

# Southern Forest Resource Assessment

## Terrestrial Ecosystems

### ABUNDANT FOREST COMMUNITIES

**History and Status:** Upland hardwood and pine types remain plentiful in the South but are subject to several health concerns. Southern pine beetle has had the largest economic impact of any forest pest over the past 30 years. The chain of forest changes begun by the chestnut blight continues; the latest change agent may be a disease complex called oak decline, which is especially severe in the Southern Appalachians and the Ozarks.

**Future:** With pine types, southern pine beetle will continue to be an economically important pest. Epidemics are likely where pines have been planted outside their natural range and in the absence of active management. Spillover epidemics from public land may continue to be problematic in the South. The complex of exotic insects and diseases affecting hardwoods has the potential to restructure forests, especially in the northern part of the region.

### RARE FOREST COMMUNITIES

**History and Status:** Many concerns about southern wildlife and plant species focus on rare forest communities. Fourteen critically endangered communities have lost more than 98 percent of their habitat since European settlement. Most are in seven classes: (1) old growth, (2) spruce-fir, (3) wetlands, bog complexes, and pocosins, (4) bottomland and floodplain forests, (5) glades, barrens, and prairies, (6) longleaf pine forests, and (7) Atlantic white-cedar swamps.

**Future:** Two of the seven classes—old growth and spruce-fir forests—are found largely on public land. The remainder is generally in private ownership, so their future depends on the decisions of numerous owners. Spruce-fir appears to be under the most stress, mainly from a combination of air pollution and an exotic insect. Remnant longleaf pine forests are threatened by development and fire exclusion.

## Water Quality, Wetlands, and Aquatic Ecosystems

### WATER QUALITY

**History and Status:** About 30 percent of the South has relatively good water quality, 36 percent has moderate water quality problems, and 34 percent has serious water quality problems. The leading causes of water quality impairment have been siltation, pathogens, and nutrients. Of the 11 major sources of water quality impairment, agriculture and urbanization have ranked highest, with silviculture ranking next-to-last. When properly implemented, best management practices (BMP's) are effective in controlling non point source pollution from silvicultural activities. Twelve of the 13 States have monitored BMP compliance and reported results. Differing survey methods among States preclude reporting regional trends. Consistency among States is improving, however, as six have adopted similar procedures since 1997.

**Future:** As timber production increases in the South, effective BMP implementation will remain crucial for protecting water quality.

### WETLANDS

**History and Status:** Approximately 32.6 million acres of forested wetlands occur in 10 Southern States (Assessment area minus Virginia, Texas, and Oklahoma). They represent 64 percent of the total in the conterminous United States. Forested wetland losses have been widespread but concentrated in the Mississippi Alluvial Valley and the Coastal Plain of the Carolinas. Rates of losses have declined since the 1970's but impacts and functional changes continue to occur.

**Future:** Land management practices and forecast urbanization are expected to continue to alter the function of wetlands. Wetland restoration efforts will continue, but their likelihood of success is not clear. Forest management practices will play an important role in the persistence of certain amphibian species.

#### AQUATIC SPECIES OF CONCERN

**History and Status:** The South supports a great diversity of aquatic life. Several hundred species of concern are found among the amphibians, mussels, crustaceans, fish, snails, and aquatic insects of the region. especially high concentrations of critically imperiled species occur in mussel, fish, and amphibian biota due to modifications of aquatic and wetland habitats.

**Future:** For many mussels and some other species, declines will continue due to the effects of essentially irreversible actions such as damming, agricultural conversions, and the introduction of exotic species. Many aquatic species of concern are narrow endemics. The effects of development and management may be disproportionately high for the small areas they occupy.

### 4.2 Subregions of Concern

Our assessment of forces of change and their potential implications for forest systems shows especially large effects in three areas of the South.

