

Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

1
A989M

CA/End
Reserve



United States
Department of
Agriculture

Forest Service

Miscellaneous
Publication No. 1461

The South's Fourth Forest: Opportunities To Increase the Resource Wealth of the South



The Forest Service, in collaboration with State forestry agencies, forestry schools, forest industries, and other forestry interests, has prepared a comprehensive analysis of the timber situation in the 12 Southern States. This analysis is published as Forest Resource Report 24, "The South's Fourth Forest: Alternatives for the Future." The present publication summarizes the major findings of that report.

"The South's Fourth Forest" is available for purchase from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161, in both paperbound and microfiche.

United States
Department of
Agriculture

Forest Service

Miscellaneous
Publication No. 1461

Washington, DC
June 1988

The South's Fourth Forest: Opportunities To Increase the Resource Wealth of the South

Foreword

There is a tide in the affairs of men which
taken at the flood leads on to fortune; omitted,
all the voyage of their life is bound in shallows
and in miseries.

(Shakespeare, *Julius Caesar*)

In recent decades there have been great achievements in forestry in the South. The huge areas of cutover, unproductive land and the uncontrolled fires of the late 1800's and early 1900's are problems of the past. A second forest and then a third forest have been regenerated. The second forest has been harvested; timber from the third forest is now the most important agricultural crop in the South. The industries processing this timber lead all other manufacturing industries in numbers of employees and in wages and salaries paid to workers.

So the tide has been rising in the South. But now it is beginning to ebb. The most recent surveys of forest resources show that net annual timber growth is declining. Softwood timber removals are above net annual growth over large areas, and inventories are beginning to decrease. A similar situation is in the offing for hardwoods. Unless action is taken to sustain increases in timber growth and inventories, the economic importance of the forestry sector in the South will surely decline.

But we can change this outlook. We have opportunities to approximately double current softwood growth and sustain employment and income in the forestry sector. If we take these opportunities, we can move on to fortune. We can greatly increase the real wealth of the South and the Nation, to the benefit of present and future generations.



F. Dale Robertson
Chief, Forest Service

Preface

This report summarizes and highlights the major findings of a comprehensive analysis of the timber situation in the South: "The South's Fourth Forest: Alternatives for the Future."¹ The basic purpose of the analysis is to describe what kind of forest is evolving in the South, what kind of forest will be of greatest benefit to the economy and society, and how it can be achieved.

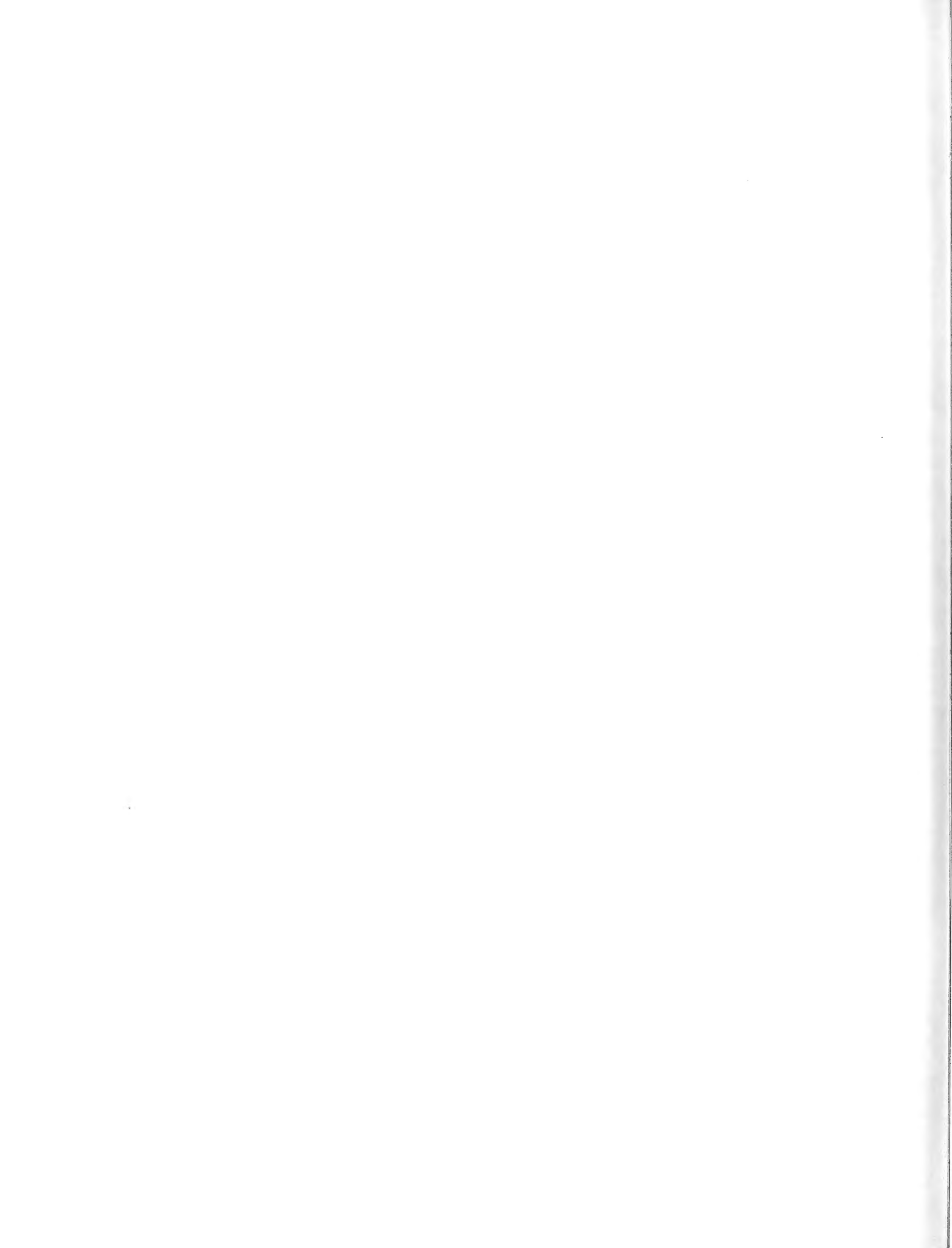
To meet these broad objectives, the analysis describes recent and prospective trends in the timber resource; the economic, social, and environmental implications of these trends; and the opportunities to manage and use forest resources in ways that will sustain continued increases in timber growth and the forestry sector of the economy while protecting and enhancing the forest environment. "The South's Fourth Forest" also describes recent and prospective trends in timber demands; the forest resource base; the economic importance of timber and the forest industries; and the policies and programs—fire protection, technical and financial assistance, research, education, and the management of private and public timberlands—that have been effective in the regeneration of the second and third forests in the South.

The work on the comprehensive analysis was a collaborative effort carried out with the assistance, advice, and guidance of participants from State forestry agencies, timberland owners, forestry schools, forest industries, and consulting foresters. The geographic area covered includes 12 Southern States divided into two regions. The Southeast region includes the five States along the Atlantic coast—Virginia, North Carolina, South Carolina, Georgia, and Florida. The South Central region includes seven States along the gulf coast and inland—Alabama, Mississippi, Louisiana, Arkansas, Tennessee, Oklahoma, and Texas.

¹ U.S. Department of Agriculture, Forest Service. [In press.] The South's fourth forest: alternatives for the future. For. Resour. Rep. 24. Washington, DC: U.S. Department of Agriculture, Forest Service.

Contents

	<i>Page</i>
The Setting for the Future	7
Timber—A Resource With Growing Demands	9
Development and Economic Importance of Forest Resources and Forest Industries in the South	13
The Changing Timber Resource Situation	18
The Economic, Social, and Environmental Implications of the Changing Timber Resource Situation	22
The Opportunities To Increase Timber Supplies	25
Increased Productivity in the Fourth Forest	28



The Setting for the Future

When the first settlers arrived in the South, they faced a great forest that stretched from the Atlantic coast to the Plains of the West. They began to clear this forest for farms, towns, and roads. Some of the forest was also cut for timber for cabins and furniture, fences and fuel, and for exports to England and other European countries. As the population grew and economic activity and trade expanded, the cutting of forests accelerated. As a result, the forest and timber resources that exist today are much different from those at the time settlement began.

The uses of the forest and forest land have also changed over time. But they still play a vital role in the social, cultural, and economic life of the South. They provide sites for recreation for tens of millions of people; they protect watersheds that are the source of water for much domestic and industrial use; and they provide habitat for nearly all

wildlife and fish species in the South. Forests and forest lands also produce forage for domestic livestock and wildlife, and minerals that are important to the national economy. Of all the benefits associated with southern forests, however, timber is usually considered to be the most important economically.

