

Trends in Southeastern Forests

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The Southern Forest Resource Assessment (SFRA, Wear and Greis 2002a; 2002b), an interagency effort to gauge the sustainability of forests and their services in the southeastern United States, found forests at a crossroads of sorts. While multiple forces of change were observed to be reshaping the vast endowment of southern forests with potential for serious consequences for habitat and human benefits, the SFRA saw an opportunity for informed and adaptive development and management to lead to a sustainable future. Five years later, these forces of change continue and in some cases have accelerated across the South, and SFRA's notion of sustainability in the South as "managed change" seems as relevant today as it did then.

The SFRA identified urbanization/development as the most immediate and substantial threat to forest sustainability in the South in 2002. Essentially permanent losses of forest habitat were anticipated for several subregions containing rare forest types with a high concentration of imperiled terrestrial and aquatic species. In many places, ongoing urbanization both increases the demand for several ecosystem services, including recreation, clean water, and aesthetics, and reduces the supply of these services. Important ecological and economic scarcities are implicated.

A second area of concern was identified as the increasing intensification of forest management in certain areas of the South. Planted forests are less diverse than naturally regenerated stands—though young stands can provide scarce open, early successional habitats in certain places—and the landscape implications of this dynamic are not well understood at this time. Where intensified forest management in rural landscapes is juxtaposed with rapid urbanization, especially important changes in forest ecosystems are signaled.

Since 2002, these two dynamics, land use and forest management, have been influenced by changes in the rates of development, markets for forest products, and in the ownership structure of a large share of the region's forests. In this paper, I summarize results from the SFRA and explore more recent findings regarding these three major dynamics affecting forests in the region. Where possible I attempt to map these dynamics to implications for forest structure and the benefits/services they provide in the Southeast. Clearly, other factors are in play as well, including climate changes and invasive species, but ownership, markets, and development will, in the short and medium run futures as they have in the past, hold the greatest sway over forest extent and conditions.

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Competition for land in other uses

The forest lands of the South have been reshaped by a long history of use, abandonment, recovery, and active management. Initial timber mining and intensive agriculture throughout much of the South have defined contemporary site conditions and production possibilities. Swings in agricultural market conditions have shifted land between forests and cropland and pasture uses over the past two centuries and the relative position of crop and timber prices continues to influence the area and condition of the region's forests. In spite of these various changes, the total area of forests in the South remained relatively constant through the second half of the twentieth century. At the beginning of the twenty first century, however, a different set of factors are governing where forests will grow and how they will be managed in the future.

In 2002, the SFRA focused concern on an accelerating rate of urbanization in the South. 31 million forested acres were forecast to be developed by 2040 to accommodate anticipated population and income growth (Wear 2002). The SFRA also anticipated that nearly the same amount of currently non-forest, agricultural land might be reforested over this period with timber uses out-competing other agriculture uses—i.e., continued no-net-loss.

The no-net-loss scenario for forestland has a natural appeal but this appeal overshadows some important elements of anticipated change. In this case, forest losses and forest gains would occur in different subregions of the South and both would have important implications for local populations. Forest losses are and will continue to be concentrated along the Atlantic and the Gulf of Mexico coasts and across the broad Piedmont Crescent stretching from northern Virginia to Birmingham (Figure 1). A high degree of forest losses leaves these rapidly urbanizing centers bereft of many of the important services of functioning forests—for example, water filtration, recreation, and heat amelioration. Offsetting forest gains would likely to occur in western portions of the South. In these areas, significant movement of land from agriculture to forests provides forest benefits, but implies changes in the structure of some rural economies with important implications for local employment.

