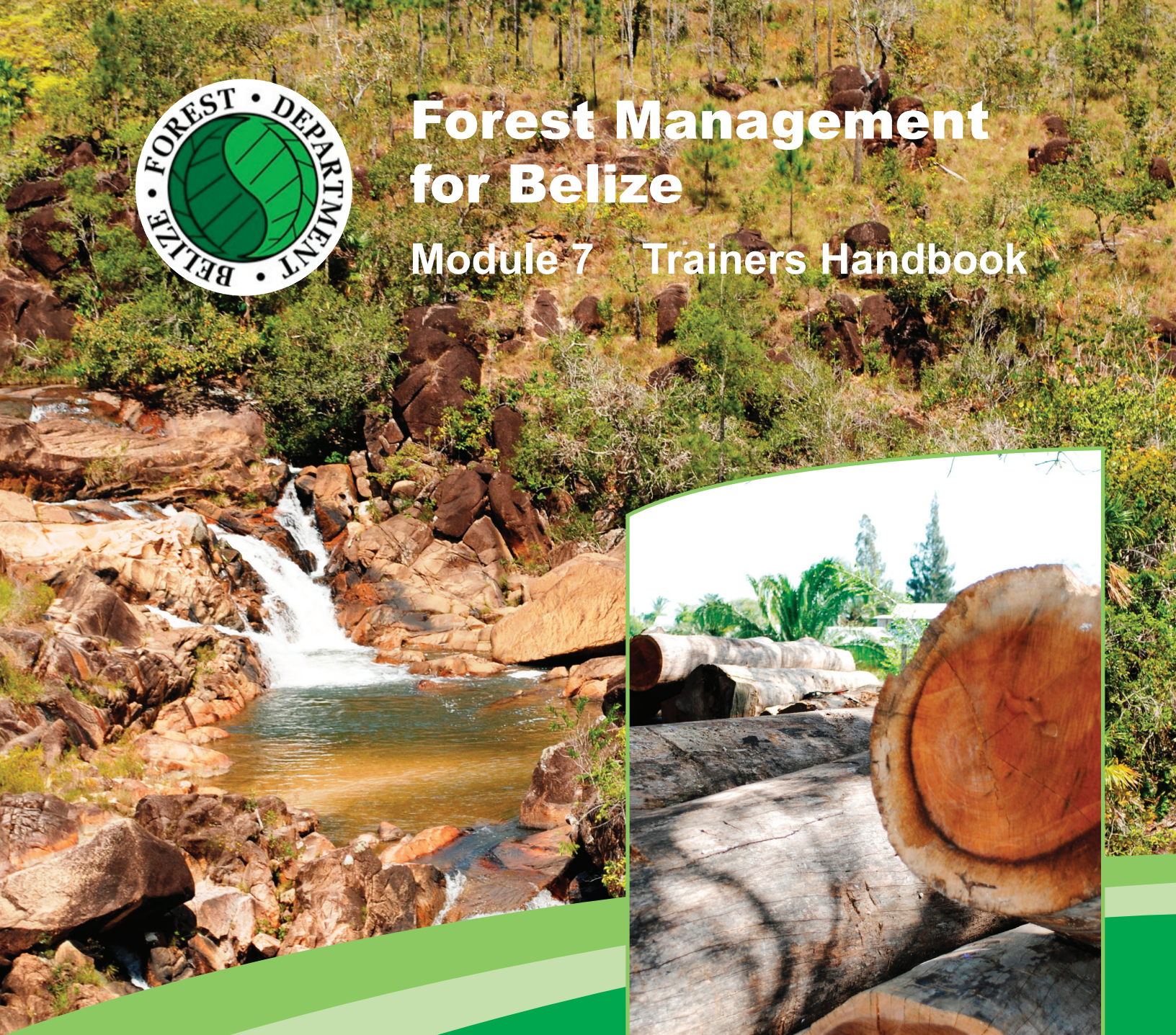




Forest Management for Belize

Module 7 Trainers Handbook



With the support of:



Finnfor Project
Forests and Forest Management
in Central America

FOREST MANAGEMENT FOR BELIZE TRAINERS HANDBOOK



Revised
September
2011

MODULE 7



Finnfor Project
Forests and Forest Management
in Central America

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PRESENTATION

The original version of the FOREST MANAGEMENT SKILLS MANUAL Trainers' Handbook for the Belize Forest Department was prepared in 1996. That document was produced under the auspices of the Forest Planning and Management Project (FPMP) implemented as an institutional and capacity building programme for the Department. It formed one of a ten-module package of training manuals prepared for the Forest Department.

At the time of its preparation, Belize had signed both the United Nations Framework Convention on Climate Change (UNFCCC) and the United Nations Convention on Biological Diversity (UNCBD), with the United Nations Convention to Combat Desertification (UNCCD) being signed in 1998 (in the year that the training was first delivered). Even though the first two Conventions listed had been signed for a few years, there was limited public education and outreach about climate change and its impacts on the environment including biological diversity. Hence no provisions were made for such management within forest management plans that were being drafted during that period.

The policy, principles, and strategic activities applied for forest management have achieved varying degrees of success, and a process for review and revision is now underway. The revised module incorporates an awareness of and minimal measures for climate change mitigation, biodiversity protection, and soil erosion, as they relate to forest management in Belize and the environmental conventions of the United Nations. It also elaborated more on watershed management as an important component of forest management. In addition, some minor changes in vocabulary and definitions were made.

Input to the revised "Forest Management Trainers' Handbook" was provided by Forest Department staff members, primarily Raul Chun and Alex Escalante. It is also acknowledged that the revision was accomplished with the technical and financial assistance of the CATIE-Finnfor Project.

Tania Ammour
Regional Coordinator
CATIE Finnfor Project
December 2011

HOW TO USE THIS TRAINERS' HANDBOOK

This handbook should be used together with the **Trainers' Guidelines** which has been written especially to support the teaching of the **Forestry Skills for Belize: Modular Training Programme**.

The Trainers' Guidelines gives information about communication; teaching methods; training resources; monitoring and evaluation which will help you conduct an effective Module.

The programme consists of Nine Modules, each of which has its own handbook. In this Handbook you will find a comprehensive set of instructions and resources for teaching this particular Module.

The first section gives an overview of:

- **Module Aim** -describes what the trainer is trying to achieve.
- **Objectives** - states what trainees **will be able to do** at the end of the Module as a result of the teaching programme.
- **Content** - summarizes the main topics covered.
- **Equipment** - teaching equipment; stationery; and practical forestry equipment needed for the Module.
- **Preparation**- pre-course preparation needed.

An example of a timetable is given. You can alter this to suit your programme. If you make changes check that the order of sessions is still logical and that you are keeping to the time allocated.

The main section consists of session plans, giving content, methods and resources for teaching. Full directions are given for preparing material and conducting each session.

The final section describes how to evaluate the Module with some examples of questions and exercises.

MODULE OVERVIEW

- **Title:** FOREST MANAGEMENT
- **Total Time:** 37 hours over six days, 16 hours in the training room and 21 hours practical.
- **Aim:** To review the basic principles of forest management so that participants can apply the techniques and skills learned in managing forested areas.
- **Objectives:** At the end of the module participants will be able to:
 - Explain what forest management is
 - Explain the peculiarities in managing forest resources
 - List the range of skills involved in forestry
 - Define silviculture
 - Apply the skills and art of silviculture
 - Explain basic management principles
 - Apply basic management techniques in the field
 - Explain the nature of watershed management work
 - List soil erosion and water control problems in the construction of roads
 - Recognize and apply forestry techniques in watershed management
 - Explain the various administrative and management concepts of organizing the forest estate
 - Apply the system of organization in executing their responsibilities
 - Explain the forest policy of the Forest Department/Belize
 - Enforce laws and regulations while conducting their duties
 - Explain the variety of activities and information required in preparing a management plan
 - Collect and collate data for the preparation of management plans
 - Implement the objective of a management plan
 - Explain their responsibilities as it relates to the implementation of a management plan

COURSE OUTLINE

1.0 Scope of Forest Management

- Definition of forest management
- Objectives of management (including functions as carbon sinks, biological diversity protection and preservation , and mitigation of soil losses)
- Peculiarities/time factor/multiple-use/size and topography
- Forest administration/control of growing stock/harvesting/sales

2.0 Silviculture Operations

- Definition of silviculture
- Silviculture characteristics
- Regeneration systems
- Thinning and its effect on tree growth
- Silvicultural systems

3.0 Management Principles

- Sustained yield/normal forest/rotation age/cutting cycle
- Growing stock/size limits
- Inventory/increment

4.0 Watershed Management

- Concept of watersheds
- Operations
- Soil conservation
- Watershed problems
- Soil erosion
- Road erosion
- Forestry practices

