

# The Changing Wood Resource In The Southern USA

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## ABSTRACT

The concern about a dwindling wood supply in the US South, as advocated by our environmental adversaries, appears to be without foundation for the pine resource. In the absence of resource data, that will be forthcoming in the Southern Forest Resource Assessment, the conclusion of many resource managers is that there will be a 'wall of wood' coming to market within the decade. A similar conclusion has been reached in Australia, New Zealand and Chile where extensive plantations of radiata pine (*Pinus radiata*) will be maturing. One concern is about the lack of local markets for trees of relatively young age which, if not removed, will adversely affect development of trees of sawlog quality. A second concern is the limited market worldwide, and all competitors vying for the same market. The wood coming from these relatively young pine plantations, in significant quantity, will affect the manufacturing process and the product.

The picture is more bleak for hardwoods than it is for pines. For example, a number of pulp mills in the South use more than 50% hardwoods in their furnish; yet, no attempt is made to insure a sustainable supply. Hardwood plantation establishment within the region is miniscule and natural stands, even where harvested to foster regeneration, will yield only about 3 tons of wood/ac/yr on a 30- to 40-year rotation. It is useful to compare that growth rate to the southern hemisphere where plantation hardwoods of *Eucalyptus* spp., *Acacia* spp. and others will grow at rates of 15 green tons/ac/yr on rotations of less than 10 years. On top of that, wood quality of those species is greatly superior to our indigenous hardwoods. It becomes evident that we will be importing a majority of our hardwood-pulp needs from the tropical and subtropical regions within 15 years, and the same scenario will follow for pines within about 30 years.

## INTRODUCTION

The adversaries of forestry in the southern United States use timber depletion as an argument against timber harvesting. The data to refute or corroborate the claim are lacking, and will remain so until publication of *The Southern Forest Assessment*, a joint effort of the USDA Forest Service, U.S. Fish and Wildlife Service, Environmental Protection Agency, Tennessee Valley Authority, forest services of the 13 southern states, and other natural resource agencies. The latest estimate is for the publication to be released in late summer or fall of 2001. That effort aside, trends are accruing to suggest that the wood basket for the Americas will be in the southern hemisphere for hardwoods in about 15 years, and for softwoods in about 30 years.

## The Scenario

In broad terms, there are about 200 million acres of commercial forest in the South. Of that, slightly half is in pines (*Pinus* spp.) or pine/hardwood stands, and slightly more than half is in

hardwoods or hardwood/pine stands. Of the conifer portion, about 31 million acres are in pine plantations and the remaining acres are in natural pine or pine-hardwood stands<sup>1</sup>. Nearly 90 percent of the total acreage is in private ownership, and the remainder is publicly owned. Of the private ownership, forest industry owns or controls about 18 percent, leaving the remaining in the ownership of the non-industrial private sector.

Data from the Forest Inventory Assessment reports of the USDA Forest Service that were initiated in the early 1930s, and especially from the early 1950s when plantation management became accepted forestry practice, show growing-stock volume to be nearly double that of the earlier time frame. Despite that accomplishment, the growth:drain ratio of pines in 1999 was less than 1.0 for the first time in decades<sup>2</sup>. The ratio for hardwoods remained positive, but it had declined significantly from the preceding decade. The hardwood trend, if continued on course, would also be negative by about 2005 (Schaberg, *et al.* 2000).

The negative ratio for pines and the declining ratio for hardwoods have left some people to conclude that we are depleting the southern timber resource; in fact, that conclusion was directly responsible for the chip-mill studies in North Carolina, Missouri, Virginia and elsewhere, and it is the basis for the *Southern Forest Assessment* that is in progress. There is no question about more timber being harvested in the South during the past decade, largely due to the decline in timber harvesting on National Forest lands, especially in the West, due to issues surrounding endangered species such as the Northern spotted owl. However, the conclusion that we are running out of wood appears to be erroneous. A major reason for the false assumption is that the FIA data do not include trees of sizes less than 5.0 inches at diameter breast height (dbh). Many of the pine plantations established during the late 1980s and early 1990s under the Conservation Reserve Program, and nearly all plantations established since then, comprising about 10 million acres, fit into this category. When the ingrowth feeds into the supply chain, especially with the intensive silviculture now being applied to pine plantations, the growth/drain ratio is projected to increase to some positive asymptotic level.