Timber generates employment and income throughout the South's economy, not only in jobs directly related to timber management, harvesting, and processing of primary wood products but also in the manufacture or construction of all products containing wood or wood fiber and in wholesale and retail trade, transportation, and other service and trade industries. Every household and business uses timber products in some form such as furniture, paper, containers, or the thousands of other things made in whole or in part



By 2030 there will be 319 million people in the United States. Per capita incomes will more than double. So there is a big job ahead—meeting the timber demands of another 77 million people, and those of 319 million with incomes more than twice those of today.

from wood. So timber is important, and changes in the timber resource affect everyone in the society in some way.

In the future as in the past, changes in the timber resource will be determined in large measure by three factors: (1) growth in population, economic activity, and income; (2) changes in timberland area; and (3) changes in the management intensity and associated growth of timber on those lands available for timber production.

Changes in population greatly influence the demands for timber products and the conversion of timberland to uses such as food and fiber production, recreation, and urban development. In the last five decades, the Nation's population has nearly doubled, rising from 123 million to 242 million people. All recent projections show the population continuing to grow. In this study, the population was assumed to reach 319 million by 2030, some 77 million above that of today (fig. 1).

Since 1929, economic activity, as measured by the gross national product in constant dollars (net of inflation and deflation), has increased by more than five times. This period has seen a major depression and a number of recessions. In each case, the economy has recovered. The basic forces that brought about longrun growth are still active. The projections used in this study show that economic activity will nearly triple by 2030 (fig. 1). Total income available for spending (disposable personal income) in constant dollars is also projected to nearly triple by 2030; per capita income, the amount each person has to spend, will increase almost 2.1 times (fig. 1).

These projections of population, economic activity, and income are a measure of the job ahead—meeting the timber demands of another 77 million people and those of 319 million people with incomes more than double those of today.

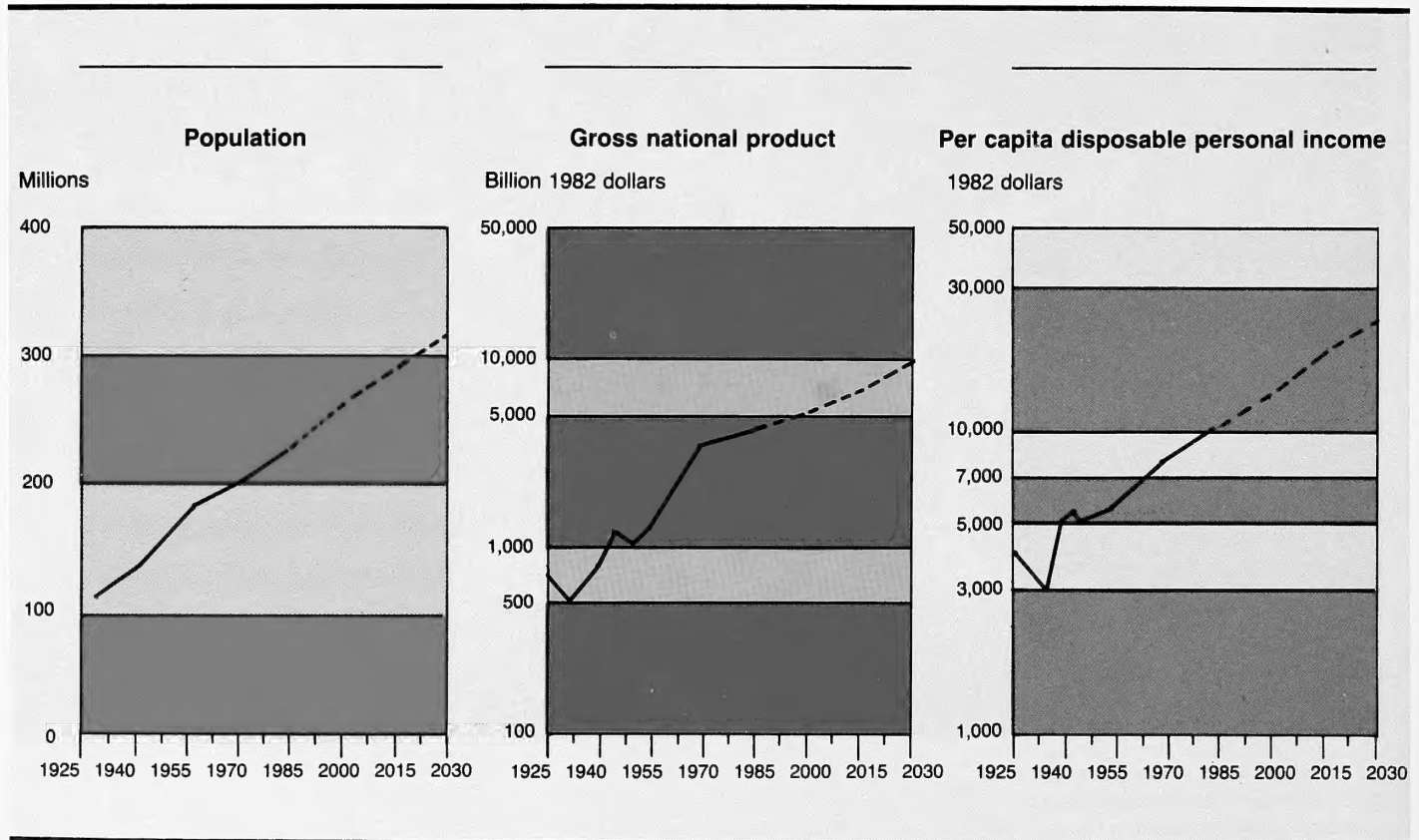


Figure 1—Population, economic activity, and income in the United States, 1929–86, with projections to 2030

Timber—A Resource With Growing Demands

Of course, no one knows what the future holds, and what actually happens may be greatly different from the above projections. However, these projections are consistent with general societal goals of full employment, continued economic growth, rising income, and most current expectations about the future.

For a long time, timber was the Nation's most important raw material. It was used for homes and furniture, for fuel, for bridges, for railroads and telegraph poles, for fences, and thousands of other uses. And timber is still important. It is the source of about a quarter of all the raw material consumed in the economy. It is also used as heating fuel in millions of homes.

Although over time there have been ups and downs in the consumption of some timber products, such as lumber and fuelwood, the trends in use in recent decades have been clearly upward (fig. 2). Between 1962 and 1984, for example, the annual consumption of sawlogs for lumber increased by 34 percent, going up from 5.9 billion to 7.9 billion cubic feet. Pulpwood use rose by 61 percent, from 3.3 billion to 5.3 billion cubic feet per year. The consumption of logs in veneer and plywood went up by 67 percent, and fuelwood use from growing stock sources alone² more than tripled.

The total volume of roundwood—the sawlogs, veneer logs, pulpwood, fuelwood, etc.—used for lumber, veneer and plywood, woodpulp, fuel, and all other products increased by 50 percent, rising from 11.1 billion to 16.7 billion cubic feet per year over the 1962 to 1984 period (fig. 3). The consumption of softwood roundwood went up from 8.4 billion cubic feet to 12.4 billion. Hardwood roundwood use rose from 2.6 billion to 4.3 billion cubic feet. Most of the increase in hardwood consumption has taken place since the mid-1970's.

Increased consumption of roundwood has been related to growth in population, economic activity, and income. The projected increases in these things are indicators of higher demands for timber ahead. An additional 77 million people and a total population of 319 million people with 2.1 times the spendable income of today can only mean much larger demands for timber as well as for all other raw materials and goods and services.

In terms of volume, most of the future growth in demand is for pulpwood and fuelwood. But substantial increases are also expected for lumber and for most other timber products. The total demand for timber is projected to rise from 16.7 billion cubic feet in 1984 to 22.3 billion in 2030 (fig. 3). This rise, although substantial, occurs over a 45-year period and is much below the rate of increase recorded during the last two and a half decades.

² Large volumes of wood used for fuel (2.3 billion cubic feet in 1984) are produced from nongrowing stock sources.



Between 1962 and 1984, the volume of roundwood—the sawlogs, veneer logs, pulpwood, fuelwood, etc.—used for lumber, plywood, woodpulp, fuel, and all other products increased 50 percent, rising from 11.1 billion to 16.7 billion cubic feet. By 2030 the demand for roundwood is projected to rise another 34 percent and amount to 22.3 billion cubic feet. Southern forests will be expected to supply much of these increased demands.

