



# THE FUTURE OF

# SOUTHERN FORESTS

BY DAVID N. WEAR

Long-term projections reveal conflicting demands for development, forestland, and natural resources.

The southeastern United States contains expansive and diverse forests that provide many values and services. The future of these forests will depend on many factors, including wood products markets, urban growth and development, insects and diseases, and climate changes.

The Southern Forest Futures Project, led by the U.S. Forest Service in partnership with state foresters, attempted to predict the combined effects of these factors across a number of scenarios over a 50-year time period. The technical reports for this project provide

details for several resources and issues in the region.

They provide a vision of the future southern forest for the five distinct regions of the South shown in figure 1: Coastal Plain,



Piedmont, Southern Appalachian-Cumberland Highlands, Mississippi Alluvial Valley, and the Mid-South. These regions all have distinctive regional characteristics and face somewhat unique future conditions and challenges.

Common themes apply throughout these regions, but with differing impacts. Forests will continue to be affected by invasive plant species and pests with varying influence on forest productivity and even tree species. Land use change is perhaps the most important immediate concern as populations grow (figure 2) and rural land will continue to be consumed by expansion of the region's cities and urban areas. The South is the nation's "wood-

basket" and changing wood product demands are expected to influence how the South's forests are managed and where timber is produced. Demand for clean water will increase across the South for various reasons. So, what will the southern forest look like?

### 1. COASTAL PLAIN: THE FOREST PRODUCTION CENTER OF THE UNITED STATES

While timber production is spread across the entire region, the Coastal Plain is the center of U.S. wood production. The South provides roughly 60 percent of the nation's timber production and a large majority occurs in the Coastal Plain. That's why 82 percent of southern-planted forests are located there (figure 3). In addition, the Coastal Plain contains several cities that are attractive for their coastal locations

and for commerce—the port cities of Charleston, New Orleans, and Miami, for example.

The Futures Project predicts continued strong growth for these coastal cities with associated land use changes; the peninsula of Florida has especially high projected rates of forest loss. Sea-level rise will provide challenges to municipalities along the Coast (figure 4). But outside of the coastal zone, land development would likely be limited in the Coastal Plain. Future growth in wood products markets would be concentrated in this area and encourage expansion of planted pine forests.

Depending on market demands, forest conditions would change in the future as the area of planted pine could expand by as much as 45 percent in this region. In some parts of the Coastal Plain—for example, northeast North Carolina and southwest Georgia—competition between cropland and managed forests could intensify.

### 2. PIEDMONT: A RAPIDLY-DEVELOPING SOUTHERN METROPLEX

A metroplex is defined as a large metropolitan area that includes more than one city. At the core of the Piedmont, the Interstate 85 corridor that begins near Richmond, Virginia, travels through the Carolinas via Raleigh-Durham, Greensboro, Charlotte, Greenville-Spartanburg, and into Georgia beyond Atlanta, defines a principle economic growth engine that has

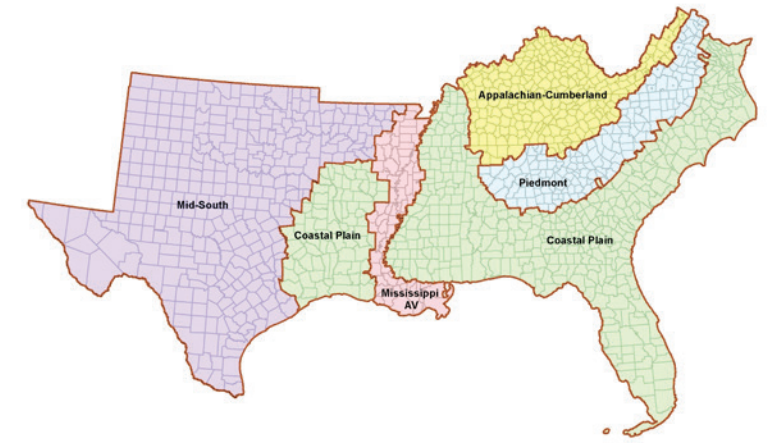


Figure 1. Map of sub-regions used by the Southern Forest Futures Project.

