itive with other southern states (Table 4) but higher than neighboring states Louisiana and Texas. A similar pattern of energy costs exists for natural gas as shown in Table 4. While nationwide Arkansas is very competitive, both Louisiana and Texas have a cost advantage in natural gas as well. The prices listed in Table 4 do not include sales and other point-of-purchase taxes. These taxes are levied in Arkansas at a rate of 6%, a higher rate than either Texas (0%) or Louisiana (4%), further increasing Arkansas' regional disadvantage in energy costs.

Labor Resources

The potential for economic development in any region is dependent on the quantity and quality of the available workforce. The U.S. Census Bureau projects that Arkansas will have a lower population growth rate over the next 25 years when compared to other states in the southeastern United States (Table 5). By 2025, Arkansas is projected to have the lowest average population density in the Southeast.

Data from the AESD regarding workforce statistics are presented in Table 6. Arkansas' employment levels have grown 2.2% from 1995 to 2003, rising from 1,160,400 to 1,186,500. Unemployment has risen throughout Arkansas, and unemployment in counties that are dependent on forest industries is consistently greater than the general unemployment rate. The total workforce has shifted somewhat over the period and now 36% of Arkansas' total workforce is in counties that have significant forest industry presence, up from 30% in 1995.

One measure of the quality of the Arkansas workforce is the population's level of education (Table 7). Nearly 80% of Arkansans are high-school graduates or better, and nearly 20% of those have a bachelor's degree or higher. Most entry-level jobs within the forest industry require a high-school education or higher. The majority of logging equipment and wood-based manufacturing equipment is computer controlled and requires computer skills that would normally be acquired at the associate's level (or equivalent technical training) or higher.

Results from the USDA Forest Service's Southern Forest Resource Assessment clearly indicate that as the population in the southern United States grows, the societal values regarding forests have "shifted away from a strong commodity orientation towards a more biocentric view" (Wear and Greis 2002). This has tremendous implications for wood fiber production in the United States and globally. The thirteen states in the southeast produce 63% of the industrial roundwood in the United States (Haynes 2003), and 18% of the world's industrial roundwood. (UN FAO 2003). The U.S. Census Bureau projects that in the years from 2000 to 2025, the South's population is expected to increase by 24.6%, while Arkansas's population growth is expected to be only 16.1% (Table 5). Only Kentucky is projected to have lower population growth during first part of the 21st Century. Arkansas' population density in 2000 (49 / sq. mi.) and projected density in 2025 (57 / sq. mi.) is the lowest among southern states. These factors would indicate that societal pressure on timber production in Arkansas may be less than that experienced by other southern U.S. states. However, certain counties in Arkansas are experiencing rapid population growth (Figure 28). From 2000 to 2004, Arkansas' total population increased by 2.8% (US Census Bureau). In central Arkansas, Lonoke, White, Faulkner, Saline, Grant, and Garland counties have increased their population by 6.9% from 2000 to 2004. In northwest Arkansas, Benton, Crawford, and Washington counties have grown 11.9% from 2000 to 2004. In counties where the forest industry is first in terms of output, population growth has been 0.5% from 2000 to 2004. One of these counties is Faulkner, which has increased its population by 10.1% from 2000 to 2004. Excluding Faulkner County, the population growth in forest product dependent counties has been -2.1% from 2000 to 2004. Because of these demographic differences, it is likely that disputes between urban and rural citizens regarding land management practices will increase in the future in Arkansas.

Educational resources within Arkansas that can support workforce development for the forest products industry include the School of Forest Resources (SFR) at the University of Arkansas-Monticello (UAM), which provides education at the bachelor and graduate (M.S.) level in forestry, wildlife management, and spatial information systems. The UAM-SFR is the only accredited forestry school in the state. The UAM-SFR also offers a two-year degree in land surveying. UAM is located in southeast Arkansas, in Drew County. Associated with the School of Forest Resources are five community colleges that have articulation agreements for student transfers into the SFR. These community colleges are located throughout the state in Sevier, Independence, Hempstead, Conway, and Phillips counties. The University of Arkansas-Monticello also includes two technical
Balancing employment opportunities and the state’s economic health with the public’s increasing valuation of Arkansas’ forests for recreational and other biocentric uses will pose an increasing challenge to industry and land management.
An Economic Assessment of Arkansas’ Forest Industries: Challenges and Opportunities for the 21st Century

The Southeast Arkansas Community Based Education Center (SEACBEC) has a heavy equipment operator academy that can provide support to the logging sector. SEACBEC is currently developing a “timber harvesting academy” to provide technical training on logging equipment and forestry practices. SEACBEC is located in Warren, Arkansas, which is approximately 20 miles west of Monticello, Arkansas. In March 2005, SEACBEC merged with the UAM College of Technology at McGehee. Thus, UAM is uniquely positioned to offer a matrix of forestry education in technical and bachelor-level programs.

In addition to UAM and SEACBEC, the AESD also maintains 31 offices statewide providing support in workforce training, assisting employers in obtaining job applicants, and providing unemployment insurance benefits.

Transportation Infrastructure

Arkansas’ transportation network consists of more than 1,860 miles of navigable waterways, 3,517 miles of railroads, and 98,541 miles of public roads (ASHTD 2002a, ASHTD 2002b, BTS 2005). Rail, barge, and truck transportation are crucial to moving logs, lumber, and finished wood products within Arkansas and also from Arkansas to domestic and international markets.

Arkansas’ water transport system is the second longest in the continental United States and includes five waterways: the McClellan-Kerr Arkansas River Navigation System, the Mississippi, Ouachita, White, and Red Rivers. The McClellan-Kerr system has ports in Fort Smith, Little Rock and Pine Bluff, with access to the Mississippi River and the Port at Yellow Bend, which are all locations with considerable concentrations of forest industry. The Ouachita River System has ports at Camden and Crossett. Crossett is home to the state’s largest single forest industry complex. The White River offers access to Arkansas’ upland hardwood forests in the Ozark foothills. Lumber, logs, wood chips and pulp represent the fifth most common products shipped on Arkansas’ waterways, with 81,507 tons shipped in 2000 (BTS 2005). This represents just 1.1% of all waterborne shipments on Arkansas’ waterways. The forest products industry underutilizes this low cost transportation method due to the lack of intermodal facilities linking waterways to the rail and highway system.