5.0 Organization of the Forest

- Territorial units/blocks
- Silvicultural units/working circle/felling series
- Administrative units

6.0 Forest Policy

- What is policy
- Belize/Forest Policy
- Others

7.0 Preparation of Management Plans

- Background
- The plan

8.0 Implementing the Plan

- Why are plans not implemented
- Responsibilities
- Content and format
- Study of plan
- Preparation for presentation
- Presentation

9.0 Management on the Ground

- You and the job

TRAINING EQUIPMENT (Rural environments)

- Overhead Projector + Screen + Spare Bulb
- Box of Transparencies + Pens (Waterproof, Fine Point,) + Eraser
- Chalkboard + Chalk + Eraser (Or White Board with Correct Pens in assorted colours + Cleaner)
- Flipcharts + 4 Sets of Flipchart Pens in assorted colours
- Flipchart Stand (2 If Possible)
- Thin card - sheets of white and assorted colours
- Blotak or Drawing Pins - 1 Box
- Masking Tape
- Hole Punch
- Stapler + Box of Staples
- Scissors - 2 Pairs
- Glue for Paper
- Paper/ Notebook for Use of Trainers

For environments where all facilities are available ¹

- Laptop computer, CDs, and/or flash drives
- LCD Projector
- Screen
- Printer/Copier

1 These should be standard equipment where environments allow.

STATIONERY FOR PARTICIPANTS (1 set per person)

- Ring Binder + Pad
- Document Folder
- Field Note Book
- Ruler+ Pencil + Sharpener + Eraser + pencil and/or pen

TRAINER PREPARATION

Read through the complete module quickly and then take each session one at a time. Read carefully and make notes if you wish. **Use the Trainers' Guidelines Manual to help you.** Some sessions have **Supplementary Notes** for your reference. These give extra information for trainers including examples of the responses and **key points** you want to bring out in discussion.

EVEN IF YOU ARE ONLY TEACHING SOME SESSIONS YOU SHOULD READ THE COMPLETE MODULE. This will help you to relate your topics to those covered in previous sessions. Positive reinforcement and links between subjects help learning.

When you have finished preparing check yourself:

YOU SHOULD BE ABLE TO RUN THROUGH EXACTLY WHAT YOU WILL DO AT ALL STAGES OF THE SESSION IN YOUR HEAD WITHOUT REFERING TO ANY NOTES!!!!

You may change the suggestions for presentation methods and activities if you have a better idea, **especially** if you can make the content more practically relevant to a particular group.

When considering changes to sessions you need to check:

- Time available - are you using more of it with the changes?
- Are you still covering the essential content/objectives?
- Resources available

Large changes to overall content and objectives (both knowledge and skills), should be made only if there is a specific Training Needs Analysis (TNA) completed. The TNA provides a basis for making appropriate changes and/or additions.

Preparing your **Training Resources** is explained in each Session Plan. **Check that the electricity supply is reliable at your training venue.** If problems are anticipated then be prepared! You may need to prepare **Flipcharts** for presentation instead of using the Overhead Projector. Or you can utilize the **Board** and write up points as you go through the session.

Check arrangements for photocopying handouts and get this done in advance. You should punch holes in all handouts so that the participants can put them straight into their ring binders. **The training content sections for each session indicates when you should give out the Handouts.** If you distribute them all together at the start of a session the amount of material will act as a distraction. **Use one handout before moving on to the next.** Handouts with more than one page **should be stapled together** before distribution.

In this module you do not need to prepare any practical field training sessions.

Documents Not Included In the Handbook

You will need to obtain copies of the following documents for teaching the Module:

- Forest Policy 1954
- T.J. Synnott. Guidelines for the Preparation of Forest Management Plans, 1992
- Copy of a current management plan
Use a current or appropriately scaled and updated management plan

TIMETABLE

Total time: 37 hours (21 hours practical)

Location: Room and Field

	8:00 - 10:00	10:15 - 12:15	13:15 - 15:15	15:30 - 16:30
Day 1	S1: Scope of Forest Management	S2: Silviculture	S3: Management Principles	S4: Watershed Management
Day 2	S4: Continued S5: Organization of Forest Quiz 1	S6: Forest Policy and Law	S7: Management Operations (Practical)	S7: Management Operations (Continued) (Practical)
Day 3	S6: Forest Policy and Law (Continued)	S8: Inputs in Preparing a Management Plan S9: Management on the Ground	S10: Management on the Ground (Practical)	S10: Management on the Ground (Practical)
Day 4	S10: Management on the Ground (Practical)			
Day 5	S10: Management on the Ground Writing Up	S10: Management on the Ground Writing Up	S10: Management on the Ground Presentation	Evaluation

SESSION PLAN

S1

- **Title:** Scope of Forest Management **Time:** 1½ hours
- **Location:** Training Room
- **Aim:** To examine the objective and scope of forest management so that participants can understand and appreciate the factors and expertise required for the management of forest resources.
- **Objectives:** At the end of the session participants will be able to:
 - Explain what forest management is
 - Explain the peculiarities in managing forest resources
 - List the range of skills involved in forestry

Key Points	Resources	Method	Time
Introduction: Definition of forest management	Handout 1/OHT	Q and A	10
Development: Objectives of forest management Peculiarities in the forest industry Benefits of Forest Management Scope of Forest Management	Handout 2/OHT Handout 3/OHT Handout 4/OHT Handout 6/OHT	Q and A Discussion Discussion Discussion	10 15 20 15
Conclusion: Review and summary	Board/Handout 6/OHT	Discussion	20

- **Training Equipment:**
 - Board OHP and Screen
 - Flip chart and sheets
- **Trainer Preparation:**
 - To prepare OHT for Handouts 1-6

- Handout 1** - Definition of Forest Management
- Handout 2** - Objective of Forest Management
- Handout 3** - Peculiarities of Forest Management
- Handout 4** - Benefits of Forest Management
- Handout 5** - Technical Fields in Forest Management
- Handout 6** – Scope of Forest Management

TRAINING CONTENT

SCOPE OF FOREST MANAGEMENT

S1

Definition of Forest Management

Trainer should solicit a definition of Forest Management from the group and note on flip-chart. Trainer then distribute Handout 1(OHT 1) and re-enforce the following points.

Key Points

- It is operated as a business as it relates to people
- It is an integration of art, skills and science
- It is concerned with all aspects of forestry
- Multiple use of the forest
- Integrated management to obtain the full range of environmental, social, and economic benefits while ensuring the future health, goods, and services of the forest

Objective of Forest Management

Have trainees list on a sheet of paper a statement of the objective of forest management.

Allow 10 minutes then on the board solicit and write suggestions.

Compare suggestions with **Handout 2 (OHT 2)**

Key Points

- Objectives are broad , basic purpose rather than specific
- Greatest good for the greatest number
- Maximum utilization of the land and soil
- For all times & time bound

Peculiarities of the Forest Industry

Forest management is not different to the general principles of basic management.

However there are certain peculiarities when compared to other industries, raw materials and other land-use.

*Introduce the above statement to the group and allow trainees 15 minutes to list factors of these peculiarities under the following headings and thereafter compare the points raised with those listed in **Handout 3.***

- *The Time Factor (slow growth of some trees)*
- *The Product and the Manufacturing Plant (relating harvests to growth or increment)*
- *Multiple Uses*
- *Extent*
- *Topography and Accessibility*

Benefits of Forest Management

Trainer should solicit students' knowledge, understanding, or perceptions of other ecological and environmental benefits derived from forests and relate these to the three Environmental Conventions:- United Nations Framework Convention on Climate Change, United Nations Convention on Biological Diversity, and the United Nations Convention to Combat Desertification (Land Degradation). Further development of these themes should be optional.

Distribute **Handout 4** summarizing the benefits of forest management

Key Points

- Forests function as Carbon sinks thus helping to mitigate global warming
- Healthy forests maintain and preserve biological diversity of both plant and animal species
- Extensive forest cover preserves quality of soils, prevents soils loss and helps to control erosion

Distribute **Handout 5** on the technical fields and emphasize the wide ranging technical ramifications in managing the forest

Scope of Forest Management

- A basic feature of forest management is that like agriculture it is very dependent on the land
- It deals with control of the growing stock
- Skills, knowledge and art of managing agriculture and land is required for the management of forests
- These technical skills and knowledge are wide
- Response to market demand for products

The scope of forest management can be summarized as follows:

- A. Control of growing stock
- B. Sales and distribution of product
- C. Operational efficiency

Trainer to distribute **Handout 6** and develop the topic "scope of forest management" under the three headings as listed above.

