



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Estimating the Value of the Green Industry to Louisiana's Economy

David W. Hughes and Roger A. Hinson

The green industry comprises the production and marketing of woody ornamentals, greenhouse, and turfgrass-related products, and landscape and horticultural services. The industry is market oriented with prospects for future growth. Many state trade organizations have become interested in better measurement of the industry's economic contribution. The contribution of major industry sectors to the Louisiana economy are quantified with a state input-output model. Also presented are study results that are mainly based on readily available data sources. Results suggest that the state industry made a strong contribution to economic activity comparable in size to that of other major agricultural commodities.

Key Words: green industry economic impact, IMPLAN model, input-output models

The green industry consists of environmental horticulture, floriculture, and turfgrass production enterprises, and allied product lines such as statuary. Various types of horticultural service vendors (e.g., lawn care service providers) are also included, as well as allied activity such as golf course maintenance and related activity. The green industry is an important and growing contributor to economic activity at state and national levels. Industry retail sales were estimated to be \$22.5 billion in 1995 (National Gardening Association, 1996), and are projected to grow at an annual rate of 4.7% through the year 2000 (Johnson and Christensen, 1995). In combination, environmental horticulture and floriculture represent the sixth largest agricultural commodity produced in the U.S. in dollar terms (Johnson, 1995). Unlike many other major agricultural commodities, the green industry has always been market oriented and will not face new uncertainties under recently enacted farm legislation.

The purpose here is to document the size and the importance of selected segments of the green industry in Louisiana and to assess the industry's economic contribution in 1995. Results from an input-output (I-O) model are used to accomplish this goal. Another goal is to illustrate a method for estimating green industry impacts,

The authors are associate professors, both in the Department of Agricultural Economics and Agribusiness, Louisiana State University Agricultural Center, Baton Rouge. This research was conducted under funding from the Louisiana Association of Nurserymen, the Louisiana Ornamentals and Turf Association, the Louisiana Turfgrass Association, and the Louisiana State University Agricultural Center.

primarily based on readily available data sources. Hence, techniques used to verify and modify the I-O model are presented. Several of these techniques, such as using occupation matrix data to estimate the impact of green industry activity occurring in other industries, are new procedures.

The importance of the green industry's production segments is not well recognized, partly because production space is intensively used. On the other hand, installations at residential, commercial, and public sites, and retail activities at garden centers and other outlets are highly visible. The industry's output is purchased with discretionary income and has increased in popularity with the growth of the middle class since World War II.

A market flowchart of the industry is depicted in figure 1. At the production level, environmental horticulture products such as trees and shrubs are raised in field-grown and container nurseries. Floricultural products include bedding plants, cut flowers, and foliage plants, and are grown in greenhouses. Turfgrass is produced on sod farms.

At the retail-wholesale level, manufacturer and wholesale companies sell inputs (such as fertilizers, pesticides, and tools) to growers, vendors, and consumers. Plants and associated products are sold through a well-defined set of retail outlets, including garden centers, hardware and general merchandise mass merchants, florists, and grocery stores. In addition, horticultural service vendor activity includes landscaping, installation, maintenance, and pest control. These services may also be performed by employees of other industries (e.g., the real estate sector). A particularly important segment in this regard includes sports, such as golf course maintenance. Golf courses install turfgrass and purchase landscaping services and other green and hard goods during construction. Extensive effort is required (nutrition, pest control, mowing) to maintain a golf course.¹

The industry's final customers are usually individual households. However, public building construction contracts often specify a percentage of total spending that must be used for landscaping. Businesses, such as shopping malls, also spend substantial sums on landscaping.

The green industry's marketing channels have been changing rapidly. The local garden center or nursery has been the traditional retail outlet. However, mass merchandisers, with more purchasing power, promotion dollars, and many outlets, have made this an important seasonal sales category. Their strategy of serving the price-sensitive end of the market has captured sales from the traditional outlets and has attracted new customers. In 1995, general merchandise mass merchandisers had achieved a market share of 42%, hardware mass merchandisers had a market share of 21%, and garden centers and retail nurseries captured a 37% market share (*Nursery Retailer Magazine*, 1996). The latter businesses have expanded to achieve

¹ Some researchers (e.g., Hodges et al., 1994, in a study of the Florida green industry) have included accessory activity, such as employment in golf course pro shops, in a broader definition of the industry than the one used in this study.

