Some Aspects of Forestry in British Columbia

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SOME ASPECTS OF FORESTRY IN BRITISH COLUMBIA

IN a conversation with an acquaintance of mine a few weeks ago, sympathy was expressed in my choice of forestry as a profession. Having lived in this province only a short time, this gentleman had the impression and belief that forestry is a steadily decreasing field of endeavor and would in a comparatively short time cease to exist. In his opinion it was unfortunate that the forestry profession was such a passing phase and that foresters would soon be out of jobs. I hastened to point out the true facts of the case, which require no argument, and I believe he was convinced that his former impressions were entirely erroneous.

This experience convinced me that in speaking to this audience to-night on "Some Aspects of Forestry in British Columbia" there might be some to whom the term is not clear, and that it might be well first to define the meaning of the term "forestry" and to explain what it includes.

The general public has a good idea of what is meant by agriculture or mining or medicine, but forestry seems to be a vague term and there are many hazy notions concerning it.

For example, to many people forestry is synonymous with tree planting—regenerating the barren or burned hillsides, artificial reforestation. This is one phase of forestry, important in certain regions in North America. But it is costly. It may be a last resort to be undertaken because of previous mismanagement of the forest resources.

To others, the protection of forests from fire is forestry. In British Columbia this is a very important part of forestry and is one of the first steps to be taken. It is useless to attempt to grow timber if we allow it to burn faster than it grows. But fire protection again is only one step in the practice of forestry.

To many more people of the general public, logging, or perhaps more recently, selective logging is synonymous with forestry. If we practise selective logging we are practising forestry—at least this is so in the minds of some. Logging, or lumbering, is the process by which the crop is harvested and there is room for much improvement in logging methods. Basically the process is similar to the harvesting of wheat, corn or oats. Everyone realizes that the harvest season is only one phase of agriculture; so it is also in the case of harvesting forest products.

Forestry an All-Inclusive Term

There are many more catch phrases which have been thought to be synonymous with forestry—forest conservation, keeping the forest green, tree culture, and so forth; but I have said enough to illustrate how vague the term is to many.

What then, in a nutshell, is forestry? Perhaps the broadest and best definition is that forestry is the management of forest lands for the purpose for which they are best suited, maintaining their resources in a permanently productive condition, and protecting them from any damage which would lessen their usefulness.

The land referred to as forest land may be best suited for timber production and this is the use most generally thought of in connection with forestry. But other uses are included which may in many cases be more important than the timber production use. Forest land may be more useful for watershed protection; for recreation, including the maintaining of a favorable habitat for fish and game; for scenic attractions, such as national or provincial parks; for grazing; and for other combinations of uses which are beneficial to man and which on certain areas may be more important than the timber.

All of these benefits obtained from forest land are to be used and enjoyed by all mankind—not simply hoarded. But it is imperative to see to it that the capacity to produce these benefits is not destroyed by use. Forest land must be protected and maintained in a permanently productive condition. This is the fundamental principle underlying forestry. It is both an economic and a social principle.

Stages in Forest Development

In British Columbia it is obvious that this goal has not been attained—nor is it likely to be fully attained for some time, perhaps not for another several generations. The conquering of a wilderness is a slow process and the orderly attainment of highest productivity of forest lands is even slower.

A study of the forest history of older countries will show what may be expected to take place in British Columbia. There are four fairly well-defined stages passed through in attaining the goal of forest development.

First, in time sequence, there is the stage of exploitation. In this stage the resources seem inexhaustible. The accumulation of growth of centuries in the past has built up a storehouse of timber which will supply forest products for several generations. No one has turned a hand to accumulate this wealth of wood. It just grew and was there. At first it has comparatively little value because of its abundance, but it is soon attacked with vigor and exploited wastefully and destructively.

The second stage might be termed the era of protection. Markets have been developed now which have made forest products more valuable, and it begins to be evident that the resources of virgin timber have a limit. Protection measures are inaugurated to prevent, or at least to lessen, further losses

by fire. In this stage, however, there is still a great deal of waste.