Conclusion

- Objectives must be clear:-timber/recreation/watershed protection, biodiversity protection, erosion control, non-timber products use, etc.
- Forest management is different because of certain peculiarities
- Forest management requires the input from a wide range of stakeholders
- Overall the management of the growing stock is of prime importance
- It involves people.
- Forest management should incorporate social, economic, & environmental concerns
- Should adopt different approaches (including communities or bottom-up input)

SESSION PLAN

S2

- **Title:** Silviculture **Time:** 3 hours
- **Location:** Training Room
- **Aim:** To examine the art and skills of silviculture so that participants can develop the techniques for managing the forest under their control
- **Objective:** At the end of the session participants will be able to
 - Define silviculture
 - Apply the skills and art of silviculture

KEY POINTS	RESOURCES	METHOD	TIME
Introduction: Definition of silviculture	Handout 1/OHT	Q and A	10
Development: Silvicultural characteristics Natural regeneration Artificial regeneration Thinning Competition Types of thinnings Silvicultural systems Seed collection	Board/OHT 2 Board Board Flip chart Board/Handout 2 Flip Chart OHT3/Handout 3	Discussion Discussion Discussion Discussion Discussion Discussion Discussion	15 40 20 10 5 15 50 10
Conclusion: Review and summary	Board	Q and A	5 hrs.

- **Training Equipment:**
 - Board, Flip chart, OHP & screen, OHT
 - Laptop Computer, LCD Projector, CDs/Flash Drive
- **Preparation:**
 - To prepare transparencies of OHT sheets 1-3 and sufficient copies of handouts 1-3 for the participants

- OHT 1** - Definition of Silvics
- OHT 2** - Definition of Silvicultural Characteristics
- OHT 3** - Definition of Silvicultural Systems and High Forests
- Handout 1/OHT** - Definition of Silviculture
- Handout 2/OHT** - Crown Classes
- Handout 3/OHT** - Protocol for Seed Tree Selection
- Handout 4/OHT** - Selection System

TRAINING CONTENT

SILVICULTURE

S2

Definition of Silviculture

- Ask the group to write down their definition of silviculture
- Allow 10 minutes then have 2 or 3 of these definitions be placed on the board
- **Handout 1** can then be discussed

Key Points

- Silviculture is an art and a science
- It includes the knowledge of silvics of the species
- It is cultivating and growing a forest in order to maximize yields and returns; manipulating stands to meet land owners' needs
- The main purpose is for commercial timber harvesting

What is silvics?

Discuss with the group the term silvics with the use of **OHT 1**.

Silvics - the natural science (practice) which deals with the laws underlying the growth and development of single trees and of forest as a biological unit (Smith, 1962).

How trees grow, reproduce, and respond to environmental changes.

Silvicultural Characteristics/silvics of a tree

Discuss with the group the term silvicultural characteristics with the use of **OHT 2**.

- The special features of the growth and site requirements of a species which affects

Trainer to discuss and list some of the points that should be taken into account in assessing the silvicultural characteristics of a species. An outline of a tree (flip chart) within the forest can be used to illustrate the key points emphasizing the characteristics of both the environment and the genetics of the tree/species. The trainees should be prompted for the key points if they are not forthcoming.

Key Points

- Shape of crown
- Shape of root systems
- Persistency of side branches
- Demand for sunlight
- Ability to withstand shade
- Soil requirements
- Rate of growth
- Quality of timber
- Quantity of timber
- Susceptibility to diseases, fungus, wildfires, damage, insect attack, wind, etc.

Why apply Silvicultural Treatments

- To Promote Regeneration
- Improve tree forms
- Reduce mortality

Regeneration System

Trainer to solicit a definition of regeneration

Regeneration is the establishment of a new crop

How could this be achieved?

- Natural regeneration
- Artificial reproduction/seeding/planting

Natural Regeneration

- Requirements of natural regeneration
 - Growing space
 - Sufficient sunlight
 - Water
- Adjustment of growing space and micro-environment
 - Clearing after a tree has fallen
 - Felling
 - Logging trails
 - After a fire
 - After insect infestation
 - After storm damage
- Seed supply
 - Good trees
 - Valuable species
 - Wildlife considerations
- Germination
 - Good germinate
 - Species differences
 - Early survival
 - Problems with seed eating animals

Artificial Reproduction/Planting

Trainer to develop this unit in a discussion format by identifying the key areas and allowing the participants to develop the issues

Key Points

- Genetic considerations
 - Plus trees/better genes
 - Testing in orchards
- Choice of Species
 - Market
 - Site for planting

- Rate of growth
- Cost of establishment
- Seed Collection
 - Harvesting of seeds
 - Cost of producing or purchasing seeds
 - Extraction of seeds
 - Storage of seeds
- Nursery Work
 - Site selection
 - Availability of water
 - The nursery technique for species selected
 - Nursery records
 - The cost of producing seedlings vs. purchasing the seedlings

Field Planting

- Site preparation
- Planting time
- Tending operations
- Density for planting
- Method and technique of planting
- Protection of the planting stock

Comparison of Planting and Natural Regeneration

Planting

- Shortened period of establishment
- Avoidance of danger to seedlings
- Easier harvesting
- Control on species type
- Greater volumes
- Specialized staff
- Operation is seasonal
- Relatively high initial cost
- Difficulty in determining the right species
- Damage to root system in operation from nursery to field

Natural Regeneration

- Generally cheaper
- Increased logging cost
- Shorten regeneration period
- Close to nature
- Environmentally pleasing
- Damage to trees and seedlings while harvesting

Pine Regeneration

- The need for fire
- Clearing/opening needed
- Ash from fire acts as a fertilizer for initial growth

- The problem of uneven regeneration
- Method requires early intervention
- The need to be aware of seedling years

Pine Seed Trees/Belize

Trainer to discuss **Handout 3** in detail with trainees

Thinning

Trainer to discuss with group why thinning is necessary?

Key Points

- It is defined as the removal of excess stems from a crop beyond the sapling stage
- To diminish the adverse effect of competition by affording more light and growing space
- To promote good growth in the stems that are retained
- Compared to weeding, the main object is the removal of the undesirable elements of the crop
- Weeding is done at an early stage while thinning is done beyond the sapling stage

Competition

Trainer to prepare a flip-chart in advance to show the structure of a tropical forest and solicit inputs about the source of the competition comes from

- Competition above and below the ground
- Above ground for sunlight and below ground for nutrients and water
- Understanding the crop and the silvics of the species is important
- Crown competition can be observed by the trained forester

What causes crown competition/Why are tree- crowns different in the natural forest?

- Competition for air, space and light

The following classifications are based on tree crown

- Dominant/pre and co-dominant
- Dominated trees
- Suppressed trees
- Dead and moribund trees
- Diseased trees

Trainer to list the various types of thinning on a flip chart and thereafter discuss with the group how each thinning operation is conducted.

Key Points

Types of Thinning

- **Mechanical**
 - Securing an even spacing
 - Removal of alternate stems
- **Ordinary**
 - Suppressed and low in canopy
 - Also called low thinning

- **Crown**
 - Look at the dominants and do thinning in favor of the best
 - Root competition not considered
 - Also those that have dropped behind
- **Free**
 - Also called elite thinning
 - Evenly spaced elite stems
 - Final crop trees
 - Remaining trees considered from their competition with the elite trees
- **Maximum**
 - Maximum number of stems from the first thinning
 - Similar to free thinning
 - Advance
 - Stems reduced to the minimum
 - Competition from weeds
- **Selective**
 - Uniform system into a selection
 - Some lower storey trees favored

Silvicultural Systems

Trainer to develop the definition of silvicultural systems and high forest and then discuss as a group the three main silvicultural systems using OHT 3

Trainer to develop the following points with the group for the different silvicultural systems. The trainees must be encouraged to describe the systems by identifying the characteristics. The following list is to be used as a guide for developing the session.

