



# What are the Key Influences on Timber Supply?

*by Doug Williams  
Cortex Consultants Inc.*

## 1. Introductory remarks

I have been asked to address the question: “What are the key factors that influence timber supply?” My task has been made easier by the fact that this question has been answered this morning in the preceding presentations. The key factors that influence timber supply are the biological productivity of the forest, the economic environment, and prevailing social values.

Don Roberts described for us the effects of one aspect of the economic environment, the recent rate of investment and its consequences for the “effective supply” of timber.

Paul Gris reminded us that society values the forest for resources in addition to timber and that all forest values must be considered when determining rates of cut and forecasting future harvest levels.

Fred Kaiser described the ecosystem management approach to resource management and warned us this philosophy may change the nature of “timber production possibilities and feasibilities.”

And finally Geoff Elliot described how a combination of social and economic factors which he called the “trade/environment linkage” could affect timber supply in Canada.

In the time allotted to me this morning, I’m going to describe the key influences on timber supply in more detail and then examine how these factors have affected our perception of timber supply, and hence our rates of harvest.

Presumably, the motivation for this question is that if we can identify the key factors we might be able to control them and therefore maintain or even expand our supplies of timber.

I am going to argue that the factors that have determined our “effective” timber supply in the past and that will determine our future timber supply, are largely uncontrollable, or at least not controlled by Canadians.



## 2. What is timber supply?

But before I do that, I need to define a few terms that I will use in my arguments. First, what do we mean by “timber supply”? I will start with a simple but subtle definition: I say timber supply is the “rate at which timber becomes available for harvesting.” I want to remind you that timber supply is not synonymous with inventory levels. Timber inventory is a measure of stock while timber supply is a measure of the flow of logs out of the forest into the mills. Of course, log production is taken from the standing stock, which is replenished by ingrowth, and in the long run we can’t harvest more than we grow.

In this definition one could substitute the phrase “made available for harvesting” in place of “becomes available for harvesting” because the actual production rates on Crown lands are governed by public policy decisions that constrain harvest levels. This definition could be extended further to the “rate at which timber is made available for harvesting in response to forest product prices” in the sense that as prices increase, more timber becomes economically operable, utilization standards change, etc.

My point is that timber supply, this flow of logs off our forests and into our mills, doesn’t occur because it is pushed by inventory levels; its pulled by price – product prices. And the flow is governed, or shaped, by public policy.

This is the essence of the process of timber supply.

## 3. Measures of timber supply

The second point that I want to remind you of is that timber supply has both a short-term and long-term manifestation. The long term, in the context of timber supply, is the period after the transition to harvesting second growth. In the long term, harvest levels are closely aligned with the long-run sustained yield, or LRSY. LRSY is a measure of the maximum possible biological production capacity of the forest for a given level of management inputs. It’s a number which can be easily calculated. Short-term timber supply is the period in which the scheduled harvest levels (AAC) depart significantly from LRSY, due to either a timber surplus or deficit situation.

And I will remind you that timber surplus and deficit are largely determined by the presence and lack, respectively, of old growth and mature timber.

The AAC is often selected based on a range of advice, including knowledge of LRSY and the results of numerous timber supply analyses, plus other studies and evaluations.



LRSY and the AAC are the two most common measures of timber supply that we use in Canada. LRSY is the narrowest definition of timber supply (a measure of productivity) and is a long-term measure. The AAC is the widest definition and is a short-term measure.

## 5. Biophysical factors

I want to return to my simple answer to the question “what are the key factors that determine timber supply.”

I said that the flow of timber was caused by economic forces, shaped by social values, and constrained by productive capacity of the forest. The productive capacity of the forest is determined by a number of operational (in terms of timber harvesting) and biophysical variables (Figure 1). These determinants (of the productive capacity of the forest with respect to timber) generally act through changing production capability at the site level (the intensity of production) or by changing the extent of the timber harvesting landbase. Any determinant that affects the timber harvesting landbase is impacting the extensive margin of production.

## 6. Economic factors

Some of these determinants in the timber supply process are in turn modified by, or under the influence of, economic factors. The larger economy affects the timber harvesting process through timber product prices, which in turn affect investment rates and technological change. The determinants that are affected by economic values are:

- silviculture programs
- utilization and merchantability standards
- harvest profile
- non-timber values (at least for priced goods)
- access



## 7. Social factors

Timber supply and AACs are determined within a policy framework. The harvesting policy framework is the product of a political process, and as such, reflects social values prevalent at the time of the development of the policy.

The social values to which I refer include how we value the various resources (not just timber) that the forest offers to us, how much of those resources we wish to consume now versus what we might leave for future generations, and our general feelings of optimism or pessimism about future economic conditions.

Social values, acting through forest policy, or more directly through public participation influence:

- IRM objectives
- silviculture programs
- utilization and merchantability standards
- non-timber values

Of course economic values are ultimately social values, and reflect the wants and needs of consumers. Which brings me around again to my original point, that timber supply is a product of the interaction of the biological productivity of the forest, the economic environment, and prevailing social values.

## 8. What are the control levers on timber supply?

In order to manage and forecast timber supply we need to know which of these determinants identified in Figure 1 can be controlled or influenced. The controls indicated in the chart can be adjusted, either by a policy decision or a business decision, based on financial reasoning, but each is constrained by economic conditions and social values.