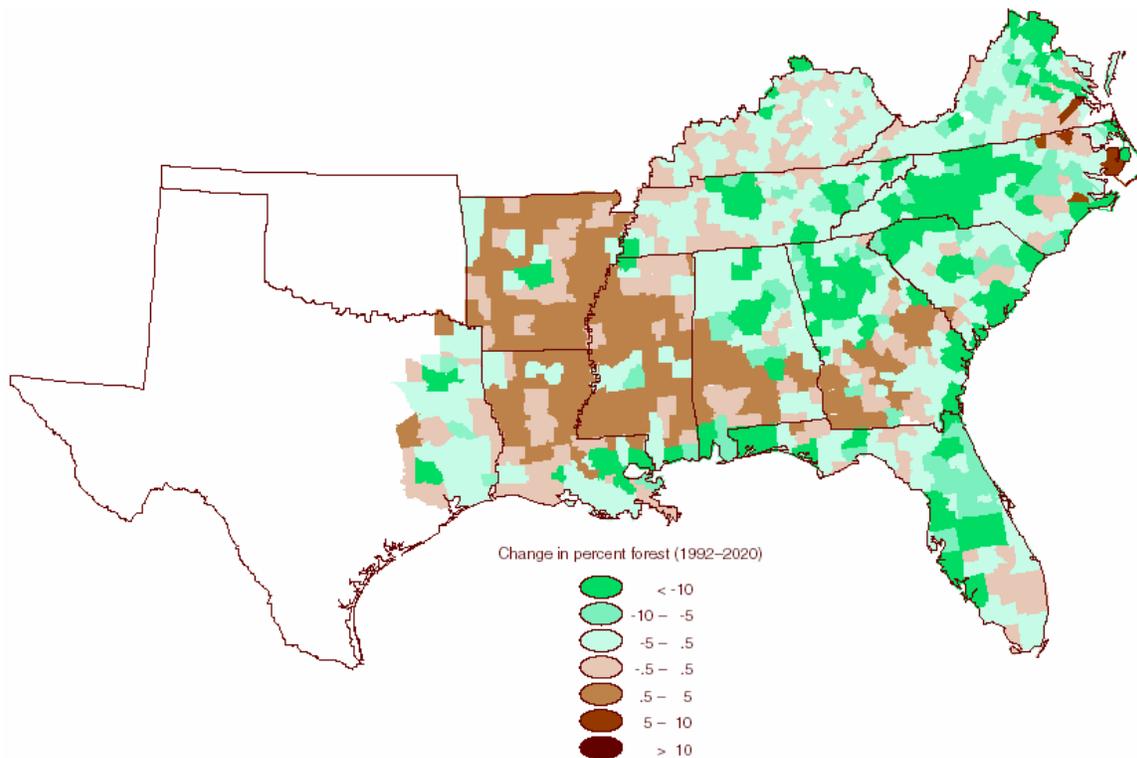


Figure 1. Projected change in the percentage of forest within a county 1992 to 2020 (Source: Wear and Greis 2002). Green areas show where forest is forecast to be lost. Brown areas show where forest could be gained depending on the relative returns to timber products.

Over the four years since release of the SFRA, these ongoing trends have intensified concerns regarding forest losses associated with urbanization in the South. Recent developments have also raised questions regarding the plausibility of the no-net-loss forest land scenario for the region. Structural changes in the markets for wood products have softened the returns to timber management in much of the South since 1998. In other words, timber has become somewhat less competitive with agricultural uses, thereby dampening the forces that could encourage reforestation. Indeed, tree planting is down substantially in the South since 2000 and changes in pulp and paper processing along with emerging import markets do not suggest that prices will soon resume the growth experienced in the 1990's (Wear et al. 2007).

A recent updating of land use forecast models and projections for the South (Wear 2007) indicates a range of futures for forest land area depending on the future of timber markets. Figure 2 shows the range of potential outcomes for the South. Again, forest losses are expected to be concentrated in the eastern part of the South—from Virginia through Florida—and potential gains might be found in western States. The base line case for this analysis (constant real timber prices over time) indicates a loss of about 13 million acres, while declining prices (low scenario) indicates a loss of about 27 million

acres by 2030, an area equivalent to the existing forest area in North Carolina and Virginia.

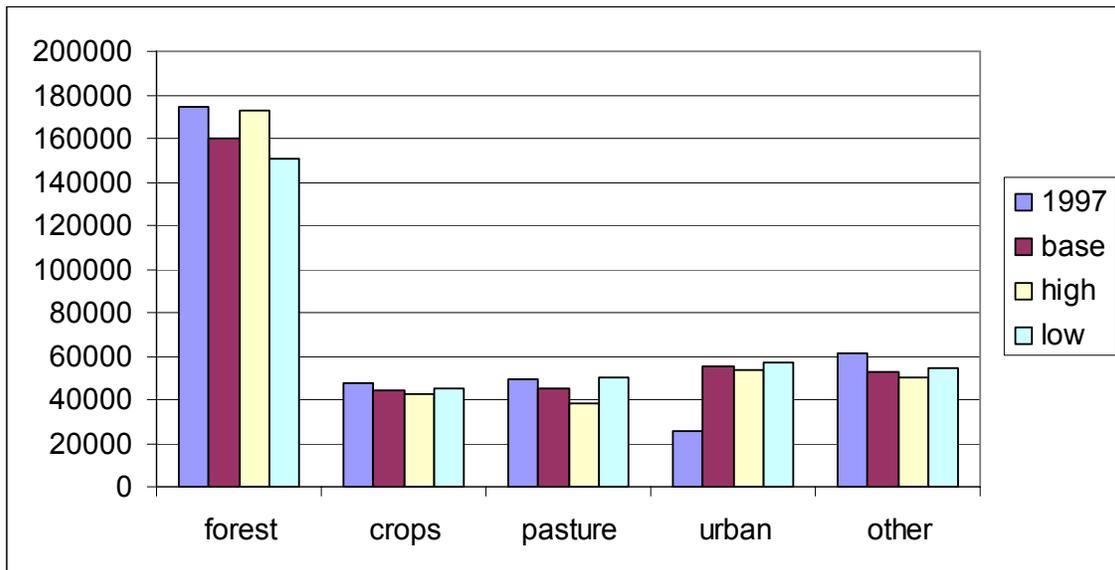


Figure 2. Range of land use outcomes (private land only) in 2020 across multiple economic scenarios for the South. “Base” defines a case where timber prices are held constant. “High” describes a case where timber prices rise at one percent per year. “Low” describes a case where prices fall at one percent per year.

Change in Forest Products Markets

Timber production in the southeastern United States has grown both in absolute terms and relative to that in other regions of the country since the 1970’s (Figure 3). Over this period, the South demonstrated strong comparative advantage in producing a renewable timber resource as management has shifted from mining of volunteer second growth forests to intensive plantation forestry². As a result, the South now generates about 15 percent of the world’s timber harvest (more than any other country) and more than 60 percent of the nation’s timber harvest. Today, forest products remain an important part of southern rural economies, but recent changes in timber markets have raised questions about the future.