Key Points

- **Clear-cut Method**
 - Where the forest crop is removed over a single cut
 - Simple to apply
 - Work concentrated
 - Logging damaged to young crops avoided
 - Best for strong light demanders
 - Regeneration interval is the shortest
 - Sudden exposure of soil
 - Felling of immature trees
 - Less margin for silvicultural mistakes
 - Spoils the aesthetics
 - Applicability/light demanders/avoid steep slopes
 - Could be classified by mode and origin of regeneration or size and form
 - From seeds from adjacent stands or from dormant seeds on the ground
 - Also advance or coppice growth
 - Operations usually termed plantations, coupes, blocks or felling strips

■ **Seed Tree Method**

- Considerable area in one operation
- Lays bare the soil
- Establishment of an even-aged forest
- Applicable where the residual trees not worthy of retention
- Reliable source of seed
- Species can develop satisfactorily
- Clear-cutting in strips
- Retention of seed trees in patches or singly
- All operations concentrated in time and place
- Timber marking is limited to a defined area
- Regulation of cut by area
- Only major problem is regeneration and aesthetics
- Applicable to even age stands
- Seed trees must be selected with care
- Wind firmness
- Height of tree
- Deep rooted species
- Must be old enough
- Selected from among the dominant and co-dominants
- The number and distribution of seed trees
- The amount of viable seeds per tree or stand
- Proportion of seed tree that will survived
- Seeds to produce adequate seedlings
- Distance of dispersal for the species selected

■ **The Tropical Shelter-wood System**

- The gradual removal of the entire stand in a series of partial cuttings which extends over a fraction of the rotation
- Resembles heavy thinning
- Natural reproduction starts under the protection of the older crop
- It is finally released when it becomes desirable to give the new crop full use of the growing space
- The fundamental characteristic is the establishment of a new crop before the completion of the preceding rotation
- The cuttings conducted in no more than 1/5 of the rotation
- Method creates an opening, then competition steps in and then release is done
- A minimum of two cuttings
- Preparatory cuttings, then seed, then removal cutting
- Reproduction is almost certain
- Rotation shortened
- Systematic and simple
- Residual trees hamper harvesting operation and are prone to damage
- Cost of logging greater
- Protection and aesthetics is good
- Uniform /periodic block/strip/group system
- Better protection of site

- Silvicultural elasticity
- Requires skills
- More time for regeneration
- Damage to new crop and old
- Work is less concentrated

■ **The Selection Method**

- The creation and maintenance of an un-even aged stand
- Contains at least 3 well defined age classes
- Mature trees removed
- Either by girth limits or species or spacing
- Natural reproduction is essential
- Determination of a cutting cycle
- Greater stability
- Permanent closure of the stand
- Less susceptible to damage
- Permanent seed source
- Complex, difficult to manage
- Costly operation
- Likely to remove good genotype
- The problem of removing only merchantable trees
- Improvement cutting; salvage cutting
- Protection of site
- Wind damage minimize
- All seeds made use of
- Resembles nature
- Aesthetically pleasing
- High degree of skill
- Damage to young trees

Trainer to discuss the composition of a selection forest using Handout 4

Key Points

- Various diameter classes
- A balanced uneven-aged stand
- Larger diameter removed for commercial purposes
- Smaller diameters removed for thinning and cleaning (not always done)

SESSION PLAN

S3

- **Title:** Management Principles **Time:** 2 hours
- **Location:** Training Room
- **Aim:** To review some forest management principles so that participants will be able to apply the techniques in their operations
- **Objectives:**
 - At the end of the session participants will be able to:
 - Explain the basic management principles
 - Apply basic management techniques in the field

Key Points	Resources	Method	Time
Introduction: Management principles	Board	Discussion	10
Development: Sustained yield/ types of yields	OHT 1	Discussion	30
Rotation/cycles	Board	Presentation	35
Normal forest	Handout/OHT	Presentation	30
Conclusion: Review and summary	Board	Q and A	15

■ **Training Equipment:**

- Board
- Flip Chart and sheets
- OHP and screen/OHT

■ **Trainer Preparation:**

Trainer to have available sufficient copies of handouts and to prepare OHT 1 and 2

OHT1 – Definition of Sustained Yield

OHT 2 – Normal Forest

Handout 1 – Definition of Normal Forest

Handout 2 – Silvicultural and Management terms

TRAINING CONTENTS

S3

Trainer to introduce the topic “management principles” and then move into the first principle of sustained yield

Sustained Yield

Trainer to solicit a definition for sustained yield from the group

*The key points to be recorded (on a flip chart sheet) and then **OHT 1** be discussed*

Sustainable Forest Management

Definition

- "The achievement and maintenance in perpetuity of a high-level of annual or periodic yield of the various renewable resources...without the impairment of the productivity of the land"
- "The yield that a forest can produce continuously under a given intensity of management"
- Extraction (of products) at levels that do not exceed growth
 - "The stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfill, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems." (*Definition adopted by FAO*)

Key Elements of SFM

- Extent of forest resources
- Biological diversity
- Forest health and vitality
- Productive functions and forest resources
- Protective functions of forest resources
- Socio-economic functions
- Legal, policy and institutional framework

Key Points

- Implies continuous production
- A balance between increment and cutting
- Without damage to the productive capacity
- A given intensity of management
- What about ratio of production?

- What about the capacity of the site?
- What about if several products are produced?
- Some products can interfere with the production of others

Since the definition of sustained yield includes yields it is important to discuss, the types of yields, rotation and cutting cycle. Emphasize difference between rotation and cutting cycle.

- **Types of Yield**

- Integral yields such as plantation
- Intermittent yields
- Annual yields
- Yield by area
- Yield by equi-productive areas such as site classes

- **Rotation Age**

- "The period of years between the initial establishment of a stand of timber and the time when it is considered ready for cutting and regeneration"
- "The interval of time between the formation of a young crop by seeding, planting or other means and its final harvesting"
- "Period of time required for seedling to grow to merchantable size"

- **Cutting Cycle**

- Period of time between successive timber harvests

- **Monocyclic and Polycyclic**

- Terms coined by Dawkins (1958)
- Monocyclic where the entire stock of marketable timber is liquidated in one single operation/objective of monocyclic is an even-aged high forest
- Polycyclic systems are systems where each logging operation is limited to only a portion of the marketable tree/the objective is to obtain a sustainable yield management of the merchantable species (Selection System)
- Polycyclic has ecological advantage but damage to undergrowth
- Monocyclic easier to manage and monitor

- **Rotation/Cutting Cycle**

- **Key Points**

- Time lapse
- Managed forest
- Timber alone is the objective

- **The Length of Rotation depends on:**

- The silvics of the species
- Site factors
- Intensity of thinning
- The product
- The economics

■ **Kinds of Rotation**

- Physical rotation
- Life of species
- Silvicultural/the growth of the tree
- Technical/most material of a specified size
- Greatest volume production

■ **Normal Forest**

Trainer to discuss a definition for "normal forest", then distribute Handout 1 and develop the key points below

- "A standard by which to compare an actual forest so as to bring out its deficiencies for sustained yield management; a forest for which, a given site and a given object of management is ideally constituted as regards growing stocks, age, class distribution and increment, and from which annual or periodic removal of produce equal to the increment can be continued indefinitely without endangering future yields".
- "That forest which has reached and maintains a practically attainable degree of perfection in all its parts for the full satisfaction of the purpose of management".

■ **Key Points**

- It is an ideal state of management
- The forest is liable to change because of several factors
- Including markets forces/techniques, etc.

Trainer to display **OHT 2** and emphasize the age structure of the forest and the increment of the growing stock

■ **Growing Stock**

- What is growing on the ground
- By species, area, numbers, etc.

■ **Increment**

- The increase in growth for a period

■ **Inventory**

- -" The gathering of data for future use"
- -" The quantity or count of physical entities"

Handout 2 is a summary of some silvicultural and management terms

The Trainer to revise each term with the participants

SESSION PLAN

S4

- **Title:** Watershed Management **Time:** 3 hours
- **Location:** Training Room
- **Aim:** To review the basic principles of watershed management so that participants can manage areas under their control by utilizing the skills and techniques learnt.
- **Objectives:** At the end of the session participants will be able to:
 - Explain the nature of watershed management
 - List the soil erosion and water control problems in the construction of roads
 - Recognize and apply forestry techniques in watershed management

Key Points	Resources	Method	Time
Introduction: Concept of watersheds	Flip chart	Q and A	15
Development: Watershed management operations	Board	Discussion	20
Soil conservation	Board	Discussion	20
Watershed problems	OHT 1	Q and A	25
Soil erosion	OHT 2	Q and A	25
Road erosion	OHT 3	Q and A	30
Forestry practices	OHT 4	Discussion	30
Conclusion: Summary	Board	Discussion	15

- **Training Equipment :**
 - Board: OHT; Flipcharts

■ **Trainer Preparation:**
Trainer to prepare **OHT 1-4**

OHT 1 - Watershed Management

OHT 2 - Effects of Erosion

OHT 3 - Road Erosion

OHT 4 - Forestry Practices

TRAINING CONTENT

S4

Trainer to develop this session in a question and answer format since most of the participants would have had some direct experience with this topic. A flip chart sheet should be used to record the responses. The notes here are to be used as a guide to the Trainer.

Concepts of Watershed Management (WM)

■ **What is a watershed?**

- Other terms 'catchment' or 'drainage basin'

A drainage basin is an extent or an area of land where surface water from rain and melting snow or ice converges to a single point, usually the exit of the basin, where the waters join another waterbody, such as a river, lake, reservoir, estuary, wetland, sea, or ocean. In closed drainage basins the water converges to a single point inside the basin, known as a sink, which may be a permanent lake, dry lake, or a point where surface water is lost underground. The drainage basin includes both the streams and rivers that convey the water as well as the land surfaces from which water drains into those channels, and is separated from adjacent basins by a drainage divide.