In the third stage, there comes the realization of the vast possibilities for growth on the cut-over lands. It is seen that protection alone is not enough to assure adequate reforestation or to maintain sufficient quantities of raw material for the large forest industry which by this time has developed. In this stage the exploitation of visible supplies without regard for the future is changed gradually to a policy of forest management for permanent production. Little by little the forests are management to secure prompt reforestation, to correlate the annual cut with the amount grown, and to eliminate the waste. Gradually the forest industries are geared to the utilization of the amount of wood which the land can grow; instead of being a migrating industry, it becomes stabilized. The cut of timber is on a sustained-yield basis.

As further markets for wood products develop, more intensive methods of silviculture are practised in order to increase the growth per acre or to improve the quality.

Finally, in the economic and social best interests of the majority, the best use of forest land is worked out—some lands for timber production, some for watershed protection, some for recreation or scenic attraction, and others for other forest uses—and each is managed permanently for the highest values.

Judging by older countries which have passed through these stages of development, this is the road we will eventually follow.

Development of Forestry in British Columbia

British Columbia is still a young and pioneering province and forestry in this province is still in its early stages. Let us see how recent the development has been.

The first lumber sawn was in 1806 during the building of the Hudson's Bay post at Fort St. James, and it was sawn by hand. The first power-driven sawmill built in B. C. was at Parson's Bridge, Victoria, in 1846. It was not until the 1860's that the lumber export trade developed as a result of the building of sawmills on Alberni Canal and Burrard Inlet. Even by 1908 the lumber industry had hardly more than just started. The cut in that year was only a little over one-half a billion feet. Compared to all of Canada it was less than 20 per cent of the total. The total lumber cut for the 60 years up to that time was estimated to have been only 5 or 6 billion board feet. Nowadays that much timber is cut in 2 years. For the past quarter of a century the cut has increased rapidly until in 1939 three and one-third billion feet of timber (log scale) was cut for lumber, pulp and allied products. The lumber cut in B. C. is now greater than that for all the rest of Canada.

During most of this period the forest resource was considered to be practicaly inexhaustible. Naturally it was exploited with little or no regard for the future.

The second, or protection stage, started with the enactment of the Forest Act and the creation of the Forest Service in

1912-13. Organized forest fire protection had its beginning at this time. In 1918 the first comprehensive survey of the forest resources in British Columbia by Whitford and Craig showed a large reserve of timber, but pointed out the need for greatly increased protection. Even then it was thought that with moderate care in guarding against fire, cut-over land would quickly reproduce itself and that with the large amount of old-growth timber available, coupled with a relatively small cut, the forest resource was in no way endangered.

But the cut of the timber did not remain long at a comparatively low figure of 1½ billion feet. The post war period resulted in greatly increased demand for forest products, and the cut increased by leaps and bounds. By 1926 it was around 3 billion feet. During this time logging methods were changing. Starting with the introduction of the high lead in 1915, logging was speeded up. The old methods of bull teams, skidroads and ground yarding gave way to high lead, slack lines and skidders. The forests were clean-cut and waste and destructiveness increased.

B. C. Entering Third Stage

It seems evident that in British Columbia we are now near the close of the second stage or possibly at the beginning of the third. We now know that the forest resource is not inexhaustible, we now know that fire protection alone is not enough to insure perpetuation of the timber supply, and we are coming to the realization of the large potential growth possibilities on cut-over lands adequately restocked with young trees.

Attention has been focussed on these facts by the booklet entitled "The Forest Resources of British Columbia," written by F. D. Mulholland and publishd by the B. C. Forest Service in 1937. This booklet is the result of forest surveys, timber cruises and land classification work extending over the past 15 years. It gives a very accurate picture of the status of the timber resources, areas and volumes in the province today.

The Forest Resources

In order to give you a clear picture of the situation I will have to resort to a few statistics. We think of British Columbia as a forested province—and it is. There seem to be trees—of some sort—everywhere. But a great deal of this tree-coverd area is not commercial timber. The total area of British Columbia is 234 million acres. Roughly two-thirds of this or 154 million acres is above the timber line, barren or alpine, or supports only a scrub growth.

Now because this is not commercial timberland, it does not mean that it is valueless. Quite the contrary. Much of it has a high value for minerals. Certain areas may and do have high value for scenic attractions, outdoor recreation, skiing and hiking. It is a tourist attraction and a sanctuary for certain game animals and birds, and its snows and glaciers act as a reservoir from which our electric power industries derive their power and from which our cities and towns obtain their water supply.