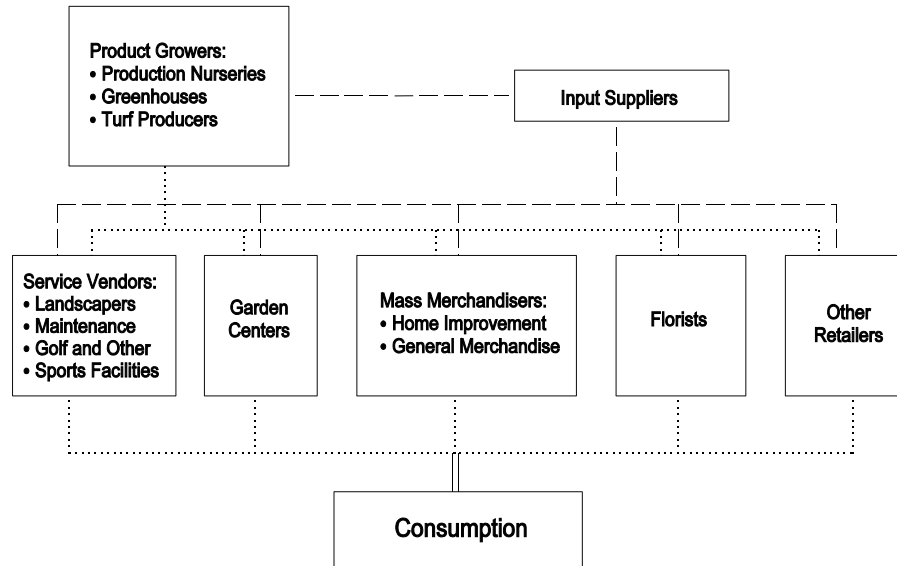


Figure 1. Green industry product flows to the consumer

economies of size and scale, and many are exploring vertical coordination mechanisms such as purchasing cooperatives.

Review of Literature

While the green industry is growing in importance, relatively little work documents its economic contribution. The input-output model is a tool that has been used to generate state- and national-level measures. IMPLAN was used to estimate the green industry's contribution to the New Jersey economy in 1990, at \$144 million in employee compensation and 10,308 jobs (Tavernier, Li, and Thatch, 1995). The 1977 U.S. I-O table and final demand vectors for the greenhouse and nursery products industry were used to examine the industry's national impact and the forward and backward linked effects (Harris, Rader, and Johnson, 1992). Survey data were used to examine the economic linkages between the Arizona greenhouse and nursery products industry and the landscape services industry (Cox, Leones, and Hollyer, 1995). In South Carolina, an I-O based study used primary data to estimate that maintenance represented 30% of total golf course expenditures. All activity attributable to golf courses (course maintenance, pro shop, and clubhouse) was directly and indirectly responsible for more than \$725 million in gross sales in the South Carolina state economy (Barkley, Henry, and Evatt, 1995).

The value-added approach, based on extensive industry and household surveys to document activity levels and economic linkages, also has been used. Eight major sectors of the Florida turfgrass production and care industry, including the retail and wholesale sectors and households, were surveyed to develop estimates of industry size (Hodges et al., 1994). A similar procedure was used to estimate the direct value of turfgrass production and maintenance expenditures by individuals and firms in Tennessee (Brooker et al., 1993). To estimate gross revenue, material costs, and direct employment in the Atlanta Metropolitan Area's green industry, Hubbard et al. (1990) employed a stratified survey of the lawn-care industry.

In this analysis, we estimate the economic contribution of major green industry segments, and of the entire Louisiana green industry, using an I-O model. The model was based primarily on readily available, published data, so techniques used to verify and modify the data used in the model are extensively discussed.

Methods and Measurement Techniques

The Impact analysis for PLANing (IMPLAN) model-building procedure (Alward et al., 1994) was used to construct a preliminary I-O model of the Louisiana economy. IMPLAN is one of several "ready-made" I-O modeling systems, providing "one-stop" access to secondary databases and model construction techniques. Among the IMPLAN data are estimates of regional total sales, final demand, returns to factors of production, and employment for up to 528 industries. Using these databases, regional models at the state or substate levels may be constructed.

In this study, the IMPLAN system was refined based on state-level data sources and expert opinion about the value of economic links within the green industry, and between the industry and the state economy. These linkages within the production sectors and with retail, service, and commercial applications were identified, measured, and verified. The result of combining these state-level data with the basic IMPLAN data was a hybrid I-O model (Jensen, 1987) of the 1992 Louisiana economy.

