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Harvesting Operations in the Tropics

With 82 Figures and 19 Tables

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Preface

Harvesting includes all the activities to fell trees and remove them from the forest to the roadside for loading and transport from the forest. Harvesting and extraction operations are the activities that generally cause the most significant impacts on forest managed for timber production. Sustainable forest management is concerned with management of forests in such a way as to control the impacts associated with harvesting and timber extraction. Harvesting and extraction for sustainable timber production in natural forests are not to be confused with logging associated with land conversion activities such as conversion to permanent or temporary agriculture, pasture land, or domesticated trees.

Much of the impact of harvesting and extracting can be reduced through proper planning and control of harvesting operations using principles, systems, and techniques common to temperate forests. However, many areas of the tropics pose unique operating conditions: heat, high humidity, high-intensity precipitation, occurrence of certain diseases, and lack of rock for suitable road surfacing. In natural forests, clear felling is rarely practiced, and many species are the rule with few commercial species on any hectare; thus, log removals per unit area are low.

Increasingly, planted forests are being established as a source of wood and fiber on previously cleared lands. These planted forests have high potential to contribute to wood supply, to reduce pressure on natural forests, and to contribute to economic development. Planted forests in the tropics pose special challenges. In many areas of the tropics, much unskilled or lower-skilled labor is unemployed, or underemployed. An important question for management of planted forests is the choice of appropriate technology to meet socioeconomic objectives.

The purpose of this book is bring together information on harvest methods, system productivity, and methods for conducting safe, efficient, and environmentally acceptable operations in tropical forests. It highlights the challenges of harvest operations in the tropics, includes techniques that have been shown to be successful, and discusses newer technologies. It is intended as a reference book for the forest engineer and others interested in planning

and management of tropical forests. Numerical examples are included, where appropriate, to provide clarity for interpreting graphs, procedures, and formulas. The book is divided into ten chapters which cover the various facets of harvest systems from planning for felling and skidding to log transport from the forest, and concludes with considerations in selecting the appropriate harvesting technology.

Chapter 1 puts harvesting operations in context of forest management, defines the requirements for successful harvest operations, and reviews why operating conditions in the tropics are different from those for other forests.

Chapter 2 defines levels of planning, available mapping and information systems generally available in countries with tropical forests, and lays the important environmental and economic considerations for successful harvest operations in the tropics.

Chapter 3 covers organization, administration, and factors affecting worker safety and productivity in the tropics.

Chapter 4 reviews felling, bucking, and delimiting equipment, techniques, and production rates for a range of technologies from hand tools to highly mechanized specialized felling machines. Prefelling operations in natural forests and techniques for maximizing tree value in both natural and planted forests are addressed.

Chapter 5 reviews various animal extraction systems that have been used and continue to be used in areas where physical demands, social, and economic conditions make them appropriate.

Chapter 6 focuses on ground-based mechanized equipment for extraction, including rubber-tired skidders, flexible and rigid track skidders, rubber-tired forwarders, and their productivity. Skid trail patterns, landing design and operations, road spacing, cost, and environmental considerations are covered.

Chapter 7 focuses on systems suitable for steep land extraction. The various types of cable systems are defined with their planning requirements and factors that affect productivity. Considerations for helicopter operations are briefly reviewed.

Chapter 8 addresses a range of loading technologies from low-technology ramp systems through mechanized hydraulic swingboom and front-end loaders.

Chapter 9 reviews transport from the log landing to the manufacturing or shipping facility by truck, water, or rail. Common truck configurations, safe operating guidelines, and productivity are discussed. Water transport plays a larger role in the tropics than in other regions. Raft construction and use on rivers, swamps, lakes, and tidal forests are presented.

Chapter 10 discusses factors in selecting the appropriate harvesting technology, including local laws, customs, worker availability, tree size, and silvicultural system.

This book represents a compilation of available literature and the professional experiences of the authors. In particular we would like to recognize the long-term contributions of the Food and Agriculture Organization for promoting improved management of world forests, and their funding and documentation of many studies in tropical forest management and conservation.

September 2006

John Sessions

Contents

1	Introduction	1
1.1	Harvest Operations in Context	1
1.2	Overview of the Tropics	2
1.3	Factors Affecting Operations in Tropical Rainforests	4
1.4	Successful Harvest Operations	5
1.5	Codes of Harvesting Practices	5
2	Planning	7
2.1	Levels of Planning	7
2.2	Mapping Tools and Information Systems	8
2.3	Environmental Considerations	10
2.3.1	Residual Stand Damage	10
2.3.1.1	Natural Forests	10
2.3.1.2	Planted Forests	12
2.3.2	Soil Compaction	13
2.3.3	Soil Rutting	14
2.3.4	Soil Laterification	14
2.3.5	Soil Erosion	14
2.3.6	Stream Protection	15
2.3.7	Wildlife Conservation	16
2.4	Wood Utilization	16
2.5	Costs of Environmental Protection	17
2.5.1	Natural Forests	17
2.5.2	Planted Forests	19
2.6	Costs for Comparing Alternatives	19
2.6.1	Production and Cost	19
2.6.2	Costing Equipment and Labor	21
3	Organization, Administration, and Labor Productivity	23
3.1	Organization and Staffing	23
3.2	Labor Training and Motivation	24
3.3	Worker Safety	26
3.3.1	Energy Expenditure	26

