FWM 201

INTRODUCTORY FOREST MANAGEMENT TECHNIQUES

The forest is a renewable natural resource which produces timber and other products for home and industry, food for wild and domestic animals, protection of soil and water values and provision of facilities for recreation. Because of the forgoing, it is essential to manage the forest very well scientifically and economically because it is exhaustible but renewable.

In the light of the above, forest management have been defined as the application of business methods and technical forestry principles to the operation of forestry properties. Or simply defined as the practical application of all branches, of forestry such as silviculture, economics, Botany, planning e.t.c. to the efficient management and organization of the forest.

This subject is concerned with:

1. Efficient planning so that the forest can provide the greatest benefits at low cost. Like the management of any other business enterprises.
2. It ensures that over-cutting or under-cutting so not occur through yield regulation.
3. I ensures correct keeping of records of all operations.

PECULIARITIES OF FORESTRY THAT DISTINGUISH IT FROM OTHER BUSINESS VENTURES AND SOURCES OF RAW MATERIALS.

1. Time Factors: The growth of trees to useful sizes takes a long time. This time that elapses between establishment and final harvesting. Rotation. It is considerably long between 10 – 20 – 50 – 200 years depend on object of management.
2. Market: Market may change during the period of growth and therefore invalidate the original decision of what product to grow.

3. Capital tied down: The long period involves delayed return – from the initial investment so that much capital is tied to the volume of maturing timber on the product.

Objects of Management

These are those that express a broad basic purpose of establishing a forest. All objectives must be clearly stated before embarking on a forest venture. Some objectives are:

1. Provision of permanent cover: For erosion control
2. Provision of a continuous supply of forest products for local use
3. To bring forest to a state of normality and to increase proportion of valuable spp.
4. To obtain maximum sustained annual yield or revenue.
5. To provide facilities for research and education.
6. Supply of services to communities.

The 1^{o} object of good management is the provision of maximum benefit to the greatest number of people all the time.

Sustain Yield Principle (S.Y.M)

This is the management of the forest properties for continuous production with the aim of achieving at the earliest possible time an approximate balance between net growth and harvest either by annual or longer period.

1. Continuous production means we must go on producing in-perpetuity a non-decreasing volume of timber and non-timber products.
2. Approximate balance between net growth and harvest means we are not suppose to harvest more or less than we put in.

Advantages

1. Simplicity of operation arising from the normality concept.
2. I gives stability to dependent industries e.g. sawmills, wood carving, paper and match industries.
3. It gives stability to rural communities through provision of rural employment.
4. Markets can be fostered and their confidents gained.

5. It provides good competition against substitute goods in forest product markets.
6. Mechanical equipments, roads and other capital goods including tractors, e.t.c.) can be used to optimal capacity.

Types of Sustain Yield

1. Integral Yield
2. Intermittent yield
3. Annual Yield (Details in class)

Disadvantages of S. Y. M:

1. Rigidity of annual cut with adverse effect on forestry industry development.
2. Felling cannot be modified to suit condition of demand.
3. Sustain Yield can perpetrate or even aggravate abnormality of forest with serious economic consequences.

Normal Forest Concept:

A normal forest is a forest that has reached an "ideal state of perfection" which satisfies the object of management to the full. It is defined as: That forest which as reached and maintained a practically attainable degree of perfection in all its parts for the full satisfaction of the purpose of management.

It has the following structure:

1. Normal distribution of age classes
2. Normal increment
3. Normal growing stock

Increment: In any form of business enterprise, it is essential to distinguish between capital and return on capital. In forestry, capital is present in 2 forms viz: the tree and the land on which the tree is growing.

In forestry therefore the return on capital is usually represented by increment on the trees. It is defined as the amount of irreversible increase in living organism overtime.

They are qualified by:

1. Variables mend e.g. ht, girth, diameter, volume e.t.c.
2. Portion of tree mend e.g. total ht, merchantable hit, hole ht, stump ht, dbh, e.t.c.
3. Period of time e.g.

C. A. I.	-	Current Annual Increment
M. A. I.	-	Mean Annual Increment
P. M. A. I	-	Periodic Mean Annual Increment

Details in class

Rotation: This is the age at which a stand or tree is eventually ready to be transformed into a product i.e. reaches maturity from the time of establishment is called "Rotation"

Simply put: It is the planned or predetermined number of years between the formation of a forest crop and its final harvesting.

Types of Rotation:

1. Physical, Silvicultural, Technical, R^b of maximum volume and financial Rotation.

Factors affecting Rotation

1. Silvicultural, economic and object of management factors

Forest Sub-division

Some of the reasons for subdividing the forest properties are:

1. To fix the responsibility of administrative and executive personnel territorially.
2. To locate all forest resources and operations.
3. To provide the basis for recording operations and resources.
4. To facilitate the formulation of plans of management and efficient control of all forestry activities.
5. You need to subdivide because of topography.
6. Because of character of forest in terms of composition, stand conditions, vegetation, stock, e.t.c.
7. Because of the variety of purposes of objects of management.