Measurement and Calculation of Linkages Within the Production and Retail Sectors

Production Size by Sales

The production sector is basic to the industry. Therefore, our research effort focused on verifying expenditures and on refining estimates of this sector's size. Accordingly, individual green industry producers (wholesale nurseries, greenhouses, and turfgrass producers) and landscape and horticultural services vendors were surveyed concerning the cost structure of their operations. The relevant populations were holders of licenses to sell horticultural products, and licensed service vendors.

Mailing lists for both groups are maintained by the Louisiana Department of Agriculture and Forestry (LDAF). The survey instrument was pretested at a trade show, then mailed by the LDAF along with license renewal applications to 497 producers and to 1,035 service vendors. Because they were relatively few, sod producers were contacted directly to encourage their participation. For producers, 45 usable surveys (9.1%) were received, while 40 usable surveys (3.9%) were returned by service vendors. These response rates were not high. However, both LDAF and other industry experts indicated that many individuals and firms (especially service vendors) hold licenses from a desire for industry affiliation, or to provide services (such as commercial pesticide application) on very rare occasions. Returned surveys indicating that the respondent was not active in the industry confirmed this opinion. Survey results provided a justification for changing the original IMPLAN coefficients.²

Industry sales represent the first link toward the retail economy. The producer-level (Greenhouse and Nursery Products IMPLAN industry) estimate in the 1992 IMPLAN Louisiana database, at \$10.251 million, was far below other unpublished estimates. Sales by the state's largest environmental horticulture producer alone exceeded the IMPLAN estimate.

An estimate of Louisiana's agricultural sales by production category, based on the combined efforts of extension specialists and parish-level extension agents, was available from the Louisiana Cooperative Extension Service (LCES, 1996). This source provided a combined estimate of 1995 total sales of \$104.628 million (1992 dollars) for environmental horticulture, floriculture, and sod. The LCES estimate was compared to a 1994 product flow survey of Louisiana environmental horticulture growers (Brooker, Turner, and Hinson, 1995) where growers indicated an appropriate sales category.

To expand these results to a state-level estimate, the number of growers in each category was estimated by multiplying the total population by experts' (extension and research horticulturalists) estimates of the proportion of growers in each sales category. The number of growers in each category was then multiplied by average sales. The resulting estimate of total sales by category was then summed over all categories. Further, the results from a survey presented in *Nursery Business Grower* (1995) reported that the farmgate value of environmental horticultural producers in Louisiana was \$65 million in 1995 (excluding floriculture and sod). The *Nursery Business Grower* and 1994 product-flow survey value confirmed that the estimated value of \$104.628 million for all green industry production provided by the LCES was reasonably accurate and a vast improvement over the original IMPLAN value.

² Once aggregate coefficients were obtained, wholesale and transportation margins contained in the cost estimates were removed and placed in the proper industry category. To account for margins at the industry level for both Greenhouse and Nursery Products, and Landscape and Horticultural Services, the 1992 set of commodity transportation and wholesale margins for household consumption was used as a proxy. These margins were found in the IMPLAN software (file name: mrgn_hh.tbl). Because firms in the IMPLAN Greenhouse and Nursery Products, and Landscape and Horticultural Services sectors were generally assumed to make purchases at the wholesale level, retail margins by industry were not used.

A combination of information from the industry survey and detailed wage data for the entire industry [Standard Industrial Classification (SIC) code 0780] (Louisiana State Department of Labor, 1995) was used to estimate the total sales value for service vendors (Landscape and Horticultural Services in IMPLAN). The inverse of the survey estimate of the proportion of expenditures paid as wages in the industry was multiplied by total wages paid by horticultural service firms in Louisiana in 1994, generating estimated total direct sales by the industry (\$146.437 million in 1992 dollars). As a basis of comparison, the original estimate for service vendors in the Louisiana IMPLAN data for 1992 was \$123.264 million (\$23.173 million, or 18.8% less than our estimate), while the industry had an estimated size in the 1991 Louisiana IMPLAN database of \$166.545 million (1992 dollars) (\$20.108 million, or 12.1% greater than our estimate).