In Arkansas there are three class-one, one regional, fifteen local, and five switching freight railroad firms. They operate on 2,604 miles of Class I lines and 916 miles of Class III and switching lines. Arkansas has intermodal facilities at Little Rock, West Memphis, Yellow Bend and a truck/rail center at Crossett. An additional intermodal facility is planned for Monticello that will coincide with the construction of I-69 and the I-69 connector to Pine Bluff. Lumber and wood products rank second among all commodities shipped out of Arkansas by rail, accounting for 3,357,340 tons in 2000 (16.1% of total). Since 1980, 740 miles of rail lines have been abandoned in Arkansas (ASHTD 2002b); most of these were feeder lines that provided low cost transport for agriculture and forestry operations.

Road transportation is also crucial in the forest products industry. The latest statistics (USDC 2004) show that truck transport of logs, pulp, newsprint, paper, paperboard, and other wood products represents nearly one-fifth (20%) of the total weight of truck shipments from Arkansas. Earlier data from 1997 (USDC 1999) indicated that logs and rough wood represented nearly 11% of the total weight of truck shipments from Arkansas. Together, primary and secondary wood products represent nearly 1/3 of all truck shipments (by weight) from Arkansas. Relative to rail and water, road transportation carries between 70 and 85% of the weight of all forest products.

Of the 98,541 miles of Arkansas public roads, 656 miles are interstate, 27,006 miles are in arterials and collectors, and 70,879 miles are local roads. State highways consist of 16,383 miles, federal highways represent 2,324 miles, and county and municipal ownership make up the remaining 79,834 miles. In 2003, the U.S. Department of Transportation rated Arkansas interstates, arterial roadways, and federal highways and found that 19% of Arkansas’ roads are rated in very good to good condition, with 81% being rated either fair, mediocre, or poor (BTS 2005). Of Arkansas’ 12,451 road bridges, 26.7% were found to be structurally deficient or functionally obsolete (BTS 2005). This is actually less than the average for the United States, in which 27.1% of all road bridges fall into structurally deficient or obsolete categories.

While Arkansas has an excellent highway system, there is poor access to the interstate highway system from much of the state’s southern pine region. Interstate 30 provides access to the western portion of Arkansas’ southern pine region.
Arkansas’ pine region and direct access to Mexico and the growing domestic markets for construction wood materials in the Dallas-Fort Worth area. However, much of the state’s timber must travel over 2-lane arterial and feeder routes in excess of 50 miles before reaching an interstate highway, particularly in the southeast portion of Arkansas. The development of Interstate 69 through southeast Arkansas and the I-69 connector to Pine Bluff with an additional interstate connection in southeast Arkansas to Monroe, Louisiana, would significantly lower transportation costs for wood products shipped out of the region.

Access to Capital

The forest products industry is tremendously capital intensive. While large forest products companies often have millions of acres of forestland holdings and other capital assets, purchases of new equipment require huge sums of capital. Simply rebuilding a single paper machine in a mill may cost $60-150 million dollars. A new paper machine typically requires a $200-500 million investment, and a new paper mill from the ground up requires capital of $2-4 billion. A typical oriented strand board mill will require an investment of $200 million dollars. And for loggers, modern computerized and mechanized logging equipment will require startup capital of $1-1.5 million.

Within the forest products sector, return on capital employed (ROCE) averaged 5.4% in 2004, up from levels of 3-4% in 2002 and 2003. Long-term industry average ROCE is in the 8-12% range, and such performance usually insures a ready supply of equity capital. Competition for capital is tight at two levels in the pulp and paper industry. The first level exists within an individual company; only those mills that are most competitive are receiving new capital equipment. Within the United States (and Canada), firms are placing capital where energy, fiber, and labor costs are lowest. The second level of competition is globally, where overseas fiber, labor, and energy costs are resulting in paper manufacturing moving out of North America to Europe, Asia, and South America. From 1999 to 2004, the United States lost 16.2 million tons of pulp and paper production through mill closures. Seven and one-half million tons of this lost capacity was in the southeast United States, with a corresponding loss of 9,741 jobs in this sector. Arkansas lost 849 jobs when the paper mill in Camden closed in 2001. In the period 2002-2005, only 2 million tons of new capacity were added in the entire United States. However, new and rebuilt pulp and paper capacity over the same period in Europe was 5.7 million tons, in Asia 6.1 million tons, and in South America 3 million tons (Forestweb 2005).

The situation for capital access is very different for small forest products businesses, such as sawmills and logging operations. In the forest industry sector, small manufacturers and mechanized logging require startup costs that are often beyond the capacity of local lending institutions to finance. For example, a typical mechanized logging operation would require $1.2 to $1.5 million to startup. This relatively large capital requirement is an extreme barrier to entry for individuals in logging. Similar issues are faced by those wishing to enter into sawmilling or other solid wood production.

Tax Structure

According the U.S. Census Bureau, Arkansas ranks 23rd in per capita tax burden in the United States, with a per capita tax rate of $2,027 in 2004. The state ranks 49th in terms of overall property tax burden and 12th in terms of sales tax burden. The low property tax burden favors forestland ownership and management by reducing the annual costs of holding capital assets that take 25-50 years to mature into a salable product.

Arkansas seems to fare worse in terms of business taxes. According to a report by the Tax Foundation (Tax Foundation 2004) Arkansas ranks 43rd (7th worst) in business tax climate in the United States. Some of the most burdensome taxes on the forest industry are the relatively high apportionment of income taxes to property and payroll (50%). Neighboring states Texas and Mississippi apportion 100% of income taxes to sales, which creates a lighter tax burden for firms that export from the state. In addition to corporate income taxes, Arkansas requires payment of a corporate stock tax, based on the value of capital assets. Thus, even in years with low income, forest industries must pay corporate stock tax on their physical assets. Arkansas also taxes corporate income and individual income on interest, dividends, and capital gains. This double taxation is a barrier to investment capital for Arkansas companies.

Arkansas’ state sales taxes are the 12th highest in the nation; Arkansas levies a statewide 6% sales tax on manufacturing machinery and utilities. Because forest products industries are highly capital- and energy-intensive, this tax burden is disproportionately high in Arkansas. Four of the six surrounding
states (Missouri, Oklahoma, Texas, and Tennessee) exempt sales taxes on utilities and machinery, and Louisiana has a lower tax rate (4%). While Mississippi has a higher state tax rate and does tax both utilities and machinery, Mississippi has no county sales taxes, and with Arkansas’ average county sales tax rate of 1.16%, Arkansas has the largest sales tax burden on energy and machinery in the Gulf Coast region of the United States.

Research and Product Development

There are two organizations tasked with conducting research in forest resources in Arkansas. The first is the Arkansas Forest Resources Center (AFRC), which is part of the University of Arkansas System and recognized as a “Center of Excellence.” The AFRC encompasses scientists and technicians from various University of Arkansas System campuses, with 18 Ph.D.-level and 7 M.S.-level scientists from the UAM School of Forest Resources forming the backbone of the AFRC. Other scientists from the University of Arkansas-Fayetteville (10 Ph.D. level), UA Cooperative Extension Service, and UA system field stations (16 at M.S.- and Ph.D.-level) complete the staffing of the AFRC. The AFRC mission is “to develop and deliver superior programs in education, research and extension that enhance and insure the sustainability of forest-based natural resources.”

