

Economic Benefits of the Forestry Industry in Georgia: 2002

Prepared for:
Georgia Forestry Commission

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Executive Summary

Georgia's forestry industry has many components, which interact with all other sectors of the economy in complex ways. The purpose of this analysis is to: (1) quantify the level of economic activity conducted by the components of the forestry industry, (2) estimate economic activity supported in all Georgia sectors by the industry's activities, and (3) compare the level of activity in the forestry industry with other industries.

The forestry industry components, and the level of economic activity represented by them, are shown in Table E-1 for 2002. Economic activity is measured by output (similar to sales revenue), employment, and income (defined as wages and salaries including benefits plus proprietor income). These measures are traditionally used in this type of analysis.

Table E-1
Georgia Forestry Industry Economic Activity: 2002

<u>Sector</u>	<u>Output</u>	<u>Employment</u>	<u>Income</u>
Forest Products (Greenhouses & Nurseries)	\$177,712,576	680	\$36,073,100
Logging Camps and Logging Contractors	\$946,273,984	5,232	\$164,824,768
Sawmills and Wood Preservation	\$2,315,247,616	7,573	\$296,485,152
Millwork	\$985,712,448	5,875	\$205,271,520
Wood Kitchen Cabinets	\$460,470,560	4,342	\$129,542,120
Veneer and Plywood	\$378,503,456	2,239	\$107,276,544
Engineered Wood	\$695,133,632	3,446	\$137,397,568
Containers	\$231,498,448	2,749	\$74,885,448
Mobile Homes	\$772,219,264	4,527	\$143,184,928
Prefabricated Wood Buildings	\$49,367,904	379	\$11,780,856
Household Furniture	\$401,833,696	3,778	\$108,512,264
Wood TV and Radio Cabinets	\$9,036,174	109	\$1,077,917
Office Furniture	\$124,158,976	1,090	\$43,290,992
Wood Partitions and Fixtures	\$303,478,304	2,576	\$86,436,048
Pulp Mills	\$565,024,192	1,287	\$103,221,456
Paper Mills, Except Building Paper	\$2,195,642,368	5,676	\$443,727,936
Paperboard Mills	\$1,466,492,928	3,442	\$270,887,968
Paperboard Containers and Boxes	\$1,958,273,408	8,165	\$422,635,072
Bags	\$909,087,744	2,594	\$119,533,864
Stationery	\$152,534,336	748	\$40,199,164
Other Converted Paper	\$890,157,056	3,588	\$261,942,544
Woodworking Machinery	\$33,949,360	212	\$10,049,672
Paper Industries Machinery	\$46,984,308	328	\$20,598,390
Burial Caskets and Vaults	\$16,133,544	80	\$2,465,809
Total	\$16,084,926,282	70,715	\$3,241,301,100

Source: Georgia Department of Labor (ES202, 2002), *1997 Census of Manufacturers*, and Georgia Tech's Economic Development Institute

Table E-1 shows that in 2002 the forestry industry employed 70,715 in all forestry industry sectors combined, paid an annual income of over \$3.2 billion, and supported total sales revenue of over \$16.1 billion.

The activities in the sectors shown in Table E-1 bring dollars into the state, which recirculate in a process called the “multiplier effect.” The recirculation touches all major industry sectors as goods and services are bought and sold to meet increased demands by businesses and households. The result of the multiplier effect, given by total impacts (which includes the direct impacts), is also measured by output, employment, and income (Table E-2).

Economic activity, including the multiplier effect, supported by the forestry industry in Georgia is almost \$25.4 billion. This activity employs 169,366 people whose compensation is over \$6.7 billion.

Table E-2
Total Benefits by Major Industry Sector

<u>Sector</u>	<u>Output</u>	<u>Employment</u>	<u>Income</u>
Agriculture	\$233,756,176	1,890	\$56,655,352
Mining	\$15,958,817	125	\$4,981,053
Construction	\$335,340,288	4,760	\$173,430,720
Manufacturing	\$16,837,896,192	74,010	\$3,390,878,976
Transportation, Comm. and Public Utilities	\$1,770,525,696	11,748	\$529,550,816
Wholesale and Retail Trade	\$2,322,763,264	30,896	\$997,396,416
Finance, Insurance, and Real Estate	\$1,464,791,808	7,578	\$316,298,816
Services	\$2,167,315,712	35,806	\$1,155,449,216
Government	\$200,693,696	1,508	\$68,411,008
Other	\$10,590,603	1,045	\$10,590,603
Total	\$25,359,632,252	169,366	\$6,703,642,976