Retail Size by Sales

The retail sector's contribution differs qualitatively from the production sector's contribution in terms of economic impact. This difference exists because the absence of production in Louisiana would not necessarily preclude retail activity served by out-of-state suppliers. Still, I-O models can provide relevant estimates of the spinoff effects from retail sales of ornamental horticultural products, regardless of their source.³

In I-O models, the total retail sales value is not credited to the retail firm actually making the sale. Rather, the retail sector adds value, called retail markup or margin, which is part of the final selling price. Both total green industry sales and the contribution of individual product categories to the total retail margin were estimated.

Survey-based data from the "National Gardening Survey, 1995–1996" (National Gardening Association, 1996) were used to estimate retail-level purchases. The information was presented by geographic state groupings, where Louisiana was included in a Deep South group with Mississippi, Alabama, Georgia, and South Carolina. Per household annual spending by major categories of green industry purchases (an average of \$190.92 for the Deep South group) was multiplied by the distribution of purchases across all retail outlets for each green industry activity at the national level. The result was an estimate of purchases by Louisiana households by type of retail outlet. For example, a typical Louisiana household was estimated to spend \$59.33 (31.1% of the \$190.92) on green industry purchases from retail nursery and garden centers. The estimates of expenditures by a typical household were then multiplied by the number of Louisiana households in 1994 (University of New Orleans, 1995). The result was an estimate of the total value of purchases of ornamental horticultural products by type of retail outlet for Louisiana in 1994. For example, all Louisiana households were estimated to spend \$90.945 million in 1994 on green industry purchases from retail nursery and garden centers. Estimated

³ On the other hand, Landscape and Horticultural Services firms from out of state could replace state firms, especially for large construction projects. Such spending would be a loss in economic activity in the state economy.

ornamental horticultural product purchases were then calculated as a percentage of total purchases by type of retail outlet based on the *1992 Economic Census of Retail Trade* (U.S. Department of Commerce, 1996). The result was an estimate of the percentage of sales due to the green industry by major retail categories. This percentage was used to estimate retail activity of \$127.419 million in 1992 dollars directly attributable to the green industry in the IMPLAN model.

Estimating Golf Industry Coefficients and Size

The golf industry is multi-faceted, leading to several alternative treatments in economic impact studies. Some studies have included all golf industry activity in the impact of horticulture, while other studies have included only the horticultural components of the industry. For this study, we adopted the latter approach by treating only course maintenance as part of the green industry.

Estimates of maintenance expenditures were found in a survey-based study of South Carolina courses (Barkley, Henry, and Evatt, 1995), a state climatically similar to Louisiana. Mean elevation, daily mean and daily mean maximum and minimum temperatures, and mean rainfall and relative humidity levels (U.S. Department of Commerce, 1999) are very similar between the two states. Accordingly, environmental conditions, such as growing season length, type of flora, and plant and animal pest problems, are quite similar between the two states. As a result, conditions and hence the costs of maintaining courses in Louisiana were assumed to be adequately represented by those in South Carolina. Resort-oriented courses in South Carolina on the Atlantic Coast are distinctly different from other, mostly inland nonresort courses, and these were treated separately by Barkley, Henry, and Evatt.

Louisiana golf course classifications were obtained from three data sources: (a) the *Southern Journal of Golf's* "1993 Guide to Louisiana Courses," (b) Louisiana Business, Inc.'s "Golf Guide: A Guide to Louisiana Golf Courses, 1995 Edition," and (c) an unpublished listing of Louisiana golf courses from the Department of Parks and Tourism. Based on our intensive examination of these published listings of Louisiana golf courses, our evaluation indicated that the nonresort type of course in South Carolina was most appropriate for Louisiana.

Golf courses were classified by type (public, semiprivate, and private) and by course size (9, 18, and 27 hole) in the three Louisiana data sources. Based on these classifications, expenditures for Louisiana golf course maintenance were estimated at \$18.581 million (1992 dollars) for labor with 1,078 direct jobs, and \$20.170 million (1992 dollars) for nonlabor expenditures. Industry association officials reported that course maintenance is done by course employees. Nonlabor expenditures were assumed to follow the same pattern as material input expenditures by landscape and horticultural service firms.

The impact of expenditures by golf industry workers was accounted for by assuming a distribution of 50% low-income, 20% medium-income, and 30% high-income

households, and by applying tax and saving leakages from the same source (Barkley, Henry, and Evatt, 1995). Resulting household expenditures on goods produced in Louisiana were estimated based on spending patterns for each income group and regional purchase coefficients found in IMPLAN. These expenditures formed the labor income portion of the shock used in estimating the impact of golf course maintenance.

