site.
2. Retention – Retain the features physically. Under permitted but such that are not visually apparent. (Selective felling). The activities that are permitted should be at the lowest rate. These are in form of collection of fuel wood, leafy vegetables, snail etc.
3. Partial Retention – Under this, higher activities are permitted. How ever, these activities must be subordinated to the natural

landscape features. In other words very drastic and visible changes are not permitted. Such changes may include huge excavation that may change physical features.

4. Modification – The use of the landscape could be dominant but should follow natural line of natural landscape.
5. Maximum Modification – Involves dominant activities which are not in harmony with the natural landscape. This may include total elimination of hills, rock out crops, valleys and marshy or inundated areas as well as alteration of drainage pattern.

Development in Libya and Israel where sand – dunes has been reduced, stabilized and converted to productive agricultural land serve as examples of maximum modification where the entire LS is given a total different look.

### **LAND EVALUATION (L E)**

L. E – is the process of estimating the potentials of land for different kinds of uses. This includes:

1. Production uses e.g. Arable farming, livestock production, fisheries and forestry.
2. Services/other benefits – water control, recreation, tourism and wildlife management.

Note that, fundamental to L.E. procedure is the fact that different kinds of uses have different requirements. The basic feature therefore is the comparison of requirements of LU with the resources offered by the land itself. L. E. requires information from 3 sources:

1. Land
2. Land use.
3. Economics.

Data on land can be obtained from natural resources summary include Ecological and technologies requirements of different kinds of land use can be obtained from the relevant disciplines.

Information on economics has to be as much as possible very current. This is due to the fact that economic indices are usually very dynamic and evolution process should as much as possible reflect these prevailing situations.

