GOOD LOGGING PRACTICES INCREASE FOREST YIELDS¹

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Ralph C. Hawley, Emeritus Professor of Silviculture, Yale University, in a paper presented at a meeting of the Division of Forest Products, Society of American Foresters, held at Washington, D.C., in December, 1950, says in part, "... forest management (or silviculture) is absolutely dependent for its general practice upon utilization of the products grown in the forest. Cutting is the major tool which the forest manager must use to control the growth and development of his forest along desired lines and to obtain his annual or periodic harvest of forest products. If he is to stay in business very long, he must utilize at a profit the material which he grows and cuts in his forest. Forest management can operate only on the basis of utilization of forest products".

This was recognized by the Third World Forestry Congress held in July 1949 in Helsinki. In the report of this meeting, the following statement appears. "One of the most striking changes of the past 13 years is the recognition of the principle that the management and conservation of forests and the manufacture and distribution of forest products must be regarded as an inseparable whole. It is the primary task of the forester to grow and produce both the amounts and the kinds of forest products needed by industry and other consumers for the optimum satisfaction of human needs compatible with the protective role of forests and the conservation of land productivity. At the same time it is the responsibility of technical research and industrial development to provide suitable outlets for all products of the forest crop and to adjust conversion methods and uses to the limitations and requirements of sound silviculture".

Forest utilization constitutes the major part of the forestry operations in Canada and the United States. Logging represents approximately 50 per cent of the total cost of putting lumber on the market, and a considerable part of the expense for converting standing timber to pulp and paper. In Canada, during the post-war years, there has been a rising demand for sawlogs and pulpwood, and a coincident scarcity of woods labour caused by the pressure of employment demand in other fields. There has been a resultant rise in the market value of most forest products. It should also be noted that most of our easily accessible—and better quality forests—have been cut, and that present logging is in more inaccessible and difficult locations. Because of these developments there is a growing realization that efficient utilization of our standing timber is one of our most important forestry problems.

Dr. L. Thiesmeyer, President of the Pulp and Paper Research Institute of Canada, in an address at the Annual Meeting of the American Pulpwood Association in New York in February of this year said "... there is great emphasis on efficiency, and, since it is more difficult and more costly to increase the supply of pulpwood, attention is focused on the better utilization of the wood that is available. This means reduction of waste, both in the woodlands

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and in the mills. It means the use of materials that were formerly discarded, left to rot or to encourage fires in the bush, or poured down the sewers at the mills".

In some quarters, considerable attention has been focused on the growing of trees with too little thought given to their proper utilization. It has been said that heavy cutting of some of the German forests during World War II actually improved their condition because, before the war, undue emphasis was placed on the growing of trees and the preservation of stands.

In the State-owned forests within the Adirondack and Catskill Mountain regions of New York, the cutting of any timber belonging to the State is prohibited by a constitutional amendment which dates back a half century. It was adopted as a result of public indignation over the way in which the forests of the State were being ruthlessly logged. However, this policy, by prohibiting all cutting, tends to produce over-mature, unhealthy forests—thereby defeating the original purpose of this conservation.

H. H. Chapman, Professor Emeritus, Yale School of Forestry, states in the *Conservationist* that: "The citizens of New York are not only 50 years in arrears in public policy but have expended upwards of \$100,000,000 in taxes, administration, and protection of this area, without either realizing any of the possible economic benefits of the timber resource or deriving more than a fraction of the recreational satisfaction to which they are entitled."

Admittedly, these are extreme conditions. However, they do serve to illustrate the lack of attention which too often in the past has characterized this phase of forestry. It can be said that, on the whole, many foresters and others have not placed the problem of the efficient utilization of our timber resources in its proper perspective. Hence, far too little thought has been given to the problems of economic utilization.

In the early days the forest was both a protection and a support to the settler. It was also a great obstacle to the colonization of the country. Forests were then seemingly limitless and inexhaustible, and by many they were regarded as an enemy to be conquered rather than as a friend to be cultivated. In fact in the economic outlook of those days, forests were not considered to be a particularly valuable national asset. It was only natural that great wastage attended the conversion of trees into usable forest products. Logging was highly selective and many trees, and portions of trees, of real timber value were almost completely neglected. An outstanding example of this was the neglect of western hemlock. In those days the value of timber from any particular tree was assessed according to its inherent value for such trades as house-building, shipbuilding, and the manufacturing of agricultural machinery. The intervening years have recorded many developments in the uses for wood and today there is recognition that our forests are of the highest importance to our national economy.