Estimating the Contribution of Other Portions of the Green Industry

Maintenance of ornamental horticultural products is conducted by many entities besides horticultural service vendors. Firms in many industries install and maintain ornamental horticultural products on their own facilities using their own employees. These employees perform similar activities to horticultural service vendors, but the economic activity is credited to the industry in which the workers are employed. For example, turfgrass maintenance performed by workers employed by real estate firms is credited to the real estate industry.

Information was not available on nonlabor expenditures for service vendor maintenance activities done by other sectors. However, the distribution of jobs in lawn and groundskeeping as an occupation for all IMPLAN industries in 1993, and average annual pay for lawn and groundskeeping workers, were available from the national industry occupation matrix constructed by the U.S. Bureau of Labor Statistics. Using this information on total number of employees, distribution of lawn and groundskeeping workers, and average compensation, total employment (7,023 jobs) and employment compensation (\$108.989 million in 1992 dollars) that should be credited to the green industry were identified. The impact of expenditures by these workers was estimated by accounting for tax, savings, and import leakages similar to the procedure used for golf course maintenance worker expenditures.

Model Results

The impact of the entire system of producers, wholesalers, and retailers in the Louisiana green industry was estimated using the hybrid state-level I-O model. Results presented here show the importance of the green industry to Louisiana's economy at the producer level, the retail level, for golf course maintenance, and for other selected components of the green industry.

Producer Impact Analysis

Model results at the producer level (Greenhouse and Nursery Products, and Landscape and Horticultural Services industries) placed the direct contribution of the production component of Louisiana's green industry to the economy at more than

Table 1. Impact of the Production Sector of the Green Industry on the Louisiana Economy as Estimated with the Louisiana IMPLAN Input-Output Model

Industry Name	Gross Sales	Total Personal Income	Gross State Product	Employment (No. Jobs)
----- (\$1992, millions) -----				
Agriculture, Forestry, and Fisheries	2.444	0.723	1.557	47.7
Greenhouse and Nursery Products	104.628	40.291	50.327	1,338.4
Landscape and Horticultural Services	146.437	69.965	69.892	4,630.2
Mining	2.954	0.444	1.822	9.2
Construction	7.380	2.894	3.843	99.3
Manufacturing	15.051	3.362	5.538	93.0
Agricultural Chemicals	6.594	1.226	0.985	19.6
Petroleum Products	14.570	0.934	3.069	12.6
Farm Machinery and Equipment	3.247	0.755	1.185	27.3
Transportation, Communications, and Utilities	30.335	7.443	14.225	205.7
Trade	41.800	19.912	30.542	1,092.5
Finance, Insurance, and Real Estate	38.991	5.919	23.908	289.8
Services	61.692	34.401	41.720	1,436.4
Government	4.038	3.740	3.817	145.5
Households	123.509	0.000	0.000	0.0
Total	603.670	192.009	252.430	9,447.1

Note: Direct impacts of \$104.628 million and \$146.437 million, respectively, occur in the Greenhouse and Nursery Products, and Landscape and Horticultural Services industries. Impacts in all other sectors are purely indirect and induced effects.

\$251 million in gross sales and almost 6,000 jobs in 1995 (1992 constant dollars) (table 1).⁴ Gross sales by producers were \$104.628 million in Greenhouse and Nursery Products, and \$146.437 million in Landscape and Horticultural Services. Employment in these industries was estimated at 1,338 and 4,630 jobs, respectively.

Economic activity in the two production sectors stimulated indirect and induced effects through other parts of Louisiana's economy. Total economic impacts were 9,447 jobs, \$603.670 million in gross sales, \$192.009 million in personal income, and \$252.430 million in gross state product (GSP) (table 1).

Impacts from the production sectors (Greenhouse and Nursery Products, and Landscape and Horticultural Services) in Louisiana were similar in magnitude to those found in studies of other states. The production impact of the Louisiana green

⁴ The version of IMPLAN used in this study generates a type III multiplier (for additional details, see Alward et al., 1994). Type III based multipliers of the type generated in IMPLAN are problematic, because the induced (household spending) impact of high wage-paying industries tends to be underestimated and the induced impact of low-paying industries tends to be overestimated by such multipliers. Accordingly, an earnings-based closure of the model was used to generate type II multipliers through a combination of IMPLAN data and MATS (a matrix manipulation program) software.

industry of 9,447 jobs and \$192 million in total personal income was comparable to Tavernier, Li, and Thatch's (1995) estimate for New Jersey of 10,308 jobs and \$144 million in employee compensation. Cox, Leones, and Hollyer (1995) reported employment impacts of 6,803 jobs and \$153.01 million for landscape and horticultural service firms in Arizona.