Types of Sub-division

1. Working plan area: These are subdivisions or sub-units or areas homogeneous with respect to objectives and conditions and large enough to form more or less self contained economic unit.
2. Working Cycle (W. C.): A working cycle may be defined as an area forming the whole or a part of a working plan of an area with a particular object and under one silvicultural system. It is a sub-division of a working plan area. If a forest contains more than one distinct type with distinct object of management, this sub-division is necessary. E.g. Oloke-meji F.R. (HF & Sav.).
3. Felling Series (FS): This is a term used to describe sub-units of a working cycle i.e. when a working cycle is extensive, it is divided in to units called felling series for the purpose administration, balanced distribution of yield and work.
4. Felling Cycle (FC): This term is used to describe the period in which all portions of a felling series are worked under a definite type of felling e.g. clear felling or selection felling.

Compartments: This is basic territorial units of the forest permanently defined for the purpose of description, observation and records. It is the smallest permanent unit in forest management and all other units can be built up by grouping of compartments.
It is useful as a basis for accurate determination of increment of the forest, stand areas and also accurate estimate of timber. Compartments are usually designated by Arabic numerals and numbered serially; Sub-compartments are indicated by smaller letters and stands within a compartment are represented by subscripts e.g. 5a.i means stand i located in sub-compartment ‘a’ and within compartment 5.

Stand: This is defined as an aggregation of trees occupying a particular area and sufficiently uniform in composition, area, argot and condition as to be distinguishable from forest or other growth on adjoining areas.

Block: This is a topographic unit which serves as a major area for the location of logging units and compartments e.g. in watershed of large streams, a reserve to be held for a sawmill. It must be under license.

Logging Units: This is an area more or less homogeneous with respect to the cost of logging and transport and which has its own separate working plan to be applied.

Organization of Forestry Staff

The general pattern in forestry service is every country is the organization of forest into field administrative units. Such units and their head may be called different names or titles. The nature and sizes of the units varies.

In Nigeria forests are organized to coincide largely with political and administrative units e.g. States and Federal

A typical tree of organization in Nigeria is as follows: (Diagram in class).

Summary:

1. Formulation of Policy - (DF, DDF, Commissioner, A.D.F.)
2. Approval of Policy - Com, PS, DF
3. Release and Interpretation of Policy - DF, DDF, ADF, & CFO.
4. Execution of Policy - FFO - General Labour.
5. Review of Policy i.e. keeping policy up to date. DF, PS, ADF & Commissioner

FOREST RESOURCES UTILIZATION

The utilization of forest resources especially timber starts with the harvesting. The various operations involved are as follows:

Logging: This is the reduction of standing timber and procts of round logs from such timber. It also includes their transportation. It covers felling, limbling and bucking.

Felling: Is the process by which a standing tree is severed from its stump. So that subsequent logging operations could be carried out. Dig:

Limbling: This is the removal by saving or chopping of branches from a felled tree.

The method of skidding dictate to a large extent how far limbling is done. Limbling is commonly done at the site of felling.

Bucking or Cross Cutting: This is the cutting of the felled and limbed logs into dimensions for minor and major transportation. Cross cutting can be carried out either at the felling site, loading site or at the sawmill. It is usually down by the power-saw.

Skidding: This is the initial movement of logs from felling site to the landing or log gantry is called "Skidding". This is technically referred to as the Minor transportation. Types of skidding methods are: Manual skidding, tractive skidding, cable yarding, animals skidding and helicopter skidding (in advanced countries).

Log Loading: Logs which have been skidded to the road are loaded into a wheeled vehicle most commonly motor trucks. This is major transportation.

Loading methods: (1) Hand labour loading

(2) Crane loading (3) Loadingtong method.

After loading the ends of the logs are marked with branding harmer. The brand indicates the ownership of the logs and the property from which they are logged.

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Log Hauling: This is the major transportation phase of logging process and it involves log movement over a much greater distance and in movement at greater speed. The 3 major methods used are:

(a) Floating, (b) Rafting, (c) Road hauling.

Floating: River transportation – soft woods float easily but staying too long in water may lead to sinking of the logs due to absorption of water. This may block the river thus hampering navigation. Lumber floated logs season better than others.

Rafting: This is the toeing of lumber together in rafts. Sinkers and floaters can be rafted together inter-spaced with each other. Toe with speed boat.

Road Hauling: Majority of logs are hauled from the landings to the point of use e.g. sawmills by means of motor trucks. Rail transportation can be used under special conditions.

Sawmilling:

Sawmilling follow the harvest of logs. This is the conversion boles into timber products of desired thickness and length.

A sawmill is a wood processing establishment which have a band or circular sawing machine for breaking down logs into desired sizes. A timber is a wawing wood product in a form suitable for construction, carpentry, rejoinery or manufacturing.