Billion cubic feet

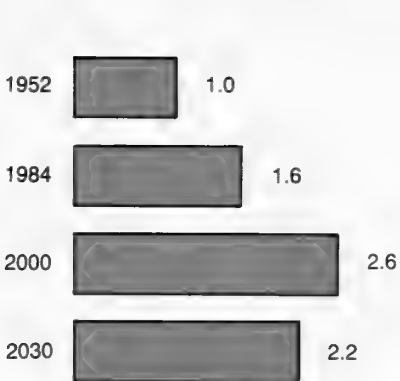
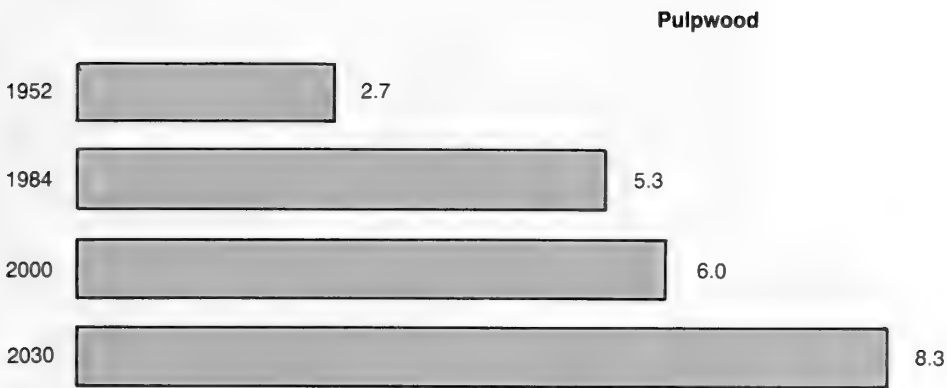


Figure 2—Roundwood consumption in the United States by product, 1952–84, with projections to 2030

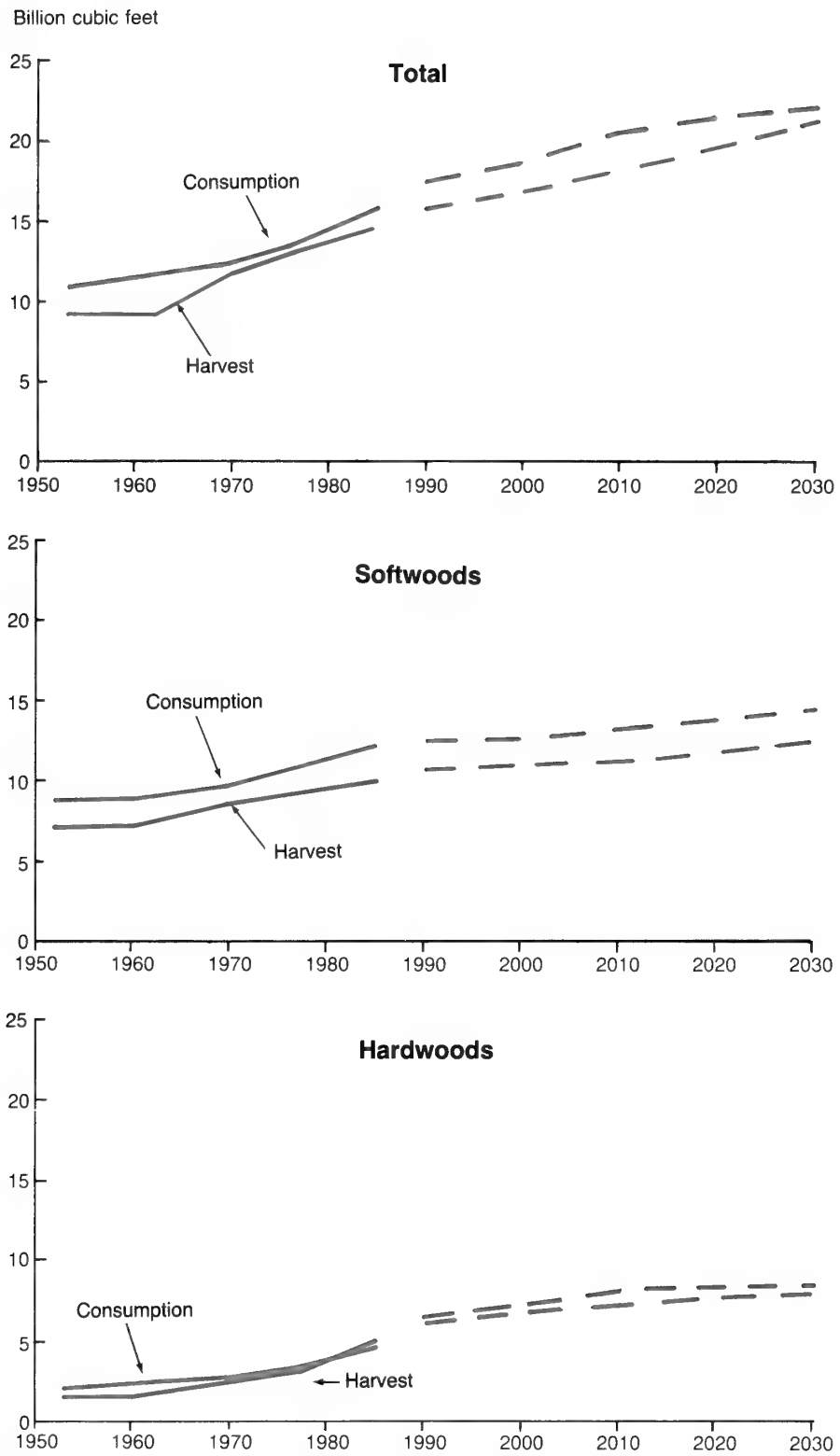


Figure 3—Roundwood consumption and harvests in the United States, 1952–84, with projections of demand and supplies to 2030

Development and Economic Importance of Forest Resources and Forest Industries in the South

The United States has always carried on a substantial volume of trade in timber products with other countries. In recent decades, imports have exceeded exports. This situation is expected to continue. Therefore, part of the demand for timber will be met by net imports, the difference between the two lines in figure 3. Increasingly, however, timber demands will be met by wood from domestic forests.

Total demands on U.S. timberland rise from 14.6 billion cubic feet in 1984 to 20.3 billion in 2030. The demand on softwood resources (pines, cypress, firs, spruces, hemlocks) increases from 10.3 billion to 12.7 billion cubic feet per year. Annual demand on hardwood resources (oaks, hickories, gums, maples) rises from 4.4 billion to 7.6 billion cubic feet.

The faster growth in demand for hardwoods largely reflects the increase in their use for pulpwood, fuelwood, and lumber products such as pallets and railroad ties. Much of the increase in the use of timber in recent decades, both softwoods and hardwoods, has been supplied by the forests in the South. Much of the future increase in demands is also likely to be met by timber cut from southern forests.

Although large areas of the original forest had been cleared for use as cropland and pasture and for other purposes, timber harvesting was not a major factor affecting the forests in the South until after the Civil War. At that time, timber harvesting accelerated as railroads were extended into the vast pine forests on the Coastal Plain, the technology for sawing large volumes of timber came into use, and huge markets for lumber developed in the Midwest and Northeast. From about the 1880's until the 1920's, very large areas were harvested. Some of this land was used for crops and much bigger areas for pasture. Because of such use and uncontrolled fires, which burned over large areas of cutover land each year, only a part of the cutover lands came back to forests. Some did, however, and the early 1900's marked the beginning of what became the South's second forest—the forest that later supplied the wood for the expansion of the pulp and paper industry in the 1930's and on into the 1960's.

As the second forest was developing, changes in land use began to have major impacts on the forest situation. By the early 1920's, the use of land for crops and pasture in the South had peaked and started to decline. Concern among forest industry and government leaders about timber supplies and the lack of regeneration of large areas of cutover lands led to (1) the development of programs of fire protection, technical and financial assistance, research, and education; and (2) the establishment of managed private and public forests. These changes gradually led to new forests in the South.

Fire protection and the educational programs associated with fire prevention were especially effective, and a large part of the cutover and idle cropland and pasture regenerated naturally. Research that led to ways to protect, regenerate, and manage forests and utilize southern pine timber for products such as pulp and plywood also had major impacts on the resource and forest industries.

These same forces continued to affect the timber situation for several decades. The programs of protection, technical and financial assistance, research, education, and management of private and public forests expanded, sometimes rapidly, from the 1940's through the 1970's. The area of land used for crops and pasture continued to drop through the 1950's, sometimes at rapid rates, and much of this land regenerated naturally.



From about the 1880's and into the 1920's, very large areas of timberland were harvested in the South. Because much of this land was used for crops and pasture, and uncontrolled fires burned on large areas each year, only a part of the cutover land came back to forest. Some did, however, and this became the South's second forest—the forest that supplied the wood for the expansion of the pulp and paper industry that began in the 1930's. In time, the South's third forest also developed—the one that will supply the timber for the forest industries in the South until around 2000.



Programs concerned with protection, technical and financial assistance, research, education, and the management of private and public lands expanded, sometimes rapidly from the 1940's through the 1970's. This, and the availability of large areas of idle cropland and pasture, led to the regeneration and growth of the South's third forest, one of forestry's greatest achievements. Fire protection was especially effective and necessary for the natural regeneration of cutover and idle croplands and pasture.