Source: Georgia Tech's Economic Development Institute

Another way to examine the forestry industry in Georgia is to compare it with other manufacturing sectors. For this comparison to be valid, all non-manufacturing forestry components must be excluded. Table E-3 lists the income and employment totals for each major industry sector sorted by total income for 2002. These data show that forestry ranks second in total income generated, and third in total employment. Textiles (dominated by carpet) ranks first in both income and employment, with food processing ranking second in employment and third in income.

**Table E-3
Comparison of Georgia Manufacturing Industries**

<u>Sector</u>	<u>Employment</u>	<u>Payroll</u>
Textiles	88,478	\$2,534,213,947
Forestry Manufacturing	64,577	\$2,420,953,241
Food Processing	67,409	\$2,265,536,304
Transportation Equipment	37,482	\$1,629,279,017
Chemicals	21,913	\$1,102,825,578
Computers and Electronic Products	17,849	\$966,037,274
Machinery	24,560	\$899,973,664
Printing	22,588	\$848,916,370
Apparel	10,617	\$227,642,213

Source: Georgia Department of Labor (ES202), 2002

Of particular importance to Georgia's state government is how the forestry industry affects its annual budget. This is investigated by estimating the revenues associated with the forestry industry's economic activity and subtracting the costs associated with providing state services to the households and companies. Revenues include individual and corporate income tax, sales and use taxes, highway taxes, fees, and miscellaneous revenues. Costs estimated include education, public health and safety, welfare, highways, administration, and miscellaneous costs. Table E-4 provides these estimates for both direct and total impacts. The net annual fiscal benefit from the forestry industry (direct impacts) is almost \$172 million, and this figure climbs to over \$226 million when multiplier effects are included for total impacts.

**Table E-4
Annual Fiscal Impacts**

Direct Impacts	
State Government Revenues	\$266,766,122
State Government Costs	\$94,891,800
Net Revenues	\$171,874,323
Total Impacts	
State Government Revenues	\$623,148,743
State Government Costs	\$396,697,520
Net Revenues	\$226,451,223

Section 1

Introduction

Georgia’s forestry industry contains many components and supports a significant proportion of the state’s economic activity. This analysis quantifies that activity in terms of economic output, employment, and household income where economic output is defined as business revenues and household income is defined as wages, salaries (including benefits), and proprietor income. Additional factors considered include how the manufacturing components in the forestry industry compare to other manufacturing sectors, and how the industry affects state government costs and revenues.

The first step in this process is to define the limits of what constitutes the forestry industry. This is not as simple a task as it may appear because the borders of one industry overlap those of other industries, and also because we are now in a transition period from the Standard Industrial Classification (SIC) system to the North American Industrial Classification System (NAICS). Because some of the information on which this analysis is based uses one system and other data use another, the industry definition must be consistent between systems. How this was done and its results appear in Section 2, which also contains estimates of how much economic activity is occurring in each component of the forestry industry.

After the industry was defined and activities quantified, the total economic activity supported by the forestry industry was estimated. Total activity is generally referred to as the “multiplier effect.” This effect occurs whenever dollars are brought into the state’s economy and recirculated before “leaking out”. Section 3 explains the methodology used to estimate total economic activity and provides perspective on how important these activities are in the overall Georgia economy.

Section 2

Definition of the Forestry Industry in Georgia

The forestry industry in Georgia has many diverse components. A general definition would include all service and manufacturing activity related to the growth, harvesting, and use of forest materials that would not exist in Georgia without the presence of extensive forests or forest industries. For example, the paper-making industry would be a part of the forestry industry definition, but retail sales of that paper would not. States without commercial forests still sell paper within their borders.

Therefore, the forestry industry definition used in this analysis includes these broad sectors: forestry, logging, wood products (such as dimension lumber), paper products, manufactured housing, furniture, other miscellaneous wood products, and woodworking and papermaking machinery. Because updates will rely on the NAICS system, the detailed industry definition will follow that system. The NAICS codes and descriptions composing the detailed definition are provided in Table 2-1.