- o **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. Forest-based recreation demands are focused on the Southern Appalachians, and increased competition between recreation user groups is anticipated. A complex of forest health issues is also affecting all forest types in this region and has the potential to restructure forest ecosystems.

- o The spruce-fir forest community is in decline because of the balsam wooly adelgid, an exotic insect that kills high elevation firs, combined with acid deposition and ozone pollution. Here is the most extreme case of ecological decline in the South.

- o Upland hardwood types are also subject to changes from several sources. Oak decline combined with gypsy moth infestations could soon reshape forest structure by reducing oaks in the overstory. In addition, dogwood anthracnose, butternut canker, and beech bark disease will greatly reduce the distribution of their respective host trees in much of the area. Loss of these tree species along with oaks will reduce the production of both hard and soft mast and therefore impact mast-dependent wildlife species.

- o The hemlock wooly adelgid kills both the eastern and the Carolina hemlock and is currently moving down the Blue Ridge from the Shenandoah Valley. While they occupy a narrow range of sites, hemlocks influence stream microclimate in headwater reaches, so loss of this species can have disproportionate influence on the quality of water in the region. Because the Southern Appalachians are headwater areas for several developing metropolitan areas in the Piedmont, changes in water quality and water production could have important economic implications.

### 4.4 Knowledge Gaps and Scientific Uncertainties

As with any endeavor of this scope, an assessment of knowledge identifies the extent of our ignorance. Available information has allowed us to identify several emerging issues about the sustainability of southern forests, but additional information is needed to refine understanding and more clearly identify problems and solutions. Each chapter in

the Technical Report identifies key uncertainties in specific topic areas. The following are some key issues that cut across the various topic areas:

- **Expanding populations and impacts on ecosystems.** More heavily populated rural and urban landscapes will impact wildlife, water, and other benefits derived from forested ecosystems in the South. Additional information is needed to reduce uncertainties regarding: (1) forecasts of how and where these changes might occur, (2) how human population density influences forest ecosystems and options for their management, and (3) how development can be designed to promote forest sustainability.

- **Markets, management, and values.** Because private landowners control most southern forests, forest conditions are determined by private management choices. These choices are heavily influenced by markets for forest goods and services and by other values derived from forests. A full accounting and understanding of how values are formed and how decisions are made is crucial for clarifying how forest uses and the flow of benefits will change in the future.

- **Forest Productivity.** The productivity of forest ecosystems is a key factor in determining land allocation, forest use, and ultimately forest conditions across the South. Productivity extends beyond timber production to include the provision of wildlife, clean water, and other benefits of forests, and is influenced to uncertain degrees by several forces of change.

- **Forecasting ecological changes.** This Assessment has highlighted the multiple forces of change at work in the South's forests. Yet tools are not available for: (1) forecasting the implications of these multiple, interacting changes on the area, structure, and function of southern forest ecosystems, and (2) fully understanding the impacts on values that are derived from these systems. Such tools would help identify emerging scarcities within the region.

- **Analysis at landscape and regional scales.** Science and management conducted at these broad scales are relatively new endeavors. Most forest research has been conducted at very fine scales, often without the information needed to develop implications at broader scales. When the scale at which the science is conducted does not match the questions that are being asked, answers are often incomplete.

- **Fire ecology and management.** Elimination of natural fire cycles is one of the most substantial alterations imposed by humans on the forested ecosystems of the South. Uncertainties exist regarding: (1) the role of fire in specific ecotypes, and (2) strategies for effectively and safely reintroducing fire into forest ecosystems.

- **Pine plantations and ecosystem functions.** Some portions of the South will see increased concentrations of pine plantations. Landscape-level ecological implications of increased pine plantations are uncertain. Additional information on the wildlife implications of expanding pine plantations is needed, especially in the Coastal Plain of Georgia, Alabama, Florida, and Mississippi.

- **Forest management approaches.** This Assessment has described an increasingly complex environment for conducting forest management and suggests a need for a broader array of management strategies. New management approaches