² The comparative advantage of the South in timber markets was helped along by policy decisions that reduced timber harvesting on public lands in the western United States (Wear and Murray).

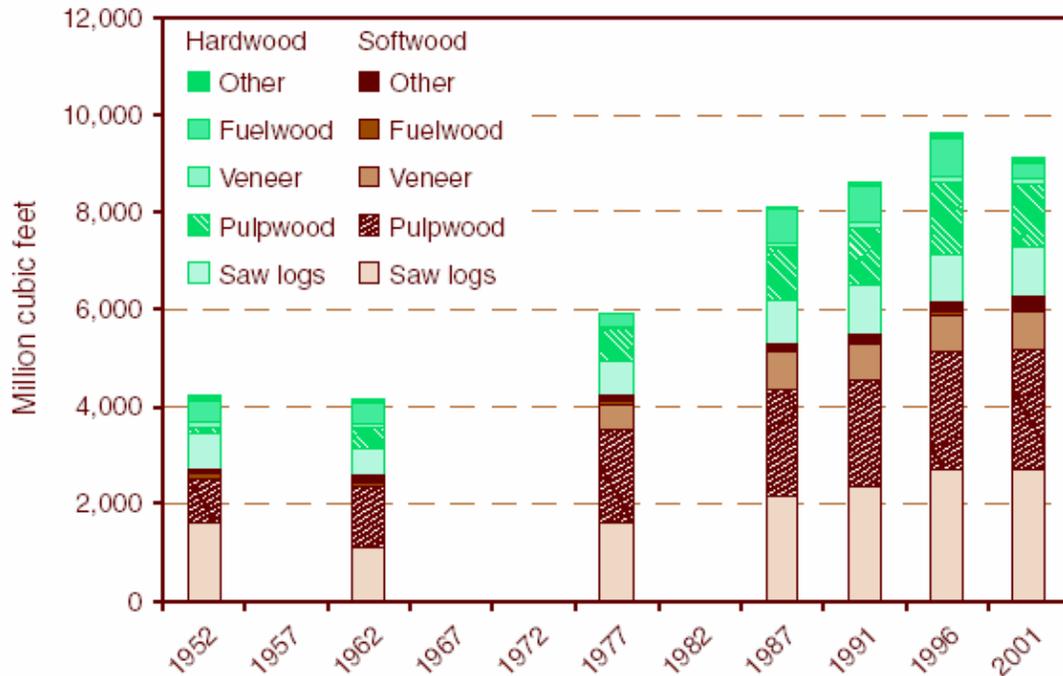


Figure 3. Roundwood harvests in the US South by product (Sources: USDA Forest Service Timber Product Output Reports).

The coincidence of several factors has altered forest products markets since the late 1990's. Industry consolidations changed land ownership across a large portion of the region's most productive timberland. Changes in domestic consumption patterns, coupled with shifts in international trade, shifted timber demands. Depreciation and closure of older processing facilities, especially in the paper industry, has accentuated many of these factors and changed the spatial arrangement of timber markets within the region. These developments have led many in the forestry community to conclude that the future of timber markets in the United States in general, and in the South in particular, is one of decline.

At the same time, other developments seem to bode well for southern forest products industries. Production of newer, engineered wood products continues to grow. Timber supply is strong and appears to have expanded throughout the 1990's in spite of competing land use pressures. Intensive forest management continues to expand yields and the potential for growth appears to persist. Indeed, long run forecasts of general economic and timber market activity predict expanding domestic timber demand over the coming decades. Any expansion in timber production is expected to be concentrated in the South. Forecasts reported in the SFRA and the 2000 RPA Timber Assessment (Haynes 2003) suggest that southern forest landowners, facing strong future markets, could continue to invest in and expand their timber production capacity.

A recent assessment of timber markets in the southeastern United States (Wear et al. 2007) evaluated the demand and supply factors that have recently affected markets for

various timber products. The following is a listing of the significant forces driving change in markets for timber products in the South.

1. The demand for domestically produced timber products has shifted downward in the United States. Consumption of solidwood products has not grown at the same pace as housing starts, and the per capita consumption of paper has declined over the past ten years, after being relatively stable for many years. These declines in domestic production and per capita consumption of some timber products have been coupled with a substantial decline in the off-shore demand for US-produced timber products. Exports of wood chips fell from its peak in 1998 to nearly zero exports in 2003.
2. The supply of domestically produced timber products has continued to expand outward since the late 1990's. Timber supply is a function of the amount of land dedicated to forest growing and the intensity of management. The area of timberland has remained fairly constant since the 1970's, and the area of intensively managed (planted) forests continued to expand through the 1990's (that is, expansionary investment continued even after production and prices fell). Because timber is a long-lived asset, supply could continue to move outward and dampen prices for years (Figure 4). The effects of recent declines in planting may not be felt for several more years.
3. Fundamentals of economics indicate that a substantial downward shift in demand coupled with a constant to increasing supply leads to (a) a decline in output and (b) a disproportionately strong decline in prices. This is exactly what has been observed in pulpwood markets—especially softwood pulpwood markets—since 1998 (Figure 5).
4. An evaluation of investment of wood products firms in manufacturing capacity within the region provides insights into future production potential. Capacity for lumber production has remained strong, while capacity for paper production has declined since the late 1990's. Indications are therefore that demand for pulpwood to produce paper may not rebound to early 1990's levels in the foreseeable future. Long term demand for solidwood products appears strong, however.
5. Persistent low prices for softwood pulpwood may indicate opportunities for the manufacture of other products from this product class. Indeed, several firms have recently announced plans to build plants to produce oriented strand board in many of the areas where pulpmills have closed. Announced plants are not always built, but the number of announcements indicates that expansion in this sector will provide additional demand for pulpwood in the next five years.
6. Upward pressure on hardwood pulpwood prices and downward pressure on softwood pulpwood prices combine to provide incentives to shift industrial production toward utilization of softwoods. Indeed, after a long period of substituting hardwood for softwood in paper production, we might expect to see an increase in the share of softwood inputs.
7. Imports of hardwood chips into the South remain relatively small compared to the total consumption. However, it appears that if hardwood chip prices rise above thresholds already reached in parts of the region (e.g., in Florida), then imports