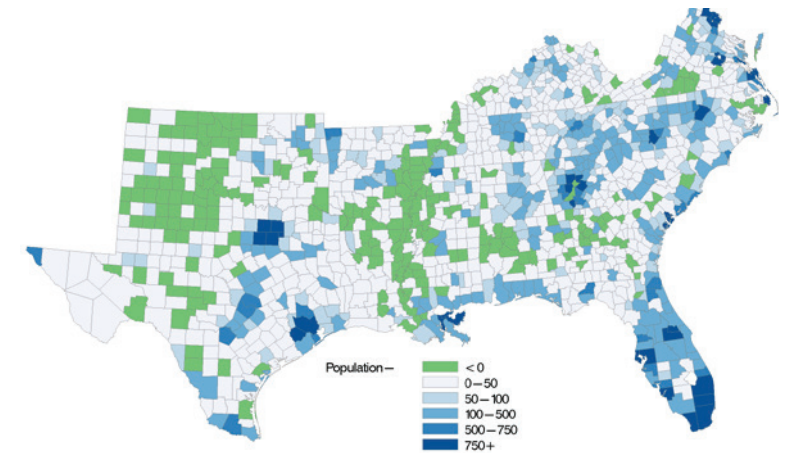


Figure 2. Projection of population change (change in people per square mile) for a scenario from the Southern Forest Futures Project; counties in green have forecasted population losses.

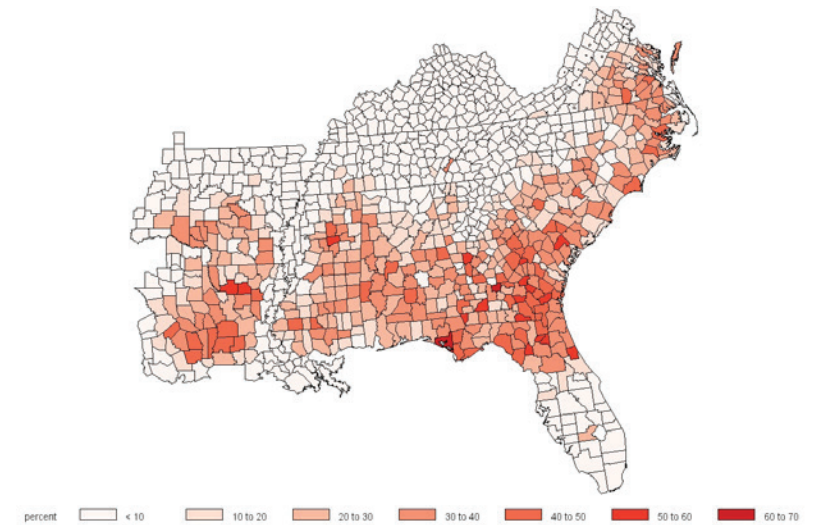


Figure 3. Percentage of county occupied by planted pine forests (source: USFS Forest Inventory and analysis data, Southern Forest Futures Project).





“THE FUTURE OF THESE FORESTS WILL DEPEND ON MANY FACTORS.”



expanded at several nodes.

It is no surprise to find that projections of land use changes anticipate ongoing rapid development, driven by the metroplex, across a majority of the Piedmont region. Forest and agricultural lands would lose ground in nearly equal measure. Across nearly 25 percent of the Piedmont, forestlands could switch to a developed use by 2060 (figure 5). In many places, rural settings would be wholly displaced by expanding cities.

The Piedmont reflects a broader trend of land use changes. Through the 1980s and 1990s, forest land area remained relatively steady in the South but this reflected two offsetting trends. While urban growth was consuming forestland uses, slightly more land was transferring from agricultural to forest uses resulting in a negligible overall change in forest area. Projections indicate that the offsetting increase in forestland is unlikely to continue in the future, resulting in net forest losses (see figure 5).

The combination of growing

populations, changing land uses, and climate change in the longer term point toward increasing water demands and water stress for municipalities in the Piedmont. Given the role that forests play in affecting stream flow and water quality, conservation activities might be increasingly focused on protecting water courses and enhancing watershed quality in these areas. As with water, recreation scarcity will increase as populations grow and forest area shrinks. Forest landowners might find increasing challenges in managing the remaining forests in this region as developed lands commingle with forests.

