AN INDUSTRY APPROACH
TO
TIMBER SUPPLY PROJECTIONS

by

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For more than fifty years, southern timberlands have supplied the raw materials required to support extensive wood products operations. Often labeled the "wood basket for the world," the South's timber resources have provided a firm foundation for unprecedented economic growth. From Virginia to Texas, southern pine has replaced cotton as the region's dominate cash crop.

Perhaps we were lulled in the belief that these timber reserves were indeed bountiful beyond limit. There was no compelling reason to believe otherwise. For years, we have grown our trees, manufactured our products, and with few exceptions we have sold our finished goods at prices that were profitable. Sales and net revenues have been adequate, the stockholders reasonably happy, and there have been few outside pressures that would rock an otherwise smooth-sailing boat.

All this complacency may soon be shattered. We now find ourselves being squeezed by powerful and pervasive political and environmental pressures that in the years to come could easily change the industry's basic structure. While laws that govern such things as air and water quality are often costly to implement, these seldom have any lasting effect on mill operations. But anything that would restrict or alter our
wood-fiber supplies could forever change the way we conduct our business.

A New Land Ethic in the West

Those of us who still cherish our "I Like Ike" buttons began our careers in a time of plenty. Periodic inventories of the nation's commercial timber reserves always revealed a favorable ratio between growth and removals. We were growing more wood than we were cutting, even as the demand for paper and solid-wood products increased.

Major changes began occurring in the early '70s. In the west, an emerging environmental movement gained momentum, and as it did dedicated proponents lobbied for more and more set-aside reserves on public forests. Their success is evident when you consider what is happening today. The most recent forecasts suggest that in the next five years timber harvests from public lands in the coastal Douglas-fir and Redwood forests could decline by more than fifty percent. While the cut in the Inland Empire will fall by a lesser amount, the total for both regions could be forty percent or more.

Private lands cannot fill the gap. They too are under increasing political and environmental pressures, and even if the cut from private landowners should somehow remain stable, near-term softwood removals from western forests could easily
decline more than twenty percent. Whereas the average annual cut from public and private timberlands was 22 billion board feet in the years 1971 through 1980, it probably will not exceed 15 to 18 billion by the year 2000.

The full impact of all of this has yet to be felt. Many west coast mills are still harvesting timber that was bought earlier, and the current recession has slowed the demand for western wood products. The problem will intensify as the economy recovers, with west coast pulp mills especially hard hit. Few process their own wood, relying instead on chips purchased from nearby wood products manufacturers. As harvest levels decline, competition for the remaining timber volumes will no doubt drive prices upward, and the marginal mills will close. As they do, the competition for residual chips can only intensify, pushing these prices upward as well. Clearly, west coast pulp producers will find it increasingly difficult to remain cost competitive in world markets.

There are a number of factors that might mitigate these trends. We may see restrictions on log exports from private lands, and we will most certainly see an increase in the use of recycled fibers. But none of this can reverse a downward slide in west coast conversion capacity resulting from lower harvest levels. Only a change in public policy could do this.
Some would have us believe that timber produced from west coast forests is not needed; that Canada and the US South could easily add incremental capacity sufficient to replace lost production from west coast mills. While there are those who may find comfort in this, no objective evidence can be found to support the argument.

![Figure 1. Current and Projected Softwood Harvests from Canadian Forests](image)

British Columbia is Canada's principal timber-producing region, providing nearly half the volumes required to support the nation's extensive conversion capacity. Now, however, the BC government is faced with an unpleasant reality. BC forests have been overcut in recent years, and as a result a decline in future softwood removals is inevitable. Figure 1 shows
the extent of this shortfall, with the annual cut falling steadily well into the next century.

Figure 1 was developed using information supplied by the BC Ministry of Lands and Forests, and similar agencies in the remaining provinces. A number of analysts would disagree with this somewhat pessimistic outlook, suggesting instead that the shortfall in British Columbia will be less. But whatever the amount, it is clear that with no significant near-term increase in the other provinces, Canadian forests cannot accommodate the added manufacturing capacities required to replace expected mill closures in the US West.

**A New Reality in the US South**

There is emerging evidence that softwood inventories in the US South are being overcut as well. The first indications appeared in the early '80s, when forest survey measurements recorded a widespread decline in net annual softwood growth. For the first time since World War II, we were growing less volume than was being cut.

The economic implications were first offered for public review in 1988 when the US Forest Service released a study entitled "The South's Fourth Forest: Alternatives for the Future." Many considered the conclusions unpleasant at best, and as a result there were a number of independent studies
attempting to discredit the results. Most of these focused on the procedures; the symptoms rather than the disease. But in the end, there simply was no denying that in state after state, throughout the South, current softwood removals are greater than the amount being grown. While the outlook may be better in some areas, and worse in others, trends for the state of Mississippi are typical for the region as-a-whole.