The declining positive growth:drain ratio for hardwoods is expected to stabilize on the positive side by about 2010 after momentarily dipping into the negative category. The reasons are:

- Much of the resource resides on public lands and protected areas where timber harvesting will be limited, if at all.
- Another portion is controlled by non-industrial private owners who own the land for purposes other than timber production.
- The cost of hardwood fiber to chemical pulp mills in the South will become prohibitively expensive because of the lack of timber within their working circle. The result will cause those mills to close, to import wood from offshore, or to convert to a pine wood resource.

The hype associated with the negative growth:drain ratio of both pines and hardwoods can whimsically be compared to a savings account where the capital has dwindled from withdrawals being greater than deposits. On the horizon, however, is a stream of money that will cause capital to exceed withdrawals. A second reversal to a negative growth:drain ratio is unexpected

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<sup>1</sup> Less than 200,000 acres of commercially viable hardwood plantations exist in the region.

<sup>2</sup> A ratio of 1.0 equates to growth being equal to drain; a number below that value denotes drain being greater than growth, and a number above the value signifies the opposite.

in our lifetime because wood and wood products from other parts of the world will help sate our appetite for the resource.

With that said, forestry in the South is changing. It is changing, among other things, because of:

- International competition
- ‘Wall of wood’ coming to market
- Capital investments
- Fiber recycling
- Competing and substitute products
- Land ownership
- Public opinion and administrative decrees

Now, let’s take a brief look at each one of these drivers.

### **International Competition**

Until about 20 years ago, forest industry in the United States, inclusive of the South, had the best of all worlds. Exclusive of Canada from whence we’ve imported more than one third of our lumber needs, and more than 60 percent of our newsprint needs for decades, we have been a net exporter of timber, wood and wood products to all sectors of the world. The pattern was that we’d export when it was economically advantageous to do so, but our reliance was largely on internal markets. The high per capita consumption of lumber, paper and paperboard, together with our insatiable appetite for high value-added products such as coated free-sheet papers, made the internal market superior to that of any other world economy. For decades, forest industries in other countries tried to tap the U. S. market, but with limited success. In the mid-1980s, however, the very strong US\$ against foreign currencies opened the floodgates. Imports flowed in from every country where quality products were manufactured. Examples include our selling of hardwood sawlogs to countries such as Germany, Taiwan and South Korea from which furniture products were shipped back to the U. S. at prices less than those for which we could manufacture the same product. Similar examples were rampant in paper and paperboard, especially in the high value-added segment. Even though currency exchanges vary over time, the US\$ has remained sufficiently strong over the last two decades to foster imports.

One has only to look at the automobile industry to appreciate the value of imports. Earlier this year, the sale of domestic-brand cars was superceded by the sale of foreign-brand cars for the first time in history. The reason: cost and quality. A similar situation exists with printing and writing grades of paper. Unlike the automobile industry, however, we often don’t know we’re buying the foreign product. Marketing agreements allows a domestic company to sell products from a foreign company, from Indonesia for example, under the domestic-company wrapper. The reason for such alliances: economics.

### **Wall of Wood**

Forestry incentive programs during the 1970s and 1980s in countries such as Brazil, Chile, New Zealand and United States, as well as forest investment programs throughout the world, have created a huge timber resource with harvest culmination about 2010. With the internationalization of trade in wood products, concern has been expressed about everyone vying for the same market. That concern has evoked the suggestion from the chief executive officer of Carter Holt Harvey, a New Zealand based company, to form a cartel to avoid duplication of

effort and, one would assume, to stabilize prices. To take advantage of e-commerce, ForestExpress was formed in 2000 by International Paper, Weyerhaeuser and Georgia-Pacific. Since then the group has been joined by Boise Cascade, Mead and Willamette. The original intent was to sell manufactured products over the wire, but the enterprise has already expanded into buying and selling timber. A similar organization has been formed in Europe, and perhaps elsewhere in the world. Let's face it, e-commerce is here to stay. If the forest products industry does not embrace it we will be buried by the competition.