The organization of the industries on this list is similar to the SIC system in that the number of digits of the NAICS codes increases as the level of detail increases. The highest level of detail practicable is the six-digit level, which is roughly equivalent to the 4-digit level in the older SIC system. In some cases, however, the six-digit industry is the same as the five-digit industry, so these duplications are not presented in Table 2-1. For example, industry 11311 (timber tract operations) does not break down into smaller components, so the six-digit industry (which would be 113110) is omitted because it's redundant.

In some cases, the higher-level NAICS industries contain components that are not part of the forestry industry. For example, metal furniture is included in NAICS 3371, but is not included at the six-digit level. Each component containing only forestry-related industries are indicated by italicized text in the table. Non-forestry-related components have been excluded.

Within the industry, Georgia companies have representative firms in each of the sectors and subsectors down to the NAICS six-digit level. The highest employment is seen in paperboard containers and boxes with over 8,000 workers, followed by sawmills with about 7,500. Many segments have employment exceeding 5,000, including paper mills, millwork, and logging. The greatest payrolls come from paper mills, and paperboard containers and boxes. The largest revenues are produced by sawmills and wood preservation, with other converted paper and paper mills following closely behind. All three industries have outputs in the neighborhood of \$2 billion.

Table 2-1
Forestry Industry Definition Components: NAICS

<u>NAICS</u>	<u>Description</u>
113	<i>Forestry and Logging</i>
1131	<i>Timber Tract Operations</i>
11311	<i>Timber Tract Operations</i>
1132	<i>Forest Nurseries and Gathering of Forest Products</i>
11321	<i>Forest Nurseries and Gathering of Forest Products</i>
1133	<i>Logging</i>
11331	<i>Logging</i>
321	<i>Wood Product Manufacturing</i>
3211	<i>Sawmills and Wood Preservation</i>
32111	<i>Sawmills and Wood Preservation</i>
321113	<i>Sawmills</i>
321114	<i>Wood Preservation</i>
3212	<i>Veneer, Plywood, and Engineered Wood Product Manufacturing</i>
32121	<i>Veneer, Plywood, and Engineered Wood Product Manufacturing</i>
321211	<i>Hardwood Veneer and Plywood Manufacturing</i>
321212	<i>Softwood Veneer and Plywood Manufacturing</i>
321213	<i>Engineered Wood Member (except Truss) Manufacturing</i>
321214	<i>Truss Manufacturing</i>
321219	<i>Reconstituted Wood Product Manufacturing</i>
3219	<i>Other Wood Product Manufacturing</i>
32191	<i>Millwork</i>
321911	<i>Wood Window and Door Manufacturing</i>
321912	<i>Cut Stock, Resawing Lumber, and Planing</i>
321918	<i>Other Millwork (including Flooring)</i>
32192	<i>Wood Container and Pallet Manufacturing</i>
32199	<i>All Other Wood Product Manufacturing</i>
321991	<i>Mobile Homes</i>
321992	<i>Prefabricated Wood Building Manufacturing</i>
321999	<i>All Other Miscellaneous Wood Product Manufacturing</i>
322	<i>Paper Manufacturing</i>
3221	<i>Pulp, Paper, and Paperboard Mills</i>
32211	<i>Pulp Mills</i>
32212	<i>Paper Mills</i>
322121	<i>Paper (except Newsprint) Mills</i>
322122	<i>Newsprint Mills</i>
32213	<i>Paperboard Mills</i>
3222	<i>Converted Paper Product Manufacturing</i>
32221	<i>Paperboard Container Manufacturing</i>
322211	<i>Corrugated and Solid Fiber Box Manufacturing</i>
322212	<i>Folding Paperboard Box Manufacturing</i>
322213	<i>Setup Paperboard Box Manufacturing</i>
322214	<i>Fiber Can, Tube, Drum, and Similar Products Manufacturing</i>
322215	<i>Non-folding Sanitary Food Container Manufacturing</i>
32222	<i>Paper Bag and Coated and Treated Paper Manufacturing</i>