The United States Department of Agriculture Forest Service Southern Research Station (SRS) maintains a research work unit at Monticello, Arkansas. Housed in the same complex as the UAM SFR, the SRS research program focuses on management of upland forest ecosystems and has 16 scientists and technicians on staff located in Monticello, Hot Springs, Crossett, and Jasper, Ark.

Comparing the southern states by their levels of university forestry research staffing at the doctoral level shows that Arkansas lags behind other southern states in both research personnel and funding. Table 8 shows for the thirteen southern states the reported university permanent doctoral-level full-time equivalents (FTEs) in teaching, research, and extension in forestry. Arkansas ranks 10th in terms of total FTEs and 12th in terms of research FTEs in the South. If these FTE numbers are compared with timber product output from Table 3, then Arkansas’ university research, teaching, and extension capacity is far less than proportional to other southern states. Table 9 shows the distribution of USDA Forest Service Southern Research Station employees and cooperative research funding to universities in the thirteen southeastern states. Arkansas ranks 12th in terms of cooperative research funding for the 13 southern states. These data clearly indicate that Arkansas’ research is disproportionate with its importance in growing wood and producing products from its timber resources.

TECHNOLOGY ASSESSMENT FOR ARKANSAS’ FOREST PRODUCTS INDUSTRY

The major costs for forest product industries in Arkansas are the primary inputs of production: wood, labor, and energy. For each of the industry sectors, critical factors often relate back to reducing one or more of these basic costs or increasing the production or value obtained from one or more of the basic inputs to production. A second set of critical technologies deals with reducing environmental impacts and improving the environmental benefits associated with wood products use. These technologies also affect society’s perception of the environmental “friendliness” of wood-based industries. The following is a brief presentation of the most pressing needs of the Arkansas’ forest products industry in order to remain globally competitive.

Logging

Production in the logging sector is highly seasonal due to restrictions in operating traditional logging equipment during wet weather. It is not unusual for logging firms to be able to have only 180-200 work days per year due to weather. Modern logging equipment capable of operating in all weather conditions is available, but these technologies are only slowly being adopted by Arkansas’ logging firms. Arkansas has, like other southern states, increased the area of pine plantations in the last decade in response to increased demand and prices. These plantations are now requiring the first thinning of smaller diameter trees. Within the logging sector, most equipment is designed to be most efficient with mature, sawtimber-sized trees. There is a demand for new logging equipment that can efficiently thin young plantations in order to promote continued forest health and to improve timberland productivity. Barriers to the adoption of new logging equipment include the high initial capital investment and the need for additional operator training as these technologies require operators with computer skills and a higher level of understanding regarding operating parameters and maintenance cycles.
As a “Center of Excellence,” the University of Arkansas at Monticello’s Arkansas Forest Resources Center (below) shares its research campus with the USDA Southern Research Station Forest Service Work Unit, which focuses on upland forest ecosystems. Engineered wood beams (left) were used in constructing the Animal Science Center at the University of Arkansas, Fayetteville.
Solid Wood Products

Engineered wood products technologies permit lower quality wood resources to be manufactured into high value products. Plywood is one of the oldest examples of this type of technology: however, it is being replaced by oriented strand board (OSB), a substitute structural panel that has a lower cost of production and allows the use of lower quality and lower cost raw materials. Other examples of engineered wood products include laminated beams, laminated veneer lumber and wood I-Joists, commonly known in Europe and the northeast United States as “heavy timber.” Heavy timber offers cost and design advantages over traditional steel and concrete construction as well as environmental benefits.

Trends in home construction are moving towards “modular systems.” The simplest such modular system is a roof truss. New home construction is moving towards complete roof systems, wall systems, and floor systems. Advantages in construction time, building quality, and waste reduction are achieved in modular construction systems.

The development of new engineered wood products and the transfer of this technology to wood products companies in Arkansas will create a competitive advantage (low cost, high quality) in construction markets. With the controversy surrounding chemically treated lumber (chromated copper arsenate), producers have voluntarily stopped production. The development of an effective, low-cost replacement has yet to be introduced in the market. The loss of treated lumber will curtail a major market for lumber products important to Arkansas. University-based research and training is vital in transferring engineered wood product technology to the solid wood products industries, which typically have very limited research and development capabilities. A cooperative of Arkansas’ producers interested in developing these capabilities would enhance research and technology transfer in this area.

Pulp and Paper

The costs of energy are critical for all forest industry sectors, but especially so for the pulp and paper sector. Wood producers use co-generation facilities that produce electricity for operating machinery and steam for drying and treating wood products. The potential for increasing wood energy production in the forest industry exists, even to the point where some firms could become net energy suppliers. Research and development of more efficient biofuel technologies and regulatory changes to promote biofuels technology application will help Arkansas industries remain globally competitive.

Forest Management

Achieving the potential for development of Arkansas’ forest products industry is dependent upon applying information technology to forest management. Financial information regarding forest products markets is not readily available, and where available is expensive, often inconsistent, and not representative of Arkansas. An excellent example is market prices for standing timber. Louisiana, Mississippi, Tennessee, and Texas all maintain timber and log price reports that are available to the public at no cost. While there are commercial reports available that cover Arkansas their high cost, infrequent reporting periods, and lack of product and location specificity diminishes their usefulness. The lack of market information for forest landowners in Arkansas is a limiting factor in promoting investment in timber production. The Arkansas Forestry Commission maintains a website with market and timber buyer information which requires constant maintenance and updates to provide accurate information. Public knowledge and use of this website is limited.

Information related to forest production systems and financial data related to the costs and revenues possible with new harvesting equipment and systems are needed. This information would assist entrepreneurs and existing firms in acquiring capital for new equipment, as well as assist the logging industry in making sound equipment selections based on the forest conditions in which they anticipate their operations will occur.

Information on timber production lags far behind what is available for other agricultural systems. Due to the long production times required to grow timber, the ability to predict future yields and returns is difficult. Landowners are hesitant to invest in timber growing without this information. Research developed by the forest industry is often proprietary and is not available to the public; therefore, it is necessary for public research agencies to provide forest investment information to private, non-industrial landowners, particularly regarding the application of herbicides, fertilizers, and other silvicultural treatments that can improve timber production and quality.
Private landowners depend on UAM researchers to conduct forest landowner education (above) and provide current forest investment information to guide silvicultural decisionmaking.