The drainage basin acts as a funnel by collecting all the water within the area covered by the basin and channeling it to a single point. Each drainage basin is separated topographically from adjacent basins by a geographical barrier such as a ridge, hill or mountain.

Other terms that are used to describe a drainage basin are **catchment, catchment area, catchment basin, drainage area, river basin, water basin and watershed**. In the technical sense, a watershed refers to a divide that separates one drainage area from another drainage area.

■ **What is watershed management?**

- "The management of land for the optimum production of high quality water, regulation of water yields and maximum soil stability along with other products"
- "Watershed management is the process of creating and implementing plans, programs, and projects to sustain and enhance watershed functions that affect the plant, animal, and human communities within a watershed boundary"

■ **What are the objectives of WM?**

- Maintain and increase water yields
- Maintain and improve water quality
- Regulate stream flow
- Control excessive run-off
- Control soil run-off

Trainer to outline the two broad operations on a flip chart and then allow trainees to list (for 5 minutes) the why and when of the two operations

The notes here can then be compared to the responses from the trainees

■ **Watershed Management Operations**

The operations can be divided into two operations

- Protection
- Rehabilitation

Protection

- Protection implemented where erosion is slight
- The operation is mainly to protect for water quality, quantity and soil stability
- The operation includes protection of forest, cultivated lands, grazing lands, roads, streams, etc.

Rehabilitation

- This operation is carried out where there is major deterioration
- It is conducted mainly to regain stability
- The operation includes afforestation, tree planting, erosion on logged areas and planting abandoned logged roads

■ **Farm Lands**

- Soil conservation
- Gullies/ roads and land slides
- Retaining walls, checks dams, re-grading road, stabilization of floods
- Channel stabilization
- Check dams
- Debris control
- Flood retarding structures

■ **Mining Areas**

- Stabilization
- Re-vegetation
- Sedimentation ponds

■ **Land-use**

- Change of use
- Crop pattern

■ **Soil Conservation**

Trainer to involve the trainees in answering the following questions and noting key points on the board or flip chart with respect to soil conservation

■ **What is soil conservation?**

- It is part of watershed management
- Even though it is a major topic itself
- The main objective is to sustain and increase agricultural production with minimum soil loss

■ **Identify the major soil conservation practices**

- **Agronomic methods:** contour; close planting; mulching; crop rotation; minimum tillage; vegetative bunds; grass barriers

- **Engineering methods:** terracing; hillside ditches; rock barriers; protected waterways

- **What are the major watershed problems?**

Trainer to explain problems with **OHT 1**

Improper land management leading to or contributing to

Soil Erosion

Trainer to introduce Soil Erosion with the following questions

- **What is soil erosion?**

- "Soil erosion is the detachment and transportation of soil from its point of origin"
- Trainer to emphasize the detachment and transportation process of water

- **What are the various forms of erosion?**

- Normal/natural processes
- Accelerated/man-made erosion

Participants to list agents of erosion and Trainer to then complete the discussion with the following main points:

- **Key Points**

- **Agents of Erosion**

- **Water:** detachment process; transportation process; absorption; intensity; climate; slope; land use
- **Wind:** open fields; dry areas ; beaches;
- **Gravity:** land-slides; rock fall
- **Acts of man:** cultivation; logging; mining; road construction

- **Erosion control**

- Vegetative cover
- Mulching
- Minimizing soil exposure
- Reducing velocity: check dams; contour ditches
- Diversion; cross drains
- Minimizing run-off/infiltration; deep plowing; contour trenches; terraces; organic matter

- **What are the effects of erosion?**

Trainer to discuss OHT 2 in relation to this question with group

- **Road Erosion**

- Begins with good road lay out and planning
- Considerations must be given to the soil, slope and geology

- **What are the causes of road erosion?**

*Trainer to guide group discussion on this question with **OHT 3***

■ **What are some of the noticeable forms of erosion?**

- **On cut slopes:** landslides; gullies at base; rill erosion; sliding of toe
- **On fill slopes:** tension cracks; surface run-off because of no protection

Road surface:

- Deep rutting by wheels because of steep gradients; gully erosion by water run-off; steep sides/collapse of road edges

■ **What are some control measures that can be taken?**

- **Concentrated run-off:** diversion; vegetation; retaining walls; weep holes

On filled slopes:

- Drainage-improvement; tension cracks-fill or compact; surface erosion-staking and vegetation

Other control measures:

- Build roads on ridges
- Avoid steep gradients
- Ensure that fill part is compacted properly
- Layer by layer
- Grade road toward the hill
- Vegetate cut slopes
- Install adequate drains
- Correct size culverts
- Protect road surface
- Use retaining walls where necessary
- Dig diversion ditches where necessary
- Proper control of water

FORESTRY PRACTICES

The following aspects of forestry practices impinge upon watershed management.

The Trainer to discuss OHT 4 and develop the following points with the group:

Nursery practices: clearing of site; sloping areas; terracing; run-off of chemicals; soil for potting seedlings.

Establishment of tree crops: clearings; contour strips; partial clearing; cutting along contours; strips along streams; use of herbicides and fertilizers.

Choice of species: broad leaves vs. others; agro-forestry.

Cultural operations: weeding; cleaning, etc.

Construction of road line: cuts; gradient, etc.

Logging: dragging strips; skidding; types of equipment.

Recreation: public use of the forest; visitor use and control; threat of fire.

SESSION PLAN

S5

- **Title:** Organization of the Forest **Time:** 1 hour
- **Location:** Training Room
- **Aim:** To expose participants to the various concepts of organizing the forest estate for the purpose of management.
- **Objectives:**
 - At the end of the session participants will be able to:
 - Explain the various administrative and management concepts of organizing the forest estate
 - Apply the system of organization in executing their responsibilities

Key Points	Resource	Method	Time
Introduction: The aim of forest management	Board	Discussion	10
Development: Administrative Units	Board	Discussion	5
Silvicultural Units	Board	Discussion	10
Organization of Forest/Belize	Maps	Discussion	30
Conclusion: Summary	Board	Discussion	10

- **Training equipment:**
 - Board
 - Flip Chart Sheets
 - Relevant Maps of Belize/administrative and silvicultural units; copies for trainees to study in group
- **Trainer Preparation:**
 - To collect sufficient maps re-administrative and silvicultural units for discussion with participants

TRAINING CONTENT

S5

Organization of the Forest

Trainer to establish with group the reason why the forest estate needs to be organized

■ Key Points

- To promote efficiency in achieving the objectives of management
- Compared to other land-uses forested areas are large
- They are often scattered and it is important to group and divide them for several reasons

■ Aims

- Separation of areas that are treated differently
- Separation of areas for administrative convenience
- Separation for market purposes
- Separation for the keeping of records
- Description
- Maintenance of records
- Location of events
- For general administration
- Organization of work programmes
- Silvicultural treatment

The units used for forest organization can be divided into the following categories:

- Administrative units/territorial units
- Silvicultural units

The trainer to outline the major groupings and then develop the various terms as listed below

(A) Administrative Units/Territorial Units

- Equalize work loads
- Facilitate sales
- Allow for prompt maintenance work

(B) Silvicultural Units

- Objective different
- Growing stock differently
- Stand maturity different

Working Circle: An area organized with a particular object and under one silvicultural system and one set of working plan prescriptions.

Felling Series: An area of forest delimited for management purposes and forming the whole or part of a working circle.

Periodic Block: The part or parts of a forest set aside to be regenerated or otherwise treated during a specified period.

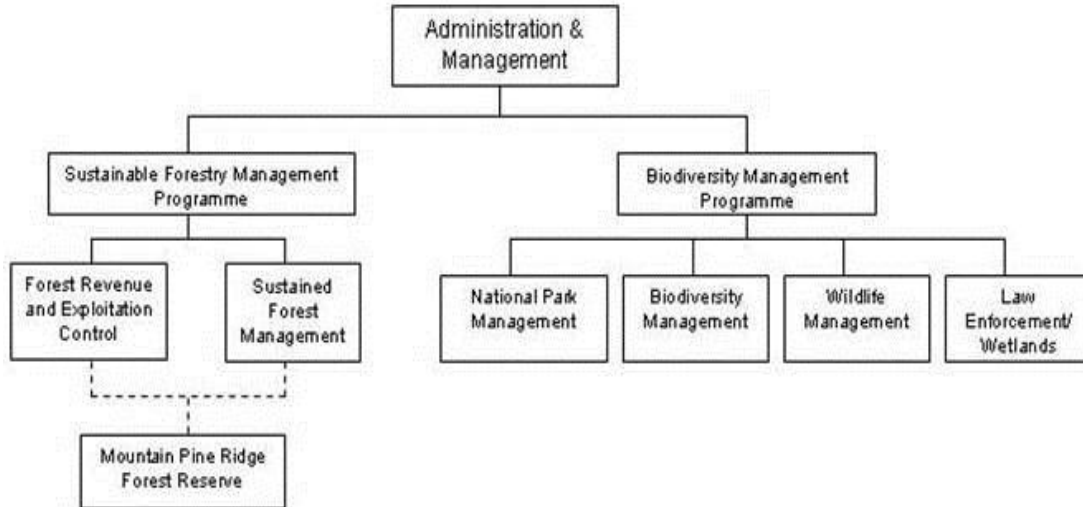
Felling Cycle: As the period in which all portions of a felling series are worked under a definite type of felling in a planned sequence.