Classification of sawmills:

(1) Density out put (2) No. of employees

(3) Size of machine (4) Quantity of power required

(5) Lumber recovery ratio (LRR) or Convertion ration (CR).

$$\text{C. R (LRR)} = \frac{\Sigma \text{ of vol of products}}{\text{Volume of logs}}$$

Small mills - - $14m^3$

Medium mills - $14 – 28m^3$

Large mills - - $28m^3$

Studies have shown that most of our sawmills are either in the small or medium level.

On log recovery efficiency the following categories are recognized:

Class 1 - Convertion ratio 70%

Class 2 - Convertion 50 – 69%

Class 3 - 30 – 49%

Class 4 - less than 29%

These categories are nothing but resources waiting ventures.

The product of any sawing operation depends mainly on the demand by customers, the tradition in vogue, within the locality and the special request of log owners.

There are numerous sizes of sawn timber but the ones commonly come across are:

(a) 1" x 12" x 12' (b) 2" x 3" x 12' (c) 3" x 4" x 12'

(d) 2" x 2" x 12' (e) 2" x 14" x 12" (f) 2" x 12" x 12'

(g) 2" x 6" x 12'.

Sawing machines

A. Breakdown or Head Saws

(i) Band Saws

(ii) Circular Saws.

Band Saws:

(i) Horizontal band saws

(ii) Vertical band saws

Horizontal band saw, 1. C. D. Type horizontal saw, Heavier machine

(iii) Semi portable CD Type.

B. Circular breakdown saws

(i) Rack bench type (2) Carriage operated

Breakdown circular saw.

Timber grading (1) Visual grading (2) Stress grading.

Factors to be considered in Grading.

1. Direction of grains – i.e. alignment of grains
2. Preference knots – there are two types of knots – loose and life knots. Life knots are attractive. Knots lead to the reduction of strength.
3. Insect attack – Visual on the surface.
4. Fungi attack – weakens and stains the timber.
5. Species – weather the spp are economical or not.
6. Checks and splits.
7. Share of timber.
8. Presence of sapwood.

Sawmaill grades: (1) Good (2) Good – rough

(3) Jacket (4) Rough

Wood seasoning – Dry of wood to remove water.

Miss of seasoning: Air seasoning - Natural

(2) Kiln seasoning (3) Solar drying

(4) De-humidifying (5) Chemical seasoning – use of macle

Wood Preservation

To make the wood insect resistant.

To make it fungi resistant.

To increase life of timber

To retain quality

Types of Preservatives

1. Tar oils - Distilates from coal tar
2. Water born - Chemicals, salts, copper, zinc
3. Organic solvents - consist of chemicals dissolved in a volatile solvents evaporates leaving the toxic chemicals dissolved in a volatile can be applied by pressure method, and hot, cold tank treatments, dipping, spraying and brushing.

Manufactured Timber

Apart from timber used for furniture, others are called manufactured timber;

Composite Wood: These are made by breaking timber by different methods e.g. slicing, sawing, veneering and rotating cut into one form or the other from the solid timber.

Categories of composite Wood

1. Plywood - made up of obligation spp (i.e spp of your choice) and the veneer glued together in different thickness.

   Block board - the same as plywood but the core is made up of santlings or strips instead of veneer.

   Lamin board - Core - 25mm width. Same as block board but core is 1.5 – 7.0mm in thickness.

   Pattern board - Same as block board except the core is 75mm in width.

   Particle board: Logs are broken down into various sizes and grind up into bits, then adhesives are added and mixed up. They are poured out into patterns and allowed to dry.

Parmali Boards: This is done by subjecting plywood to great heat pressure, then the plys would join into one and it would be difficult to one from the other. It is heavier and stronger.

Non-timber Products (MTFPS)

NTFPs - Are all biological (other than industrial round wood and its derivatives) and non-biological materials extracted from forest ecosystems and are utilized within the household, industries, or are marketed or have social, cultural or religious significance. They include plants, animals, and parts of animals and plant. NTFPs may be used for fuel, food, forage and fodder, medicine, cottage and small scaled industries, clothing, construction, tools, wrapping materials, biochemical's among others.

They provide direct and indirect benefits to their immediate users, but also employment and income thro' their collection marketing and processing.

Examples are as follows:

1. Leaves - Rafia, teak leaves, palm frond
2. Ropes - Acacia ataxacantha
3. Chewing sticks - e.g. Pako Ijebu Masukaria accuminata
4. Gums - Prospected from plant exudates e.g. Acacia Seyal – Gum Arabic.
5. Fruits & seeds, e.g. Mango, guava, e.t.c.
6. Bamboo – for furniture, pulpwood, e.t.c.
7. Rattan - (Pankere) furniture
8. Winetapping - from palm tree coconut trees
9. Medicinals - leaves, roots, barks for venirous ailments
10. Fuel - Charcoal, densited wood. e.t.c.