State-of-the-art, cut-to-length logging equipment from Finland (above) is appearing in Arkansas' pine forests.

A Nuttall oak seedling (right) in a University of Arkansas Division of Agriculture Pine Tree Branch Station research study.
In order to ensure the sustainability of Arkansas' forest ecosystems, a statewide ecological assessment showing the allocation and distribution of rare, threatened, and endangered species and communities of plants and animals is needed. This will permit landscape-level planning of conservation efforts and ensure that intensive management for timber production will occur where it will not adversely affect ecosystem health. The Nature Conservancy and Arkansas Natural Heritage Commission are working on such databases, which incorporate spatial analysis technology, such as computerized geographic information systems. The development of spatial databases and introduction of spatial analysis technologies into forest management remain critical in understanding the relationships between wood fiber production systems and the myriad of other ecosystem services (wildlife, clean air, clean water, recreation, soil conservation) provided by forest ecosystems. The University of Arkansas Center for Spatial Technology and the UAMS SFR Spatial Analysis Laboratory are capable of developing these new technologies and delivering them into the hands of land managers.

**MAJOR ISSUES DETERMINED BY STAKEHOLDERS**

The process of determining the issues facing Arkansas' forest products industry and the goals for the industry's future began with interviewing 52 key individuals in various sectors throughout the state (Appendix A). The individuals were selected to represent private forest landowners, government agencies involved in natural resource management, forest products industries, consulting foresters, and non-government organizations. The interviews were conducted between November 2004 and March 2005. The interviews were an open discussion of issues confronting the forest products industry loosely structured around the following six economic development themes -- biological capacity, economic/financial issues, physical infrastructure, laws and public policies, human resources, and research and development. The interviews were digitally recorded and transcribed. After all of the interviews were completed, the issues identified by the stakeholders were condensed into 131 “issues” under the 6 economic development themes (Appendix B). In early April 2005, 31 stakeholders were invited to participate in focus group discussions where the compiled interview results were presented to the entire group. Subgroups then discussed the issues collectively. Then, each individual voted on their three most important economic development issues for the forest products industry in Arkansas. The individual votes where tallied and the top five identified for further discussion. The five most critical issues confronting Arkansas’ forest products industries, as identified by leading stakeholders are:

- **human dimensions,**
- **forest management,**
- **research, development, and education,**
- **infrastructure,** and
- **policy and legislative issues.**

**Human Dimensions**

There is a strong belief among the forest stakeholders in Arkansas that the forest products industry has a very poor public image. Concerns regarding the sustainability of forest production and the impacts of logging on biological diversity, clean water, recreation and aesthetics have been used to portray a negative public image of forestry and the production of forest products for more than twenty years. Forest management practices, such as clearcutting and the use of herbicides and pesticides, have often been at the center of forest management disputes. The debates in the 1980’s and 1990’s focused on public forest lands and have resulted in major declines in timber harvesting on national forests throughout the United States. Forest stakeholders in Arkansas are concerned that timber production from private forest lands may soon face similar pressure. The public’s perceptions of low wages, poor working conditions, and low technology levels in forest products industries increase the difficulties in recruiting a high-quality workforce and in attracting assistance from state and local governments.

Another significant human dimension issue in Arkansas is internal to the community of forest stakeholders. The diversity of goods and services produced by forests in Arkansas is reflected by a diversity of stakeholders. Even among market- and commodity-based products, the “forestry community” is fragmented and lacks a common voice on many issues that affect it.

Finally, the lack of political and community involvement by members of the “forestry community” was noted as a significant problem. Professionals and others working in the forest industry are under-represented in community organizations and local
and state government. Without a “voice” in communities and government, the needs of the industry are not being considered in many vital decision-making processes.

Forest Management

Several concerns regarding the ability to manage Arkansas’ forests sustainably were identified by the stakeholders. The first is forest fragmentation or the loss of contiguous forest cover within the state. Throughout the southern United States, fragmentation is the leading cause of forest cover loss (Wear and Greis, 2002). In Arkansas, the fragmentation of forests often starts with a fragmentation of ownership, and then the conversion of smaller forest parcels into permanent non-forest uses. In 2003 and 2004, several hundred thousand acres of forest land owned by forest industry were sold to private individuals and investment groups. This fragmentation of ownership alone is problematic for achieving landscape-level management, which is crucial for protecting threatened species and habitats. Ownership fragmentation often coincides with a reduction in technical forest management resources, which leads to productivity losses and decreased environmental compliance. The reduction in productivity may be compounded if public criticism of forest management tools, such as clearcutting, fertilization, prescribed fire, and herbicides is not addressed by the industry.

Research, Development, and Education

Research and development of wood-based energy production is needed in Arkansas. The Energy Information Agency of the U.S. Department of Energy has identified southern Arkansas as a region with wood-based energy potential. Cooperation between forest industry and local municipalities could result in greater rural economic self-sufficiency and lessened dependence on fossil fuel and other energy imports.

Of all forest products, engineered wood products are best poised for growth in the United States. In Arkansas, several potential markets for engineered products exist. Wood-plastic thermocomposites can be molded into light structural panels for automobiles and home interiors, and are also useful in replacing treated wood in exterior home products such as decks and steps. These thermoplastic composites can be manufactured using mill residue and waste. Arkansas truss manufacturers could move into building complete roof, wall and floor systems by working in close cooperation with major building contractors. Arkansas has one oriented-strand board mill. OSB is rapidly replacing plywood as the most commonly used structural panel and is also a component in many other engineered wood products.

Arkansas timber producers are facing two challenges in workforce development. The first challenge is continuing education to upgrade the knowledge and skills of the current workforce. Environmental regulations for the protection of water quality have placed a great burden on loggers that can be solved through technical education and new logging equipment. Loggers of the 21st century must obtain skills never needed by the profession before; they must be knowledgeable in computer technology, spatial technologies (GPS/GIS), and forest ecosystems. Currently the Arkansas Timber Producers Association conducts training in logger safety and environmental compliance, but there are no formal schools or educational resources for loggers in these areas. The UAM College of Technology at McGehee is developing a “logging academy” in southeast Arkansas that would fill this need. This education facility would provide structure for continuing education as well as assist with the second challenge, recruiting new workers into this industry. The traditional method of recruiting new loggers is through family-owned businesses, where parents passed on the business and operations aspects of their logging business to their children. This demographic is changing throughout rural America and in order to maintain a supply of increasingly skilled woods workers, logging education must be institutionalized.