from South America become a viable alternative to domestic production. The existence of this backstop supply of plentiful eucalyptus chips indicates that future hardwood pulpwood prices may have a ceiling in the region.

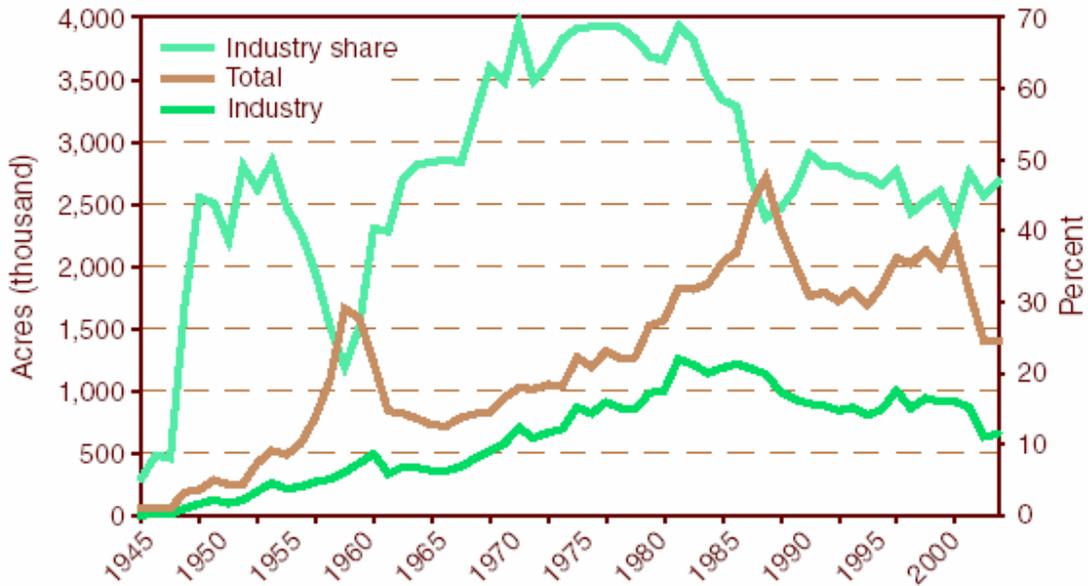


Figure 4. Total area planted in trees in the US South, all ownerships (industry, nonindustrial private, and public) and the industry ownership (Sources: 1945-1999: Robert F. Moulton (2000 [compiled from annual USDA Forest Service tree planting reports; including estimates by J. Prestemon for industry (Arkansas 1954; Florida 1981; Georgia 1954, 1982; Louisiana 1954, 1981; Mississippi 1954; Texas 1981)]; 2000-2004: Steve Chapman, Georgia Forestry Commission (2005)).