322221	<i>Coated and Laminated Packaging Paper and Plastic Film Manufacturing</i>
322222	<i>Coated and Laminated Paper Manufacturing</i>
322223	<i>Plastics, Foil, and Coated Paper Bag Manufacturing</i>
322224	<i>Uncoated Paper and Multiwall Bag Manufacturing</i>
322225	<i>Laminated with Foil for Flexible Packaging</i>
322226	<i>Surface-Coated Paperboard Manufacturing</i>
32223	<i>Stationery Product Manufacturing</i>
322231	<i>Die-Cut Paper and Paperboard Office Supplies Manufacturing</i>
322232	<i>Envelope Manufacturing</i>
322233	<i>Stationery, Tablet, and Related Product Manufacturing</i>
32229	<i>Other Converted Paper Product Manufacturing</i>
322291	<i>Sanitary Paper Product Manufacturing</i>
322299	<i>All Other Converted Paper Product Manufacturing</i>
33321	<i>Sawmill and Woodworking Machinery Manufacturing</i>
333291	<i>Paper Industry Machinery Manufacturing</i>
337	<i>Furniture & Related Product Manufacturing</i>
3371	<i>Household and Institutional Furniture and Kitchen Cabinet Manufacturing</i>
33711	<i>Wood Kitchen Cabinet and Countertop Manufacturing</i>
33712	<i>Household and Institutional Furniture Making</i>
337121	<i>Upholstered Household Furniture Manufacturing</i>
337122	<i>Non-upholstered Wood Household Furniture Manufacturing</i>
337127	<i>Institutional Furniture Manufacturing</i>
337129	<i>Wood Television, Radio, and Sewing Machine Cabinet Manufacturing</i>
337211	<i>Wood Office Furniture Manufacturing</i>
337212	<i>Custom Architectural Woodwork and Millwork Manufacturing</i>
337215	<i>Showcase, Partition, Shelving, and Locker Manufacturing</i>
333	<i>Machinery Manufacturing</i>
3332	<i>Industrial Machinery Manufacturing</i>
33321	<i>Sawmill and Woodworking Machinery Manufacturing</i>
33329	<i>Other Industrial Machinery Manufacturing</i>
333291	<i>Paper Industry Machinery Manufacturing</i>
339	<i>Miscellaneous Manufacturing</i>
3399	<i>Other Miscellaneous Manufacturing</i>
33999	<i>All Other Miscellaneous Manufacturing</i>
339995	<i>Burial Casket Manufacturing</i>

Source: North American Industrial Classification System, and Georgia Tech's Economic Development Institute

The level of economic activity in each forestry industry component is measured by output, employment, and income. Measures for the 2002 calendar year appear in Table 2-2. This table shows that total employment in all of the forestry industry sectors is 70,715, and these jobs earned annual total wages and salaries (including benefits) of over \$3.2 billion from total sales revenue of almost \$16.1 billion.

Table 2-2
Georgia Forestry Industry Economic Activity: 2002

Sector	Output	Employment	Income
Forest Products (Greenhouses & Nurseries)	\$177,712,576	680	\$36,073,100
Logging Camps and Logging Contractors	\$946,273,984	5,232	\$164,824,768
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Wood Kitchen Cabinets	\$460,470,560	4,342	\$129,542,120
Veneer and Plywood	\$378,503,456	2,239	\$107,276,544
Engineered Wood	\$695,133,632	3,446	\$137,397,568
Containers	\$231,498,448	2,749	\$74,885,448
Mobile Homes	\$772,219,264	4,527	\$143,184,928
Prefabricated Wood Buildings	\$49,367,904	379	\$11,780,856
Household Furniture	\$401,833,696	3,778	\$108,512,264
Wood TV and Radio Cabinets	\$9,036,174	109	\$1,077,917
Office Furniture	\$124,158,976	1,090	\$43,290,992
Wood Partitions and Fixtures	\$303,478,304	2,576	\$86,436,048
Pulp Mills	\$565,024,192	1,287	\$103,221,456
Paper Mills, Except Building Paper	\$2,195,642,368	5,676	\$443,727,936
Paperboard Mills	\$1,466,492,928	3,442	\$270,887,968
Paperboard Containers and Boxes	\$1,958,273,408	8,165	\$422,635,072
Bags	\$909,087,744	2,594	\$119,533,864
Stationery	\$152,534,336	748	\$40,199,164
Other Converted Paper	\$890,157,056	3,588	\$261,942,544
Woodworking Machinery	\$33,949,360	212	\$10,049,672
Paper Industries Machinery	\$46,984,308	328	\$20,598,390
Burial Caskets and Vaults	<u>\$16,133,544</u>	<u>80</u>	<u>\$2,465,809</u>
Total	\$16,084,926,282	70,715	\$3,241,301,100

Source: Georgia Department of Labor (ES202, 2002), *1997 Census of Manufacturers*, and Georgia Tech's Economic Development Institute

Section 3

Economic Benefits

Methodology

Economic impact analysis has used basically the same methods for over 40 years. The tools, although greatly improved in quality and ease of use, are also similar to those in long-time use.