Of the total economic impact attributable to the Louisiana Greenhouse and Nursery Products, and Landscape and Horticultural Services industries, \$352.606 million (58.4%) in gross sales, \$81.753 million (42.6%) in personal income, \$132.211 million in GSP, and 3,479 jobs (36.8%) were in sectors indirectly related to these two production industries. The larger indirect impacts were in the Trade sector, which includes retail trade firms, such as clothing and grocery stores; the Finance, Insurance, and Real Estate sector; and the Services sector, including a variety of medical and business and personal services. The combined gross sales impact was \$142.483 million, and the employment impact was 2,819 jobs. Other important indirect impacts were in Agricultural Chemicals and in Petroleum Products, the latter with a gross sales impact of \$14.570 million and an employment impact of 13 jobs (table 1).

The IMPLAN model was also used to separately estimate the spinoff impacts of green industry activity at the retail level, the impact of golf course maintenance, and the impact of green industry activity in other industries. For brevity, only summary results are discussed below for each impact analysis (i.e., results are not presented in separate tables):

- *Retail Impact Analysis.* The retail (Trade) component of the green industry contributed 5,987 jobs, \$393.221 million in gross sales, \$121.979 million in personal income, and \$190.236 million in GSP, with impacts concentrated in Trade with total employment impacts of 4,160 jobs. This result was not surprising since the direct shock was in the Trade sector, and since Trade is also affected by the induced effect of household spending. A major part of the impact also occurred in Services with gross sales impacts of \$50.968 million.
- *Golf Course Maintenance Impact Analysis.* Golf course maintenance activity added \$52.946 million in gross sales, \$33.913 million in personal income, \$42.354 million in GSP, and 1,718 jobs to the Louisiana economy.⁵ Concentrations of employment and income impacts were in the Trade sector and in the directly affected Services sector.
- *Other Green Industry Impact Analysis.* Other green industry activities added \$264.007 million in gross sales, \$158.309 million in personal income, \$184.221 million in GSP, and 9,137 jobs. Employment impacts were concentrated in Household Industries with total employment impacts of 1,945 jobs, and Finance, Insurance, and Real Estate (1,986 jobs, mostly from 1,772 directly employed workers in real estate).

⁵ The total impact of the golf industry on the Louisiana economy would undoubtedly be markedly larger. In the South Carolina study (Barkley, Henry, and Evatt, 1995), the proportion of golf course expenditures devoted to course maintenance in noncoastal facilities ranged from 33% for private courses to 47% for semiprivate courses.

Table 2. Impact of the Entire Green Industry on the Louisiana Economy as Estimated with the Louisiana IMPLAN Input-Output Model

Industry Name	Gross Sales	Total Personal Income	Gross State Product	Employment (No. Jobs)
----- (\$1992, millions) -----				
Agriculture, Forestry, and Fisheries	3.948	1.169	2.515	77.1
Greenhouse and Nursery Products	104.628	40.291	50.327	1,338.4
Landscape and Horticultural Services	146.437	69.965	69.892	4,630.2
Mining	5.393	1.013	3.418	31.1
Construction	21.490	11.563	13.663	544.6
Manufacturing	37.496	8.447	13.854	234.0
Agricultural Chemicals	7.737	1.444	1.162	26.7
Petroleum Products	23.973	1.541	5.054	20.7
Farm Machinery and Equipment	3.419	0.795	1.247	28.8
Transportation, Communications, and Utilities	63.908	15.682	29.967	433.4
Trade	233.942	112.140	171.295	6,164.0
Finance, Insurance, and Real Estate	125.625	43.592	88.213	2,539.7
Services	179.108	107.432	126.656	5,919.0
Government	35.618	34.873	35.065	1,970.8
Households	315.767	36.025	36.025	2,269.0
Total	1,308.489	485.970	648.353	26,226.9

Note: Direct impacts of \$104.628 million and \$146.437 million, respectively, occur in the Greenhouse and Nursery Products, and Landscape and Horticultural Services industries. At the retail level, direct impacts of \$127.419 million occur in the Trade sector. The direct impact of green industry activity by employees in other industries is a total of \$108,989 million, and is spread throughout the economy with concentrations in real estate, government, and household industries. The direct impact of golf course maintenance (\$38.751 million) occurs in the Services sector.