Figures 2a and 2b show "Fourth Forest" projections for non-industry private landowners. Figure 2a charts growth and
removals for five previous forest surveys, and projections for the years 1990 through 2030. Growth and removals converge about 1984. Figure 2b is a companion chart showing the downward slide in future softwood inventories that result from deficit growth.

The non-industry private landowners are emphasized in Figures 2a and 2b because throughout the South, they provide fully three-quarters of our log and wood-fiber requirements. The decisions that they make will to a large extent determine aggregate timber supplies for years to come.

Moving from the Macro to the Micro

Conventional wisdom tells us that "the race will go to the swift." This is indeed true in our competitive business environment, where the successful firms are those who can identify future risk and uncertainty and respond in a manner that will offer a relative advantage. While state-wide trends are worthwhile from a macro standpoint, what is happening in a specific wood basket is of much greater interest to the individual firm.

A number of techniques have been developed that will let us examine smaller geographic units. No doubt some of these will be described by Fred Cubbage in his talk. We prefer using a linear programming model; not because it offers any
special advantage, but because it provides a convenient analytical framework for the problem at hand.

This paper describes a very simple formulation that we have used to evaluate current and potential timber supplies in a number of smaller "wood baskets" scattered throughout the South. The model simulates expected changes in timberlands acreage and volumes as wood is cut. There is no attempt to forecast future demand, but rather to answer the question: can we continue to satisfy existing demand if we harvest and manage our timber reserves as we have in the past?

Data is derived from the information retrieval systems developed by the Southern and Southeastern Forest Experiment Stations. Transition tables define the new timber-type distributions that occur when a stand is cut, including the amount that is lost to non-forest use. Additional tables prescribe the acreage that reverts to commercial timberlands from other land-use categories. Volumes are calculated using empirical yield tables developed from Forest Service plot data.

The objective function maximizes the amount that is cut for a specified planning horizon subject to constraints that represent the acreage and volumes that are available each
five-year period. As acreage is cut, the resultant pine and hardwood volumes contribute to satisfying current timber and wood-fiber requirements, and a new acreage distribution is calculated for the next period. Thus the model prepares a rolling forecast of harvest acres and volumes for an extended planning horizon, and periodic timber reserves for each five-year planning period.

![Figure 3. Projected Supply Gap - Softwoods NIP Lands in Lower Piedmont Supply Unit](image)

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</table>

Figure 3 shows expected softwood removals from a typical lower Piedmont wood basket. The horizontal line near the top of the graph represents the average 14.4 million cords that are currently cut from non-industry private lands each five-year period. The shaded area is the amount that will be available in the future if current timber harvest patterns
and forest management intensities continue. Clearly, there is an emerging gap between the amount of softwood available, and recent harvest levels.

The precipitous decline around the turn-of-the-century is preceded by a reduction in softwood inventories. These fall more than forth-percent in the ten-year period 1990 to the year 2000. The trend is shown in Figure 4a, where the downturn on non-industry private lands is compared with a modest increase for industry. The forest-products industry
plays a dominate role in many areas throughout the South. Total timber supplies are enhanced by aggressive management on industry-owned or controlled lands. While this may be true in some areas, industry's role is limited in this Piedmont unit. With little more than twenty percent of the commercial forest acreage, industry can do little to reverse what is happening elsewhere. Figure 4b shows the expected gap between current consumption and future softwood supplies when the two tenures are combined. The near-term downturn remains.

Future Implications

This Piedmont unit is neither the best or the worse. We have conducted similar studies in other areas, and while we can change the trend in later years by altering certain assumptions, in most of these the near-term decline in softwood availability remains. The message is clear: in many areas throughout the South, we have been adding softwood-based conversion capacity faster than we can grow the trees. The softwood fiber that we would need to feed our mills for the next fifteen to twenty years is not in the ground, and growing.

We are not suggesting an impending "timber famine," or any other doomsday scenario. We do suggest that Southern timberlands are undergoing a fundamental change, with more
and more cutover acreage reverting to hardwood rather than pine. We leave it to the politicians and the policy-makers to debate the reasons why, but the fact of the matter is that fewer and fewer non-industry private landowners are investing the funds required to plant their holdings after they are logged. As a result, softwood inventories are under stress, while hardwood supplies remain relatively stable.

All of this has implications with regard to how we will wood our mills as we enter the twenty-first century. We will no doubt see further hardwood substitution, a trend that is already well underway. The US Forest Service reports that in the decade from 1980 through 1989, softwood pulpwood removals from southern timberlands increased less than one percent, while hardwood increased 48 percent. The American Pulpwood Association reports a similar trend. In their most recent southwide survey they report a 15 percent increase in hard-wood consumption for the years 1986 to 1989, while softwoods increased a meager 0.8 percent. But don't be fooled by the numbers. While the trend is significant, softwoods still represent more that two-thirds of the total.