The increase in the number of applications for wood and wood products has been near phenomenal, and annual output has steadily grown in volume and diversity. Recently there has been more and more emphasis on the value of wood as wood fibre—how the fibres can be separated and put together again. Research continues its attempts to develop uses for lignin and other

component parts of the wood substance, and developments in the use of laminated wood, veneers, and plywood have made great strides in recent years. Thus, the increases in the uses for wood material emphasizes, more than ever, the urgent need for more complete utilization.

Research has been active on many conversion phases, all aimed at increasing effective utilization. New processes for cooking and refining pulps to increase the yield of useful fibre are under intensive study. New methods are being developed to make possible the use of species which have long been considered as being unsuited for the production of chemical pulps. There is an increasing awareness of the values contained in waste liquors from chemical pulping operations. The extraction of vanillin from these liquors will be considerably increased when several new plants, now under construction, come into production. The manufacture of wallboard from bark is under intensive consideration. Research into the various phases of lumber conversion and manufacture has brought about some marked improvements in production techniques, and processes have been developed which have brought about a large increase in the utilization of wood waste. A notable example is the increasing use of slabwood for pulp chips—50,000 cords per year in Eastern Canada, 50,000 cords per month in British Columbia.

Research in logging operations has lagged far behind research and development in the manufacturing phases of the industry. The need for such research is immediately apparent from the considerable volume of valuable wood substance left on logged areas. While some of the waste produced is unavoidable under present conditions, there is definitely room for betterment. Harvesting practices are often wasteful and improved cutting methods could considerably reduce present wastage of valuable material. More complete utilization, when an area is being logged, would also result in a substantial increase in total recovery.

Preliminary logging waste studies conducted in Eastern Canada by the Ottawa Laboratory, working in close co-operation with industry, indicate that large quantities of merchantable wood material are left in the forest after the completion of sawlog operations. Waste of usable material occurs as a direct result of low standards of utilization on the part of management, in accepting only the higher quality material, and because of the over-cautious attitude of the workers who avoid cutting logs that may be culled.

During the summer of 1951 the Ottawa Laboratory conducted a preliminary logging waste survey in the Maritime Provinces. Results indicated that for softwood sawlog operations about 21 per cent of the volume of the original stand was left in the woods as logging waste. This figure is comprised of waste due to high stumps amounting to 2 per cent; waste resulting from the long-butting of logs—3 per cent; waste from uncut defective trees of merchantable diameter—4 per cent; and waste in the form of large tops amounting to 12 per cent of the original volume of the stand. After spruce, balsam fir, and white pine stands averaging 2116 cubic feet per acre—had been logged, there remained 441 cubic feet per acre of merchantable wood material.

Annual lumber production in New Brunswick and Nova Scotia, during the post war years 1946 to 1949 inclusive, has averaged 640 million board

feet. This represents an approximate volume of 114 million cubic feet of sawlogs actually sawn to lumber. Using the total waste average of about 21 per cent—from the survey in these two provinces—the total merchantable wood volume of trees cut to logs was 144 million cubic feet. It will thus be seen that the total annual logging waste for the region averaged 30 million cubic feet.

If left each year for four years, this volume of logging waste would approximately equal the average annual lumber production of New Brunswick and Nova Scotia. It is approximately equal to ten times the annual increment for the areas logged, on the basis of an annual increment of 2 per cent.

This loss in utilization has important implications on forestry and forest management. Although it must be recognized that there will always be some waste of merchantable wood material on logging operations, companies contemplating sustained yield operations would be well advised to inaugurate logging utilization surveys of their own in order to determine an expression of this volume. *If cutting operations are to be on a sustained yield basis, the volume of logging waste must be added to the wood actually removed as reported by scalings.* Otherwise, it would be difficult to keep any program of this nature in balance. Such surveys would also bring to the attention of management violations of good cutting practices, which at present all too often receive but little notice. On the whole, such surveys would tend to promote more efficient utilization.

A question arises as to what practical methods can be employed by industry to reduce the volume of waste resulting from logging operations. Professor Hawley of Yale has pointed out that if a forest manager is to stay in business he must utilize at a profit the material which he grows and cuts in the forest. Recent developments in the industry have shown that, not only can more complete utilization be accomplished physically, but that this is economically desirable from the viewpoint of management.

One of these developments has been the use of portable chippers in the woods for the manufacture of pulp chips. In its pulpwood logging a large concern in Wisconsin uses, almost exclusively, portable chippers and large truck trailers for the transport of the pulp chips to the mill. Wood—with bark—to a minimum diameter of one inch is utilized in the manufacture of pulp for container stock. By utilization to this small diameter limit, logging waste is eliminated and the yield per acre has been estimated to have been increased by as much as 180 per cent over that realized from conventional pulpwood operations. By the elimination of much of the slash, the danger of forest fires spreading in the cut-over areas is also reduced considerably. Admittedly, the use of portable chippers in the logging industry has definite limitations at the present time. However, recent advances in equipment designed to separate the bark from the wood after it has been chipped—in some cases even after the cooking process—and new developments in handling and transporting chips, indicate a broader application for the use of this equipment in the woods in the near future.