Infrastructure

Two major concerns focused on Arkansas’ road infrastructure. The first, and most critical, relates to local ordinances and “improvements” to county and municipal roads in Arkansas. Local road improvements are often unable to support the maximum weight (80,000 lbs) allowed for logging trucks, leading to local restrictions on “improved” roads. Local road ordinances vary greatly from county to county restricting access to forest land and effectively increasing the haul distance from forests to mills. In Arkansas, county roads are under the jurisdiction of county judges. A systematic effort needs to take place regarding the importance of the local transportation infrastructure to the forest products industry so that road improvements do not further reduce access to forest lands.
The second road infrastructure issue dealt with expansion of the interstate system in Arkansas. The most critical need appears to be in southeast Arkansas. The development of an interstate “connector” between I-530 in Pine Bluff and the proposed route of I-69 has been started, and could also create a potential interstate link to I-20 in Monroe, Louisiana.

The connection from Pine Bluff (Ark.) to Monroe (La.) would support several regional paper mills and container industries located in the region:
- Pine Bluff, Ark. (International Paper and Delta Natural Kraft)
- Arkansas City, Ark. (Potlatch),
- Crossett, Ark. (Georgia Pacific Corp., Bemis Corp.),
- Bastrop, La. (International Paper), and,
- Monroe, La. (Mid-State Paper, Precision Paper and Board, Quality Paper/Packaging).

The third infrastructure issue identified by stakeholders dealt not with roads but with financial institutions and the difficulty in providing capital to small wood products businesses, particularly logging firms. There is tremendous need for modern logging equipment capable of working in all weather conditions without soil or water quality impairment. The cost of this equipment is prohibitive. A single harvesting machine that is capable of wet weather logging and efficient operations in forests with small diameter trees typically costs $375,000. The associated equipment for forwarding wood to the road and from the roadside to the mill increases the total capital investment to more than one million dollars. Most logging contracts are short-term contracts providing less than 6 months of work, and with current equipment suffering from seasonal, weather-related shutdowns, local financial institutions will finance at most 50% of the required capital. Few small logging firms have hundreds of thousands of dollars of equity to reinvest into new systems, and gradually, this is eroding the productive capacity of Arkansas’ existing logging sector and is an extreme barrier for those wishing to enter the business. Extending loan guarantees offered by the Farm Service Agency to loggers could alleviate this capital access problem. FSA guarantees 95% of loans up to $813,000, which would be adequate for many existing loggers to upgrade their equipment.

Policy and Legislative Issues

Legislative issues facing the industry can be briefly summarized as follows. On the state level, lowering state sales taxes on energy consumed in the manufacturing process would be in line with tax policies in four of the six surrounding states. Currently, Arkansas has the highest sales tax rate on utilities in the Gulf Coast region. Particularly for the pulp and paper industry, which is heavily energy dependent, lowering energy costs would make Arkansas mills more cost competitive nationally and would encourage investment in these facilities.

Additional policies to encourage the development of biofuels are needed in the state. Permitting processes need to be streamlined. Tax incentives on construction of biofuel energy plants need to be established and tax incentives for using renewable fuels should be applied to existing facilities.

The forest products industry enjoys amicable relationships with state agencies such as the Arkansas Forestry Commission, Arkansas Fish and Game Commission, the Arkansas Natural Heritage Commission, and the Arkansas Department of Environmental Quality. The relationships are non-adversarial and are the product of frequent dialogue between the industry and these state agencies.

On a federal level, concern about softwood imports from Canada is foremost on the minds of the solid wood products sector. Stability in the volume of imports into the United States is strongly desired by those stakeholders expressing concern on this issue.

STRATEGIC PLANNING: FIRST STEPS TOWARD PROMOTING THE DEVELOPMENT OF ARKANSAS’ FOREST PRODUCTS INDUSTRIES

Participants in the economic development focus group meetings developed possible first steps to enhance Arkansas’ forest products economy. These activities and this report will be the starting point for discussions within the Arkansas Forest Economics Council (AFEC). The first meeting of AFEC was scheduled June 28, 2005 in Little Rock. A second meeting will be planned for late 2005. Additionally, university faculty from Mississippi, Louisiana, and Arkansas will be meeting in summer of 2005 to discuss creating a regional forest economic development council for the Gulf Coast states (Mississippi, Louisiana, Texas, Arkansas, and Oklahoma). The suggested action steps listed below are not listed by priority but rather as they were discussed by stakeholders participating in the focus group meetings.
Action Step 1: Educate private landowners on landscape-level forest management

The USDA Forest Service has a “Forest Legacy Program” which supports landscape-wide conservation efforts among private forest landowners. The program, established in the early 1990’s, has not been applied in Arkansas, but would provide an opportunity to create a conservation-based forest economy for private landowners. Education programs for landowners need to include “landscape-level” management and demonstrate financial returns to landowners for improving their forest land management practices. The Arkansas Forestry Commission is currently drafting a needs assessment for this program in Arkansas.

Action Step 2: Governor’s conference on forest resources

A regular, periodic governor’s conference on forest resources should be held in Arkansas. The purpose of such a conference would be to communicate the importance of Arkansas’ forest resources to the economy and quality of life in the state. Participants would include local and state leaders and decision-makers and stakeholders in Arkansas’ “forest community.” Sponsors of the conference would include forest stakeholder groups such as the Arkansas Forestry Association, Arkansas Forest and Paper Council, Arkansas Timber Producer’s Association, the University of Arkansas, the Arkansas Forest Resources Center, the USDA Forest Service (Southern Research Station and Ouachita and Ozark/St. Francis National Forests), the Arkansas Forestry Commission, the Arkansas Fish and Game Commission, the Arkansas Natural Heritage Commission, and private forest landowner organizations such as the Ozark Woodland Owners Association. Working cooperatively with government leaders, forest stakeholders could use such a conference to develop solutions to current and developing issues affecting economic development and ecological health of forest resources in the state.

Action Step 3: Provide permanent funding for timber harvesting education

The UAM-McGehee/SEACBEC heavy equipment operator academy is developing a proposal for a timber harvesting academy in Warren. This academy would fill a critical need within the logging industry by providing a supply of new workers with adequate levels of technical skills and environmental education as well as provide a place for continuing education and upgrading the existing workforce to new, computer controlled and highly-advanced timber harvesting equipment.

Action Step 4: Work on creating a favorable tax structure for the forest-based economy

The Arkansas Forest Economics Council should work with the Arkansas Department of Finance and Administration to propose tax strategies that would promote forest-based economic development in Arkansas. Taxation issues that could be addressed are:

- Reduction or elimination of sales taxes on energy used by manufacturing
- Property tax reduction for private landowners with forest management plans
- Protection of family forests by changes in inheritance tax laws
- Creation of financial incentives for development of wood-based energy
- Reduction/elimination of sales taxes on logging equipment
- Changing the state corporate income tax formula to weight taxes more heavily on sales and less on property and payroll.