Compartment: Is the smallest permanent sub- division of a forest; it is a territorial unit of a forest permanently defined for purposes of administration, description and record.

Organization of Forest Department

Trainer to then involve group in a discussion with appropriate map of how the Belize Forest Department

- *Current organizational structure of the Forest Department*



- *Management by Programme (Ecology)*
- *Economic and Resource Allocation*
- *Relations with the public (PEO)*

SESSION PLAN

S6

- **Title:** Forest Policy and Laws **Time:** 4 hours
- **Location:** Training Room
- **Aim:** To discuss the forest policy laws and regulations of the Belize Forest Department
- **Objectives: At the end of the session participants will be able to:**
 - Explain the forest policy of the FD
 - Enforce the laws and regulations as it relates to their duties

Key Points	Resources	Method	Time
Introduction: Overview/what is policy	Board	Discussion	5
Development: Belize Forest Policy	Handout	Discussion	30
Forest and related laws	OHT	Discussion	25
Forest Rules	Laws	Group Discussion	90
License	Laws	Group Discussion	85
Conclusion: Summary	-	Discussion	5

- **Training Equipment:**
 - Board
 - OHP and Screen
 - Forest Laws/Rules of Belize; a completed forest license applied in Belize

- **Trainer Preparations:**

Ensure that participants bring to the Training Room their copy of the Forest Laws.

Trainer to prepare OHT 1 and to note in the Time Table the scheduling of this session on two days because of field assignment

OHT 1 - Summary of Forest and Related Laws

Handout 1 - Forest Policy (1954)

Handout 2 - Forest License

TRAINING CONTENT

S6

■ Policy

Trainer to introduce the topic of policy by asking the question

■ What is policy?

The following key points must be emphasized

■ Key Points

- Broad guidelines
- They are made at a high level in the organization
- They are long lasting
- Some policies are unwritten

Trainer to distribute Handout 1 and allow 15 minutes for participants to study

Thereafter the group should discuss each policy and its implications as it relates to enforcement and management in the field. The following key points must be emphasized.

■ Key Points

- To establish, preserve for all time and develop a National Forest Estate
 - From lands unsuitable for permanent agriculture
 - Capable of producing a greater financial return
 - Lands for the protection of watersheds
 - Far reaching and all encompassing
 - Lands for fuel woods
 - Lands for **nature reserves (protected areas)**
- In order to establish the National Forest Estate
 - Survey, demarcate and gazette
 - De-reserve for public necessity
- In order to preserve the Forest Estate
 - Maintain demarcated boundaries
 - Placing all exploitable FR under sustainable yield management
 - By resource assessments enumeration surveys, increment calculation/sample plots, sustainability assessments on national lands
 - Yield maintained in perpetuity
- In order to develop the Forest Estate
 - Adequate and increasing supply/management
 - Also for export
 - Intensive regeneration centers
 - Support sawmill at areas/centers
- To increase production from Forest Reserve
 - Full utilization/research

- To raise the quality of sawn timber exported to world markets
 - Timber grading
 - Seasoning
 - Accurate sawing

- To promote the practice of forestry on free hold lands
 - Control felling of special species
 - Minimum girth

- To control the exploitation of forest and forest produce growing outside FR
 - Issues of licenses

- To bring about an increased appreciation of the need for and aims of forest conservation
 - Public education/schools

- To maintain a Forest Department
 - Adequate staff
 - Adequate funds
 - Adequate research

■ **Forest and Related Laws**

All trainees would have had by now a compilation of a "Forest and Related Laws. Trainer to remind the group of the laws with the use of OHT 1 and by highlighting any specific feature of each law.

■ **Forest Rules**

The Trainer to divide the participants into three groups and assign each group 1/3 of the Forest Rules to be discussed for 20 minutes.

The participants to regroup and problems areas for each group be discussed and clarified for the next 40 minutes.

■ **License**

Trainer to distribute a license (Handout 2) to all participants and allow 15 minutes for studying the document individually.

Thereafter each clause of the license be discussed. Participants to raise issues and propose solutions.

SESSION PLAN

S7

- **Title:** Management Operations (Practical) **Time:** 5 hours
- **Location:** Forest Reserve (sites to be determined)
- **Aim:** To outline on-going management operations in the areas of seed tree selection, thinning, erosion control and road maintenance

■ **Objectives:**

At the end of the session participants will be able to:

- Select good seed trees
- Conduct thinning operation
- Identify erosion problems and take corrective action
- Conduct proper road maintenance

Key Points	Resources	Method	Time
Introduction: Overview of exercise	Handout	Discussion	
Development: Field Trip	Notes	Discussion	180
Conclusion: Presentation	Charts/notes	Discussion	120

■ **Training Equipment:**

- Flip Chart and Sheets; maps; compass; cutlasses; clipboard; binoculars

■ **Training Preparation:**

Sites relevant to the objective to be selected prior to the start of the training programme. The areas selected should be within 30 minutes (maximum) travel time from the training room.

Handout 1 - Forest Management Mark Sheet

Handout 2 of Session 2 - Protocol for Seed Tree Selection

Trainer to select sites related to the following topics prior to the start of the training programme:

- (i) Seed Tree Selection
- (ii) Thinning Operation

Prior to the field trip the participants should be divided into three groups and at the conclusion each group will be required to make a 20 minutes presentation.

The training content for this field trip can be drawn from **S2** and **S4**.

TRAINING CONTENT

S7

Prior to the field visit the trainees must be briefed on the objective of the exercise. The objective of the exercise is to allow trainees to conduct activities covered in the training room and in the field and allow each group to work as a team with a team leader. This is to allow hands -on experience in:

- (i) Seed Tree Selection and
- (ii) Thinning Operation

The time allotted for each activity is as follows:

- (i) Seed Tree Selection -1hr 30mins
- (ii) Thinning Operation -1hr 30mins

The exercise will involve the following:

(i) Seed Tree Selection - each group will be stationed at a point in a pine forest and be requested to follow the instructions on the Seed Tree Protocol and select four (4) Seed Trees. The selected trees must be identified as set out in the Parent Seed Tree Protocol. Selected Seed Trees must be marked with flagging tapes.

(ii) Thinning Operation- each group will be stationed in a pine forest that requires thinning and will be requested to mark a plot of 20 m x 20m for thinning. The data collected from the plot must indicate total number of trees, average height of trees, basal area before thinning, basal area after thinning, number of stems thinned, etc.

Report

Based on the visit of the above sites each group will deliver an oral presentation of their involvement.

SESSION PLAN

S8

- **Title:** Inputs in Preparing a Management Plan **Time:** 1 hour
- **Location:** Training Room
- **Aim:** To expose participants to the activities and collection of information required in preparing a management plan

- **Objectives:**

At the end of the session participants will be able to:

- Explain the variety of activities and information required in preparing a management plan
- Collect field data for the preparation of management plans

Key Points	Resources	Method	Time
Introduction: Overview	Board	Discussion	5
Development: Background information	Handout	Discussion	2
The plan	Handout	Discussion	25
Conclusion: Summary	Board	Discussion	5

- **Training Equipment:**

- Board

- **Trainer Preparation:**

Appendix 2 from T.J. Synnott- Consultancy Report to be copied as **Handout 1** for this session. Sufficient copies to be made for all participants (not included).

TRAINING CONTENT

S8

■ Preparation of Management Plan

It is unlikely that Forest Guards will be called upon to prepare management plans. However, Management Plans rely on trends (past and present) to offer sound prescriptions. If the data presented is inaccurate the prognosis will be flawed. In many instances, Forest Guards provide field data and it is necessary to explain the important role they play in the preparation of Management Plans.

