Journal of Extension
www.joe.org

August 2010
Volume 48 Number 4
Article Number 4TOT7

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# Timber Supply Fundamentals for Extension Forestry Professionals

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**Abstract:** Timber supply is a term forestry professionals often misuse. It is not the same as timber availability. Competing uses for timber, like bioenergy and carbon credits, make a proper definition important. Timber supply has three subsets: biological potential and physical and economic timber supplies. Plus, there is a temporal aspect that creates a relationship between stock and short-run and long-run timber supplies. A change in stock supply automatically triggers a long-run timber supply response in the opposite direction. Timber supply is a complex issue, and this discussion may help Extension professionals educate landowners and avoid mistakes when using the term.

## Introduction

Timber supply is a hot issue, especially as it relates to wood bioenergy, forest carbon credits, and other non-traditional uses of the wood supply. Forestry professionals, including Extension foresters, often make technical mistakes when discussing the timber supply. One recent trade journal article on forest carbon credits stated, "demand for quality carbon offsets greatly outstrips the supply." Anyone who had a college economics course knows that supply, by definition, always equals demand at equilibrium price. What the author meant to say was that carbon offsets were not available at what he considered a reasonable price.

Wood bioenergy is anticipated to become a significant part of the wood supply chain. Will there be enough fiber for both the traditional forest products industry and the wood energy industry? Fiber availability is not just a long-term forest inventory issue; it has an economic basis as a supply and demand equilibrium situation.

## Timber Supply Definitions

There is a maximum biological level of timber output that can be harvested from the land. This is biological potential timber supply, and it will seldom, if ever, be obtained within a region. This upper limit is strongly influenced by management intensity (inputs like drainage, fertilizer, and herbicide treatments). Some timber supply analyses optimistically assume something approaching this biological potential for a region, but biological potential corresponds loosely to the concept of plant capacity in conventional supply analysis. Like any manufacturing plant, a forest seldom operates at full capacity.

Physical timber supply is a subset of biological potential timber supply and is the total inventory of commercial timber in the forest. The physical timber supply will rarely, if ever, be available for harvest within a region at any specific point in time. Just because timber exists, does not mean it is available for harvest. Even tracts that are clearcut don't always have the entire physical inventory removed during harvesting. (Some timber might require excessive harvesting costs.) Some owners may simply refuse to harvest timber. A common mistake is to consider forest inventory to be the same as timber supply.

Timber supply is a subset of physical timber supply and is an economic concept. It operates with a supply curve just like any other commodity. As timber price increases, more and more is supplied. The physical timber inventory includes much timber that is inoperable or inaccessible, due to high harvesting costs, low stumpage prices, or forest owner objections to timber harvesting. Economic timber supply is the timber available under existing market conditions and the correct one to use for planning purposes.

## The Temporal Element

Timber supply must be looked at in a temporal framework, or over time. To an economist, the supply of a commodity is the quantity supplied in relation to some independent variable, like timber price. When discussing timber supply, the timeframe must be specified: stock (market) supply, short-run supply, or long-run supply.

The stock supply is a timber flow from an existing growing stock (inventory). The stock timber supply response (timber flow) in forestry is complicated by the fact that the timber growing stock is, at the same time, both the "factory" growing wood and the product being produced. It is the immediately available timber supply from the existing inventory of growing stock. (It occurs "now" and all other variables that might affect growing stock production, like fertilization or thinning, are considered fixed.) This means a timber flow from stock supply implies a reduction in the timber production base (growing stock). A change in stock supply might occur, for example, when something as simple as a change of ownership of a forest tract happens. The new owner might be less inclined or more inclined to harvest timber.

Short-run timber supply is based upon the amount of timber production that flows into stock, with most aspects of production, except the level of growing stock, variable. It is short-run because there are limited opportunities to vary the level of growing stock (i.e., the size of the "factory"). Basically, in the short-run, timber flow can be affected by varying silvicultural inputs (thinning, drainage, fertilization, herbicide), thereby changing forest productivity.

The long-run timber supply situation allows all agents of production to vary, including the growing stock and forest acreage. Since the amount of timberland is allowed to vary, long-run timber supply is affected by forest land-use change. Long-run timber supply decisions center on landowners' investment or disinvestment in forestry.

Timber supply is distinguished from other more conventional supply analyses by the inescapable linkage between stock supply and long-run supply. A change in stock supply automatically triggers a long-run supply change in the opposite direction. For example, an increase in today's timber harvest (a positive stock supply response) triggers a reduction in timber inventory and implies a negative long-run timber response (a reduction in growing stock and, hence, a reduction in long-run timber output potential). Thus, changes in long-run timber supply are accomplished primarily by (1) changes in the level of growing stock (plant size) and (2) changes in the amount of land devoted to forestry (entry or exit into forestry investment).

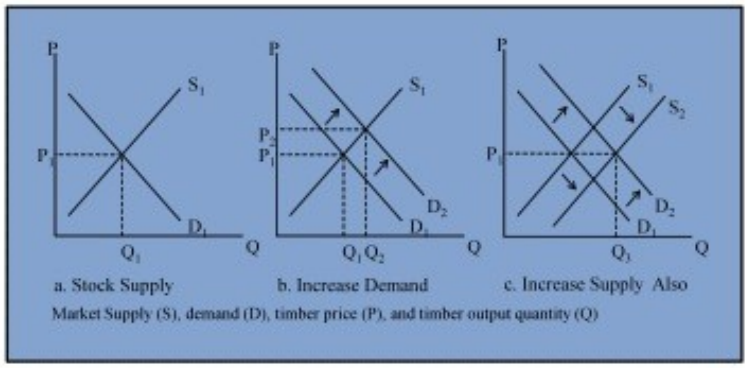
It is surprising how many timber supply discussions ignore its temporal basis. Current timber prices affect the amount of timber being harvested today, but also affect forest owners' perceptions of future timber prices.

Timber price expectations influence acres devoted to forestry and the intensity of management applied to the forestland. The number of 30-year old loblolly pines is fixed. Nothing can be done to change that physical supply. Decisions made 30 years ago, by forest owners using their own crystal balls and timber price expectations, determined how many 30-year old trees would be available today. That temporal linkage cannot be escaped in forestry.

# Economics 101

For those readers brave enough, and with some idea of supply and demand concepts, Figure 1 illustrates the complexity of supply and demand. It isn't as easy as saying increasing demand for bioenergy wood fiber will cause timber prices to increase. Stock supply is shown in Figure 1a, where supply is upward-sloping (as price increases more is supplied) and demand is downward-sloping (as price increases less is demanded), but neither one is static. In Figure 1b, stock supply is fixed, and then demand increases, causing price to increase from $P_1$ to $P_2$. But in the longer run, supply can also shift, as it does in Figure 1c, and the price moves back down to $P_1$.

**Figure 1.**
Simple Example of Supply and Demand Interaction




There are many ways both demand and supply can shift. The point is that timber supply and resulting timber prices are a lot more complex than changes in forest inventory. As biomass issues become more common, notice how the term "timber supply" is used and misused. If you consider this discussion, you can avoid misusing the term.

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