Accelerated use of recycled fiber is another recent development. Many mills have used some recycled paper in the past, but now the overall amount has increased in response to
consumer demand, and legislative action. Near-term capital investments in recycle capacity will no doubt be driven by end-user markets and legal requirements, but in the longer run, recycled fiber may be a partial answer to diminishing softwood supplies.

Hardwood substitution and increased use of recycled fibers will help, but these are partial solutions at best. A number of analysts have predicted a decline in softwood use as recycled paper replaces virgin fiber. I have some reservations, suggesting instead that there will be very little outright substitution. While a few of the older and less efficient mills will convert, a modern facility with hundreds of million invested in pulping capacity simply cannot let their existing digestors remain idle. For these mills, any increase in recycle use will more than likely provide fiber for additional machine capacity, while the pulpmill continues to operate at current levels. Recycle will slow the increase in softwood use, but will not reduce it.

What conclusions can we draw from all of this? While there are "pockets of plenty" where reserves appear adequate, throughout much of the south a near-term downturn in softwood supplies is as certain as tomorrow's sunrise. The consequences
are legion, but to help us understand what these may be let's turn again to our lower piedmont supply unit.

Figure 5.
Projected Supply Gap - Softwoods
NIP Lands in Lower Piedmont Supply Unit

<table>
<thead>
<tr>
<th>PERIODS</th>
<th>Pulpwood</th>
<th>Sawtimber</th>
<th>Current Cut</th>
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<td>90-94</td>
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<tr>
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<td>28-31</td>
<td>2.3</td>
<td>3.0</td>
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I've used this unit as an example because it illustrates an important point. All of us have seen previous forecasts that predict rising stumpage prices, and we know what has happened. Real prices have remained relatively constant, with little change for more than twenty years. Figure 5 provides a partial explanation.

If local timber sales are sufficient to satisfy current mill requirements, the equilibrium price is demand driven. There are no competitive forces that would cause an upward spiral. But what will happen when the supply gap shown in
Figure 5 begins to emerge? An immediate increase in stumpage prices may be averted if mills can compensate by buying some of their wood from distant locations where there is less competition. This may explain the recent interest in remote chipping facilities. But these opportunities are limited, and soon the competition for remaining timber supplies will intensify. With more buyers than sellers, "real" stumpage prices will creep upward as more and more they are supply driven.

As competition for limited timber supplies intensifies, and stumpage prices escalate, marginal converters will fall by the wayside. Now I'm not talking about individual mills; I'm suggesting that entire segments of the wood-products industry could easily disappear. Fifteen to twenty years hence, timber allocations and the structure of our industry may be altogether different than it is today.

I don't know what form this new structure will take; I'm still muddling through these issues myself. I do know that the answers will depend on how our industry, and society as-a-whole, will eventually resolve these issues:

- Wood products and pulp and paper manufacturing have developed a convenient symbiotic relationship wherein the two industries complement one another very well. But what will happen when the sawmill and the pulp mill begin competing for the same tree?
With diminishing softwood supplies, can society afford to continue supporting manufacturing processes that utilize less than half the tree, or has the age of "Engineered Wood Products" finally arrived?

Once again, I don't have the answers, and would welcome the chance to discuss the topic with each of you individually. Perhaps you can help as I struggle with all of this myself.

You'll notice that I have not addressed the longer-term supply issues. If we want to pay the price, then we can indeed develop measures that would increase future softwood supplies by significant amounts. Our immediate concern is not what softwood supplies will be thirty years from now, but how do we wood our mills in the next fifteen to twenty.

To help provide answers, we have been developing a whole new generation of models that address these issues in greater detail. One is an input-output, or fiber balance model that we will use to evaluate probable structural changes for a broad geographic region, and associated supply and demand relationships. This model is still being developed, and it will be a month or two before we have our first solutions. This is perhaps an appropriate topic for a future SOFEW paper.
Conclusions

Dramatic changes continue to shape the environment in which we operate. For years, the forest products industry has enjoyed a relatively stable business arena where the players were known, and what changes there were occurred at a predictable rate. Now, however, the rate of change has accelerated, making it difficult to forecast what the future may hold. Rather than plan for a likely future scenario, companies must now learn to plan for change itself.

Among the most significant changes are those that will influence future raw-materials supplies. Here in the south, we have for decades been growing timber faster than it was cut. Now we must adjust to a new reality; one in which our future softwood supplies will diminish. Those firms that prepare for this uncertain future will no doubt survive, and perhaps thrive; those who do not, may not.