634.9
Set
1984

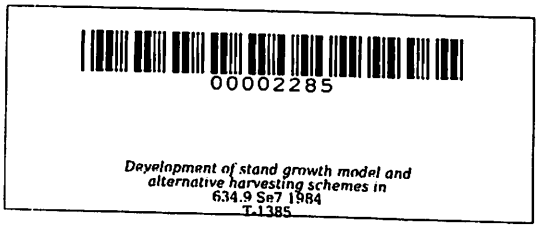
[illegible]

AND ALTERNATIVE MARKETING SCHEMES IN INDONESIA

[illegible]

DEVELOPMENT OF STAND GROWTH MODEL AND ALTERNATIVE HARVESTING SCHEMES IN INDONESIA

AGUS SETYARSO



SUBMITTED TO THE FACULTY OF THE GRADUATE SCHOOL
UNIVERSITY OF THE PHILIPPINES AT LOS BAÑOS
IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE
DEGREE OF

MASTER OF SCIENCE
(Forestry: Forest Resources Management)

June, 1984

ABSTRACT

AGUS SETYARSO, University of the Philippines at Los Baños, May, 1984. Development of Stand Growth Model and Alternative Harvesting Schemes in Indonesia.

Major Professor: Dr. Guillermo A. Mendoza

The Indonesian Selective Logging System is a guideline being applied by most of the forest concession holders in managing the tropical rain forests of Indonesia. Since its launching, problems arose concerning its capability to guarantee the future forests, due to the fact that some of the requirements in the system were hardly fulfilled in practical situation.

One of the most appropriate way with which to evaluate the system is growth and stand projection analysis. A stand growth model derived through Leslie Matrix principle is considered to have the highest compatibility with Indonesian tropical forests.

It was found, based on the data taken from three concession areas in East Kalimantan, that the operationalization of the growth model could be recommended. Stand structures were projected in this study, and the performance

of Indonesian Selective Logging System was evaluated at the end of cutting cycle. It was observed that the forest would gain lower volume of harvest at the second cutting cycle.

Mathematical programming technique was used in order to give more comprehensive evaluation on the system. Some alternatives in harvesting scheme were generated and discussed.

DSAC-EAPIO
RECEIVED
BY: Edwards
10/8/93

TABLE OF CONTENTS

	PAGE
INTRODUCTION	1
REVIEW OF LITERATURE	4
On the Selective Logging of Indonesia	4
Growth Model for Stand Simulation	8
Optimization Techniques in Uneven-aged Forest Management	11
MATERIALS AND METHODS	20
Materials	20
The Structure After Harvest	20
The Growth Model and Stand Projection	21
The Optimization Model	23
Impact on Species Classification	25
RESULTS AND DISCUSSION	26
The Study Area	26
Growth System Components	30
Stand Projections	41
Remarks on the Performed Indonesian Selective Logging	50
Optimum Harvest Under Indonesian Selective Logging	56
CONCLUSIONS AND RECOMMENDATIONS	70
LITERATURE CITED	75
APPENDICES	78

LIST OF TABLES

TABLE		PAGE
1	Several alternatives concerning diameter limit, length of cutting cycle and residual trees	5
2	Average structure before and after harvest, commercial species	28
3	Average structure before and after harvest, all species	29
4	Growth elements, commercial species, one-year observation basis	34
5	Growth elements, all species, one-year observation basis	35
6	Growth elements, commercial species, two-year observation basis	36
7	Growth elements, all species, two-year observation basis	37
8	Ingrowth, commercial species	40
9	Ingrowth, all species	40
10	Stand projection for commercial species, based on one-year observation	43
11	Stand projection for all species, based on one-year observation	44
12	Stand projection for commercial species, based on two-year observation	45
13	Stand projection for all species, based on two-year observation	46
14	Stand projection for all species, based on two-year observation with manipulated G matrix	53

TABLE		PAGE
15	Required residual trees in maintaining equal volume of harvest at the second cutting cycle	55
16	Long-term optimal harvesting scheme, 35-year cutting cycle, with 50 cm diameter limit	64
17	Optimal harvesting scheme: $H \leq$ 60% (class of 40-60 cm) + 80% (class of 60-70 cm) + 100% (class of $\geq$ 70 cm) with 35-year cutting cycle	65
18	Long-term optimal harvesting scheme, 25-year cutting cycle, with 50 cm diameter limit	66
19	Optimal harvesting scheme: $H \leq$ 60% (class of 40-60 cm) + 80% (class of 60-70 cm) + 100% (class of $\geq$ 70 cm) with 25-year cutting cycle	67

LIST OF APPENDICES

APPENDIX		PAGE
1	Number of Species (counted in local names)	78
2	Table of the logged trees	79
3	Regression analysis of variance for ingrowth predictions, with model: $Y = b_o + \alpha_1 + \alpha_2 + b_1 B + b_2 N$	
4	Stand projections: Graphical representation	83
5	Map of Kalimantan, Indonesia	86
6	Growth elements presented in number of trees, one-year growth period	87
7	Growth elements presented in number of trees, two-year growth period	88

INTRODUCTION

Most of forested areas in Indonesia are covered by Tropical rain forests. As a management policy, some forestlands are given out as concessions to logging companies. To manage their forests, forest concession holders use the Indonesian Selective Logging System, which is one of several logging systems recommended by the government.

The guidelines for the Indonesian Selective Logging System were issued by the Director General of Forestry in 1972. It has been said that the guidelines were written based on a set of considerations as follows:

1. Sustainability principle,
2. Silvicultural acceptability,
3. Economic consideration, and
4. Control system.

The sustainability principle stipulates that volume of harvest must not decrease at every cutting cycle. Therefore, there should be a balanced structure of growing stock to be maintained that will support the harvest. Silvicultural acceptability requires that any treatment applied to the forest should be suited to forest growth potential, species composition, ecological conditions, topography and other practical situations. On the other hand, some economic considerations should be taken.