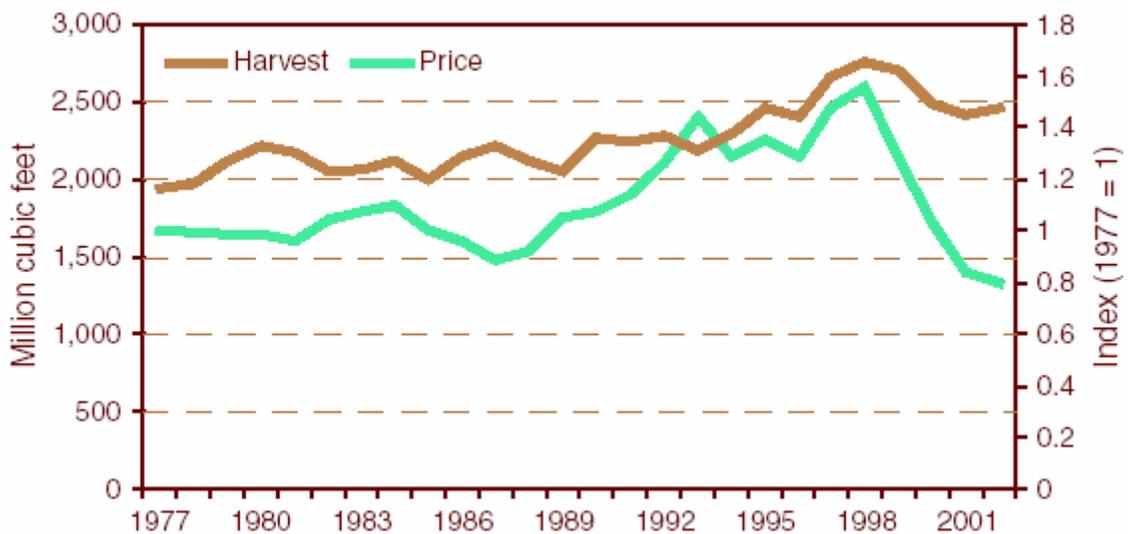


Figure 5. Softwood pulpwood harvest and price in the US South (Source: Timber Mart South and various RPA Timber Product Output reports).

Concerns about southern timber markets have necessarily shifted from a focus on supply issues to a focus on demand issues. Forest investment, driven by both market forces and tree-planting programs, has produced plentiful and sustainable timber supplies and supported a more than doubling of timber production over a thirty year period. Forecasting models (e.g., Prestemon and Abt 2002) indicate that the region can readily supply even more timber. While some uncertainties regarding supply may be indicated by the divestiture of forest industry lands, they are at least partially quelled by a surge of investment capital into the sector from pension funds and other sources.

The big question is: how will demand respond in the future? We find little evidence that there will be a strong rebound in demand for pulpwood for paper production or a return of chip export markets. Increased production of OSB and other engineered wood products may increase demand for pulpwood sized materials, but this effect has not yet fully offset declines in demand from the paper sector. This means that softwood pulpwood prices are not likely to rebound to mid 1990's levels anytime soon. Emergence of biomass energy markets may affect demand in the future but this is highly uncertain at this time.

What does this mean for the forests of the South? We've already described the effect of timber prices on the future of land uses. In essence, if prices fall, so does the area of forestland. Current forest investments are at essentially replacement values—i.e., the expansion in planted forest area predicted by the SFRA has, at least for the moment, been stalled. We expect a reduction in the intensity of management applied to forests harvested in the near future leading to a marginal decline in the future supply of timber in the region.

Change in Forest Ownership

Another important development since release of the SFRA in 2002 is the sale of forestland holdings by nearly all the integrated wood products firms in the region. These sales have been driven by a number of factors, including large debts accumulated through a series of corporate mergers in the 1990's, undervalued timberland in stock prices, and tax disadvantages of holding timberland. Perhaps most importantly, these transactions clearly signal that the wood products sector is less concerned about timber availability—so much so that firms are willing to forego their traditional buffer against scarcity and high material costs. This buffer also had the effect of supporting the largest tracts of undeveloped forests within the region. This is an important turn-around in the market perspective regarding timber supplies in the United States. Optimism regarding supply suggests dampened prices in the future (reinforced by the recent market history described above), further discouraging reforestation efforts.

Industry land sales also raise questions regarding the new owners of these forests and their long run management interests. The largest share of this timberland has been

acquired by timberland investment organizations (TIMO's)³ and Real Estate Investment Trusts (REIT's). These groups manage forests for groups of investors, including large pension funds and insurance companies. Their focus is on maximizing profits from forest management and land sales. The change from forest industry to TIMO ownership doesn't necessarily imply a change in management approaches. It does, however, imply that land assets may more readily be sold for alternative uses through a constant reappraisal of the highest-profit uses of forestland holdings—i.e., increased liquidity. This structure of ownership, with frequent transactions, is more likely to encourage continuing fragmentation of forests. Because the Forest Industry ownership class had anchored many of the largest contiguous forest areas in the South, fragmentation of the ownership could have important implications for biodiversity and other services derived from these rural landscapes.