Each of these determinants can be adjusted through expenditure (either investments or by incurring additional operational costs), and each has a margin or point beyond which further expenditure is economically counter-productive. It is these margins that are set by product prices. The margins move in response to the cycles and trends of the demand for timber products, in that a higher price for roundwood (or lower costs of harvesting inputs) can justify larger investments or higher costs of recovery. For example, we can essentially “buy” timber harvesting landbase by incurring higher operating costs for helicopter logging, or “buy” higher yields by increasing utilization standards—so long as product prices are high enough to cover the operating costs.



Of course, this mechanism also works in reverse—lower product prices and higher costs cause the economic dimensions of our timber supply to shrink.

Furthermore, both these economic and social values are largely defined in foreign markets.

So we don't have complete control. We have to live with price cycles and trends for the timber products and input factors. A similar situation occurs on the social value side of the process. Social values change in cycles and trends for which we have very little understanding.

## 9. Forecasting timber supply

Since timber supply is a flow variable, and is being removed from a dynamic biological system, we must forecast its future levels. The traditional strategy has been to assume some fixed level for each of these determinants, and then treat the dynamics of the forest (yield curves, accruals, depletions) in some detail. Is this a satisfactory approach? It's instructive to review the historical record for British Columbia.

The solid line in Figure 2 shows the actual volume harvested in British Columbia (Crown timber) from 1950 to 1993. From 1947 until the late 1970s, allowable cuts were determined using Hanzlik's Formula. The dashed line represents the likely trajectory of harvests that would have been achieved if Hanzlik's Formula had been recalculated every five years. The AAC forecast at 1950 could be expected to follow the staircase down to LRSY over the next 50 years.

But instead, the harvest has risen steadily, from about 21 million cubic metres in 1950 to about 79 million cubic metres in 1993. By 1960, the harvest had risen to 33 million cubic metres. Economic forces (improvements in timber utilization and increasing product prices) caused the AAC to increase, in spite of scheduled reductions in the harvest. We were proceeding along the "declining staircase" as planned, but the LRSY floor that we were heading for was rising.

By 1970 we were descending the staircase but economic forces were expanding the timber supply and raising the staircase faster than our scheduled descent. In the late 1970s we changed from Hanzlik's Formula to a modeling method, but we have essentially simulated the Hanzlik's approach to this day.

By 1990 the steps were getting big, because we were rapidly running out of the old-growth timber (timber surplus) that allowed us to harvest at levels above LRSY.

In the late 1980s, social values changed and public pressure began to build to reduce AACs for environmental reasons. The economic pressure to raise harvests is still with us—in fact it strengthened in the early 1990s—but the



downward pressures of land withdrawals, constraints on harvesting, and scarcity of old-growth timber are overwhelming.

My point in all of this is that for the last 45 years, harvests in British Columbia have always been scheduled to decline to the LRSY and yet have risen almost continuously. This has happened because we have considered only the forest dynamics, and ignored the economic and social dynamics associated with our forests.

## 10. Concluding comments

To answer the question posed to me, the key influences on timber supply are the biological productivity of the forest, the economic environment, and prevailing social values. Canada's future timber supply will be determined largely by price levels in foreign markets, and domestic and imported social values. Forest growth, yield and inventory levels will continue to be of secondary importance.

Figure 1 Determinants of timber supply.

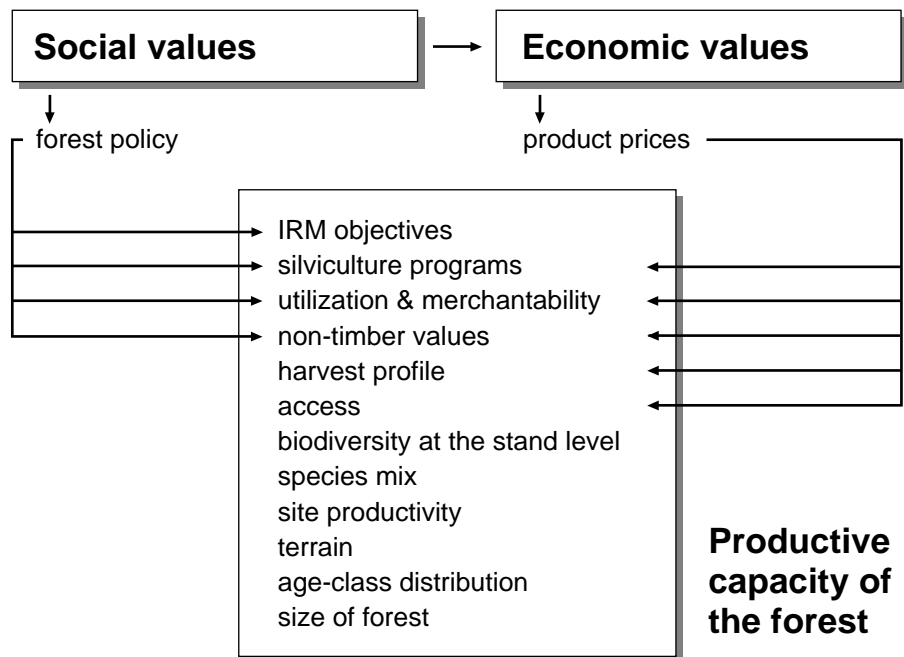




Figure 2 Volume harvested and projected falldown, 1950–1993.