The productive timber area, or rather the area capable of producing commercial timber, is 75 million acres. This is roughly one-third of the total area of the province and is 50 per cent greater than the productive forest area of Finland—the country about which we are reading so much these days.

The area of forest land in British Columbia is 15 times greater than the area suitable for agriculture. Less than 5 million acres is classed as agricultural land and of this a little over a million acres are now under cultivation. These figures indicate the basic importance of forestry, in its various phases, to the welfare of the people of this province.

Considering again the productive timber land, it will be noted that the lumber industry is concentrated on the lower Coast. Nearly 90 per cent of the industry is located here. Obviously this is because of larger and better timber, good transportation facilities and because it is closer to markets. The 10 million acres of productive forest land located on the Coast is of relatively greater value than the 65 million acres in the Interior and it is these 10 million acres which should be and are receiving first attention.

The amount of standing timber is of interest to those who would attempt to forecast how long the supply will last. It is measured in board feet. The amount for the whole province is expressed in billion board feet. To the ordinary person this is an astronomical term and may have little actual meaning. It will help if we illustrate using a solid timber wall as an example. If you piled up lumber in a solid wall and made this wall 10 feet high and 10 feet wide and extended it across country for a mile in length, it would contain only 6-1/3 million board feet. You would have to keep on building that wall for a distance of 157 miles before a billion board feet of timber would have been used in its construction. This is about the distance from Vancouver to Seattle.

Last year the cut of timber, log scale, was 3-1/3 billion board feet. Some of this was made into pulp, paper and other products, but if all were sawn into lumber it would be enough to build 500 miles of wall 10 feet high and 10 feet wide.

With this yardstick in mind, it is easier to grasp the significance of the figures of standing timber in the province. According to latest estimates there are 254 billion board feet of merchantable timber of all species in British Columbia. A simple calculation of dividing the timber stand by the yearly cut will show that there is about 80 years of timber left at the present rate of cutting. Arithmetically this is correct, but actually the problem is far more complex. There are to many variables for a simple solution. For example, less than half the total timber is accessible—that is, only 110 billion is estimated to be located close enough to transportation facilities so that it could be profitably logged by present-day methods and at present prices. Undoubtedly a considerable part of the timber now considered inaccessible will become profitable to log in 10-20-30 years' time.

Another variable is the amount cut each year. Will it remain at 3 billion feet as at present? Judging from the past it will tend to increase as long as the demand for forest prod-

ucts is steady and as long as an ample supply exists. The operation of these two variables tends to shorten the length of time that the supply of virgin timber will last.

The predicted future for a single species may be very different from that predicted for the timber supply as a whole. Douglas fir is in a more critical position than either hemlock or cedar owing to a smaller reserve supply and a larger yearly cut. The lumber industry has been built on Douglas fir and it still supplies over 50 per cent of the amount of timber cut each year. A decrease in the cut of fir may be expected within the next 10 to 12 years. While some mills will still be cutting fir 20 years or more hence, others will have to turn more and more to hemlock or cedar and develop markets for these and other species, as the supply of fir decreases.

Growth

But thus far we have not considered growth. Timber is a renewable resource. It is not like a copper or coal mine or an oil well which when mined out is gone. Trees can be renewed and they do grow. The growth on a single tree in a year seems infinitesimal, but when this is multiplied by several hundred trees on an acre and that product by several million acres of forested land, the result is staggerng.

Just a word of caution about growth. Net growth is taking place only on young or immature stands of timber. In mature timber the growth is offset by the loss from windfalls, decay or insects. Many acres of mature trees have less volume today than they had 50 years ago owing to this loss.

Sustained Yield

The potential growth on the 10 million acres of productive forest land on the Coast might be enough to support our present forest industries in perpetuity. But as long as we have stagnant old-growth timber which is not making net growth, this potential growth cannot be realized. At present there are 1,200,000 acres of immature timber on the Coast which are putting on growth. The yearly growth on these areas is estimated to be 275 million board feet.

Now how can we estimate how much we can afford to cut so that as growth takes place, the forest resource is renewed—in other words—so that we can continue to cut this amount indefinitely or on a sustained-yield basis?