This combination of events led to what is surely a great achievement in the history of forestry, the regeneration and the growth of the South's third forest. There are now 182 million acres of timberland in the South. Timberland is defined as land capable of growing 20 cubic feet of timber per acre per year and not withdrawn from utilization for timber harvests by law or administrative regulation.

Timberland is the predominant land use in the South; it covers 2 to 3 out of every 5 acres in all the Southern States, including eastern Texas and eastern Oklahoma. There are more acres in timberland than in cropland and pasture combined.

The South's timberland is composed of a diversity of forest types. Approximately one-third of the area is covered by pine types, 41 million acres in natural pine stands and another 21 million acres in planted pine. Loblolly pine is by far the most abundant species. It occurs in natural stands in most sections of the Coastal Plain and Piedmont, where it has frequently seeded in on idle cropland and pasture. These stands usually contain substantial numbers of hardwood species as well. Across much of the South, pine stands represent a transitional stage in natural succession to hardwood forest types.

Mixed pine-hardwood stands occupy 27 million acres, or 15 percent of the timberland in the South. Typically, these stands are 50 percent or more oak and 25 to 50 percent pine.

Hardwood forest types occupy over half the timberland area in the South, 93 million acres. Two-thirds of this area is classified as upland hardwoods. A typical upland hardwood association includes oaks and hickories, with gum, yellow-poplar, elm, and maple.

There are 30 million acres of bottomland hardwoods in the South, about 17 percent of the timberland. Over half of these bottomland forests are located along the alluvial floodplains of the major rivers in Louisiana, Florida, Georgia, and Mississippi. Oak-gum-cypress is the typical association on these sites, with such species as willow, water, laurel, swamp chestnut, and cherrybark oaks; water tupelo; blackgum and sweetgum; and baldcypress.

Some 164 million acres, or 90 percent, of the timberland in the South is in private ownership. The bulk of this area, 122 million acres, is in the other private ownership category, that is, all private ownerships other than forest

industry (fig. 4). This category is diverse: it includes farmers and all other individuals and corporations that do not run wood-processing plants. Corporate owners include a variety of organizations holding timberland property as an investment, recreational area, or for other purposes. Typical corporate owners are utility companies, railroads, realty firms, hunting clubs, insurance companies, and banks. Farmers own 40 million acres of timberland, corporate owners 16 million acres, and other private individuals 66 million acres. These acreages represent approximately one-fourth, one-tenth, and one-third, respectively, of all the timberland in the South.

Forest industries hold 42 million acres, slightly less than one-quarter of the total area of timberland. This category includes companies or individuals that operate primary wood-using plants and either own timberland or hold a long-term lease on such land.

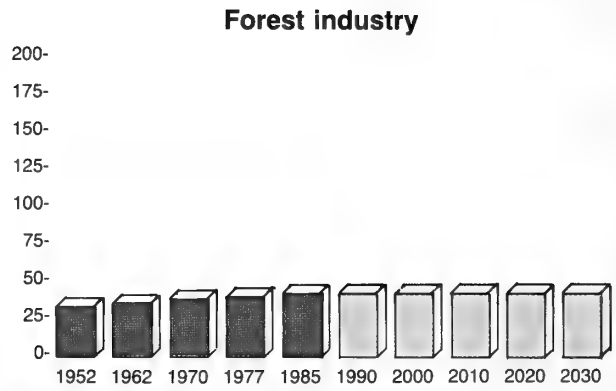
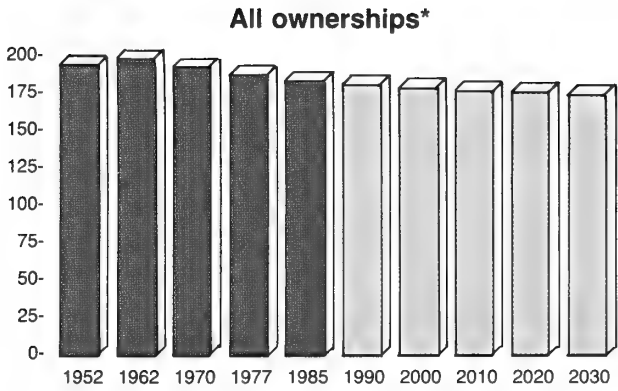
About 60 percent of the 18 million acres of publicly owned timberland in the South is in national forests. The rest is in State forests and wildlife refuges and other Federal, State, and county lands.

In 1984, the softwood timber inventory on timberlands in the South was 102 billion cubic feet, about equally divided between the Southeast and the South Central regions. There was an additional 119 billion cubic feet of hardwood timber, also about equally divided between the regions.

As with timberland area, the timber inventory is concentrated on the other private ownerships—these contain 73 percent of the hardwood and 61 percent of the softwood inventories. Another 16 percent of the hardwood inventory and 26 percent of the softwood inventory are on forest industry ownerships. Most of the remaining inventories are on the national forests.

In 1984, an estimated 7.5 billion cubic feet of roundwood timber products—sawlogs, veneer logs, pulpwood, fuelwood, and other round products—were harvested from the forests in the South. Over 5 billion cubic feet of this volume came from softwood species, primarily southern pine, and 2.5 billion cubic feet came from a variety of hardwood species. The value of standing timber—the trees from which these products were cut—in 1984 was \$3.1 billion, \$2.7 billion for softwoods, and \$0.4 billion for hardwoods. This amount, the stumpage value, represents the value that landowners received from the sale of timber.

Million acres



*Includes public ownership

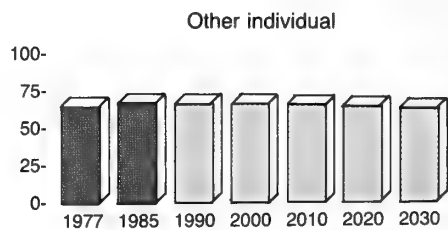
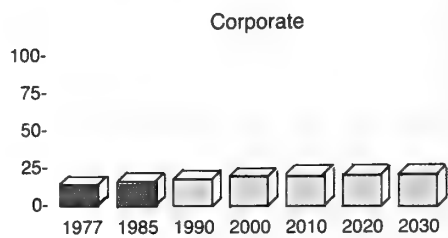
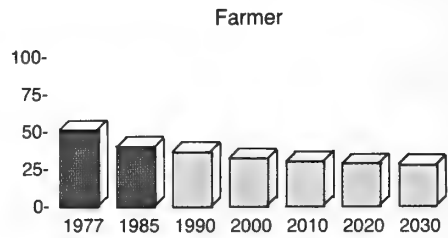
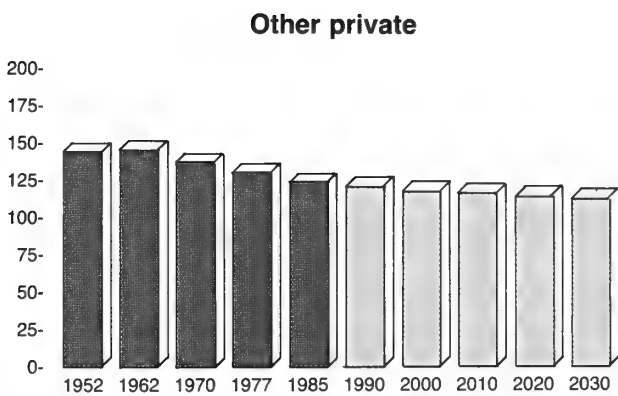


Figure 4—Timberland area in the South by forest ownership, 1952–85, with projections to 2030

When the value added from harvesting the timber and transporting it to rail sidings, concentration yards, or other local points of delivery is included, the value of roundwood timber output in the South was \$6.1 billion in 1984. The value of softwood products was approximately \$4.5 billion, that of hardwood products, \$1.6 billion.

The \$6.1 billion of roundwood timber products in 1984 was twice the value of soybeans or cotton harvested and three times the value of tobacco, wheat, or corn crops in the South (all values at local points of delivery) (fig. 5). With a few exceptions, the value of the timber harvest exceeded the value of these crops State by State as well. Compared to total agricultural production Southwide, there was \$1 of roundwood timber output for every \$3 of other agricultural crops.