The 'wall of wood' is having specific impacts in the southern US. Those plantations established since the beginning of the Conservation Reserve Program in 1987, and especially those managed under an intensive silvicultural regime, are rife for thinning. The problem is that many pulp mills in the immediate vicinity of the plantations are poorly equipped to handle the timber with its high proportion of juvenile wood. Additionally, in some situations, pulp mills with a high diet of hardwoods are sitting amidst the juvenile-pine resource.

In the first instance, chemical pulp yields are adversely affected by increased usage of juvenile wood even if fiber properties of the wood are suited for manufacture of the specified product. Additionally, black liquor recovery and, especially, the effluent system become bottlenecks in the operation because of the great amount of lignin common to such wood. To effectively utilize the resource, new markets will have to be identified or major changes will have to be made to existing manufacturing plants.

### **Capital Investment**

The pine resource is even more problematic for use in mills used to a high diet of hardwoods. Pine tracheids from juvenile wood can be machined (causticized, refined, calendared, sized, etc.) to make them similar to hardwood fiber, but never exactly and at greater cost. In addition, such mills are usually devoid of a recovery system since hardwoods are without resins common to pines. Thus, a large capital investment will be required to make the conversion, a commitment that few companies have been willing to make. For the U.S. forest products industry as a whole, projected capital spending at \$7.4 billion for 2000 through 2002 is down more than 45 percent from the high of \$13.6 billion in 1996 (Jensen and Rockhill 2000). Of the projected \$7.4 billion, 28 percent is allocated for environmental compliance, further reducing the amount for pulp and paper mill modernization. Since 1996, the industry has consciously held capital spending to less than amortization and depreciation. Such a tactic will relegate the U. S. industry to a secondary position relative to new investments in South America, Asia and Europe (inclusive of the Nordic countries) where the latest in mill design and manufacturing technology is the standard.

### **Fiber Recycling**

#### *Paper and Paperboard*

The world average for recycling of paper and paperboard fiber is about 40 percent. Until about 15 years ago, the U. S. average was about 25 percent with 5 to 6 percent of that being exported. Following governmental decrees about inclusion of secondary fibers in paper and paperboard products, existing mills were modified and greenfield mills were built to use a greater amount of the resource. Today, the U. S. recovers nearly 50 percent of the fibers used in paper and paperboard, with old corrugated containers and newsprint leading the way at about 80 and 70 percent, respectively. Of the 50 percent recovered, less than 8 percent is exported.

The cost of recycled fiber per ton of pulp produced is about 25 percent which is 5 to 10 percent less than the cost of wood to produce a ton of pulp. However, the cost of waste paper

and board is highly variable, sometimes exceeding the cost of wood fiber and sometimes being significantly less costly than an equivalent amount of wood fiber. During such times, warehouses tend to be capacity saturated, discouraging the collection chain from additional collections.

The 50 percent recovery rate of secondary fibers by the U. S. is secondary to developed countries who are dependent on wood and wood fiber imports. For example, the recovery rate in Japan is about 60 percent, and in South Korea about 65 percent. Still, it is doubtful that the U. S. rate will significantly exceed 50 percent because of the myriad uses in which fibers are used, from extenders in plastics to wallpaper to sanitary products.

Some proponents of environmentalism decry tree harvesting of any sort, and exhort the use of secondary wood fibers or non-wood fibers. In response to that plea, yield from secondary wood fibers will decrease up to 30 percent, inclusive of the additives, with each repulping. For high-grade printing and writing grades of paper, two repulpings are about the limit whereas for lower grades of paper and paperboard, such as low-strength corrugating medium, the limit to repulping is about five times. Even then, repulping is not environmentally benign. The waste from repulping, such as spent fibers, clays, waxes, and starches, and heavy metals associated with ink have to be deposited in landfills. In short, there is no free lunch.

