Feasibility of Selective Logging in Dipterocarp Forest

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Selective Logging Defined

To avoid any misunderstanding in the use of the term "selective logging," this term, as used in this report, means the application of the silvicultural system known as "selection cutting." The accepted definition of "selection cutting" is as follows: "Removal of mature timber, usually the oldest or largest trees, either as single scattered trees or in small groups at relatively short intervals, commonly 5 to 20 years, repeated indefinitely, by means of which the continuous establishment of natural reproduction is encouraged and an uneven-aged stand is maintained."[1]

Application of Selection Cutting to Dipterocarp Forest

The objective of forest management in dipterocarp forest should be the maintenance of the stand in continuous production thru natural regeneration. The achievement of this objective requires (1) leaving of enough residual stand to constitute succeeding economic cuts within reasonable periods of time; and (2) the production of a condition which will permit the establishment of natural reproduction and at the same time prevent the invasion by secondary species and vines.

This necessitates a partial opening of the stand permitting sufficient light for the reproduction to start.

The residual stand acts as a nurse crop for the development of the desirable reproduction.

Selective logging meets both of these requirements and would seem, therefore, to be the proper system of cutting applicable to dipterocarp forest.

The fact that it is not in general practised has been due to the objection that it is economically infeasible. If it can be shown that this objection is not generally valid, there should be no reason at all why selective cutting cannot be generally adopted in dipterocarp forest.

Application of Selective Logging at Bislig

On the operation of the Bislig Bay Lumber Company's concession at Surigao, a good start is being made with the application of selective logging with economic success.

THE CONCESSION

This company was originally granted O.T. License No. 4-'55 on April 26, 1951, to expire on June 30, 1955, covering about 29,500 hectares of public forest located in the municipalities of Sumilao, Bislig and Lingig in the provinces of Agusan and Surigao. This was converted into a ten-year Timber License Agreement No. 43 to expire on April 26, 1961, with a total area of 50,274.7 hectares, of which 16,214.2 hectares are alienable and disposable. This license agreement

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[1] "Forest Terminology" *Society of American Foresters*, 1950.

was amended on April 28, 1953, by adding thereto 116,964 hectares, thereby bringing the total area covered to 167,238.7 hectares and located in the Provincial Division of Sumilao, Agusan; Lingig and Bislig, Surigao; and Baganga, Catee land Compostela, Davao.

The annual allowable cut is 120,000 cubic meters but not to exceed 240,000 cubic meters.

Logging operations have been confined on the watershed of Mangagoy, Bunawan and Tuma-an Rivers. The country is rolling and consists of low mountains with broad ridges.

An idea of the stand of the virgin forest in the vicinity of the present logging operation may be seen from the following cruise data of the company for two adjacent sections of one mile square each:

RANGE OF SIZE DISTRIBUTION

Diameter Inches	Section 12 No. of trees	Section 13 No. of trees
24	320.0	1,599.9
26	799.0	693.3
28	373.3	1,013.3
30	533.3	1,599.9
32	53.3	373.3
34	106.7	213.3
36	106.7	160.0
38	373.3	160.0
40	160.0	266.6
42	106.7	373.3
44	——	160.0
46	——	——
48	——	106.7
50	——	——
52	106.7	160.0
Total ..	3,039.8	6,879.6

In a plot of ¼ hectare in a virgin forest, there were counted 22 dipterocarps from 2-22 inches in diameter or a stand of 88 dipterocarps to a hectare in this diameter or a stand of 88 dipterocarps to a hectare in this diameter range.

RANGE OF VOLUME BY SPECIES

Species	Section 12 Volume (Bd. Ft.) Brereton	Section 13 Volume (Bd. Ft.) Brereton
Almon	——	79,680
Apitong	139,904	184,320
Bagtikan	——	361,960
Mayapis	1,452,863	2,336,640
Red Lauan	2,365,120	4,626,240
Tañgile	306,496	1,823,936
White Lauan	604,736	1,130,944
Yakal	——	264,000
Total ..	4,869,120	10,807,720

METHOD OF LOGGING

The system used by the Bislig Bay Lumber Co. is, in general, truck logging, with the use of cold-decking and swinging.

High standard main roads are constructed, along which are strategically located log landings or loading points. Logs are brought to these landings by combination of yarding, cold-decking, swinging and sky-lining to fit the terrain.

