ECONOMICS OF FORESTRY¹

By G. K. GOUNDREY²

When I was first asked to give a paper to this conference, I was given a great deal of latitude in deciding on the subject I would discuss. The general topic is the economics of forestry and I must confess at this stage that I do not think that the economists and the foresters mean the same thing by the term "Economics of Forestry". In my opinion the economics of forestry has advanced but little since Fernow wrote in the 1890's. Much of what has been called the economics of forestry is not economics at all but might better be described as the financial aspects of forestry. It should be emphasized that the economic problem transcends the technological problems of forestry, and in any economic analysis, the solution of the technological problems is taken as data. The few remarks I shall make are not all on the economics of forestry but I shall attempt to remain as close to the economic aspects as I can.

The question of sustained yield has been one that has fascinated me since the first time I heard it. I must confess that neither I nor the man who used the term so fluently knew what it meant, but that seems to be a common failing of many people who talk so blithely about this major aim of forest management. Perhaps the glamour of the term and its emotive appeal are responsible, but it is clear that, except for foresters who tend to have a well integrated conception of its meaning, many of the people in the public eye, and of course, the press, use the term without understanding what it means.

I understand sustained yield to mean the production of a constant or increasing quantity of wood in perpetuity from desirable species. While this has been accepted as a major tenet of policy by most bodies administering forested areas, to my knowledge no real consideration has been given to the economic aspect of sustained yield. Needless to say, I am not competent to set out any complete analysis and I shall be forced to confine my remarks to a few salient points.

First, it must be admitted that much of the data used to illustrate the profitability of sustained yield is the result of European experience. It appears to me that conditions here are sufficiently different that the data can be considered to be irrelevant except that they show what could be done and what has been done in other parts of the world. This applies less to Norway and Sweden than to other countries, but it is still to some extent true of the whole European picture.

The stands in Europe, which have yields ranging from 13¼% to 5% per annum, have depended on a ready market for thinnings and diseased trees. A major sale has been that of small timber, or as we would say, branches and tops, as fuel. It is common knowledge here that wood, particularly small wood, is too expensive to have any market as fuel, at least in the short-run. This is exemplified by the fact that many pulp and paper companies and the Ontario Northland Railway are finding it less costly to replace wood with oil for cooking and heating. This replacement is frequently ascribed to the high cost of bush labor, but it is well to remember that the wages of labor in the bush

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² Department of Political Economy, University of Toronto.

are not set independent of other operations in the economy, and that any substantial reduction in the wages of bush labor would probably result in a migration of such laborers to other employment areas.

In Ontario the Petawawa Management Unit is sometimes cited to show the profitability of management; this is because many firms are reapplying for rights to cut timber. It is argued that this type of management must be profitable or the firms would not show such alacrity in their attempts to obtain cutting permits. Leaving aside the questions of (a) whether the same alacrity would be shown in another region and (b) whether such alacrity would be shown if more areas were under management, one may say categorically that the construction of roads by the Department of Lands and Forests has been the decisive factor in making management possible. Thus, while it is profitable now to mark trees for selective cutting, the lack of roads would probably make clear cutting essential and might make anything but the most extensive and informal type of management too costly.³

In general, the findings would seem to point out that clear cutting is the only feasible method of cutting timber in many parts of Ontario. While certain areas, more accessible and with higher timber values, might stand the costs of selective cutting, the vast majority of the forest stands require clear cutting if they are to be exploited at the present.⁴

Sustained yield is more successful if the annual cut is balanced *at all times* (after the forest is brought into balance) by the annual increment. The annual increment in a reasonably balanced forest is relatively stable (or, at least, predictable) and the effectiveness and productivity depends to some extent on the elimination of too much fluctuation in the amount cut annually. Variations between the net annual increment and the annual cut reduces the productiveness of forests, but small variations are probably not too important.

If we consider Europe, where management has been practiced for many decades, we find that the annual cut of round wood fluctuated between a period high in 1927 of approximately 305 million cubic metres, a low in 1932 of 260 million cubic metres, and a high in 1937 of 310 million cubic metres. The cut in 1946 approximated 315 million cubic metres. From 1920 to the outbreak of World War II, the net annual increment in Europe's forests was amazingly constant (increasing slightly from 285 million cubic metres in 1920 to 291 million cubic metres in 1938). In 1946, the net annual increment was 260 million cubic metres.

Thus, in the inter-war period, the annual increment was relatively constant, while the annual cut showed quite substantial fluctuations. The post-war figures above show that in 1946 over-cutting took place. This was partly because of post-war demands, but it should also be noted that the degree of over-cutting was enlarged by the lower increment. This lower increment

³ There is also some question as to whether the increased stumpage is actually covering the costs of road construction and maintenance.