It is apparent that it will take 80 years, on the average, for Douglas fir or hemlock or spruce to grow to a merchantable size on the Coast. Theoretically our present timber stand of 155 billion board feet on the Coast should be cut gradually over that 80 year period of time. If the areas cut in 1940 reproduced satisfactorily and the young trees grew normally, they should be ready to be cut again in 80 years when the last of the virgin timber had been removed. 155 billion divided by 80 equals 1,937 million feet. Add to this the 275 million now being added yearly to immature stands and the total is 2,200 millions. This is the amount we should remove yearly on a

sustained yield basis. Last year we over-cut this amount by about 35 per cent.

Summarizing these statistics, just quoted, it is evident that British Columbia has a large area of forest land suitable for the most part only for timber growing, that the reserve of sawtimber is still large, and that the potential growth is sufficient to meet our needs. However, the present growth is relatively small and we are overcutting. The situation is not very satisfactory from a long range standpoint.

This brings us to a consideration of the difficulties confronting us in an attempt to work out a solution of the forest problem. On first thought it would appear that the solution is simple and lies in limiting the yearly cut to that of the sustained yield capacity. Unfortunately this is not possible because timber is mostly in private hands. The people of British Columbia, through their Government, own the land and have a share in the timber through ground rentals and returns from stumpage and royalties. But the right to cut, when and how much, is in the hands of private individuals and companies.

When the timber is cut and these lands revert back to the government and a second crop matures, then we may have more to say about limiting the cut. This is a long time in the future and in the meantime we have more immediate and more pressing problems to consider and to solve.

Problems in Forestry

The five most pressing problems in forestry today have to do with fire protection, natural reforesting of burned or cut-over lands, planting of barren areas, markets for less valuable species and material now not used, and bound up with all of these—what will be the cost and who will share it? It is to some of the aspects of these problems that I wish to direct your attention.

Fire Protection

Fire is still public enemy No. 1 of B. C. forests. Fire will continue to be a serious hazard as long as virgin old-growth forests with their century-old accumulations of dead wood and decaying windfalls remain, and as long as we cannot utilize the entire tree. The fire problem may be far simpler when our virgin forests have been replaced by thriftily-growing immature forests and when markets have developed for material now left after logging to be consumed in slash fires.

Contrary to popular belief, it is not the logger or lumberman who starts the bulk of the forest fires—although some severe fires are started as a result of logging operations—but it is the berry picker, the fisherman, the picncker and camper, the hiker, the land clearing settler and just the general public who use the highways and byways. Over 50 per cent of the forest fires in British Columbia, according to government figures, are caused by the thoughtlessness and carelessness of the general public, compared to less than 10 per cent which are caused by the industry.

For the past 10 years an average of half a million acres of forest land have been burned over annually—200,000 acres in the Vancouver district alone in 1938. It should be apparent that we cannot grow a crop which takes 80 years or more to mature if we continue to allow our forest land area to be burned over on an average of once in 50 years.

There are many small but complex problems to be solved in the large one of fire protection and many of them are being tackled by both private and public agencies. It would be impossible to go into them tonight. A solution will require an attack on all fronts—the prevention of occurrence of fire by education and regulation of the public, better methods of fire detection, more and better fire-fighting equipment and a larger force of protection officers and men. All this will cost money both by logging companies and government but is absolutely essential if we intend to solve the whole forest problem.

Second Growth

Closely allied to fire protection is the problem of securing prompt and adequate second growth on cut-over or burned-over lands. It is essential that this regeneration be prompt and dense enough to fully restock those areas, if the forest land is to remain fully productive and if we wish to avoid a tremendous economic waste. Every thousand acres that remains barren for a decade means the loss in growth of at least 2½ million board feet. Twenty years ago it was generally thought that full regeneration of Douglas fir would promptly follow logging if successive fires were kept out. Surveys of cut-over land, both burned and unburned, have shown this expectation to be optimistic. Less than 50 per cent of areas logged during the past 20 years have restocked adequately. True, in many areas there are some trees but it takes more than a few dozen seedlings to the acre surrounded by willow and vine maple brush to make a good stand of timber. There should be more than 500 seedlings to the acre, evenly spaced, to be considered adequate second growth from the standpoint of future merchantable timber. Open-grown trees are limby and full of knots and make very inferior lumber or other products. They should be grown in dense stands to make valuable timber.