The company is operating on four sides. Three are so-called "Washington" sides and one "tractor" side. A "Washington" side is composed of one (1) Skagit for sky-lining only, one (1) D-8 tractor yarder also used for skylining and that three (3) 150 h.p. Washington" diesel yarders. The "tractor" side is composed of one (1) Berger yarder and two (2) tractor yarders. A unique feature of this operation is the fact that no yarder is more than 150 h.p. The yarding radius is from 700-800 feet.

FELLING AND BUCKING

Trees 60 cm. d.b.h. or 50 cm. top diameter are felled, except in stands of very low density of from 70-80 cu-m. per hectare. This is another unique feature of this operation, as the legal diameter limit for dipterocarps, except the first group, is 50 cm. d.b.h. Tree lengths run up to 20 meters. Felling is done by the conventional method of axe and crosscut saw.

As much as possible, logs are not bucked more than 12 meters, except for small diameter logs. This is so because of the limited power of the yarders and the fact that the company does not wish to overload the trucks used for log transportation.

The method of bucking is by hand with the use of cross-cut saw.

YARDING AND LOADING

As mentnioned above, all yarders are diesel-powered and no yarder is more than 150 h.p. with yarding radius of from 700-800 feet. On account of the terrain, double yarding is resorted to. Yarders usually cold-decked and the logs are swung to loading points along the road.

Loading on trucks is done by cranes and heel-boom.

TRANSPORTATION

Transportation equipment consists of two (2) types, namely, the heavier type loading from 28-30 thousand board feet, and the lighter type loading half as much. Hauling distance is now about 13 kilometers to the mill.

PRODUCTION

Under this system of operation, the company logged the following:

Year	Area (Hectare)	Total Volume Bd. Ft. (Brereton)	Volume per Hectare Bd. Ft. (Brereton)
1951	474.50	20,306,772	42,796
1952	916.50	51,332,972	56,010
1953	1,413.76	54,237,331	38,364

SILVICULTURE RESULTS

This operation, except for the area covered by the management plan in Basilan, is the closest approach to the application of selective logging on a large scale in the Philippines and the results are quite encouraging.

A good idea of the residual stand of dipterocarps may be obtained from the attached simplified stand table. The table lumps all dipterocarp species together, and omits other miscellaneous species on the area. These data were compiled from 12 sample plots each .05 hectare in size, located in the 1951 cut-over area. The table shows the average stand (number of trees) per hectare, by one-inch-diameter classes in April 1952 and April 1953. The figures in parenthesis in the 1952 column indicate mortality. Those in parenthesis in the 1953 column indicate trees which have moved up to a higher diameter class during the year.

In summary, these data show that the residual merchantable stand of dipterocarps in April 1952 averaged 25.7 trees, 21" or greater d.b.h., and 13.5 trees, 25" or greater d.b.h. One year later, the stand averaged 27.4 trees, 21" or greater d.b.h., and 13.6 trees, 25" or greater d.b.h.

Compartive d.b.h. measurements made on 100 individual dipterocarps on these plots showed an average increase of .36 inch for the year.

While these data are, of course, too meager to attempt to accurate long-range growth prediction, they do give an indication of what might be expected in the future, barring a catastrophe such as typhoon or kaiñgin-making. If we apply the average growth figure to the average individual stand per hectare, the following is indicated:

	No. of Dipterocarps	
	21" D.B.H.—	25" D.B.H.—
Present residual stand	25.7	13.5
Ingrowth during 15 years	40.0	26.0
Available for cutting at the end of first cutting cycle	65.7	39.5
Ingrowth during next 15 years	42.8	38.4

The amount of merchantable material available for the third cut, 30 years hence, will be the ingrowth during the second cutting cycle plus the residual stand left by the second cut. No deduction has been made for mortality, except the small amount shown on the stand table. However, even if a fairly heavy mortality factor were applied, there would still be a satisfactory merchantable stand.

The data apply to timbered areas only and do not include spar tree areas, skylining roads or other blank areas. For the area as a whole, these portions will have to be considered. They represent blank areas with no residual stand and no advance natural reproduction.

The data indicate that the selective system of cutting has left a condition where satisfactory, economically feasible successive cuts are probable, with cutting cycle as short as 15 years.

A most important point is the fact that natural reproduction is taking place, and the growth of vines is being retarded. Reproduction counts made by company foresters show 1,600 seedlings per hectare, of which 70 per cent are dipterocarp species. From this reproduction will come the future successive cuts.

It must be kept in mind that the all-size situation of the Bislig Bay stands, with good representation in all diameter classes, is especially well suited to the selection system, which assumes an uneven-aged forest.