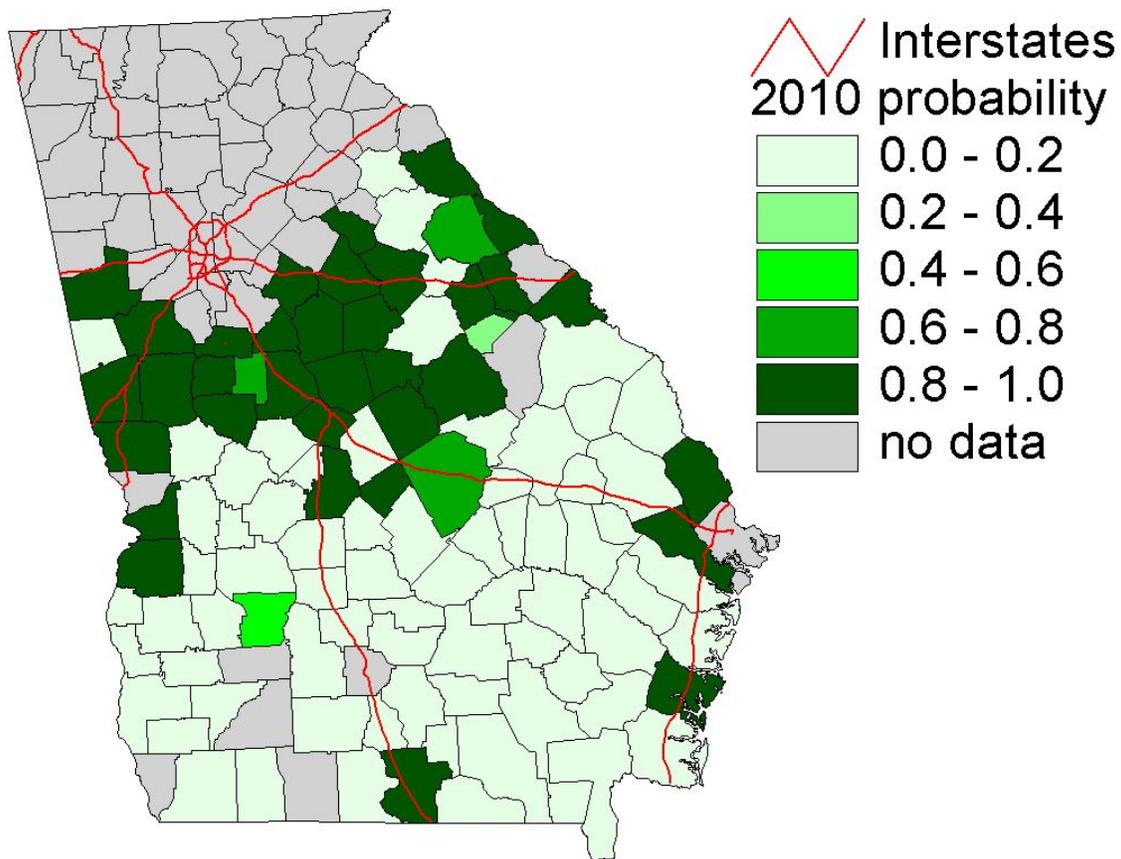


Figure 6. Forecast of the percent of industry timberland in a land conversion-value class in Georgia, 2010 (Source: Wear and Newman 2004).

³ It is important to emphasize that there is a broad diversity of management styles within the TIMO ownership class. Recent estimates indicate that there are about 25 different large TIMO's now operating in the US and their clients include investors with long run and short run investment horizons, focus on recreational as well as timber values, and, in some cases, partnerships with large conservation groups.

While sales of forestland by integrated forest products firms have occurred throughout the US, the effects of the shift are strongest in the South, which has the greatest concentration of both industrial and nonindustrial private forest ownership. Here, over 18 million acres of forestland have changed hands over the past 10 years (Clutter et al. 2007). One motive for selling forests is shown in Figure 6 which charts the portion of Georgia's forest industry land in 2002 that is expected to have land values that far exceed the potential returns from forest management. In addition, a confluence of other factors has driven this structural change in ownership. They include:

- The need to increase shareholder returns: Firms' returns on investment from forestland are low compared to those from other alternatives, such as manufacturing or sales. At the same time, the development of well-supplied, reliable timber markets throughout the U.S. has reduced the need for firms to own forestland as a hedge against stumpage price fluctuations or timber shortages.
- Debt reduction needs: Large-scale consolidation in the industry over the past decade has left the surviving firms with large amounts of debt on their balance sheets. The sale of forestland frees up capital to use in debt reduction and to generate shareholder wealth.
- Federal and State taxes: At the Federal level, forest industry firms structured as large C-corporations are taxed at a 35 percent rate on both ordinary income and capital gains. In contrast, institutional investors structured as TIMOs (Timber Investment Management Organizations, which often are held by tax-exempt organizations) or REITs (Real Estate Investment Trusts, which must pass 90% of their taxable income through dividends) pay little or no federal taxes. At the State level, all forest owners face rising property taxes. As well, in some states, forest industry firms are excluded from beneficial "current-use" timberland assessment provisions.
- Development of strategies to minimize the tax implications of large forest sales: Historically, the capital gain tax due on forestland held on a firm's books at a low cost basis and sold at market price has been an impediment to large-scale sales. Now, however, the buyer and seller typically postpone or eliminate the tax through the use of a variety of financial strategies.

While the shift in forest ownership from forest industry firms to institutional investors has resulted in little change in land use or tract size to date, there are reasons to assume future changes:

- Institutional investors have a shorter planning horizon than forest industry firms: Institutional investors focus on returns over only 10 to 15 years, leading to concern that they may be less inclined than forest industry firms to invest in long-term management practices or to retain the land after a harvest.
- Potential for fragmentation: The large acreages involved in forest industry sales often requires combinations of buyers, leading to concern over fragmentation and loss of open-use recreation land and wildlife habitat. Both forest industry firms and institutional investors have participated in the subdivision and sale of forestland near recreation and urban centers.

The conservation sector has also been involved with these large land transactions. In some cases, groups such as The Nature Conservancy have been able to buy land outright. In many more cases, however, conservation groups have partnered with other owners (TIMO's) to acquire conservation easements for rights to protect various environmental values. These exchanges can be viewed as a unique opportunity to influence the eventual uses of large acreages in the South. It represents the largest turnover of land since the late nineteenth century.

Implications for Forests and Ecosystem Services

Taken together, changes related to growth, timber markets, and ownership point toward continued losses of forest land in the South for development without a large compensatory push toward reforestation on other rural lands. Change in the use and condition of the South's lands is nothing new. However, the types and degree of changes we are experiencing in 2007 are qualitatively different from what has come before. The overall result of this variety of factors—including population and income growth, timber markets, ownership, and the agricultural sector—may well be an unprecedented loss and increased fragmentation of forest land area in the South.