### 3. THE APPALACHIAN-CUMBERLAND HIGHLANDS: A DIVERSE AND COMPLEX FOREST ECOSYSTEM

The Appalachian-Cumberland highlands contain some of the most diverse forests in the Earth’s temperate zone. Here ecological diversity, linked to a varied topography, soils, and environment, merges with a broad range of human

settings from growing cities to isolated backcountry.

Projected land development focuses on a few growing cities, especially Nashville, greater Cincinnati, Knoxville, and Asheville, and the recreation centers of the Southern Appalachians, leaving a large majority of the region’s forests unaffected by land use change.

The forests of this region are expanding, sequestering more and more carbon, and used for a variety of goods and services including hardwood timber products, water protection, and wildlife.

The Southern Appalachians especially have long been a nationally significant recreation region. Future forests will be largely influenced by a combination of natural forest development processes, insect and disease effects, and surging recreation demands. As forests continue to age, projections indicate an increasing scarcity of this region’s younger forests or “early-succession habitat” that support certain types of wildlife.

The hemlock woolly adelgid already has decimated most of the region’s hemlock trees. Other pests

are expanding into the region. In similar fashion, emerald ash borer activity likely will lead to the demise of the region’s ash trees. Forest health experts are concerned about several other pests, including the potential impacts of thousand cankers disease on walnut; butternut disease on butternut; and a disease complex referred to as oak decline.

Conservation concerns regarding this region are an outgrowth of its high diversity. The Southern Appalachians (along with the Florida Panhandle) contain a high concentration of imperiled amphibians—many focused in an area where development pressures are high (figure 6). What’s more these highland forest watersheds provide drinking water to some of the rapidly developing cities in the Piedmont where water stresses are expected to experience significant growth.

### 4. THE MISSISSIPPI ALLUVIAL VALLEY: A HIGHLY MODIFIED RURAL LANDSCAPE

The MAV contains a small portion of its original forest cover, reflecting the dominance of cropland on its exceptionally productive soils. Here an agricultural economy has largely determined the allocation of lands among land and crop use. For every acre of forest there is 4.5 acres of crop or pasture (Figure 7).

Populations have shifted strongly in this region, as most rural counties experienced strong losses beginning in the 1970s, while cities at the periphery of the Alluvial Valley, including Memphis, Jackson, Little Rock, and Baton Rouge, grew over the same period. Future land use changes are expected to be relatively small given the high returns to agriculture, but

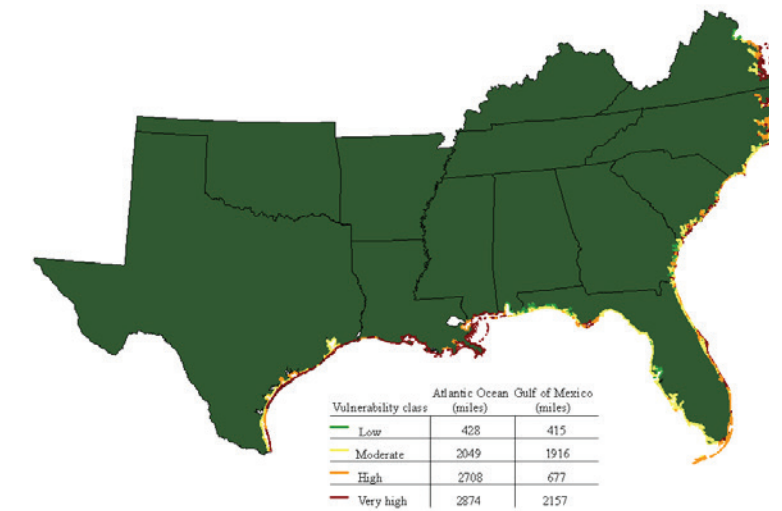


Figure 4. Figure 13-17—Coastal vulnerability to sea level rise along the Atlantic Ocean and Gulf of Mexico (Hammar-Klose and Thielier 2001).