⁴ Dean Sisam has pointed out that from a silvicultural, as well as an economic, viewpoint, this is so in certain areas. If, however, extensive planting is required the lower costs of clear-cutting may be more apparent than real. Clear-cutting is, of course, compatible with sustained yield.

demonstrates the affects of over cutting during the war, war damage and some boundary changes.

In Canada annual production increased steadily from 1.88 billion cubic feet in 1922 to 2.48 billion cubic feet in 1930. The depression decline in Canada was to a low of 1.50 billion cubic feet in 1932. That is, the fall in production in Canada from the pre-depression high to the depression low was 40%, while the decrease from high to low in Europe was 15%. Canadian production was largely exported whereas European output was insufficient for consumption in Europe.

While it might be considered that these selected years were unusual, a glance at comparable 5-year periods shows the following:

Total Cut: 5 years inclusive.	
Europe—1926 - *1930	1,489 million cubic metres
1931 - 1935	1,339 million cubic metres
Per Cent change = 9%	
Canada—1926 - 1930	11,894 million cubic feet
1931 - 1935	8,735 million cubic feet
Per Cent change = 27%	

The conclusion reached from the above figures is that an area which exports a high proportion of its total cut will find it much more difficult to maintain regularity of harvesting in times of fluctuations in world markets. This contention is supported by the experience of Ontario and British Columbia, two areas epitomizing the high export pattern, during the depression.

In Ontario the decrease in production from the high point before the depression to the low point during the depression was just under 50%, while in British Columbia the decline was over 50%.

The latest report from F.A.O. seems to imply that the dependence of Europe on western wood will be greater in the short run than in the longer period when war damage is repaired and a more forceful policy is adopted. The European market can, therefore, be expected to impart some variations to the demand for Canadian output assuming no cyclical changes in European conditions.

There is a danger of a trough in Europe's timber production lasting for the next 20 to 30 years. The result of the trough and the entailed shortage will be a slowdown of the expansion in the European economy unless there is an increase in imports into Europe, probably some relative increase in timber prices, or some combination of the three. The trough will be followed by a period when forest production will increase. The shortages and higher prices will apply pressures to the hopes of rebuilding the European growing stock.

The questions for Canadian forestry may be summarized as follows:

1. If we do not supply the European market during this 20 to 30 year relative shortage of timber, the rise in the price will give rise to two tendencies: (a) substitution of other materials for wood, which may be deleterious to the market for soft woods in the next half century; (b) the over-cutting of European

forests followed, if no substitutes are forthcoming, by strong demands for North American woods.

2. A second question is whether the European balance of payments problem, the so-called dollar shortage, will allow Canada to sell on the European market.

In connection with these problems it is wise to emphasize that some irregularities in the imports of wood into Europe can be expected without the development of unfavorable economic conditions and that substitution is more likely to occur if the price of wood rises relative to other materials. The cost of producing wood is beyond my competence to discuss since it is a matter of forest technology, but it seems safe to assume that the balance of payments problem will be with us for a long time. There appears to be no short-run solution and even the long-run solution postulated by classical analysis is rather depressing for a country such as Canada, whose traditions and values are rooted in the European liberalism of the nineteenth century.

Governments of many countries must revamp their trade policies, so that finished goods are not discriminated against by tariffs. The F.A.O. has gone on record as suggesting that "some lowering of discrimination of imports against finished paper in favor of pulp or of pulp in favor of round wood, will also be required if full use is to be made of economies of manufacture". Restrictions against the import of finished products as opposed to raw materials tend to create an unhealthy structure of industry leading to a lack of flexibility in time of depression, and leading to a poor use of capital, labor and other resources. As I have emphasized at some length in another place,⁵ it is also highly desirable that exporting countries reconsider any prohibition of the export of raw materials. In the interest of improving the age and species distribution and of sustaining output in certain regions, there may be good reasons why such exports of, say, round wood should be *encouraged*.

One of the factors which can be taken for granted in any analysis of Ontario's forests is the type of ownership. While minor changes will undoubtedly take place, discussions about how advantageous it would be to have private ownership of Ontario's forests are otiose. Changes in the form and conditions of tenure are, however, very important.

It has been demonstrated that uncertainties tend to lead to depletion and are antagonists to conservation. In the first place, instability increases uncertainty allowances and thus prevents conservation. Secondly, uncertainties affect the interest rate, generally raising it. This increase in the rate of interest will increase the value of present net revenue at the expense of future production and will, therefore, stimulate depletion.

Uncertainties also affect the rate of utilization in the boom and in the depression in obverse ways. Depletion in the depression is not offset by consumption in the boom.⁶ It is easily seen how uncertainties can lead to bad soil practices in agriculture, "skimming" in mining and over-cutting in forestry.

⁵ See my article in *The Commerce Journal*, Toronto, 1953

⁶ See in this connection the works of S. V. Ciriacy-Wantrup. (*Quarterly Journal of Economics*, Feb. 1944; *Quarterly Journal of Economics*, May 1946; *Journal of Farm Economics*, Feb. 1942.)