3.3.2	Nutrition	26
3.3.3	Heat Stress and High Altitudes	27
3.3.4	Vibration	28
3.3.5	Noise	29
3.3.6	Exhaust Gases	29
3.3.7	Operator Safety Equipment	30
3.3.8	Insect Control	30
3.4	Camp Facilities	31
4	Felling	33
4.1	Introduction	33
4.2	Field Planning	33
4.3	Manual Felling	35
4.3.1	Equipment	35
4.3.1.1	Axe	35
4.3.1.2	Crosscut Saws	35
4.3.1.3	Bow Saws	37
4.3.1.4	Power Saws	38
4.3.2	Felling Methods	39
4.3.2.1	Axe Felling Smaller Trees	39
4.3.2.2	Axe Felling Larger Trees	40
4.3.2.3	Felling Smaller Trees with Handsaws	41
4.3.2.4	Felling Larger Trees with Handsaws	43
4.3.2.5	Felling Smaller Trees with Power Saws	44
4.3.2.6	Felling Larger Trees with Power Saws	45
4.3.2.7	Felling Trees with Plank Buttresses	45
4.3.3	Bucking	46
4.3.4	Felling and Bucking Production	47
4.3.4.1	Natural Forests	47
4.3.4.2	Planted Forests	50
4.3.4.3	Cutting Tree Lengths	51
4.3.4.4	Cutting Shortwood	53
4.3.4.5	Debarking	55
4.4	Mechanized Felling and Delimiting	57
4.4.1	Mechanized Felling	57
4.4.2	Mechanized Delimiting	58
4.4.3	Harvesters	61
4.5	Maximizing Tree Value	62
4.5.1	Natural Forests	62
4.5.2	Planted Forests	63
5	Animal Skidding	67
5.1	Mules	67
5.2	Oxen	69
5.3	Elephants	71

6	Ground-Based Mechanized Skidding and Forwarding	75
6.1	Skidding Equipment	75
6.1.1	Natural Forest	75
6.1.2	Planted Forest	77
6.2	Skidding and Forwarding Patterns	79
6.2.1	Natural Forest	79
6.2.2	Planted Forest	81
6.2.2.1	Skidders	81
6.2.2.2	Forwarders	83
6.2.2.3	Shovels	84
6.3	Production and Cost	86
6.3.1	Rigid-Track Crawler Tractor	90
6.3.2	Rubber-Tired Skidders	91
6.3.3	Flexible-Track Skidders	92
6.3.4	Combined Use of Crawler and Wheeled Skidders	92
6.3.5	Forwarders	93
6.4	Landings for Ground-Based Systems	95
6.5	Spur Road Spacing	98
6.5.1	Optimum Spur Road Spacing	100
6.5.2	Optimum Spur Road Density	103
6.5.3	Average Skidding Distance	104
6.5.4	Spur Road Cost	104
6.5.5	Variable Skidding Cost	105
6.6	Environmental Considerations	105
6.6.1	Surface Disturbance	106
6.6.2	Soil Compaction	107
6.6.3	Activities Near Streams	108
6.6.4	Training, Incentives, and Supervision	108
7	Cable and Helicopter Yarding Systems	111
7.1	Highlead	111
7.2	Skylines	112
7.3	Yarders	113
7.4	Carriages	114
7.5	Load Capacity	120
7.6	Planning for Cable Yarding	122
7.7	Landings for Cable Yarding	124
7.8	Cable Yarding Operations	126
7.9	Cable Yarding Production	126
7.10	Helicopter Operations	128
8	Loading	129
8.1	Loading from Ramps	129
8.2	Loading with Swingboom Hydraulic Loaders	130
8.2.1	Loading Long Logs or Tree Length	131

8.2.2	Loading Shortwood	134
8.3	Front-End Loaders	134
8.4	Unloading	135
9	Transport	137
9.1	Trucks	137
9.1.1	Equipment	137
9.1.2	Transport Costs	141
9.1.3	Variable Tire Inflation	142
9.1.4	Truck Maintenance and Repair	144
9.1.5	Driving and Safety	145
9.1.6	Extended Terrain Transport	147
9.1.6.1	Agricultural Tractors with Trailers	147
9.1.6.2	Off-Road Trucks	148
9.2	Water Transport	149
9.2.1	Mangrove and Tidal Forests	151
9.2.2	Swamps	152
9.2.3	Seasonally Inundated Forests	152
9.2.4	Driving in Creeks and Rivers	152
9.2.5	Rafting in Rivers and Lakes	153
9.3	Railroads	154
10	Appropriate Harvesting Technology	155
11	Concluding Comments	159
	References	161
	Further Reading	163
	Index	165

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