The timber harvested in 1984 ranked among the top three agricultural crops in terms of value of production in all 12 Southern States. It was first in value in six States—Virginia,

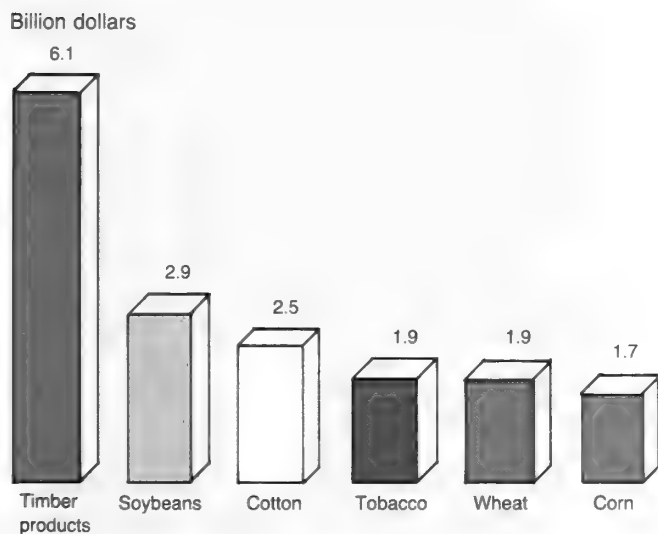


Figure 5—Value at local points of delivery of roundwood timber products and the highest valued agricultural crops in the South, 1984

South Carolina, Georgia, Alabama, Mississippi, and Louisiana. In Alabama, roundwood timber products almost equaled in value the total for all other crops. In the other five States, the value of roundwood products was equivalent to two-fifths to three-fifths of total values of all other crops.

Round timber products (sawlogs, veneer logs, and pulpwood) are the raw material for forest industries, which are composed of approximately 17,000 sawmills, pulp and paper plants, millwork and furniture plants, wood-preserving plants, and other manufacturing plants that process wood or wood products in some form.

In relation to all manufacturing in the South in 1982, forest industries employed one out of every nine workers, paid \$1 out of every \$10 in wages and salaries, and produced \$1 out of every \$11 of value added by manufacturing. Aggregate employment and income in the forest industries across the South exceeded those in other major manufacturing industries, such as textiles, apparel, nonelectrical machinery, food products, electric and electronic equipment, chemicals, and transportation equipment (fig. 6). The forest industries ranked first or second in economic importance among manufacturing industries in over half the States in the South.

Wages and salaries in the forest industries support employment and income in all the other parts of the economy producing goods and services for forest industry firms and their employees. An additional \$1 paid out in wages and salaries by a forest industry firm increases total income in the economy by about \$2.40.

It is clear that forests in the South have come back a long way since the early 1900's, when fires were uncontrolled and huge areas of cutover timberland were idle and unproductive. Today, timberland is the major land use, the source of the highest valued agricultural crop, and the base for the leading manufacturing industry in terms of employment and income. But there are still opportunities for further progress, opportunities to greatly increase the forest wealth of the South.

The Changing Timber Resource Situation

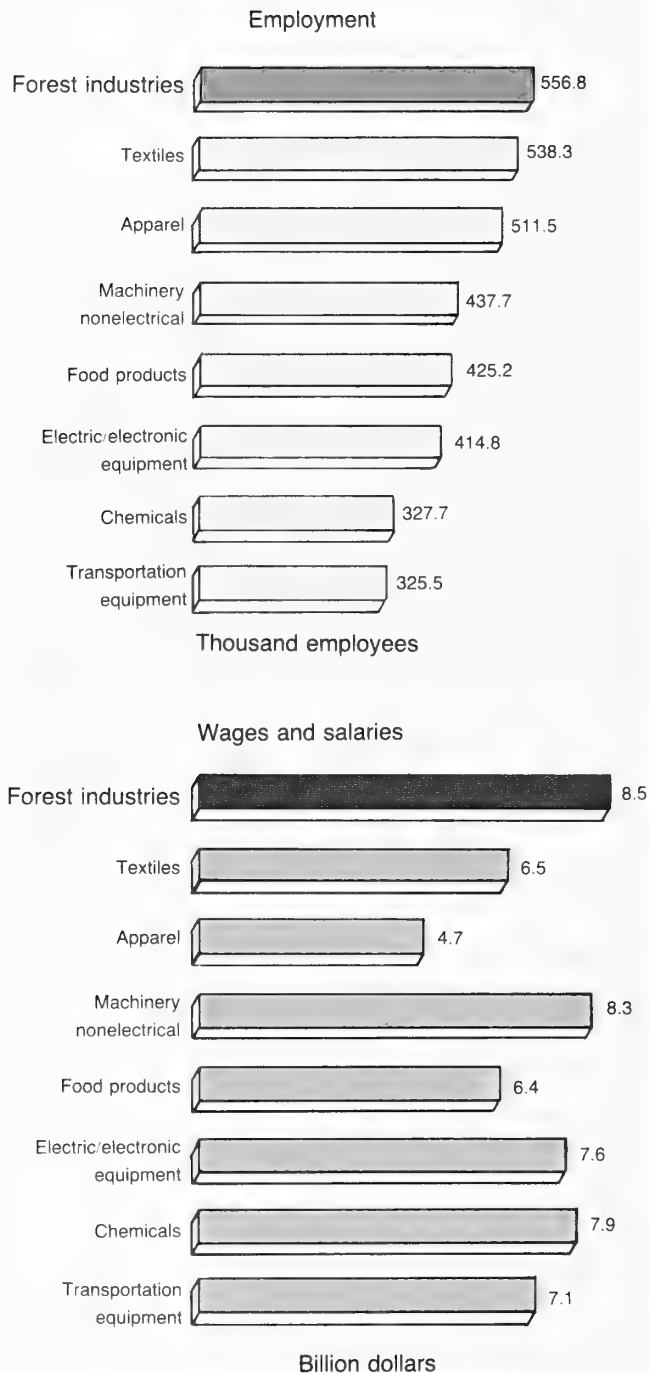


Figure 6—Employment and wages and salaries in manufacturing in the South, by industry, 1982

Although there are opportunities to greatly increase forest productivity, there are now trends underway in the timber resource that are a cause for concern. The most recent surveys of forests conducted by the Forest Inventory and Analysis research units in the South show that net annual timber growth for softwoods and hardwoods, after rising for decades, has begun to decline.

There are four major causes of the decline in softwood growth. One is the lack of adequate regeneration of pine stands after harvest on lands in private ownerships other than forest industry. The natural succession after harvest in most of the pine stands is to mixed hardwoods and pine or to hardwoods. Many of the other private owners have been accepting whatever species nature provides. As a result, the latest cycle of forest surveys shows a 30- to 50-percent decline in the number of pine saplings on these ownerships. This decline has been going on long enough to be reflected in net annual growth.

A second factor acting to reduce net annual softwood growth is an increase in the volume of mortality and cull trees. Over the last 10 years, for example, annual pine mortality in the South has about doubled. Roughly 15 percent of the gross annual growth in pine is now lost to mortality, compared to 9 percent 10 years ago. Much of the increase in mortality can be attributed to outbreaks of pine bark beetles. Part of the rise in mortality is attributable to suppression of overtopped trees. Much of the rise in cull tree volume is attributable to increasing stand age.

The third important factor affecting net annual softwood growth has been a drop in radial growth in the Piedmont and mountain regions of Georgia, South Carolina, North Carolina, and Virginia. In these areas, average annual radial pine growth has been some 20 to 30 percent lower during the last 10 years than in the preceding 10-year period. The causes of the decline in radial growth have not been determined. Changes in stand density and age, drought or other weather factors, the depletion of fertilizers in old fields that came back to pine, an increase in hardwood competition, and atmospheric deposition are all possible contributing factors.

The fourth factor, which affects both hardwood and softwood growth, has been the conversion of timberland to cropland and pasture or urban and other nontimber uses. Since the early 1960's, the area of timberland in the South has declined from 197 million acres to 182 million. Approximately one-third of the loss can be attributed to the conversion of hardwood bottomlands to cropland, especially



The most recent surveys of forests in the South show that net annual timber growth for softwoods and hardwoods, after rising for decades, has begun to decline. There are four major causes of the decline: (1) lack of adequate regeneration of pine stands after harvest, (2) an increase in mortality and cull trees, (3) a decline in radial growth, and (4) the conversion of timberland to other uses.

in the Mississippi Delta. Most of the loss, however, was from pine stands in other private ownerships.

All of these factors affecting net annual growth are the result of forces not easily or quickly changed. And even when they are changed, time will pass before the effects show as a measurable increase in net annual growth. The effects of regeneration after harvest on the other private ownerships, for example, would not show up for a decade or so: it would take that long for the trees to reach 5 inches in diameter at breast height, the minimum tree size used in measuring net annual growth. Thus it is inevitable that recent trends will continue for a while. Only time and large increases in current management programs, especially the regeneration programs, can turn these trends around so that net annual growth is rising again.

During the period in which net annual timber growth has been declining, timber removals have increased very rapidly.

This situation reflects increased timber harvests to meet the rapidly expanding national demands for timber products described above. As a result, softwood timber removals now exceed net annual growth over large areas in the South. Net annual hardwood growth is still above removals, but the trends are converging.