The extent to which decreased uncertainties result from changing the form of tenure, makes some changes desirable in the interest of conservation.

It should also be noted that tax policies can have serious effects on conservation. Progressive taxation on net revenues, particularly if the rate is expected to fall in the future (or at least not increase) will stimulate conservation, whereas taxes on the present value of resources (property taxes) tend to cause depletion. Death and inheritance taxes also tend to cause depletion, although all such taxes on the present value of a resource check speculation on withheld resources and stimulate better utilization.

It is conceivable that the Canadian forester can plan for a larger home consumption, with the United States taking up the balance of output. It is not at all clear to what extent the Canadian economy can expand. There can be no doubt that the western hemisphere can sustain a larger population, but it is also doubtful if western people are prepared to make the sacrifices in their material standards which would be required by such rapid expansion. At the same time, the stated policy of the U.S. forest administration is to become as self-sufficient as possible in wood products. We must recognize that this is only sensible since the Paley Report has emphasized that in the field of non-renewable resources the United States is in a critical situation. The over-extraction of non-renewable resources has brought home to the American authorities the need for strong action to bring renewable resources back into production, and the Chief of the U.S. Forest Service has made one public statement at least in which he maintained that the U.S. in 25 or 30 years would be self-sufficient in wood products, with a small surplus for export, if the present rate of improvement in home-grown supplies can be continued.

One must, however, recognize that the high price of wood has stimulated substitution of alternative materials. Particularly is this true of shingle, lath, steel and alloys in construction and aluminum, while for many purposes outside the construction field plastics are making heavy inroads in the traditional wood markets. This has been emphasized in the report of the 22-man committee appointed by the N.L.M.A. In the long run this may not be as disastrous as some people maintain since many of the substitutes presently being used instead of wood, with the exception of pulp and some chemical derivatives, are non-renewable and it can be expected that for many purposes wood will recapture these markets, if only because it is renewable and adaptable. Sustained yield in a very broad sense is not only desirable, but essential for survival. At the present time the world in which we live is still too busy digging up ore and wasting oil to worry about shortages, but in the near future, perhaps sooner than many think, renewable resources will come back into their own and the forester will be vindicated.

In the meantime, it is essential to emphasize that wood, to compete in today's markets, must be cheap. Intensive management in Canada at the present time is undoubtedly too expensive, given the wage rates and the labor-to-capital ratio existing in Canada.

But something more than a delaying action must be contemplated. Increased production will be required in the future, and perhaps more important,

forest cover is essential in providing the ecological conditions necessary to other sectors of the economy.

I plead then for a more realistic approach and a much more serious consideration of the economic factors underlying sustained yield management. While it is always necessary for dedicated men to have a goal and an ideal, it is also necessary for them to compromise and accept far less than the ideal if they wish to be considered anything other than visionaries.

SUMMARY OF DISCUSSION FOLLOWING THE PANEL ON FOREST ECONOMICS

D. Naysmith - Chairman

Gentlemen, the meeting is now open to discussion from the floor.

G. W. Creighton - Nova Scotia

I would like to describe conditions as they are in Nova Scotia. I think we have a condition there that might be of interest to industry and foresters in other parts of Canada.

In Nova Scotia 75% of the forest land is held in fee simple. Farmers own 25% of the woodland in small woodlots. About 25% is owned by the crown and the balance is owned by industry.

Since Confederation, tens of thousands of acres of farmlands have been abandoned and today old fields that were abandoned 90 years ago are yielding anywhere up to 25 cords per acre.

In 1910, Dr. Fernow carried out an inventory of the forest resources in Nova Scotia and he reported total forest production amounted to 400 million board feet per year. Dr. Fernow went on to predict that if cutting progressed at that rate, lumbering would come to an end in 25 years. Since 1910 that cut has continued; some years getting as high as 600 million feet.

What happens to free hold land that is owned by the companies? During the past 15 years the Department of Lands and Forests has purchased a total of about 560,000 acres of free hold, cut over and burned over land from private industry. This land has been bought at a price varying between 25c - \$1.25 per acre. The province is holding this land for the future, carrying out improvement cutting which in some cases has paid the purchase price many times.

With regard to the method of cutting, some stands obviously can be cut selectively to good advantage. Other stands quite obviously do not lend themselves to selective cutting. We heard in Nova Scotia that it was not economically possible to cut selectively. One of the companies had bought crown stumpage area that would lend itself to selective cutting. A few of the men agreed to try cutting, and within a week the word went out that the pulp cutters were making much higher wages cutting selectively than clear cutting in the same kind of area.

A short time later the Small Trees Act came into force and enabled control by Government on private land. A few small operators had been just barely getting along on a clear cutting proposition. As a result of