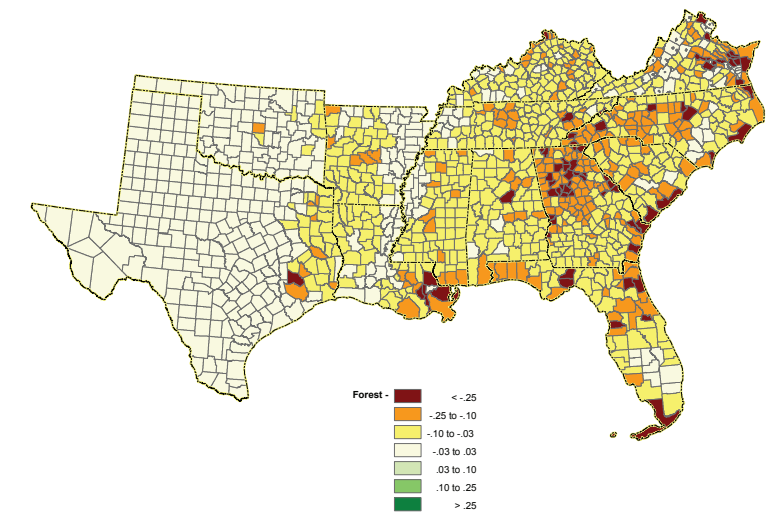


Figure 5. Change in proportion of county in a forestland use, 1997-2060 (Source: Southern Forest Futures Project for scenario Cornerstone B).

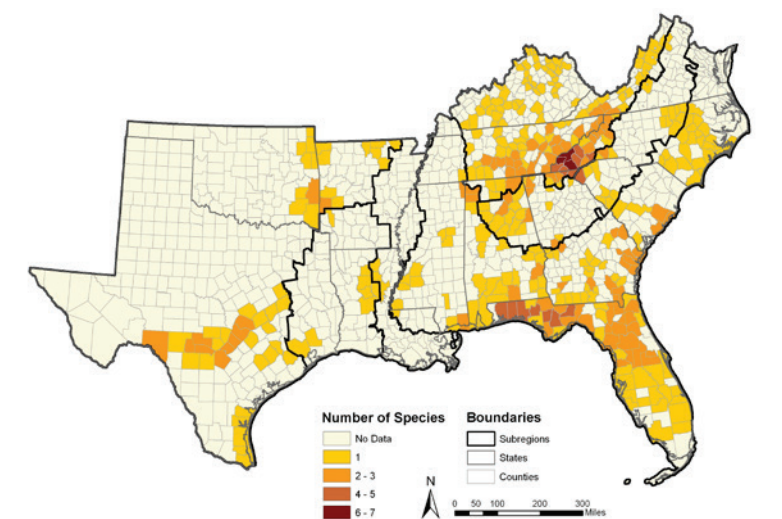


Figure 6. County-level counts for amphibian species of conservation concern in the South (Source: NatureServe data, in Southern Forest Futures Project).





driven by growth around these cities rather than by agricultural demands.

The future of forests ranges from small losses to small gains depending on the forecasts for urban growth, but also the future markets for timber, but the region also has a high potential for reforestation depending on future markets and programs.

Areas of conservation concern include coastal bald cypress-water tupelo swamps, which are vulnerable to degradation and loss from urbanization, altered hydrology, and sea-level rise. Lowland forests are aging and have been similarly degraded through altered hydrology, which might predispose some forests to increased insect and disease risk.

## 5. THE MID-SOUTH: TRANSITION FROM FOREST TO RANGE

The Mid-South region stretches from Arkansas and western Louisiana to the western boundaries of Texas and Oklahoma. This region includes highly productive pine forests in the east and

rangeland in the west with multiple woodland conditions. This variety of settings defines a broad range of resource management challenges.

Climate projections hold especially important implications for this region that is already accustomed to the effects of broad climate patterns (El Nino to La Nina) on periodic drought and their implications for wildfire. These cycles are expected to lengthen and deepen. Climate projections indicate persistent increases in average and seasonal temperatures, but provide mixed signals regarding precipitation in the future. Water stress in this arid region is expected to increase as warmer temperatures increase arid conditions and droughts could become more pronounced (figure 8).

Wildfire frequency and severity are projected to increase over the next 50 years. Predicted sea level rise along the Gulf Coast indicates losses of coastal forest habitat and damage to transportation and other infrastructure.

The cities of Houston, Dallas, and Austin define another of the South's growth centers and development is expected to consume large areas of rural land. Near Houston, this includes forestland—largely pine types—while development around Dallas and Austin is focused on woodland and rangeland habitats. Rapidly expanding populations and climate-driven water stress amplifies water scarcity for municipalities and agricultural uses.