Total Green Industry Impact Analysis

The total green industry contribution to the state economy was \$1,308.489 million in gross sales, \$485.970 million in personal income, and \$648.353 million in GSP (table 2). As a basis of comparison, the total green industry contribution to the state economy was 0.87% of gross sales in Louisiana in 1992 (\$150,241.27 million), 0.9% of total personal income (\$52,586.013 million), and 0.8% of GSP (\$82,807.386 million). In addition to the production sector, other more important sectors included Trade with a gross sales impact of \$233.942 million, Services with a gross sales impact of \$179.108 million, and Finance, Insurance, and Real Estate with a gross sales impact of \$125.625 million.

In terms of employment impacts, all 5,969 producer and service vendor jobs were direct. The second largest indirect and induced employment impacts were in Services at 5,919 jobs, which included direct jobs—such as golf course maintenance

workers—and indirect employment resulting from spending. Employment in the Trade sector (6,164 jobs) also was a mixture of retail employees directly involved in the sale of ornamental horticultural products and indirect employment impacts. Employment impacts in Finance, Insurance, and Real Estate, at 2,540 jobs, were primarily due to direct jobs in the real estate industry. Thus, like most primary product industries, ornamental horticultural products impact Service and Trade sectors of the economy through indirect spending impacts. But unlike other primary product sectors, the industry has significant levels of direct employment in sectors such as Finance, Insurance, and Real Estate.

These results show the absolute importance of the green industry's economic impact. A broader study of agricultural industry effects on the state's economy permits some comparison between the green industry and other agricultural industries (Hughes, 1995). Using employment as an illustration, the 26,227 jobs (1.3% of the 2,062,744 Louisiana jobs in 1992) generated in the green industry were exceeded only by wood products production and processing (an impact of 60,101 jobs), and sugar cane production and processing (an impact of 32,542 jobs). The cotton industry is an example of a traditionally important agricultural enterprise with substantially less employment impact (15,591 jobs) than the green industry.

Summary and Conclusions

In summary, an IMPLAN-based I-O model of the Louisiana economy was used to assess (a) the direct economic impacts from activity by environmental horticulture, floriculture, and sod producers, and by service vendors such as landscapers and horticultural services firms, and (b) the spinoff impacts from retail sales of horticultural products, of golf course maintenance, and of horticultural maintenance work in other industries. Because of the low survey response rate for the production sectors and because we relied on secondary data sources for other values, model results should be interpreted with care. However, estimates were confirmed as reasonably accurate when compared with other available data sources. Accordingly, results suggest a Louisiana green industry with strong linkages to the general economy, and one that provided substantial levels of total output, income, and employment.

Model results also carry implications for private interests and public policy makers. In relevant policy deliberations, policy makers need to realize that the green industry is an important part of the Louisiana and U.S. economies, which is comparable to larger agricultural commodities in size. Further, the industry benefits more from income growth than do traditional agricultural industries. These facts are also relevant to private interests, such as individuals seeking profitable investment opportunities. Moreover, from the viewpoint of policy makers, employment impacts are more widespread than for traditional agricultural producers. Both rural and urban areas benefit from direct green industry jobs, while direct employment in other agricultural enterprises concentrates in rural areas. Similarly, direct employment is found in sectors such as service firms, which usually have no direct agricultural jobs.

Model results also open other areas of possible research. Similar studies should be conducted in other states where the green industry is surely an important contributor to economic activity. Another interesting research area would include collecting primary data for further verification of appropriate secondary data. This would provide information concerning the need for collecting data versus relying on secondary data sources. An additional research area is the relationship between industry and occupational structure in terms of how much effort sectors (such as real estate) devote to green industry activity. Anecdotal evidence suggests that much green industry activity is not reported due to licensing and other issues. An interesting but difficult topic would be to estimate the level of unreported activity.