Conclusions

1. Selective logging in dipterocarp forest is silviculturally desirable and economically feasible. Its best application, however, requires a stand condition where there is a fairly even distribution of all size classes particularly on the smaller size classes (24 inches or less d.b.h.).

2. Conditions suitable to selective logging exist in varying degrees on all large conces-

sions. On Bislig area, there is a good distribution of all size classes over a large portion of the area. On some other large concessions, an even-size condition predominates over much of the area.

3. On areas where even-size condition exists, especially where there is a heavy concentration on the higher size classes, selective cutting will not leave a good residual stand and therefore cannot be satisfactorily applied. On such areas, some degree of clear-cutting must be permitted at least for the first harvest. However, in order to obtain natural reproduction and to discourage the growth of undesirable species and vines, this clear-cutting should not be applied over the total area but should be done in strips or patches.

4. The conditions of size distribution are not always obvious or well defined. For this reason, a high degree of professional judgment is necessary in determining the cutting policy on any area.

5. Even where an all-size condition exists, the resulting damage on, and density of, residual stand depend much on the power and type of the yarding machineries. On Bislig area, diesel yarders of not more than 150 h.p. showed very desirable results on the residual stand.

Recommendations

1. Selective cutting should be required on all areas where a sufficiently satisfactory all-size distribution exist.

2. Modified clear-cutting in strips or patches should be permitted for the first cut on areas where even-size condition makes it necessary.

3. Since varying stand conditions exist on all concessions, the cutting system used should not be uniform over the entire area, but should be flexible and varied to suit specific stand conditions. This will require good professional judgment in many cases. Technical foresters of the Bureau of Forestry should be the ones to exercise this judgment. Resident foresters on the concessions

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THE TREES . . .

up to 500 years. And while some oaks live up to 1,500 years, junifers are able to reach 2,000 years. Some of the giant sequoias are even believed to be about 4,000 years. I think we should take care of young trees as we would our babies and treat old trees as we would respect our grandparents.

Because some trees live very much longer than the longest life span of a man (Adam lived up to 900 years old only perhaps), trees have become landmarks and memorials and have carried their associations with great persons from one generation to another. According to statistics, there are trees still living that were planted by the first President of the United States States (George Washington).

And so as we initiate our "Arbor Week" observance this July 24-30, 1955, we hope that we may become as tree-conscious as the Americans are. We hope too that the Magsaysay tree, which the President will personally plant, will live for many generations to come just like the Washington trees.

Any one can become angry—that is easy; but to be angry with the right person, and to the right degree, and at the right time, and for the right purpose, and in the right way—that is not within everybody's power, and is not easy.

—*Aristotle*

should be freed to the greatest possible extent from sub-professional work, and devote the maximum amount of time to the determination of the optimum cutting system for all areas. Sub-professional personnel should be trained and used to handle the sub-professional work.

4. In areas where selective logging is required, concessionaires must use diesel yarders with not more than 150 h.p. each.

COMPOSITE STAND TABLE
Area Logged in 1951
(Dipterocarps per Hectare)

Diameter Class	April 1952	April 1953
(Inches)		
2	0	1.5 (1.5)
3	7.7 (1.5)	6.2
4	12.3	9.2
5	4.6	6.2 (3.0)
6	7.7	7.7 (1.5)
7	4.6	4.6 (1.5)
8	16.9	13.8 (1.5)
9	9.2 (1.5)	9.2 (1.5)
10	9.2 (1.5)	7.7 (3.0)
11	3.0	3.0 (3.0)
12	9.2	9.2 (3.0)
13	9.2	9.2 (3.0)
14	3.0	4.6 (3.0)
15	6.2 (1.5)	4.6 (1.5)
16	9.2	7.7 (1.5)
17	4.6	6.2 (3.0)
18	6.2	7.7 (1.5)
19	4.6	3.0
20	9.2	7.7 (1.5)
21	0	1.5 (1.5)
22	7.7	6.2 (1.5)*
23	1.5	3.0 (3.0)
24	3.0	4.6 (1.5)
25	1.5	1.5
26	3.0	1.5
27	3.0	4.6 (1.5)
28	3.0	3.0
30	1.5	1.5
41	1.5	0
42	0	1.5 (1.5)

* Increased two classes.

LEARN TO LAUGH

A good laugh is better than medicine. Attend to your own business; few people can do that well. Say kind things; nobody ever resents them. Avoid hasty remarks; they cause much of the world's trouble. Stop grumbling; see some good in the world and keep the bad to yourself. Hide aches with a smile; nobody is much interested anyway. Learn to laugh; it pays.

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