The conceptual basis for estimating economic benefits of an industry is that resources brought into Georgia's economy by the industry raise the level of economic activity. This additional economic activity, commonly called the multiplier effect, supports increased employment, income, and business revenues. These increases are estimated from an input-output model (I/O).

The purpose of an I/O model is to estimate the flows of resources among various economic sectors by using the "recipes" followed by producers. These recipes provide the type and amount of goods and services purchased during production, which are produced by other firms. For example, a pulp mill purchases wood from a logger. The logger, in turn, purchases equipment and fuel from firms, that, in turn, purchase their raw materials from still other firms. Combined with estimates of what percentage of these items are supplied by Georgia firms, the recipes can be used to estimate how much of each item is purchased from Georgia firms and how much is purchased from outside Georgia.

Purchases from sources outside the Georgia economy are known as "leakage," which puts the brakes on the multiplier effect; the higher the leakage, the lower the multiplier effect.

The I/O model used in this analysis is called IMPLAN, devised by the Minnesota IMPLAN Group. It is a nationally recognized model that uses Georgia data to tailor its estimates to the Georgia economy. Still, the model must be modified somewhat to account for differences in specific industry sectors revealed by more current data. For example, the wage and salary data used in this analysis is from 2001, whereas the wage and salary data available to IMPLAN is from 1998.

One area of uncertainty that persists, however, is the level of benefits provided to workers in each of the forestry industry sectors. The available wage and salary information does not include benefits, but the I/O model bases its analysis on wages and salaries that include benefits. An average of 25 percent was assumed for this analysis.

The analytical process includes three steps after the industry sectors are defined, as described in the previous section. The first step is to quantify employment, income, and output associated with each of the defined sectors. Several data sources are used to accomplish this.

The best source for employment and wages is the employment security data collected and maintained by the Georgia Department of Labor. Commonly called ES202 data, it has the advantage of being current, allowing an estimate of the economic benefits occurring in 2002.

Output levels are more difficult to estimate because the most recent information was produced from 1997 data reported in the *Census of Manufacturers*. Estimates of output per employee from that source were converted to current dollars and multiplied by current estimates of employment to estimate current output.

The second task is to divide the forestry industry output into two categories: (1) output that is sold to another Georgia firm, and (2) output sold outside the state. Another way to look at this is to recall that the multiplier effect starts from dollars brought into the Georgia economy. Output not sold to another Georgia firm is, by definition, bringing in resources from outside the Georgia economy, and it is these “exports” that fuel the multiplier effect. Forestry industry output used as an input to another Georgia forestry-industry firm is already accounted for in the multiplier effect; counting it again would result in double-counting and would imply a level of production from the input-supplying industry higher than actually observed. For example, if the multiplier effect is calculated for the paper industry, it will include some of the activities of Georgia logging operations. If the entire output from logging was then added to the multiplier effect for paper, it would double-count the logging output that went to the paper industry. The I/O model is used for these estimations, with the resulting estimates called “direct impacts.”

Direct impacts are measures of the output from, in this case, forestry industries that are exporting to entities outside Georgia. These are considered exports even if they only go to Alabama.

The third step is to use the I/O model to estimate total impacts, which are divided into three components. The first is the direct impacts which represent the value of resources brought into the state. The second is indirect impacts which are impacts from recirculation of resources resulting from forestry industry purchases from other industries. The third is induced impacts, which result from activities in the household sector. Adding direct, indirect, and induced impacts yields total benefits.

Three measures of economic benefits are provided. The first, output, is a measure of how much each industry or sector produced in 2001 - roughly equivalent to a measure of sales revenue. The second measure is income, including all household income and employee benefits. The last measure is employment provided by the firms in each industry.