Another interesting development has been the increasing attention focused on the advantages of tree length logging. Some companies found this a most

practical method of logging where markets are available for the sale of the multiple forest products that result from such an operation. The timber is cut in tree lengths and hauled or driven to a sorting point where material of suitable quality is converted into sawlogs and the remaining material diverted for use as pulpwood, fuelwood, etc. Reports indicate that this method of logging has proven profitable and has resulted in an appreciable increase in utilization.

In the past decade, on the West Coast of the United States, a new approach in regard to wood values has been developed by the lumbering industry. A national advertising campaign aimed at promoting acceptance of the lower grades of lumber has achieved marked success. The low-cost appeal for lower grades proved attractive to consumers. This was particularly so when customers learned that, for many purposes, lower grades were as serviceable as were the more expensive better grades of lumber. In this way there has been more complete utilization of the forest crop, and logs considered culls ten years ago are being brought out of the woods for conversion to lumber. From a conservation viewpoint, a phenomenal situation has been created in the West Coast Douglas fir region by this opening up of markets for lower grade lumber. An additional 125 billion feet of wood is now available, which economically did not exist in 1940, owing to the lack of markets for materials from low-grade logs.

Generally, in Eastern Canada, the disposal of low-grade lumber has not presented a serious problem. Several large scale uses for low grade material have taken care of the problem to a large extent. Use of No. 6 common white pine for dunnage and for plank wall construction in the housing industry of Quebec are examples. There have been instances, however, of over-abundance of low grade material, such as the build-up after the war of low grade jack pine, and at present hemlock is not moving particularly well.

The Canadian Lumbermen's Association of Ottawa, has in the past made it a practice to have one of its officials visit architects and engineers to educate them as to the proper use of lumber of various grades, and especially as to the suitability of the lower grades for specialized uses. However, only in a rare instance has it been found necessary to conduct promotional campaigns in Eastern Canada to encourage the use of low grade material.

A step in the right direction, in regard to utilization, has been taken by a progressive firm in Eastern Canada with extensive timber holdings. This company was one of the first to appreciate the need for utilization surveys designed to obtain an expression of the volume of waste resulting from logging operations. Surveys designed to measure waste also proved of value; they brought to light violations of cutting regulations which were contrary to the conditions of contract with the jobbers, and so permitted of remedial measures. Thus they serve as a basis for administrative controls on the various operators who have contracted with the company.

Annual surveys, of the order of half of one per cent intensity by area, are carried out on all jobbers' cutting areas as well as on any company camp operation included in the district. The sampling is semi-systematic following the line plot method and the logging residue is classified and measured. The

cost of these surveys is approximately one-tenth of one cent per cord of pulpwood produced—insignificant when compared to the benefits derived from closer utilization.

It has been estimated that, principally due to these surveys, utilization in some districts has improved by as much as 30 per cent. This means that stands that formerly yielded say 5,000 cu. ft. of sawlogs now yield 6,500 cu. ft. An increase in yield resulting almost entirely from utilization surveys. In many cases increased yield is much above 30 per cent, in fact it is as much as 100 per cent in some cases. Company officials consider a 30 per cent figure as being conservative. Utilization surveys of this company have not only reduced waste in stumps, long butts, and tops, but have also resulted in the cutting of many trees formerly left standing. This, in the opinion of the company is definitely improved utilization since unwarranted selectivity in the logging operations has been eliminated.

Such a control method is probably one of the most practical methods for reducing logging waste, and is deserving of consideration by most forest companies. It is perhaps the best method to provide for a bulk use of current waste wood material. It is one whereby a small investment may effect a substantial reduction in the volume of logging waste.

Better utilization by waste reduction is the best method of promoting profitable utilization which, in reality, is synonymous with forest conservation of a high order. If logging waste could be reduced by only 10 per cent, the industry would not only have moved substantially towards greater efficiency and the financial benefits that follow it, but they would also be making a worthwhile contribution towards the wise use of our forest resources.

The statement that the utilization phase of forestry—particularly in regard to logging operations—has been neglected by many in the past, can hardly be challenged. The era of relatively cheap and readily accessible stands of high-quality, large-diameter virgin timbers is now practically at an end. New circumstances facing the industry will necessitate many new methods and practices. Logging waste data will have to be taken into account for the formulation of cutting programs for sustained yield operations. It will be essential to give more attention to a closer utilization of our present standing timber. By and large, it becomes more and more important that utilization in the woods should be closely integrated with good forestry practice.