*As an introduction to the contents of a management plan the trainer will develop the following key points which are included in **Handout 1**.*

■ Key Points

1.0 Introduction

- Usually the same format
- Remember that each plan is unique
- Each must be designed to meet its own goals

2.0 Why write Management Plans

- Usually basic technical information lacking or in-sufficient
- Optimum is the ideal
- Aim is to improve management
- Logical and systematic
- Alone it is not enough
- Also adapt to new situations
- Dynamic situation
- Aims and methods change with changing circumstances
- Systematic presentation of current situation and provision for recording future progress
- Better long term programmes
- Ensure that decisions are based on knowledge of past events

3.0 Basic elements of the MP

- Description of the forest
- Objectives and justification
- Programmes for actions planned
- Recording system
- Maps

4.0 MP Format

- Title page:-name; administrative unit; period; author; date and authority
- Contents:-chapter; sections; titles; page numbers
- Executive summary

Handout 1 to be distributed and discussed in detail with participants. Trainees must be requested to study Part I of the handout in the training room for a duration of 20 minutes and thereafter the content of the document should be discussed for another 35 minutes. The same approach will be used for Part II of the handout. The objective here is to gain a clear understanding of the various data to be collected and the involvement of the FG in this regards.

SESSION PLAN

S9

- **Title:** Management on the Ground **Time:** 1 hour
- **Location:** Training Room
- **Aim:** To review some management and administrative principles as they relate to getting the job done.
- **Objective:**

At the end of the session participants will be able to:

- Explain their responsibilities as it relates to the implementation of a management plan

Key Points	Resources	Method	Time
Introduction: Overview	Board	Discussion	5
Development: You and the job	Handout 1	Discussion	50
Conclusion: Summary	Board	Discussion	5

- **Training Equipment:**
 - Board
 - OHP and screen
- **Trainer Preparation:**
 - Sufficient copies of **Handout 1**.

Handout 1 - Management on the Ground

TRAINING CONTENT

S9

■ Management on the Ground

■ Overview

Trainer to outline responsibility of officers and loyalty to the job by developing the following points:

- Responsibilities are divided
- FG has specific duties
- Supervisor expects job to be done
- This requires trust and honesty at a high level

Trainer to distribute Handout 1 and allow 15 minutes for participants to study. Thereafter the following key points should be discussed in a question and answer format.

■ Key Points

- **Know your district better than any one**
 - Know your map inside out
 - Keep a current map with notes and sketches
- **Know what's going on in your district**
 - Keep abreast of all operations
 - Know your plan of operations
- **Know your employees**
 - Likes and dislikes
 - Attitudes
 - When to intervene
 - Training needs
- **Know the people in your district**
 - Private land owners
 - All with and without an interest
 - Keep a friendly relationship
- **Know what is expected of you**
 - JD
 - Seek clarification
 - Know the policy decisions
 - Use your initiative and resourcefulness
 - Ask for help when it's needed
 - What is there is a reflection of YOU

- **Plan ahead**
 - Study it
 - Know it inside out
 - Seek clarification
 - Plan for tomorrow, next week, and next month

- **Gather together the things you need**
 - Review your job and the things you need to do on the job
 - Maps
 - Handbooks
 - Standing instructions

- **Learn about programming and finances**
 - Unit cost for each operation
 - What is the best time to do a job

- **Your recommendation means a lot to your supervisor**
 - Valid and reasonable
 - Cover all points
 - Pros and cons

- **You are working for a supervisor**
 - What he/she stands for
 - Dead lines
 - When to raise what
 - Be loyal and trustworthy

SESSION PLAN

S10

- **Title:** Management on the Ground (Practical) **Time:** 16 hours
- **Location:** Forest Reserve (Chiquibul/Columbia River/Mountain Pine Ridge) A properly managed forest reserve
- **Aim:** To bring into focus the different concepts of Forest Management by visiting on-going management operations and activities.

■ **Objectives:**

At the end of the session participants will be able to:

- Describe the operational structure of the F.D.
- Explain the functions/responsibilities of the relevant units within the F.D.
- Discuss the management plan for the area visited
- Explain the different forestry operations in the area visited
- Prepare a report of the activities at the areas visited

Key Points	Resources	Method	Time
Introduction: A detailed explanation of the exercises	Flipcharts	Q and A	30 mins.
Development : Administration: Organizational Structure; Responsibilities Management and Planning: Management Plan/Mapping: Implementation; problems	Forest Office	Discussion Q and A	45 mins.
FIELD VISIT Preparation of reports	Forest Office	Discussion Q and A	45 mins. 8 hours
Presentation	Forest Reserve Training Room As requested	Groups Groups Groups	4 hours 1 hour
Conclusion: Summary	Board	Discussion	1 hour

- **Technical Equipment:**
 - GPS - 1 per group
 - Measuring Tapes - 1 per group
 - Binoculars - 1 per trainee
- **Training Equipment:**
 - Flipcharts; clipboard

■ **Trainer Preparation:**

To determine suitable sites for accomplishing the objectives: Chiquibul / Columbia River Reserves / Mountain Pine Ridge.

- Visit Senior Forest Officers to discuss their input
- Visit the area with the Officer in Charge
- Arrange transportation for participants
- Arrange packed lunches for participants
- Inform participants of the need for field gear
- Secure the required technical equipment
- Discuss the field exercise in its entirety on the preceding day

TRAINING CONTENT

S10

Forest Department Office

■ Introduction

Give a detailed explanation of the exercise to the participants:

Provides them with an opportunity to gain hands-on experience in management practices and that they should observe very closely the importance of planning to the success of any enterprise.

Advise the participants that the implementation of most of the concepts discussed during the entire training programme will be seen during this visit and many will be pointed out to them, however, they ought to be alert to recognize those which are not, and to ask questions if in doubt.

Many of the terms used during the training programme will be revisited on this occasion; however, the emphasis will be on application and not on definitions.

■ Administration

A Senior F.O. i.e. Chief Forest Officer or Principal Forest Officer will describe the operational structure of the F.D. the responsibility of each category of officers, the Forest Policy and the F.D.'s Mission.

■ Planning and Management

The officer with responsibility for the above will be required to discuss the management plan for the area to be visited.

Maps of the area showing zoning and the different prescriptions should be available to complement the discussions on the M.P.

The areas to be visited and the operations for each should be highlighted. The under mentioned operations are:

- a) Location: Chiquibul - Permanent Sample Plot
Operations: Logging Experiment (Effects of logging)
- b) Location: Chiquibul - Compartment
Operations: Sustainable Selection Felling
- c) Location: MPR - Sub-compartment
Operations: Clear-fell
- d) Location: Chiquibul - Las Cuevas
Operations: Biodiversity Conservation

The above is a listing of the areas and operations to be visited; it does not suggest the sequence to be followed since the pattern of the visits will be determined by the available time and space (the distance part). A pattern which provides for easy flow should be adopted.

■ **Field Visit:**

The trip is scheduled for eight hours. The group will be divided into two teams at the commencement of the exercise and each member of the team is required to comprehensively record his/her observations. Each team will be required to deliver an oral presentation but each participant will be required to submit a written report of not less than three pages at the conclusion of the team's presentation. The grade a participant receives will be the average of the group's mark and the mark received for the individual paper (**see Handout 1 for evaluation system to be used**).

Four hours will be assigned for the teams to prepare their presentation and individuals to submit their report. Thirty minutes will be assigned for each team to deliver an oral presentation (medium: flip charts, transparencies etc. to be determined by the teams) who are expected to use the knowledge gained in Module 2 (Communication and Management) to full advantage.

- **At location (a):** The participants are to use the GPS to establish the position at one of the corners of the plot and verify this position on the map. The Forest Officer with responsibility for the plot is to give a discourse of the history, objectives and the types and periods of measurement. A record of measurements to date to be evaluated for the trainees benefit...
- **At location (b):** The participants use the opportunity to gain valuable practice in the use of the GPS by establishing the position of the block on the map. The F.O. with responsibility for the block should explain the objectives and technique used. *The trainees to conduct silvicultural marking under the guidance of the F.O.*
- **At location (c):** The participants to use the GPS to establish position of Coupe. The Forest Officer with responsibility to explain the history, objectives and the conditions under which the licensee operates. The effects of this operation on the environment to be evaluated at the site... wildlife; soil; roads; regeneration.
- **At location (d):** Personnel from the natural history Museum will be required to explain the objectives, policy, unique nature of the area and management.

MODULE EVALUATION

You will want to evaluate the Module in several ways:

- Trainees' learning
- Trainees' opinions on various aspects of the Module
 - Subject matter and topics
 - Methods used in training
 - Relevance to their jobs
 - Feedback on trainers' performance
 - Things that should be improved/altered
- Self-evaluation of your own training performance

It is recommended that you make sure that learning is taking place during the sessions by using question and answer techniques. At the end of the module, test learning by designing a short test paper that can be completed in 30 minutes.

Use objective questions or those that require short, one sentence answers. See the Trainers' Guidelines Manual for information on designing test questions.