Results

Table 3-1 provides estimates of direct impacts for each of the forestry industry sectors contained in the industry's definition. These differ from the level of economic activity shown in Table 2-3 because Table 3-1 excludes production consumed by another sector. This eliminates the double counting of production in the multiplier effect of the consuming industry sector. For example, Table 3-1 does not contain much output from the logging industry because most of it seems to be consumed by the various Georgia wood-using industries such as paper and millwork. Logging operations are included primarily as part of the multiplier effect by these consuming industries, not as a direct impact separate from them.

Another way to interpret Table 3-1 is to consider the direct impacts to be estimates of the exports of forestry-related industries. This exporting (to anyone outside Georgia) brings resources into the state to support the increase in economic activity estimated by the multiplier effect.

The highest output is achieved by the "Other Converted Paper" sector, which includes sanitary paper and products from pressed pulp such as paper plates and egg cartons. The greatest employment is in the "Paperboard and Containers" sector with about 7,265 employees. The highest payroll, however, is in the "Paper Mill" sector with over \$400 million in salaries, wages, and benefits. Together, the forestry industry exports almost \$17 billion, with this activity supporting 64,392 jobs with a payroll of over \$3 billion.

As dollars brought into Georgia's economy (as measured by the direct impacts) recirculate, a higher level of economic activity is supported. This higher level is estimated by applying the IMPLAN input-output model to the direct impacts provided in Table 3-1. The results of this analysis are presented in Table 3-2. Because all industries in Georgia are affected by the forestry industry, Table 3-2 summarizes the benefits by aggregated industry codes (used in the input-output model) which are roughly equivalent to one-digit SIC codes.

Table 3-1
Direct Impacts by Forest Industry Sector
(Dollars)

<u>Sector</u>	<u>Output</u>	<u>Emp</u>	<u>Income</u>
Forest Prod (Greenhouses and Nurseries)	\$207,509,184	1,434	\$67,707,288
Sawmills & Wood Preservation	\$1,243,670,784	4,072	\$165,861,536
Millwork	\$826,061,696	4,716	\$163,208,368
Wood Kitchen Cabinets	\$306,500,544	2,893	\$82,160,224
Veneer and Plywood	\$824,528,128	4,081	\$298,612,864
Engineered Wood	\$575,176,192	2,815	\$114,460,536
Containers	\$428,929,824	2,895	\$73,193,472
Mobile Homes	\$930,441,664	5,460	\$167,493,808
Prefabricated Wood Buildings	\$81,331,488	625	\$14,254,087
Household Furniture	\$247,762,144	2,292	\$58,581,816
Mattresses and Bedspings	\$318,121,216	1,477	\$68,020,848
Office Furniture	\$445,587,264	2,651	\$96,862,792
Pulp Mills	\$927,615,808	2,115	\$171,948,752
Paper Mills, Except Building Paper	\$2,053,710,080	5,457	\$405,276,960
Paperboard Mills	\$1,610,599,424	3,784	\$273,449,984
Paperboard Containers and Boxes	\$1,774,333,440	7,265	\$373,828,192
Bags	\$1,297,555,456	3,774	\$170,672,048
Stationery	\$430,952,384	1,734	\$74,895,792
Other Converted Paper	\$2,111,752,576	4,464	\$263,599,008
Woodworking Machinery	\$35,513,508	222	\$11,004,193
Paper Industries Machinery	\$10,446,019	73	\$4,784,960
Burial Caskets and Vaults	\$18,736,500	93	\$2,813,828
Total	\$16,706,835,323	64,392	\$3,122,691,356

Source: Georgia Department of Labor ES202 data files for 2001, and Georgia Tech's Economic Development Institute

The largest benefits are seen, not surprisingly, in the manufacturing sector, with almost \$17 billion in output, 74,010 employees, and about \$3.4 billion in income. A distant second is held by wholesale and retail trade, with over \$2.3 billion in output, 30,896 employees, and almost \$1.0 billion in income. Together, the economic activity supported by Georgia's forestry industry totals almost \$25.4 billion, involving employment of 169,366 people whose income exceeds \$6.7 billion. This employment represents about 4.3 percent of total Georgia employment and 5 percent of household income when compared to 2002 ES202 totals.