As with net annual growth, the trends in timber removals are the result of forces that are not easily or quickly changed. Thus, like the declines in net annual growth, these trends in timber removals are also likely to persist for a time.

The projections in the study show that the trends in net annual growth and removals do persist (fig. 7). Net annual growth of softwoods declines through the early 1990's, and that for hardwoods until 2010. Beyond those times, net annual growth rises again. Timber removals continue to rise through the projection period, although at a much slower rate than during the last two decades.

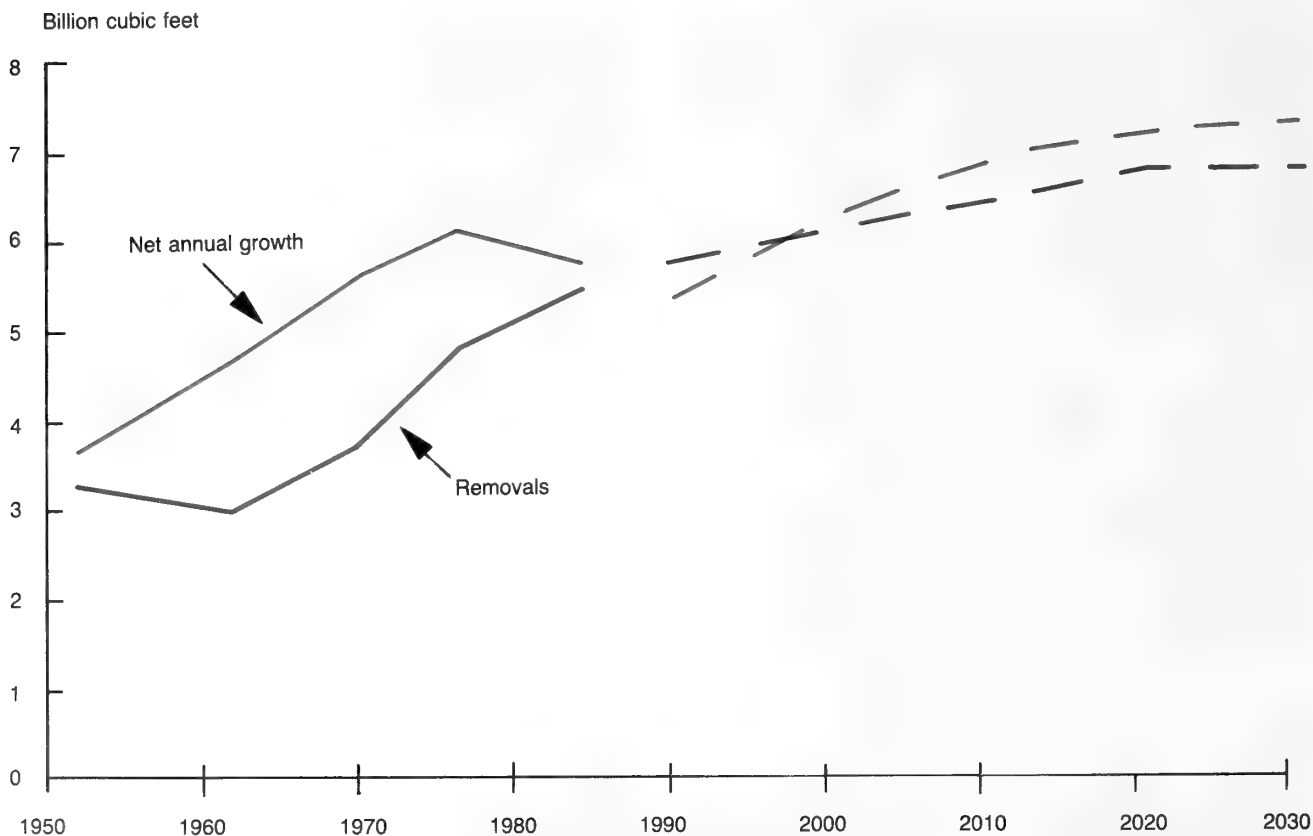


Figure 7—Softwood net annual growth and timber removals in the South, 1952–84, with projections to 2030

As a result of these trends, softwood timber removals are above net annual growth until the early 1990's, and timber inventories decrease until after 2000. Then, as net annual growth increases and goes above removals, softwood timber inventories increase; but at the end of the projection period, they are still below the level reached in 1985.

Although the net annual growth of hardwoods is declining, growth exceeds timber removals until the late 1990's (fig.

8). And even though net annual hardwood growth starts to go up after 2010, it remains substantially below removals. As a result, hardwood timber inventories start to decline after 2000 and continue to do so through the rest of the projection period.

The trends in inventories mean that the forest industries in the South will be facing intensifying competition for timber in the future. Declining inventories also mean that the

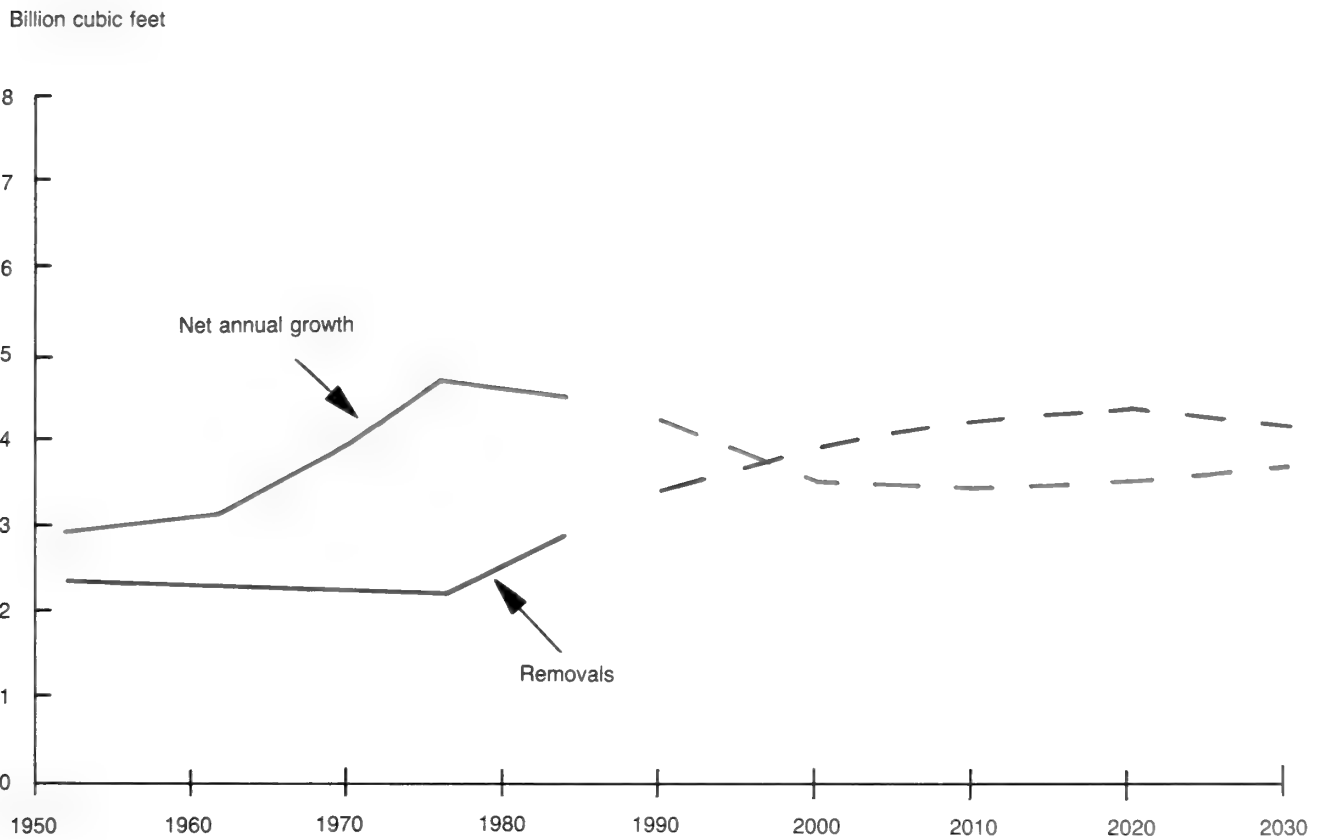


Figure 8—Hardwood net annual growth and timber removals in the South, 1952–84, with projections to 2030

The Economic, Social, and Environmental Implications of the Changing Timber Resource Situation

projected increases in investments in timber programs are not large enough to fully meet the growing demands for timber. This is true despite the fact that the assumed investments in timber management programs that underlie the projected trends in growth and inventories are much above those of today. By 2030, the area in pine plantations is more than doubled; large areas of mixed pine-hardwoods and upland hardwoods are converted to pine. The necessary planting and conversion would require investments on private lands of \$2.7 billion, with most of the investment occurring within the next 15 years. Substantial increases in timber yields and in the intensity of management are also assumed for large areas of pine plantations. Thus, the projections of net annual growth and inventories described above reflect what would happen if there continues to be major progress in forestry in the South and continued expansion in the technical and financial assistance, protection, research, education, and management programs that have brought about the improved forestry situation in the past.