These changes would make Arkansas more attractive for forest industry expansion and competitive with surrounding states.

Action Step 5: Maintain favorable regulatory environment

While stakeholders noted that the regulatory environment in Arkansas is good, there are some issues that could be addressed to improve the potential for forest-based economic development. These issues are:

- Work statewide with the Arkansas Highway Transportation Department and the Arkansas Association of Counties to develop local road improvement guidelines that will maintain and support logging access to private forest lands.
- Improve the permitting process for energy generation from wood and other renewable fuel sources
- Maintain voluntary best management practices for water quality protection through continued logger and landowner education and monitoring programs.

Action Step 6: Improve public perception of forest-based economy

The stakeholders believe that while the forest industry does have a public perception problem, the
University of Arkansas forestry researchers study hardwood tree quality in cherrybark oak at Hope, Arkansas.

University of Arkansas-Monticello faculty scientist investigates pine tree weight.

Computerized cutting machines used in furniture manufacturing in a Piggot, Arkansas, plant.
public is also expressing their belief that forest industry has certain behavior problems. These two viewpoints may never be completely reconciled, but communication between forest industry and the public must be improved. Forestry community forums, which would involve local forest-based industries and local governments (municipal and county), community business leaders, and the general public, could be held on a regular basis throughout the state. The meetings could be moderated by University of Arkansas Division of Agriculture personnel from the Public Issues Education Center and the Natural Resources group. Public concerns regarding management practices such as prescribed burning, clearcutting, and chemical application could be addressed in these forums and allow the “forestry community” an opportunity to educate the public and, when necessary, modify its own behavior.

**Action Step 7: Support research and development of new timber and wood economies**

The state should set a goal of generating 10% of all energy from renewable resources by 2020 and implement research, development, and incentive programs in order to meet this goal. Partnerships between energy producers, the agriculture, wood industries, and state and local governments should be encouraged through incentives and regulatory changes. Renewable energy production, especially in rural areas, will lead to economic self-sufficiency and stimulate rural economic growth.

Currently, Arkansas’ Department of Economic Development (ADED) provides extra financial incentives to firms in “emerging technologies” such as information technology, bio-based products, biotechnology, agriculture, food and environmental sciences, and advanced manufacturing systems. The state needs to broaden its definition of “emerging” technologies to include engineered wood products, renewable building materials, biofuels, and renewable energy generation. For a firm to qualify for incentives, they must exceed a tiered county wage average determined by ADED. Many engineered wood facilities already meet required wage standards for lower tiered (3 and 4) Arkansas counties, but are penalized by having to pay 150%-160% of the overall county average wage. Often, this forces them to compete with other high-paying wood processing firms in that county. In order to promote development, new wood processing industries should not have to compete against wages within their own sector, but only with non-wood industry sectors.

Funding for wood products research should be expanded in the state. This would include basic research in engineered wood products, design and marketing of wood products, and development/implementation of new wood processing technologies to expand existing businesses and create new businesses.

**Action Step 8: Develop forest economies beyond timber**

Forest industry should foster and support forest economies in recreation and tourism and ecosystem services such as wildlife, clean air, clean water, and aesthetics. These benefits are jointly produced with timber in Arkansas forests, but are often not recognized by either formal or informal economic markets. Many of these forest outputs are “public goods” that are received freely by consumers without any compensation to producers. The growth in demand for these “ecosystem services” is outpacing their production. Solving this failure of free markets would encourage greater production of these services by forest landowners. Research and development that will promote new economic markets for these vital forest services are needed.

**Action Step 9: Statewide business planning**

In order to build a stronger, more competitive state economy, Arkansas business leaders, elected officials, and universities need to work together in a coordinated fashion. One of the first steps is to identify Arkansas’ economic strengths on a comprehensive fashion and then identify clusters of allied businesses that are leaders in their respective sectors. Arkansas needs to develop its economy around business clusters that are strong exporters of value-added goods and services and that create well paying jobs within the state. Furthermore, these industries should be compatible with maintaining Arkansas’ healthy natural environment and promote a high quality of life. Forest-based industries certainly will play a role in this strategic plan and the “forestry community” needs to take leadership by encouraging other business sectors and state officials to take a long-term, comprehensive view of Arkansas’ economic future.

**ACKNOWLEDGMENTS**

This project was funded by the United States Department of Commerce Economic Development
University of Arkansas-Monticello faculty scientist and graduate student study fire ecology and history in northwest Arkansas.

Best Management Practices are taught to landowners to protect water quality in Arkansas.

Forest managers conduct a prescribed burn in hardwoods in Washington County, northwest Arkansas.
Administration. Diana Boldon was instrumental in organizing interviews and analyzing data. Her dedication, hard work, and tremendous organizational skills were essential in the completion of this report. Additional research support came from Rachel Kluender and Rebecca Montgomery. Many thanks to the proofreaders, Dr. Hal Liechty, Dr. Sayeed Mehmod, and Dr. Richard Kluender, whose valuable comments greatly improved this report. Finally, a special thanks to the Honorable Blanche Lincoln, United States Senator, and her staff for their advice during the development of the project proposal and their continued support throughout this project.

REFERENCES


### Table 1. Total economic impacts of Arkansas’ forest industries, 2001.

<table>
<thead>
<tr>
<th>Item</th>
<th>Direct</th>
<th>Indirect + Induced</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment</td>
<td>43,371</td>
<td>53,722</td>
<td>97,183</td>
</tr>
<tr>
<td>Wages</td>
<td>$1,553,532,137</td>
<td>$1,493,086,701</td>
<td>$3,046,618,838</td>
</tr>
<tr>
<td>Output</td>
<td>$7,381,513,403</td>
<td>$5,023,926,697</td>
<td>$12,405,440,019</td>
</tr>
<tr>
<td>Value-added</td>
<td>$2,446,417,704</td>
<td>$2,485,326,793</td>
<td>$4,931,744,497</td>
</tr>
</tbody>
</table>

### Table 2. Change in Arkansas’ timber-growing stock, 1995-2002. (USDA Forest Service)

<table>
<thead>
<tr>
<th>Species grouping</th>
<th>Growing stock in cubic feet</th>
<th>% Change from 1995 to 2002</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1995</td>
<td>2002</td>
</tr>
<tr>
<td>Pine</td>
<td>8,865,289,567</td>
<td>9,862,640,667</td>
</tr>
<tr>
<td>Other softwoods</td>
<td>476,636,065</td>
<td>892,033,453</td>
</tr>
<tr>
<td>Oaks</td>
<td>7,169,036,681</td>
<td>9,054,914,763</td>
</tr>
<tr>
<td>Other hardwoods</td>
<td>5,174,860,849</td>
<td>6,601,198,610</td>
</tr>
<tr>
<td>Totals</td>
<td>21,685,823,161</td>
<td>26,410,787,492</td>
</tr>
</tbody>
</table>