Table 3-2
Total Benefits by Major Industry Sector

<u>Sector</u>	<u>Output</u>	<u>Employment</u>	<u>Income</u>
Agriculture	\$233,756,176	1,890	\$56,655,352
Mining	\$15,958,817	125	\$4,981,053
Construction	\$335,340,288	4,760	\$173,430,720
Manufacturing	\$16,837,896,192	74,010	\$3,390,878,976
Transportation, Comm. and Public Utilities	\$1,770,525,696	11,748	\$529,550,816
Wholesale and Retail Trade	\$2,322,763,264	30,896	\$997,396,416
Finance, Ins. and Real Estate	\$1,464,791,808	7,578	\$316,298,816
Services	\$2,167,315,712	35,806	\$1,155,449,216
Government	\$200,693,696	1,508	\$68,411,008
Other	<u>\$10,590,603</u>	<u>1,045</u>	<u>\$10,590,603</u>
Total	\$25,359,632,252	169,366	\$6,703,642,976

Source: Georgia Tech's Economic Development Institute

Comparison of the Forestry Industry with Other Industry Sectors

By itself, it is difficult to understand the significance of the level of economic activity generated by the forestry industry. To give these results a sense of scale, the forestry industry economic activity is compared to that of other industry sectors in the Georgia economy. Table 3-3 summarizes this comparison using employment and payroll as the basis for the comparison.

Table 3-3
Comparison of Georgia Industries

<u>Sector</u>	<u>Employment</u>	<u>Payroll</u>
Textiles	88,478	\$2,534,213,947
Forestry Manufacturing	64,577	\$2,420,953,241
Food Processing	67,409	\$2,265,536,304
Transportation Equipment	37,482	\$1,629,279,017
Chemicals	21,913	\$1,102,825,578
Computers and Electronic Products	17,849	\$966,037,274
Machinery	24,560	\$899,973,664
Printing	22,588	\$848,916,370
Apparel	10,617	\$227,642,213

Source: Georgia Department of Labor (ES202)

The industry sectors in Table 3-3 are ranked in order of their payroll. Textiles (dominated by the carpet industry) has the highest payroll, followed closely by the manufacturing components of the forestry industry. When employment is considered, food processing is slightly larger and would rank second. The fourth industry (ranked either by employees or payroll) is transportation equipment, which is significantly smaller than the top three industry sectors.

Fiscal Impact Analysis

Economic impact analysis examines how much economic activity is supported by the influx of resources attributable to the forestry industry. Fiscal impact analysis examines the revenues and costs to state government generated by this economic activity. Revenues are generated from households and businesses through income taxes, sales and use taxes, fuel taxes, fees, and other miscellaneous revenue sources. The costs to the state resulting from this economic activity would include education, highway construction and maintenance, health and welfare, public safety, and general governmental administration. The net revenues (revenues minus costs) provide an estimate of how the state benefits from the existence of this industry.

The revenues and costs associated with the economic activity supported by the forestry industry were estimated using SFIA, a model developed specifically for Georgia by the author. It uses a population-response algorithm that estimates how migration patterns change as employment opportunities change. From the estimate of employment supported by the forestry industry, and its associated household income, estimates of net migration form the basis of state costs associated with population. Employment forms the basis for business-related costs and revenues in the model.

Table 3-4 summarizes the results of the fiscal impact analysis for the direct and total economic impacts. Direct revenues are estimated to be almost \$276 million, while costs are about \$95 million, yielding net revenues to the state government of almost \$172 million per year. When total impacts are considered, the revenues more than double to over \$623 million and the costs quadruple to almost \$400, million yielding a somewhat greater net revenue (compared to the direct impacts) of over \$266 million.

Table 3-4
Annual Fiscal Impacts

Direct Impacts

State Government Revenues	\$266,766,122
State Government Costs	\$94,891,800
Net Revenues	\$171,874,323

Total Impacts

State Government Revenues	\$ 623,148,743
State Government Costs	\$ 396,697,520
Net Revenues	\$ 226,451,223

Source: Georgia Tech's Economic Development Institute

References

Georgia Department of Labor, ES202 Wage and Employment Data: 2002.

US Department of the Census, “Census of Manufacturers 1997”
<http://www.census.gov/epcd/ec97/ga/GA000.HTM>

North American Industrial Classification System (NAICS),
<http://www.census.gov/epcd/www/naicstab.htm>

US Office of Management and Budget, “Standard Industrial Classification System Manual,”
1987.

Bureau of Economic Analysis Input-Output Sectors as contained in “IMPLAN Pro: Data Guide”,
Minnesota IMPLAN Group, Inc., Stillwater, MN, 1997.