Now, why have the results of second growth been so disappointing in many instances? Douglas fir which has been and is, now, the most important timber tree in British Columbia, does not bear seed every year. Abundant seed crops are borne at irregular intervals of three to seven years. The seed is scattered by the wind normally a distance of only two or three hundred feet from a single tree, or perhaps a quarter of a mile from a block of uncut timber—and in the direction of the prevailing wind in September and October. If, between seed years, logging has pushed back the edge of uncut timber for a distance of half a mile to several miles, most of the area will receive no seed, and natural regeneration of the forest will be a failure.

But suppose the area has received an adequate seed supply—there are still many adverse factors to be overcome before an adequate stand of timber is assured. Squirrels, mice, and other rodents are very fond of Douglas fir seed. It constitutes a large part of their diet. In a fair seed year much of the seed may be

eaten before it has a chance to germinate. It usually takes a good seed year to feed the squirrels and have enough to reproduce the forest.

Another critical period awaits the seed at the time of germination. A hot dry period in early May when the soft-stemmed seedlings are just emerging will cause sun scald and results in the death of thousands of young fir seedlings. If some escape this, there is the possibility of prolonged drought in later summer when the water table sinks below the penetrated depth of roots. Even if the young tree escapes all this there is still the competition of faster growing willow and alder brush to overcome. When all these adverse factors are considered, is it any wonder that the cut-over areas have not restocked 100 per cent or even 50 per cent?

The direct cause of this failure to regenerate is man's upset of the balance of nature. By clear-cutting large areas with increased rapidity he has placed a barrier between harvest and seed time which even the abundance of nature cannot overcome. The remedy lies, at least in part, in a modification of logging methods to give nature a more even chance. Large areas should not be clear-cut. Seed trees or patches of timber should be left in advantageous locations to assure a source of seed for restocking the cut-over areas.

Selective logging, as a fairly recent development, is not necessarily the answer. By selective logging is meant the harvesting of the most profitable trees here and there, either individually or by groups or areas, rather than taking all trees as they come regardless of value. In too many cases in the Douglas fir region it has been simply a method for removing the highest values—or high-grading the forest—without any consideration for the conditions left behind. In many instances the results have been worse than clear-cutting. With proper application selective logging could be beneficial.

Whatever logging methods are employed in the future to correct this failure in regeneration, they will entail some inconvenience and expense undoubtedly, but the obstacles are not too great to be overcome by careful thought and planning. Surely the continued productivity of our forest land is a first principle in forest policy and is worth some little trouble and expense to attain.

Artificial Reforestation

The question is sometimes raised, why rely on nature at all to reseed the cut-over areas, Why not replant immediately after logging, A project to replant all the cut-over and barren areas would be a colossal undertaking. There are nearly a million acres of cut-over or burned-over forest land on the Coast which are now barren. This is being added to at the rate of 40,000 to 50,000 acres a year due to logging, although half of these 40,000 acres may be reforested by nature in spite of man. Planting in this province is just getting under way. This year the Forest Service will plant approximately one million young trees on about 1,000 acres of cut-over land. The cost for raising the trees and planting them amounts to ten or twelve dollars an acre. Production of young trees is to be

increased to 10 million by 1942—enough to plant 10,000 acres at a cost of $100,000. Even at this increased rate it would take 100 years to reforest the areas now barren, and in the meantime many thousands of acres more would have been added to them unless other means are taken to halt this trend.

The mere physical and organization obstacles to be overcome in raising millions of young trees, transporting them to the planting site and providing the labor for such a short-season job as tree planting—to say nothing of the financial cost—is one answer as to why artificial reforestation of all cut over areas is impracticable.

Planting is necessary on certain areas but it should not be relied upon entirely. It should be used only to fill in the gaps left by nature and after man has done all else that is possible to assist.