The above projections simply show the direction things are heading—what is likely if current expectations about economic growth, changes in timberland area, the establishment of pine plantations, management investments, and all the other factors that affect timber demand and supply are realized. The projected changes are not inevitable. The present outlook can be changed, and as indicated in the following discussion, there are important reasons to do so.

The intensifying competition for timber which will result from the projected changes in net annual growth, timber removals, and inventories in the South have important economic, social, and environmental implications. Among the economic consequences are rising real prices of stumpage, that is, prices net of inflation or deflation.

The increases in softwood stumpage prices are largest in the early part of the projection period, the time in which softwood timber inventories are declining. Between 1984 and 2000, for example, softwood sawtimber prices are projected to rise at an annual rate of 3.2 percent in the South Central region. After 2000, as inventories begin to rise, the rates of price increase slow down. Between 2020 and 2030, increases in the South Central region average only 0.5 percent per year. Softwood pulpwood stumpage prices rise at about the same rate as sawtimber prices in the early part of the projection period and more rapidly (3.5 percent per year in the South Central region between 2020 and 2030) in the latter part.

Hardwood stumpage prices show much different trends from those for softwoods. They decline in both the southern regions for sawtimber and pulpwood until around 2000. This reflects the availability of large and increasing inventories of hardwood timber. After 2000, as timber removals rise



The South is facing a future of intensifying competition for softwood and hardwood timber and rising real prices (prices net of inflation) for stumpage and most timber products. This will mean higher costs to the consumers of wood products—and everyone uses wood products. It will also constrain growth in the forest industries, and employment in these industries is projected to drop.

above net annual growth and inventories begin to decline, prices begin to increase. In the last two decades of the projection period, prices for hardwood sawtimber stumpage are going up at a rate of 1.4 percent per year in the South Central region and 1.2 percent in the Southeast.

The projected increases in hardwood sawtimber prices are for the smaller, lower quality hardwood timber that comprises the bulk of hardwood timber inventories. The stumpage price outlook for larger hardwood timber of preferred species, such as select white and red oak, ash, and black cherry, is quite different. Removals of higher quality sawtimber of most preferred species have been close to or above net annual growth in recent decades, and large increases in stumpage prices have apparently reflected this situation. These trends seem likely to continue.

Increasing stumpage prices are reflected in the prices of sawlogs, pulpwood, and the other round products used by the forest industries. These increases, which are increased

costs to the processing industries, are also passed on and reflected in the prices of products. This is especially true in the case of lumber and softwood plywood, where stumpage represents a large part of the product cost.

In the highly competitive markets in which nearly all timber products are sold, rising prices act to constrain demand. As a result, softwood timber supplies (harvests) rise slowly over the projection period, much below the increases since the early 1960's. Hardwood harvests rise in the first three decades; then they level off and begin to decline.

The increases in harvests are too small to sustain employment in the forest industries (fig. 9). Rising productivity per employee overrides the increase in harvests. After 1990, employment drops; by 2030, total employment in the lumber and wood products and pulp and paper products industries will be 21 percent, some 85,000 people, below the employment level of 1984. Total wages and salaries also start to decline after 2000.

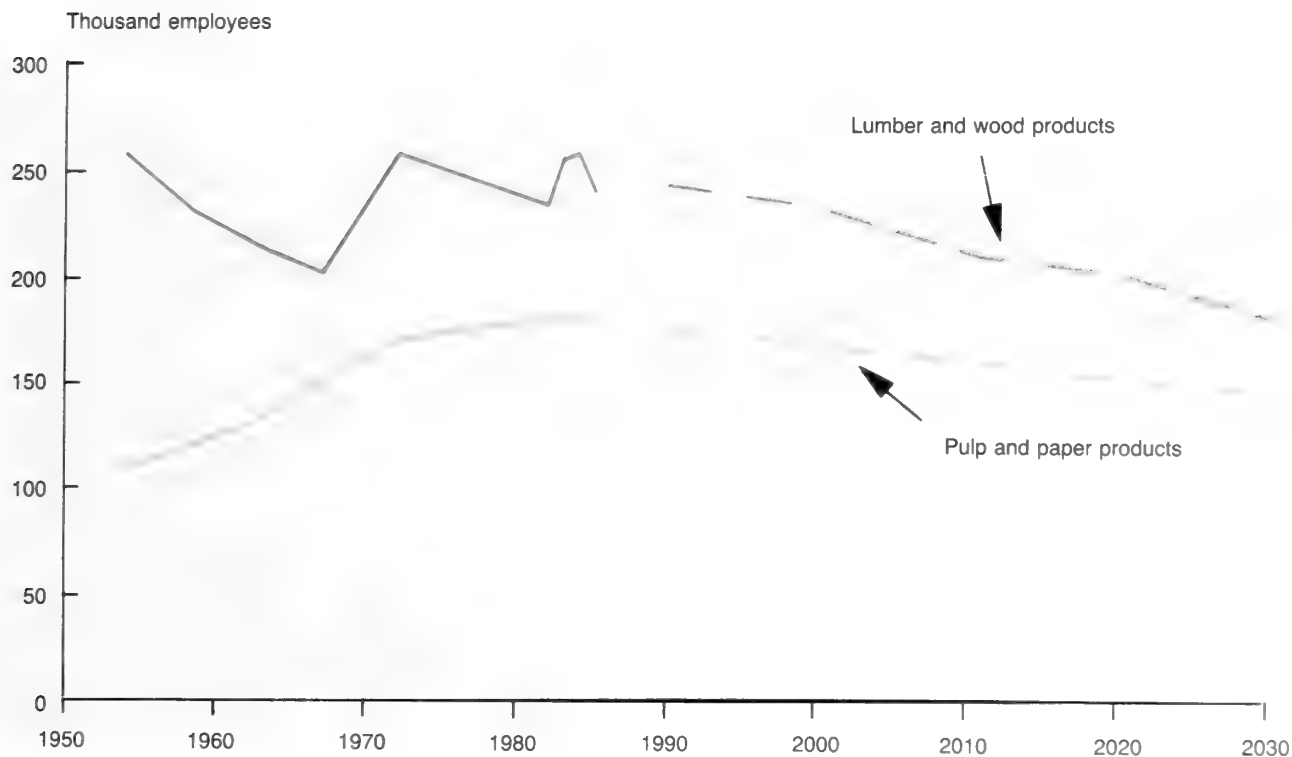


Figure 9—Employment in lumber and wood products and pulp and paper products industries in the South, selected years 1954–85 with projections to 2030

The drop in employment and wages and salaries in the forest industries is of great economic significance in the South. The effects of reduced employment will be multiplied as they spread through the trade, service, transportation, and other sectors of the southern economy that provide goods and services to the forestry sector. It is currently estimated, for example, that a loss of one job in the lumber and wood products industry would result in a decrease of 2.3 jobs throughout the economy in the Southern States. A loss of one job in the pulp and paper products industry would be multiplied 2.6 times as other parts of the economy were affected.

Rising real prices have other important implications. Exports of most timber products will be constrained, and use of substitute products such as concrete, steel, aluminum, and plastic will increase above the levels that would have otherwise prevailed. As production of these substitutes is stepped up, more and more nonrenewable resources, including the ore and fossil fuels used in their production, will be removed from the Nation's finite supply. In addition, the mining, industrial processing, and power generation associated with increased use of timber substitutes will result in more air and water pollution.

Consumers—and this includes everyone in our society—will be adversely affected by rising prices. Home buyers will bear most of the increased costs both in terms of higher prices and in adverse impacts on the number, size, and quality of dwelling units built.

Rising prices and the associated economic and environmental impacts are not inevitable. They simply show what is likely to happen if current expectations about the future timber situation materialize. The development of the South's fourth forest can be managed, and the forest can take almost any form desired.



Consumers, and this includes everyone in the society, will be adversely affected by rising prices of stumpage and timber products. Home buyers will bear most of the increased costs, both in terms of dollar costs and in the number, size, and quality of units built.

The Opportunities To Increase Timber Supplies

There are economic opportunities (those that would yield 4 percent or more net of inflation or deflation on the investments necessary to implement them) to greatly increase net annual timber growth on 70 million acres of timberland in the South. If utilized, these opportunities would increase growth by 3.2 billion cubic feet, a volume equal to 57 percent of current net annual softwood growth (fig. 10).