Population growth and loss of forest land. The combined effects of urban expansion, population growth, and the loss of forest land is an increasing human population density in the proximity of forests. This raises a number of issues that will affect forest ecosystems.

1. Increased road density leads to easier spread of several invasive species into the region's forests. Japanese honeysuckle, Chinese privet, and other species are increasingly displacing native flora in the wildland-urban interface.
2. Higher population and building densities in the proximity of forests reduces the ability to manage interspersed forests. Most especially it reduces the ability to use fire in important fire-adapted forest types. For example, the opportunity to restore and manage the long leaf pine type is greatly reduced in these rapidly expanding urban areas. It also increases the value of restoration activities on the remaining large tracts—especially Department of Defense, National Forests, and other public lands.
3. Perhaps most importantly, ongoing development is fragmenting remaining forests and reducing their functionality in several regards. Floral species richness as well as the habitat needs of several neotropical migrant bird species in the Southern Appalachian Piedmont region and amphibian habitats along the Coastal Flatwoods are likely to be impacted. Again habitat protection and restoration on DOD lands could hold disproportionately high value.

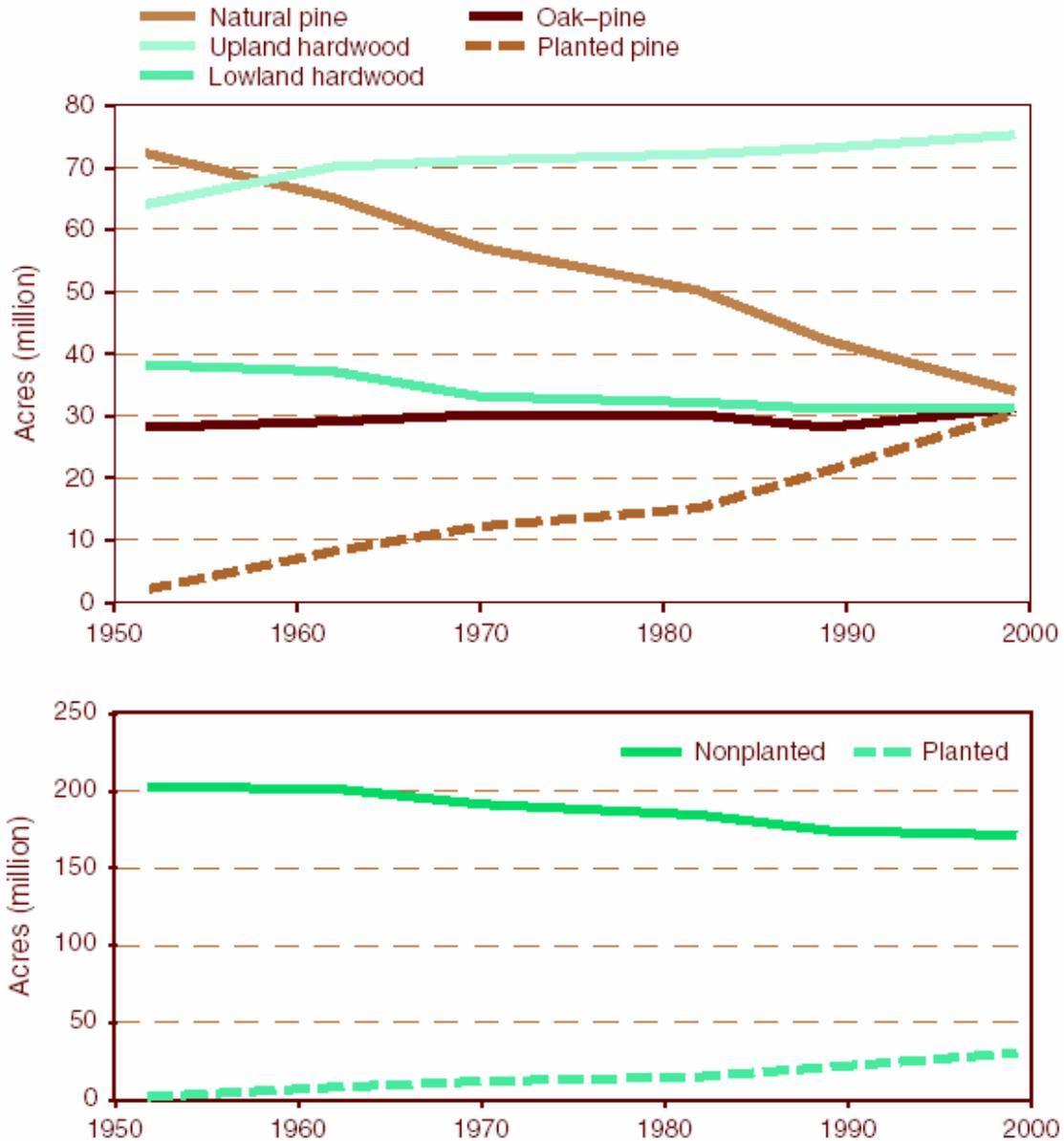


Figure 7. Acres of forest by forest management type 1952-1999 (Source: USDA Forest Service, Forest Inventory and Analysis data, various sources).