Limitations also exist from growing non-woody crops for pulping. Most such crops are annuals, which means that energy is required to establish, manage, harvest and store the resource. Storage is a major concern because the harvested crop has to be packaged to assure a fiber supply throughout the year. Without harvesting at maturity, the fiber will deteriorate until it is partly or wholly useless. The benefit of tree crops for fiber usage is that following the cost of establishment and perhaps some tending, the fiber is stored on the stump until ready for harvest, be it summer or winter, or wet or dry events.

### *Solid wood*

Some spent solid wood has been collected for decades, with railroad ties and wooden pallets being good examples. Uses of these materials have primarily been for landscaping and fuel. However new uses are emerging, such as plastic board which is a combination of wood flour and plastic. That product is finding a niche in decking because it is decay resistant, can be ribbed to improve tread, and is color-fast with the color of choice selected at time of installation. Other wood-plastic combinations include Boise Cascade's new product, called Marathon, which is used for siding. It is a combination of film plastic, like that used for grocery bags, and wood waste. The potential uses for wood fiber and wood flour in combination with plastic, referred to as fiber reinforced polymers (FRPs), are unlimited.

## **Competing and Substitute Products**

### *Lumber*

When lumber prices approach \$500/mbf (random lengths) alternative building materials start to be strongly competitive. The competitors, among others, are: brick, cement, steel and aluminum. In advertisement for those products, the benefits are extolled without reference to limitations. For instance, in the April 2001 issue of *MetroMagazine*, a Raleigh, NC publication, a pitch was given for concrete homes because of the low amount of energy required for heating and cooling. To add insult to injury, the claim was made that such homes are 'green' and 'environmentally friendly' because they require 'fewer trees'. Nothing was said about the energy expended in building such homes from non-renewable resources, nor about the carbon dioxide released which

is projected to be more than 10 times greater than from manufacturing the same house of wood. The forest products industry has been slow to mount a common theme to extol the use of their products. Instead, the standard has been for one company to run expensive advertisements suggesting that their product or their environmental record is superior to another forest products company. Such tactics must fill the alternative-building industry with glee.

### *Paper and Paperboard*

Substitute products are not common in paper and paperboard products. Some research has been done on the manufacture of a printing and writing grade of paper that can be reused innumerable times. Since nothing has been heard about this product in recent time, one would conclude that it has yet to find a niche.

Despite claims a few years ago that computers would create a paperless society within the decade, the event has not come to pass. The conclusion is that another generation will be required to achieve the milestone. The present generation, for the most part, continues to prefer reading their newspaper, magazine and novel from a hard copy. Despite the conventional preference for reading hard copies, the 'web' is making a difference in the use of newsprint. The impact is in the significant reduction of advertising in newspapers, and the commensurate increase in advertising on the 'web'. Caught in the middle are the newspaper publishers, but the impact is now being felt in the pulp and paper industry because of a decrease in price of the paper product. I project that the newspaper industry will progressively decline from the onslaught.

### **Land Ownership**

Until recently, forest industry has owned or controlled about 18 percent of the 200 million acres of commercial forestland in the South. For the first time in decades, that ownership declined during the 1990s. Among the reasons are a large corporate debt, a desire to monetize the value of the lands and timber, and intensive silviculture on selected parcels of land within proximity of the manufacturing plants. The latter objective has the potential to increase productivity two or more times over conventional silvicultural practices (Borders and Bailey 2001); thereby, reducing the land base needed for self-sufficiency.

The buyers of industrial land are primarily the Timber Investment and Management Organizations (TIMOs). The largest of these is Hancock Timber Resources Group, with 3 million acres and \$3.2 billion under management (Anonymous 1999), but others include investments by banking and insurance firms (Wachovia and Prudential for example) that operate primarily from pension funds. Others that operate from private funds include Joshua Management LLC, Madison Dearborn Partners, and Virginia Forest Investments LLC. The TIMOs collectively own more than four million acres of southern timberlands. Their strategy is to hold an ownership, most often of an established stand, for about 10 years after which the timber and sometime the land is sold. During the time, the resource is projected to increase in value through growth and quality at a rate exceeding the cost of capital. An increase in price for the resource is added income. Additionally, tax on the investment is a one-time event, at the conclusion of the sale. Contrast that to a forest industry who pays taxes at time of liquidation of the asset, and the stockholder who again pays taxes on the dividend and on accrued stock price. This example portrays why industrial land ownership is being downsized, and it also portrays why the TIMOs will be increasingly setting timber prices in the South.