## CONCLUSIONS

We projected a set of diverse future conditions across the region we know as the South, but also some common themes across resource issues. Each of the five broad regions of the South has a unique character that determines the focus of landowners, forest managers, and conservationists.

The Coastal Plain will continue to be the nation's wood basket and this will continue to be where the

South's forest plantations are located. It is also a growth region, especially near the coastal cities. Cropland will compete with forests in this region. The Southern Metroplex will drive growth in the Piedmont, resulting in expanding water use and quality issues. The Appalachians-Cumberland Highlands will continue to support a diverse forest ecosystem, but one increasingly subject to newly introduced forest pests. The Mississippi Alluvial Valley's dominant cropland won't change, and conservation issues for lowland forests will continue to be important.

The Mid-South will be especially impacted by climate change and urban growth in major cities in Texas. All the regions follow the same mega-trends and the South's forests will face substantial changes over the next 50 years.

The South's forests are part of a longstanding and active working landscape that will continue to evolve in the future, defining new and amplifying old resource management and conservation challenges. "Futuring" provides a way to identify these challenges in the long run and perhaps to help this broad community steer the course of effective management. ■

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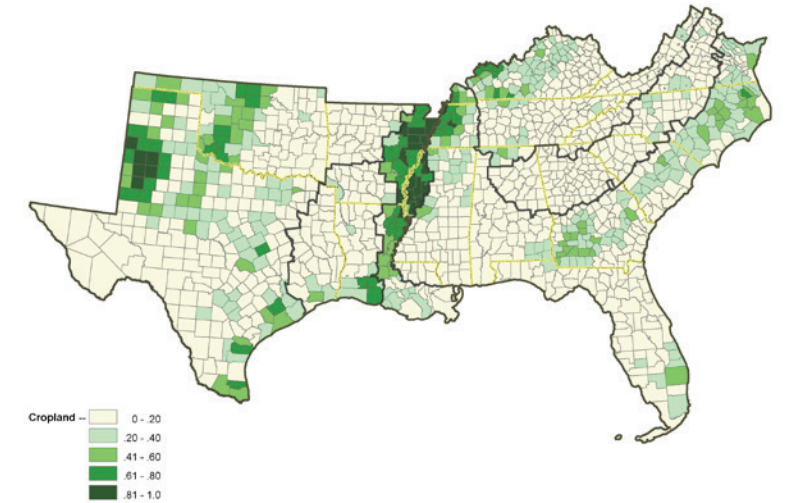


Figure 7. Proportion of county area in crop uses in 1997, U.S. South (Source: Southern Forest Futures Project, USDA National Resources Inventory).

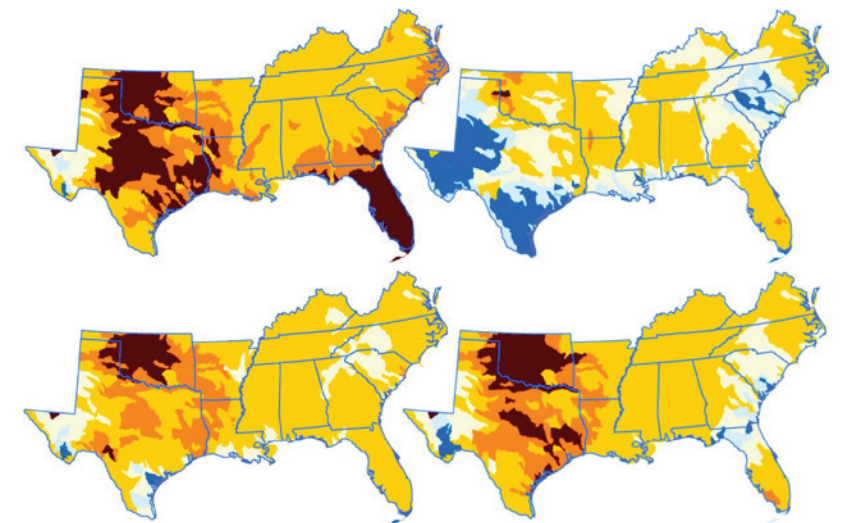


Figure 8. Change in a water stress index (WaSSI) due to climate change across scenarios for the South (Source: Southern Forest Futures Project.)