Utilization and Markets

Thus far we have considered only some of the problems pressing for solution in the field of forest production. There is also a vast field for research and improvement in forest utilization and in markets for forest products—particularly markets are needed for the lesser used species and for trees of smaller size. The waste of wood material in British Columbia after logging seems appalling, especially to anyone from Eastern Canada. As much as 20 per cent to 25 per cent of the cubic volume of the original timber stand is left on the ground to rot or create a bad fire hazard. But this is not an economic waste if this material cannot be used profitably—and under present conditions it cannot be used profitably. The farmer is not accused of waste because he burns his piles of wheat straw for which there is no profitable market—neither should the logger for leaving small or broken logs and tops which he could only harvest at a loss.

It must be remembered that our local market for forest products is small and that 85 per cent of our production competes with that of other countries in world markets. We are 9000 miles from our principal market, the United Kingdom, and transportation is a big factor in costs. Small trees which are profitable to harvest in the Scandinavian countries because they are close to large consuming centers are highly unprofitable to utilize in British Columbia. Judging from past experience this situation will change as new uses and markets are developed. When this time comes it will be possible to utilize the forests more closely and there will be less material left on the ground to rot.

Markets are even now being developed for hemlock and cedar. Both of these woods have excellent properties. In the past hemlock has been sold with difficulty and at a low price. Due to trade promotion efforts of lumbermen and governments this situation is being corrected. This work should continue and be increased not only to provide markets for "Cinderella woods" but to develop profitable uses for small material now wasted.

The degree of intensity to which forestry can be practised in any country depends upon the existence of a profitable out-

let for forest products. British Columbia, then, should not be satisfied simply with efforts to protect and grow new forests, but should also see to it that these products will have a real value when grown.

Cost

In any human endeavor, sooner or later the question of cost comes up. Forestry is no exception. The full benefits of a stabilized and permanent industry will not be attained without some expense. But the time to undertake this is while there is still a large reserve of raw material available and while financial returns are still coming in.

The yearly value of forest production for the past ten years is in the neighborhood of 65 million dollars. One-third of the wage earners in B. C. are directly supported by this industry and the entire population is indirectly affected by prosperity or depression in this the leading basic industry in the province. In addition the forests have returned directly to the government an average of over 3 million dollars yearly from royalties, rentals, stumpage, taxes, and so forth. This represents the share we all have in the forests.

This share, during the past 25 years, has amounted to a total of approximately 70 million dollars. It has been pointed out by various Royal Commissions—most recently by the Report of the Rowell Commission—that this money is capital and not revenue in the usual sense of the term. As capital, then, most of these funds should be used in protecting the forest and in maintaining forest productivity.

In the past, 75 per cent of this capital—over 50 million dollars—has been turned over to the Consolidated Revenue Account and used for other purposes. Last year 37 per cent of the income to the government from forests was spent in maintaining the forest—including the entire cost of the forest service, research, reforestation, and fire protection.

This is not a criticism of present or past governments. Without doubt in a pioneering province, funds are needed for many other purposes. But finances are now needed for forest maintenance and are available from ordinary forest revenue. In some provinces and countries forest expenditures match forest receipts dollar for dollar. In others, more money is spent than is received in an endeavor to bring back to productivity previously denuded lands. This latter situation must not be allowed to develop in British Columbia. To forestall it, a larger proportion of forest revenue must be put back into the business both by the government and by the industry.

My remarks to-night were intended to convey a clear picture of the forest situation at this time in British Columbia, but I do not wish to sound too discouraging. There are many adverse conditions to be overcome. A start towards solving the problems has been made—much remains yet to do. I think all will agree that the land use problem in general eventually must be solved. The continued prosperity of the people of this province depends upon it.

In conclusion I would like to leave with you the Eleventh Commandment, which was suggested in a recent article* by Dr. Walter C. Lowdermilk, Chief of Research of the U.S. Soil Conservation Service. This is the commandment:

"Thou shalt inherit the holy earth as a faithful steward, conserving its resources and productivity from generation to generation. Thou shalt safeguard thy fields from soil erosion, and protect thy hills from over-grazing by thy herds, so that thou and thy descendants may have abundance forever. If any shall fail in this stewardship of the land, thy fruitful fields shall become sterile stony ground and wasting gullies, and thy descendants shall decrease and live in poverty or be destroyed from off the face of the earth."

*January 1940 issue, "American Forest."