### Table 3. Selected states’ roundwood production and value of shipments. (USDA Forest Service)

<table>
<thead>
<tr>
<th>State</th>
<th>Roundwood production (cubic feet)</th>
<th>Value of shipments ($1000s)</th>
<th>Value of shipments per ft.³ roundwood production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>1,241,478,991</td>
<td>$12,164,105</td>
<td>$9.80</td>
</tr>
<tr>
<td>Arkansas</td>
<td>720,951,994</td>
<td>7,190,078</td>
<td>9.97</td>
</tr>
<tr>
<td>Florida</td>
<td>512,346,993</td>
<td>7,801,094</td>
<td>15.23</td>
</tr>
<tr>
<td>Georgia</td>
<td>1,442,215,014</td>
<td>15,801,956</td>
<td>10.96</td>
</tr>
<tr>
<td>Kentucky</td>
<td>226,816,996</td>
<td>4,613,106</td>
<td>20.34</td>
</tr>
<tr>
<td>Louisiana</td>
<td>825,192,995</td>
<td>8,304,118</td>
<td>7.64</td>
</tr>
<tr>
<td>Mississippi</td>
<td>1,013,519,988</td>
<td>8,872,075</td>
<td>8.75</td>
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<tr>
<td>Missouri</td>
<td>174,226,130</td>
<td>5,241,632</td>
<td>30.09</td>
</tr>
<tr>
<td>North Carolina</td>
<td>853,280,889</td>
<td>17,223,426</td>
<td>20.18</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>129,837,999</td>
<td>1,919,894</td>
<td>14.79</td>
</tr>
<tr>
<td>South Carolina</td>
<td>661,312,992</td>
<td>7,492,800</td>
<td>11.33</td>
</tr>
<tr>
<td>Tennessee</td>
<td>348,451,995</td>
<td>8,668,794</td>
<td>24.87</td>
</tr>
<tr>
<td>Texas</td>
<td>705,539,995</td>
<td>12,892,584</td>
<td>18.27</td>
</tr>
<tr>
<td>Virginia</td>
<td>545,724,990</td>
<td>9,162,093</td>
<td>16.79</td>
</tr>
</tbody>
</table>

37

<table>
<thead>
<tr>
<th>State</th>
<th>National rank</th>
<th>Electricity Price ($/mil. BTU)</th>
<th>National rank</th>
<th>Natural gas Price ($/mil. BTU)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Florida</td>
<td>8</td>
<td>11.72</td>
<td>41</td>
<td>5.10</td>
</tr>
<tr>
<td>North Carolina</td>
<td>13</td>
<td>11.21</td>
<td>10</td>
<td>6.73</td>
</tr>
<tr>
<td>South Carolina</td>
<td>16</td>
<td>10.43</td>
<td>21</td>
<td>5.99</td>
</tr>
<tr>
<td>Virginia</td>
<td>22</td>
<td>10.19</td>
<td>8</td>
<td>7.03</td>
</tr>
<tr>
<td>Georgia</td>
<td>23</td>
<td>10.16</td>
<td>17</td>
<td>6.32</td>
</tr>
<tr>
<td>Tennessee</td>
<td>25</td>
<td>9.95</td>
<td>24</td>
<td>5.89</td>
</tr>
<tr>
<td>Mississippi</td>
<td>33</td>
<td>9.85</td>
<td>46</td>
<td>4.72</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>34</td>
<td>9.75</td>
<td>35</td>
<td>5.34</td>
</tr>
<tr>
<td>Arkansas</td>
<td>35</td>
<td>9.61</td>
<td>32</td>
<td>5.45</td>
</tr>
<tr>
<td>Alabama</td>
<td>37</td>
<td>9.22</td>
<td>30</td>
<td>5.47</td>
</tr>
<tr>
<td>Texas</td>
<td>40</td>
<td>8.82</td>
<td>49</td>
<td>4.3</td>
</tr>
<tr>
<td>Kentucky</td>
<td>44</td>
<td>8.53</td>
<td>26</td>
<td>5.77</td>
</tr>
<tr>
<td>Louisiana</td>
<td>49</td>
<td>7.62</td>
<td>50</td>
<td>4.19</td>
</tr>
</tbody>
</table>

Table 5. Current and projected population and population density in southern U.S. states, 2000 to 2025. (U.S. Census Bureau)

<table>
<thead>
<tr>
<th>State</th>
<th>2000 population (1000s)</th>
<th>2025 est. population (1000s)</th>
<th>2000 density (#/sq. mi.)</th>
<th>2025 est. density (#/sq.mi.)</th>
<th>% growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>4451</td>
<td>5224</td>
<td>86</td>
<td>101</td>
<td>17.4%</td>
</tr>
<tr>
<td>Arkansas</td>
<td><strong>2631</strong></td>
<td><strong>3055</strong></td>
<td><strong>49</strong></td>
<td><strong>57</strong></td>
<td><strong>16.1%</strong></td>
</tr>
<tr>
<td>Florida</td>
<td>15233</td>
<td>20710</td>
<td>260</td>
<td>353</td>
<td>36.0%</td>
</tr>
<tr>
<td>Georgia</td>
<td>7875</td>
<td>9869</td>
<td>134</td>
<td>168</td>
<td>25.3%</td>
</tr>
<tr>
<td>Kentucky</td>
<td>3995</td>
<td>4314</td>
<td>99</td>
<td>107</td>
<td>8.0%</td>
</tr>
<tr>
<td>Louisiana</td>
<td>4425</td>
<td>5113</td>
<td>93</td>
<td>107</td>
<td>15.5%</td>
</tr>
<tr>
<td>Mississippi</td>
<td>2816</td>
<td>3142</td>
<td>59</td>
<td>66</td>
<td>11.6%</td>
</tr>
<tr>
<td>Missouri</td>
<td>5540</td>
<td>6250</td>
<td>79</td>
<td>90</td>
<td>12.8%</td>
</tr>
<tr>
<td>North Carolina</td>
<td>7777</td>
<td>9349</td>
<td>148</td>
<td>178</td>
<td>20.2%</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>3373</td>
<td>4057</td>
<td>48</td>
<td>58</td>
<td>20.3%</td>
</tr>
<tr>
<td>South Carolina</td>
<td>3858</td>
<td>4645</td>
<td>124</td>
<td>149</td>
<td>20.4%</td>
</tr>
<tr>
<td>Tennessee</td>
<td>5657</td>
<td>6665</td>
<td>134</td>
<td>158</td>
<td>17.8%</td>
</tr>
<tr>
<td>Texas</td>
<td>20119</td>
<td>27183</td>
<td>75</td>
<td>102</td>
<td>35.1%</td>
</tr>
<tr>
<td>Virginia</td>
<td>6997</td>
<td>8466</td>
<td>172</td>
<td>208</td>
<td>21.0%</td>
</tr>
<tr>
<td>SE state avg.</td>
<td><strong>94747</strong></td>
<td><strong>118042</strong></td>
<td><strong>102</strong></td>
<td><strong>127</strong></td>
<td><strong>24.6%</strong></td>
</tr>
</tbody>
</table>
### Table 6. General statistics on Arkansas’ workforce. (Arkansas Employment Security Department)