## **Public Opinion and Administrative Decree**

Regardless of the hypocrisy that surrounds timber harvesting, we in the forestry profession will be governed by whims of society. The hypocrisy is that our adversaries don't want timber harvested or, if they do, harvesting has to be done in such a restrictive fashion that the practice becomes uneconomical. This philosophy prevails among the advocates of timber preservation even while they are want to give up the amenities that are products of the forest- -primarily lumber and pulp and paper. The alternative is to import more of those products from offshore, oftentimes from the very forests, and associated species, that are most endangered.

That lament aside, timber harvesting on public lands in the U. S. will become a thing of the past in our lifetime, and that on private lands will be severely restricted. I predict that it will be only a matter of time before every southern state, the wood basket of the nation, has a forest practices act in place. Some states outside the region are already governed by the acts- - California, Oregon, Washington, Maine. The recommendation is to continue to adhere strongly to Best Management Practices (BMPs) for as long as we can, knowing all the while that more severe measures will occur.

## **What Of The Future?**

The future of forestry in the southern U. S. is both bright and dim. The bright side is that we are learning to increase site productivity for pines by two or more times. That is being accomplished by intensive silviculture, including genetics/biotechnology, soil amelioration, plant nutrition, competition control, and spacing. Rotations of about 20 years will be normal practice, even for sawlog regimes, inclusive of one or two thinnings. The projection is that the land will be zoned which will allow us to practice intensive silviculture on selected sites, freeing large areas of land where extensive silviculture will be practiced. Longer rotations will be practiced on the majority of non-industrial private owner lands, and on industrial/corporate lands of economically marginal productivity. Old-growth timber from those regimes will bring premium prices.

The thinning regime will dictate that we find a use for the large amounts of juvenile wood. Most chemical pulp mills in the South are poorly designed for large-scale use of that material, and few mills are investing capital to update the process. I predict that within 30 years few stands in the South will be grown strictly for fiber; fiber for pulpmills and engineered wood products plants (OSB, Waferboard, Parallam, etc.) will come from thinnings and forest residue. The South will revert to a sawlog regime, much as it was 80 to 100 years ago. Pulp will be produced offshore, for forest productivity and economic reasons, and shipped to the U. S. where paper mills will ply their trade for the domestic consuming market.

To this point, much of the discussion has been devoted to the pine resource. I've suggested that within 30 years we'll largely be in a sawlog regime. The issue is even more critical for hardwoods than it is for pines. The reason is that literally no research, and even less operational commitment, is being given to hardwood management. The irony of that situation is that some chemical pulp mills in the South are operating on a steady diet of hardwoods, and they are in the midst of areas where the resource is quickly dwindling. The alternatives for such mills are to make the capital investment to use increasing proportions of pines, to ship domestic hardwoods great distances to keep the mills operations, or to import wood from offshore. Given that none of these alternatives are being actively pursued, the option is for the mills to close when the wood becomes prohibitively expensive. I'm confident that such closures will occur, and I predict that it will happen within 15 years. The alternative then is to import hardwood pulp from offshore, from Brazil for example where plantations hardwoods (eucalypts) commonly

produce more than 15 tons/acre/year of solid wood. The amount is double the amount from intensively managed hardwood plantations in the South.

Similarly, as for pine, the hardwood resource in the South will be managed in natural stands, by accident not by design, on a sawlog regime, with thinnings and residues being used for fiber-based products.

On a final note, mergers will continue within the industry. More significantly, the mergers will cross international boundaries. Within the last two years, two Finnish firms, Stora Enso and UPM Kymmene have bought pulp and paper mills in the U. S., International Paper with its acquisition of Champion is now firmly established in Brazil, as well as in New Zealand, Australia, France, Poland, and Russia, Boise Cascade is in a joint venture project with Riocell in southern Brazil, Arauco and CMPC, from Chile, are heavily investing in Argentina, and the list goes on. The industry is fast becoming globalized.

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