Forest Products and Forest Management. Consider two possible futures. One would be organized by a resumption of the growth in production observed in the 1990's. In this case, timber prices would resume their moderate upward growth, leading landowners to invest more in future timber production. The results would be (1) more forest land in the South—though gains would occur largely in the western half of the region and (2) an expansion in the proportion of forests that are planted and intensively managed. The SFRA predicted that plantation area could expand from 16 percent of forests to about 25 percent of forests by 2030 under this scenario (continuing the historical trend shown in Figure 7). New plantations would be especially concentrated in the Coastal Plains.

The other scenario would be characterized by flat to declining timber prices as production continues to move offshore. In this case, forest area would decline relative to current levels and the area of plantation management would also decline. While planted pine is not optimal wildlife habitat, it does have habitat values that are generally greater than for agricultural and developed land uses. Reduction in the wood products sector would likely have a net negative impact on the area and the functionality of forests within the southeastern United States with greater fragmentation as well.

Land Ownership Changes. While several factors are behind the changes in landownership, it is clear that recent transactions involving forest tracts are interrelated with population growth/urbanization and changes in the markets for forest products. One can view these transactions as accelerating the economics of development, essentially increasing the liquidity of land markets. If timber is not viewed as scarce (i.e., prices are flat to declining) then the wood products sector does not have the incentive to protect large blocks of land from encroachment of other uses.

The consequences for forestland focus mainly on increasing parcelization and fragmentation as lands are sold and resold. Removing the perceived returns to ownership of big blocks of forestland further encourages landowners to split off those lands that can immediately return a higher return in a developed use. The effect of “closed-end” fund investing in timberland also forces the sale of forestland on a frequent basis (generally about every five years).

SFRA allowed us to define where change and the potential implications of change are focused within the region. In particular, we identified three areas in the South where concerns regarding forest sustainability may be especially high:

Southern Appalachians- This region will be influenced by a combination of human, biological, and physical factors over the next two decades. Population growth and land-use changes will increase the human presence in many forests. Demands for forest-based recreation are focused on the Southern Appalachians, and increased competition among recreation user groups is anticipated. A complex of forest health issues is affecting all forest types in this region and has the potential to restructure forest ecosystems.

Piedmont—Forecasts of land-use change suggest that the Piedmont, from Virginia to Alabama, will experience the greatest loss of forest area among ecological sections of the South. Already this heavily forested region has a very low ratio of interior forest to total forest, indicating a high degree of forest fragmentation. This fragmentation is likely to continue with growth of populations in urban counties and interspersed rural counties. Consequently, wildlife habitats will be altered for certain neotropical migrant and other important bird species. Because populations will grow and forest area will decline, we also expect an increasing scarcity of forest-based recreational opportunities for city dwellers.

Lower Atlantic and Gulf Coastal Plains—Coastal flatwoods areas are forecast to lose large shares of forest to urban development. Forest loss combined with intensified forest management could have cumulative negative effects on coastal wetlands, through direct wetland loss and modification of hydrological regimes. The flatwoods, one of two areas in the South with the highest concentrations of endangered animal and plant species, contain many imperiled amphibians, crustaceans, and reptiles. These concerns are concentrated especially in the Florida Panhandle. DOD already has broad experience in managing for the special conditions of these coastal flatwoods—e.g., prescribed burning, Red Cockaded Woodpecker protection, wetland restoration, and endangered plant management at places like Camp Lejeune and Eglin Air Force Base.

Looking Forward

Population and land development are driven by powerful, sometimes overwhelming economic forces. The challenge for sustaining forests and their valuable services is managing the development that will occur. The ability to anticipate how development might proceed in the future allows us to begin to identify where the most critical forest changes might arise. With this information, forest benefits can be protected through strategic land purchases, and more commonly, through conservation easements. The current rapid growth in easement activity reflects a market response to perceived increase in the scarcity of forest systems and is perhaps the most effective mechanism for immediate protection of forest benefits in a developing landscape.

Strategic protection of forest systems is critical where land prices are determined by subdivision values. In high-land-value conditions, conservation investments can be most effective where they protect the connectivity of remaining forests by investing in corridors. Recent research (Damschen et al. 2006) suggests that corridors can be effective in protecting the long run species richness of forest habitats in the southeastern Coastal Plain.

Another strategy focuses on protecting the values provided by existing large blocks of forests—notably DOD and other public lands. This suggests that efforts such as Integrated Natural Resource Management Plans (INRMP) be predicated on forecasts of development and use adjacent to large facilities. Here the returns to reinforcing buffers (preventing encroachments) can be high in terms of protecting the ability to engage in effective forest restoration and management (i.e., using fire as a management tool) and insulate large blocks from exposure to invasive species (as anticipated by the DOD Legacy Resource Management Program). This requires creative management approaches to make buffers effective.

There is also a strong need for creative silviculture and forest management in the many areas that are experiencing low density development. Interspersed forests can provide valuable products and services. However, standard rural forestry practices are generally not practical within this type of landscape. In addition, management practices that can provide complementary habitat values in intensively managed landscapes could help

provide maximized benefit from the region's forests. Emerging partnerships between timber capital and conservation capital indicate strong potential for these types of activities and could be extended to include other partnerships such as those between DOD and conservation groups, academic institutions, and public land management agencies.

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