<table>
<thead>
<tr>
<th>Statistic</th>
<th>1995</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkansas total workforce</td>
<td>1,219,650</td>
<td>1,264,650</td>
</tr>
<tr>
<td>Total employment</td>
<td>1,160,400</td>
<td>1,186,500</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>4.9%</td>
<td>6.2%</td>
</tr>
<tr>
<td>Percent of workforce in counties</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dependent on forest industry</td>
<td>30%</td>
<td>36%</td>
</tr>
<tr>
<td>Average unemployment rate in counties</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dependent on forest industry</td>
<td>5.9%</td>
<td>7.4%</td>
</tr>
</tbody>
</table>

### Table 7. Education level of Arkansas’ population, 2002. (US Census Bureau ACS)

<table>
<thead>
<tr>
<th>Level of education</th>
<th>Estimate of population</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 9th grade</td>
<td>124,288</td>
<td>7.3%</td>
</tr>
<tr>
<td>9th to 12th grade, no diploma</td>
<td>219,984</td>
<td>12.8%</td>
</tr>
<tr>
<td>High school graduate (including equivalency)</td>
<td>575,081</td>
<td>33.7%</td>
</tr>
<tr>
<td>Some college, no degree</td>
<td>372,325</td>
<td>21.7%</td>
</tr>
<tr>
<td>Associate’s degree</td>
<td>82,287</td>
<td>4.8%</td>
</tr>
<tr>
<td>Bachelor’s degree</td>
<td>226,105</td>
<td>13.2%</td>
</tr>
<tr>
<td>Graduate or professional degree</td>
<td>111,484</td>
<td>6.5%</td>
</tr>
<tr>
<td>Total population 25+ years of age</td>
<td>1,711,494</td>
<td>100%</td>
</tr>
</tbody>
</table>

### Table 8. Forestry teaching, research, and extension full-time equivalents by state in the U.S. South. (National Association of Professional Forestry Schools and Colleges, 2004 report)

<table>
<thead>
<tr>
<th>State</th>
<th>Teaching</th>
<th>Research</th>
<th>Extension</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>11.23</td>
<td>21.37</td>
<td>6.6</td>
<td>39.2</td>
</tr>
<tr>
<td><strong>Arkansas</strong></td>
<td><strong>8.4</strong></td>
<td><strong>8.05</strong></td>
<td><strong>3.55</strong></td>
<td><strong>20</strong></td>
</tr>
<tr>
<td>Florida</td>
<td>6.1</td>
<td>8.4</td>
<td>1.5</td>
<td>16</td>
</tr>
<tr>
<td>Georgia¹</td>
<td>15.3</td>
<td>17</td>
<td>5</td>
<td>37.3</td>
</tr>
<tr>
<td>Kentucky</td>
<td>2.8</td>
<td>5.3</td>
<td>4.4</td>
<td>12.5</td>
</tr>
<tr>
<td>Louisiana</td>
<td>20.58</td>
<td>21.85</td>
<td>3.61</td>
<td>46.24</td>
</tr>
<tr>
<td>Mississippi</td>
<td>14.31</td>
<td>25.43</td>
<td>6.74</td>
<td>46.48</td>
</tr>
<tr>
<td>North Carolina²</td>
<td>42.59</td>
<td>32.37</td>
<td>8.87</td>
<td>83.83</td>
</tr>
<tr>
<td>Oklahoma³</td>
<td>4.4</td>
<td>8.6</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>South Carolina</td>
<td>7.9</td>
<td>11.65</td>
<td>3.45</td>
<td>23</td>
</tr>
<tr>
<td>Tennessee</td>
<td>10.58</td>
<td>11.45</td>
<td>6.32</td>
<td>28.35</td>
</tr>
<tr>
<td>Texas</td>
<td>23.14</td>
<td>10.52</td>
<td>2.3</td>
<td>35.96</td>
</tr>
<tr>
<td>Virginia</td>
<td>27.28</td>
<td>21.25</td>
<td>8.96</td>
<td>57.49</td>
</tr>
</tbody>
</table>


² - Does not include Duke University

³ - Oklahoma State University website [http://www.it.okstate.edu/reportcards/FOR.html](http://www.it.okstate.edu/reportcards/FOR.html)
<table>
<thead>
<tr>
<th>State</th>
<th>Support for state forest inventory</th>
<th>Cooperative research funding to state universities</th>
<th>SRS Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>$514,882</td>
<td>$1,146,528</td>
<td>27</td>
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<tr>
<td>Arkansas</td>
<td>$487,619</td>
<td>$42,523</td>
<td>16</td>
</tr>
<tr>
<td>Florida</td>
<td>$126,770</td>
<td>$642,781</td>
<td>9</td>
</tr>
<tr>
<td>Georgia</td>
<td>$599,623</td>
<td>$1,075,595</td>
<td>57</td>
</tr>
<tr>
<td>Kentucky</td>
<td>$325,000</td>
<td>$120,817</td>
<td>1</td>
</tr>
<tr>
<td>Louisiana</td>
<td>$60,672</td>
<td>$329,988</td>
<td>49</td>
</tr>
<tr>
<td>Mississippi</td>
<td>$0</td>
<td>$259,482</td>
<td>71</td>
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<tr>
<td>North Carolina</td>
<td>$258,239</td>
<td>$2,394,247</td>
<td>165</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>$0</td>
<td>$31,076</td>
<td>1</td>
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<tr>
<td>South Carolina</td>
<td>$381,970</td>
<td>$253,772</td>
<td>44</td>
</tr>
<tr>
<td>Tennessee</td>
<td>$299,242</td>
<td>$375,241</td>
<td>60</td>
</tr>
<tr>
<td>Texas</td>
<td>$731,755</td>
<td>$111,318</td>
<td>14</td>
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<tr>
<td>Virginia</td>
<td>$344,445</td>
<td>$402,921</td>
<td>11</td>
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