Some Examples for this Module Are:

Participants will be evaluated as follows:

- (i) Quiz # 1 - based on S1-S3;
Short questions and answers; multiple choice; 10 minute duration 5%
- (ii) Quiz # 2 - based on S4-S9;
Short questions and answers; multiple choice; 10 minute duration 5%
- (iii) Session 7 - practical; marked on content and presentation; a group mark 25%
- (iv) Session 10 - practical; marked on content and presentation; a group mark 25%
- (v) Final - short questions and answers on all sessions; emphasis on implementing concepts; one hour duration 40%

QUESTIONS

Give short answers to the following questions:

1. The primary reason for doing thinning in a parcel of forest is?

2. List any three types of thinning

- 1) _____
- 2) _____
- 3) _____

3. List 4 major watershed problems

- 1) _____
- 2) _____
- 3) _____
- 4) _____

In the following please tick (/) the correct answer to the statement:

4. The type of Silvicultural System which involves the removal of quality tree in many cuts is defined as:

- (a) Seed-tree method
- (b) Monocyclic method
- (c) Clear cut method
- (d) Selection method

5. The desired distance in Belize between selected Seed Trees is?

- (a) 18 m.
- (b) 18 ft.
- (c) 22 ft.
- (d) 22 m.

Complete the following sentences. Use one word for one gap: two words if there are two gaps.

6. Two ways in which a bare area can be replanted are _____ and _____.

7. The application of business methods and technical forestry principles to the operation of forest property is defined as _____.

Underline True or False for the following.

8. Within a Forest Ecosystem competition takes place only among the crowns of the trees.
(TRUE OR FALSE)

9. A licensee or contractor needs a waybill when transporting logs in his area of work.
(TRUE OR FALSE)

10. Rotation is the period of years between the initial establishment of a stand of timber and the time when it is considered ready for cutting. List five (5) factors which determine the length of rotation.

i) _____

ii) _____

iii) _____

iv) _____

v) _____

11. The Mountain Pine Ridge Reserve is divided into working circles for the purpose of Silvicultural management. Give the names of the working circles.

a) _____

b) _____

c) _____

12. There are several reasons why management plans are NOT implemented. Give four reasons for lack of implementation.

a) _____

b) _____

c) _____

d) _____

13. List 4 advantages of using Natural regeneration for replanting an area.

- 1) _____
- 2) _____
- 3) _____
- 4) _____

14. List 4 soil conservation remedial measures.

- 1) _____
- 2) _____
- 3) _____
- 4) _____

A Module evaluation form for use by participants and a self evaluation checklist for use by trainers follow.

MODULE FEEDBACK FORM

MODULE _____

Look at the programme and topics covered during the module. List the 3 most useful things you learned.

- 1) _____
- 2) _____
- 3) _____

List any topic that you think was not relevant to your job.

Please assess the following aspects of the workshop by placing a * in the box of choice.

Aspect	Excellent	Very Good	Good	Satisfactory	Poor
Relevance of material to job					
Presentation methods					
Visual aids					
Handouts					
Time allocation					

Please add comments for clarification on any aspects of the module

Please give feedback to the trainers on their performance.

Assess each trainer against the criteria using:

A=Excellent B=Very Good C=Good D=Should Improve E=Poor

Did they...?	Trainer 1	Trainer 2	Trainer 3
Introduce themselves and what they were doing			
Organize their session and material			
Display a friendly and encouraging manner			
Show confidence and enthusiasm for topics			
Demonstrate an interest in the group			
Speak clearly and loudly enough			
Give correct information at the right level for you			
Explain topics clearly			
Go at a good speed for understanding			
Keep people interested			
Involve everyone in the group			
Emphasize the important points			
Keep to the time allocated			
Give a good summary of main points at the end			

Please add comments to clarify any points.

What do you think should be changed in this Module before the next training course?

TRAINER SELF EVALUATION CHECKLIST

Mark yourself by circling the appropriate number:

1=Poor, needs improvement

2=Average, should be better

3=Good

4=Very Good

5=Excellent

Management					
1. Organization of the training environment (chairs, tables, tidiness, etc.)	1	2	3	4	5
2. Organization of equipment & training materials	1	2	3	4	5
3. Motivation and attention level of group	1	2	3	4	5
4. Presented information in a clear and logical sequence	1	2	3	4	5
5. Kept to time	1	2	3	4	5
Personal					
1. Appropriate and clear language	1	2	3	4	5
2. Friendly and encouraging	1	2	3	4	5
3. Confident and enthusiastic	1	2	3	4	5
4. Knowledge of subject	1	2	3	4	5
5. Practical competence	1	2	3	4	5
Training Methods					
1. Planning of session	1	2	3	4	5
2. Introduction of subject	1	2	3	4	5
3. Use of variety of training methods	1	2	3	4	5
4. Use of practical examples	1	2	3	4	5
5. Clear, interesting visual aids	1	2	3	4	5
6. Involved all the trainees	1	2	3	4	5
7. Clear instructions and explanations	1	2	3	4	5
8. Emphasized the key points	1	2	3	4	5
9. Gave a good conclusion	1	2	3	4	5
10. Linked topic into previous	1	2	3	4	5
11. knowledge and future study	1	2	3	4	5

What went particularly well in this session?

What went wrong in this session?

What will I do differently next time?

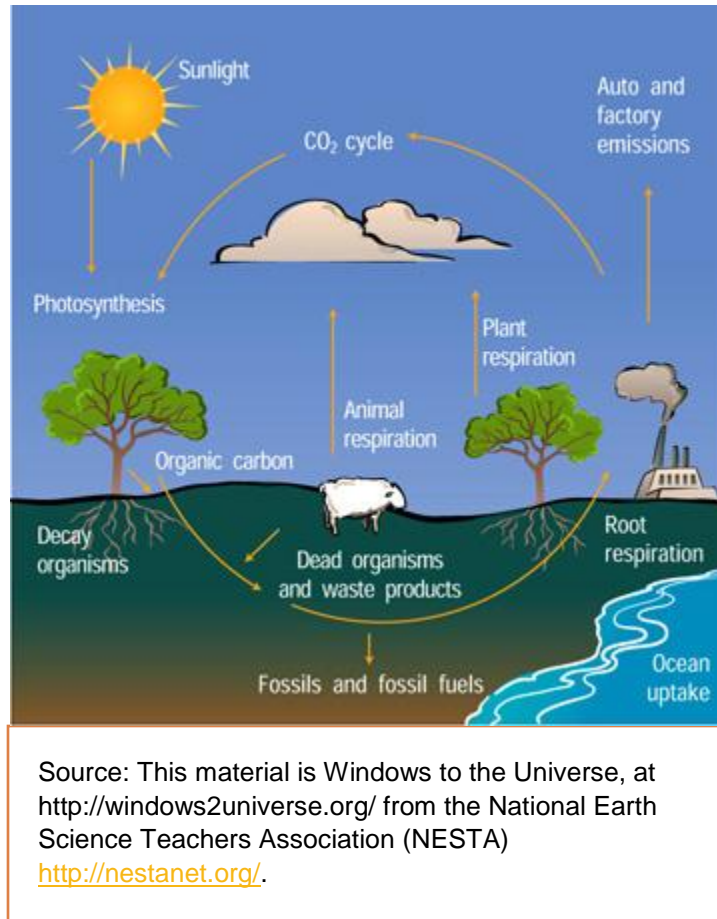
Annex

HANDOUT 4

S1

BENEFITS OF FOREST MANAGEMENT

Carbon Sinks - forests function as Carbon sinks thus helping to mitigate global warming



A **carbon sink** is a natural or artificial reservoir that accumulates and stores some carbon-containing chemical compound for an indefinite period. The process by which carbon sinks remove carbon dioxide (CO₂) from the atmosphere is known as carbon sequestration.

The main natural sinks are:

- Absorption of carbon dioxide by the oceans via physicochemical and biological processes
- Photosynthesis by terrestrial plants

Maintenance and Protection of Biological Diversity - healthy forests maintain and preserve biological diversity of both plant and animal species

"Biological diversity" or "biodiversity" is often defined as the "totality of genes, species, and ecosystems of a region".

"Biological diversity is the variety of life forms...at all levels of biological systems (i.e., molecular, organismic, population, species and ecosystem)...".

The 1992 United Nations Earth Summit defined "biological diversity" as "the variability among living organisms from all sources, including, 'inter alia', terrestrial, marine, and other aquatic ecosystems, and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems". This definition is used in the United Nations Convention on Biological Diversity.

Forests help to preserve quality of soils, **prevent and help to control erosion.**

Hillside where soils have been lost due to the failure to manage the forest that was previously on the site. Note the lack of living vegetation on the exposed areas.



Source:

http://awsassets.panda.org/img/img_0037_360281.jpg