Almost three-quarters of the opportunities to increase timber growth in the South—2.3 billion out of 3.2 billion cubic feet—are on the other private ownerships. There are, however, opportunities on all ownerships, including 0.6 billion cubic feet on forest industry ownerships. The relatively small potential on the public ownerships—0.3 billion cubic feet—reflects the fact that little timberland is publicly owned in the South.

Just over half—1.8 billion cubic feet—of the opportunities to increase timber growth are in the South Central region. The opportunities in the Southeast region total 1.5 billion cubic feet. There are economic opportunities to increase timber growth by over 0.2 billion cubic feet a year in every State in the South except Oklahoma and South Carolina. The largest potential—0.5 billion cubic feet—is in Alabama.



There are economic opportunities to increase net annual timber growth on timberland in the South by 3.2 billion cubic feet, a volume equal to 57 percent of current net annual softwood growth. Nearly half of the opportunities for increasing growth involve regenerating nonstocked or cutover timberland sites.

Billion cubic feet

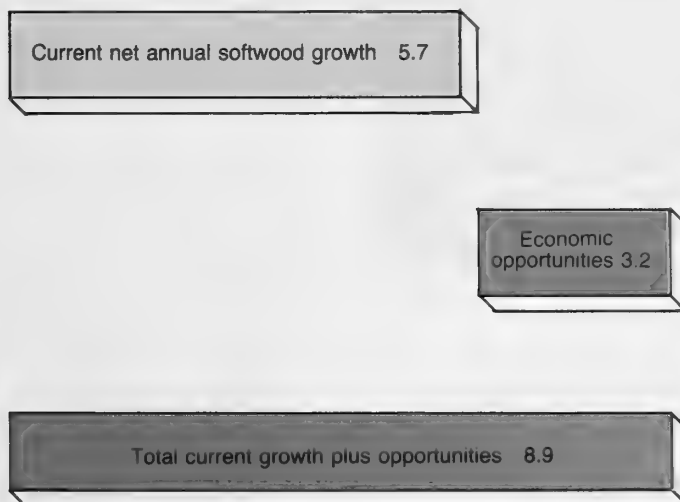


Figure 10—Economic opportunities to increase current net annual growth on timberland in the South

Nearly half of the economic opportunities to increase net annual timber growth are in stands of the upland hardwood types. Most of the remainder is in natural pine and mixed pine-hardwood stands. Nearly half of the opportunities for increasing growth involve regenerating (with site preparation) nonstocked or cutover sites. Most of the rest involve either regeneration of mature stands or stocking control, cleaning, or release of stocked stands.

The total investment that would be required to utilize the economic opportunities to increase timber supplies is \$6.9 billion. The largest part of this, about three-fifths, would fund regeneration with site preparation. Although treatment costs are large, the rate of return on the investments would equal or exceed 4 percent, which approximates the longrun opportunity cost of capital in the private sector of the U.S. economy.

There are additional opportunities to increase net annual timber growth in the South. There are currently 22 million acres of cropland and pasture that would yield higher rates of return to the owners if planted to pine. This includes



In the South, there are about 22 million acres of marginal cropland and pasture, including highly erodible land, that would yield higher rates of return to the owners if planted to pine. If planted, these lands would produce about 2.1 billion cubic feet of timber each year. If these lands were planted and the economic opportunities on today's timberland were utilized, net annual timber growth could be increased by 5.3 billion cubic feet. This would nearly double current net annual softwood growth and would be enough timber to sustain employment and wages and salaries in the forest industries.

nearly 8 million acres of highly erodible cropland that is suitable for growing trees. In a sense, all of these 22 million acres are marginal for crop and pasture use. If planted to pine, they would produce about 2.1 billion cubic feet of net annual timber growth.

About three-fifths of the opportunities on marginal and highly erodible cropland and pasture are in the South Central region. There are substantial opportunities in all Southern States. In most States, the potential for new net annual growth is above 100 million cubic feet a year.

In total, net annual timber growth in the South could be increased by 5.3 billion cubic feet if all the economic opportunities on timberland were utilized and the marginal and highly erodible cropland and pasture were planted to pine (fig. 11). This would nearly double current net annual softwood growth and increase the projected softwood growth shown in figure 7 by about 50 percent.

In making the base projections, it was assumed that a little over a third of the opportunities to increase net annual growth would be implemented over the projection period. However, the investments have not been made, and the opportunities as described do exist at this time.

Achieving the total potential increase in timber growth would have very positive benefits for the South. The additional growth would sustain employment and wages and salaries in the forest industry. It would also help the general economy of the South. The effect of forestry sector employment is multiplied in the trade, service, and transportation sectors, and in other parts of the economy. Currently it is estimated that total employment is increased by about 2.3 jobs for each job in the lumber and wood products industry and by 2.6 jobs for each job in the pulp and paper products industry.

Achieving the full potential for greater timber growth would also have important national impacts. Consumers would pay less for timber products. Because everyone consumes forest products, everyone would benefit. Export sales of forest products would be stimulated and imports reduced, thereby favorably influencing the national balance of trade. The use of substitute materials such as steel, aluminum, and plastics would also be constrained. There would be related environmental benefits, particularly from reduced emissions of air and water pollutants from the mining, industrial processing, and power generation associated with the use of substitute materials and from reduced erosion and sedimentation as cropland and pasture were converted to forest.

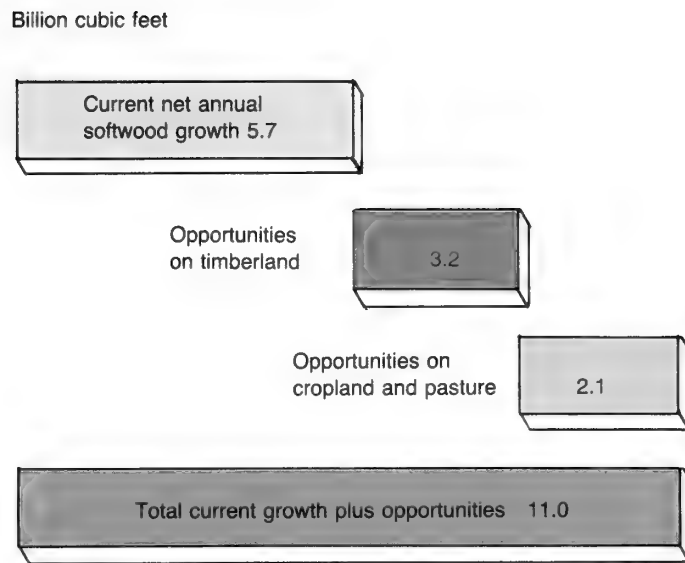


Figure 11—Economic opportunities to increase current net annual timber growth in the South

Increased Productivity in the Fourth Forest

There is clearly the economic potential to grow a fourth forest in the South that can sustain much larger timber harvests. But only a limited part of this potential is likely to be realized under the market system that effectively guides the production of most goods and services. The problem is the limited increases in timber supplies that come about as prices rise. For example, the best available data show that for each 10-percent increase in stumpage prices, there is less than a 4-percent increase in supplies.



There is clearly the economic potential to grow a fourth forest in the South that can sustain employment and income in the forest industries, which are now such an important part of the South's economic base. But only a limited part of this potential is likely to be realized unless action is taken to expand the public and private programs of protection, technical and financial assistance, research, education, and management that are effective in increasing timber supplies.

The limited response to price changes largely reflects the characteristics of the private timber owners other than forest industries. Various studies have shown that these owners have widely diverse objectives and attitudes; limited technical knowledge of the ways timber stands should be marketed, harvested, regenerated, and managed; and varying willingness and capacity to make investments in management practices. Ownership tenures are typically short, and most owners are in the older age groups. Thus, for timber, where the time between investment and harvest is long, there is the likelihood that direct benefits such as income from timber sales will not accrue to many current owners.

In the past, society has taken action to increase timber supplies by supplementing market forces, although the limited response of supplies to price changes has not been explicitly recognized as the reason in any of the forestry legislation, and in only a very limited way, in the forestry literature. Nearly all forestry legislation—the public programs of protection, technical and financial assistance, research, education, and public ownership—and many forest industry programs are in fact societal adjustments designed to supplement the market system and increase timber supplies.

By any standard, these actions have worked. They have resulted in the regeneration of the second and then the third forests. This, in turn, made possible the development and growth of the forest industries that now constitute such an important part of the South's economic base. The programs are also efficient—the benefits exceed the cost—and they are effective in increasing the income of forest owners. If future employment and income in the forest industries is to be sustained, action must be taken to expand both public and private programs that are effective in increasing timber supplies. This can be done in a variety of ways, but it must be done if the forests in the South are to continue to have the important place in the economy they have today.



Sandra Phelps '86

7