References

- Alward, G., E. Siverts, J. Wagner, C. Taylor, S. Winter, O. Senf, O. Olsen, and S. Lindall. (1994). *Micro IMPLAN User's Manual*. Department of Agricultural and Applied Economics, University of Minnesota, St. Paul.
- Barkley, D. L., M. S. Henry, and M. G. Evatt. (1995). "Contribution of the golf course industry to the state economy: South Carolina, 1994." Extension Report No. 159, Department of Agricultural and Applied Economics, Cooperative Extension Service, College of Agriculture, Forestry, and Life Sciences, Clemson University, Clemson, SC.
- Brooker, J., M. Gray, E. Carson, and T. Samples. (1993, November). "Tennessee's turfgrass industry: Structure and economic value." Research Report No. 93-16, Tennessee Agricultural Experiment Station, University of Tennessee, Knoxville.
- Brooker, J., S. Turner, and R. Hinson. (1995). "Trade flows and marketing practices within the United States nursery industry, 1993." Southern Cooperative Service Bulletin, Tennessee Agricultural Experiment Station, University of Tennessee, Knoxville.
- Cox, L. J., J. Leones, and J. R. Hollyer. (1995, March). "Economic linkages between the U.S. greenhouse and nursery products industry and landscape services." *Journal of Environmental Horticulture* 13(1), 1-3.
- Harris, T., L. Rader, and W. Johnson. (1992, March). "Economic linkages of the U.S. greenhouse and nursery products industry." *Journal of Environmental Horticulture* 10(1), 4-7.
- Hodges, A., J. Haydu, P. van Blokland, and A. Bell. (1994, December). "Contribution of the turfgrass industry to Florida's economy, 1991/92: A value-added approach." Economics Report No. ER 94-1, Florida Agricultural Experiment Station, University of Florida, Gainesville.
- Hubbard, E., J. Purcell, G. Landry, and T. Murphy. (1990, June). "An economic profile of the lawn-care industry in the metropolitan Atlanta area." Special Publication No. 65, Georgia Agricultural Experiment Station, University of Georgia, Athens. (10 pp.)
- Hughes, D. W. (1995, October). "Measuring the effect of Louisiana agriculture on the state economy through multiplier and impact analysis." Bulletin No. 849, Louisiana Agricultural Experiment Station, Louisiana State University Agricultural Center, Baton Rouge.

- Jensen, R. C. (1987). "On the concept of ready-made regional input-output models." *Review of Regional Studies* 17, 20–25.
- Johnson, D. C. (1995). "U.S. greenhouse and nursery industry flourishes." *Agricultural Outlook* 222, 26–31. USDA/Economic Research Service, Washington, DC.
- Johnson, D., and R. Christensen. (1995, Spring). "Green industry today—Some issues and future prospects." *Journal of Agribusiness* 13(1), 65–76.
- Louisiana Business, Inc. (1995, May 12). "Golf guide: A guide to Louisiana golf courses, 1995 edition." Supplement to *The Greater Baton Rouge Business Report*. Louisiana Business, Inc., Baton Rouge, LA.
- Louisiana Cooperative Extension Service. (1996). "1995 Louisiana summary: Agriculture and natural resources." Louisiana State University Agricultural Center, Baton Rouge.
- Louisiana State Department of Labor. (1995). "Unpublished state of Louisiana employment data, 1992–1994." Research and Statistics Unit, Baton Rouge.
- Nursery Business Grower (staff). (1995). "1995 Nursery Business Grower 100." *Nursery Business Grower*, special report insert. Brantwood Publications, Clearwater, FL.
- Nursery Retailer Magazine (staff). (1996, February/March). "Reflecting on the future." *Nursery Retailer Magazine*, pp. 36–41. Brantwood Publications, Clearwater, FL.
- Southern Journal of Golf (staff). (1994). "1993 guide to Louisiana Courses." *Southern Journal of Golf*, Supplement. Jackson, MS.
- Tavernier, E., F. Li, and W. Thatch. (1995, June). "Proving the economic importance of the greenhouse, nursery, and sod industry: A New Jersey case study." *Journal of Environmental Horticulture* 13(2), 86–88.
- University of New Orleans. (1995). *Louisiana Fact Book*. Division of Business and Economic Research, College of Business Administration, University of New Orleans.
- U.S. Department of Commerce, Bureau of the Census. (1996). *1992 Economic Census of Retail Trade*. Washington, DC: U.S. Government Printing Office.
- . (1999). *Statistical Abstract of the U.S.* Washington, DC: U.S. Government Printing Office.