ECONOMIC IMPACTS OF ENVIRONMENTAL HORTICULTURE IN CALIFORNIA, SOUTH CAROLINA, AND THE U.S.

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ABSTRACT

Information about the economic impacts of environmental horticulture is important for better government and business decision-making. Californians spent $8.52 billion on marketed and in-house environmental horticulture, managed at least 1.37 million acres of horticultural landscapes, and generated $10.1 billion of related sales in 1995. These sales directly supported 128,842 jobs. According to preliminary estimates, golf course superintendents and their staffs spent $864 million and worked 14,210 full-time-equivalent jobs to care for 145,386 acres of landscapes at golf courses in 2000. The area of facilities with golf courses and real spending to care for these landscapes both grew 2.1% per year during 1995-2000. Employment in golf course maintenance grew 1.1% per year during the same period. In South Carolina, retail sales of marketed goods and services for environmental horticulture grew from $513 million in 1994 to $948.5 million in 1999. Adjusted for inflation, these sales increased 10.6% per year. Employment associated with the production and sale of these products grew from 18,478 full-time equivalent jobs in 1994 to 24,710 in 1999, or 6.0% during the period. Although the direct economic impacts are larger in California than South Carolina, they are larger relative to traditional agriculture in the Palmetto state than the Golden state. The greater relative importance of environmental horticulture in the farm economy of the Palmetto state coincides with the greater proportion of land that South Carolinians have converted land into residential and commercial real estate. In the U.S., retail expenditures on marketed goods and services of this industry were $54.8 billion in 1998. Estimates of expenditures and sales associated with not only marketed but also in-house environmental horticulture at the end-user level were $93.5 billion and $92.9 billion in 1995 for the U.S. Adjusted for inflation but not for any economic or demographic growth, these estimates would have been $103.7 billion and $103.0 billion in 2001. Researchers should focus on not only estimation of economic impacts but also analysis of the behavioral determinants of these impacts.

INTRODUCTION

Increases in population, personal income, and commerce have induced phenomenal growth of environmental horticulture throughout the United States. Up-to-date, periodic, and comprehensive information is important for determining economic impacts of this non-traditional farming, comparing these contributions to those of other industries, assessing impacts of changes in land use or regulations, and establishing priorities of policy makers. This information should represent not only marketed, or contractual, horticultural goods and services but also in-house horticultural services. This information should not double count revenues from production or wholesale activity that are also included in revenues from retail activity.

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ENVIRONMENTAL HORTICULTURE IN CALIFORNIA'S ECONOMY

Economic impacts of environmental horticulture are probably larger in California than any other state because the Golden state has the most people and largest economy in the U.S. In 1987, Californians generated $5.023 billion worth of horticultural services or goods to end users (Pittenger *et al.* 1991). In 1995 or twelve months close to that year, retail customers and other final users in California spent $8.518 billion on environmental horticulture (Table 1 adapted from Templeton *et al.* 2000). Householders in the state spent 45% of this total on do-it-yourself or professional maintenance, installation, and irrigation of their yards and for indoor plants and Christmas trees. Californians also generated $10.108 billion of horticultural sales at the retail, other final-customer, or export level (Table 1). Exports in 1994 of $1.645 billion (1995 dollars) of goods and services for environmental horticulture less $56 million of retail sales of imported Christmas trees account for the difference between total sales and expenditures. These sales translated into an estimated $6.971 billion in household income. Horticultural landscapes that enabled outdoor beatification, recreation, energy use, and other activities covered at least 1.3 million acres in the state in 1995 (Table 1).

Table 1: Annual expenditures and sales by Californians and area for environmental horticulture

Landscape or plant type	Expenditures[w]	Sales[w]	Area (acres)
Residential yards subtotal:	$3,579	≤$3,579	679,426
Do-it-yourself care and installation (1995)	$1,864	≤$1,864	
Professional care and installation (1995)	$1,354	≤$1,354	
Landscape water (1991)	$361	$361	
Cut flowers (1995)	$1,429	$1,429	n.a.
Houseplants (1995)	$102	≤$102	n.a.
Christmas trees (1995)	$131	$75	n.a.
Golf courses (1995)	$683	$683	131,108
City, county, two federal (FY94-95), and state (FY96-97) parks	$600	$600	157,686[x]
City streets and other right-of-ways (FY94-95)	$218	$218	49,190[y]
State-highway vegetation (FY94-95)	$108	$108	22,778
Public and private school yards, K-12 (FY94-95)	$286	$286	100,248
Public university yards, CSU and UC (FY94-95)	$27	$27	8,700
Electric-utility vegetation (1995)	$147	$147	157,717
Cemetery grounds (1995)	$141	$141	17,931
Arboreta and botanical gardens (1995)	$13	$13	1,133
Zoos (1995)	$7	$7	702
Other landscapes in California (1994)	$467	$467	n.e.
Horticultural waste (1995)	$582	$582	n.a.
Out-of-state landscapes (1994)		$1,645	n.e.
Total	$8,518	$10,107	1,302,023[z]

n.a.≡not applicable. n.e.≡not estimable. [w] millions of 1995 dollars. [x]area of state parks not included. [y]area of roadside vegetation only. [z]Total area does not include one-half of the area of roadside vegetation managed by city governments because the landscape below power lines within cities, the area of which is already included, parallels one side of a road.

In 1987, 87,319 employees sold goods and services to end users (Pittenger *et al.* 1991). In 1995, the $10.1 billion in sales directly supported 128,842 jobs (Table 2 adapted from Templeton *et al.* 2000). In particular, in-house provision of horticultural services–for example, grounds keeping at golf courses–accounted for 46,001 full-time-equivalent jobs. Marketed horticultural services–for example, professional lawn care–entailed another 54,015 jobs, not necessarily full time, however. Retail sales of horticultural goods directly accounted for the remaining 28,826 jobs. Also, these sales indirectly supported and induced an additional 103,975 jobs, some of which were associated with production of ornamental plants that were sold by retail outlets.

Table 2: Annual employment in mid-1990s for environmental horticulture in California

Employer	Jobs
Horticultural service companies (1995)	54,015
Retail florists (1995)	10,850
Retail nurseries, lawn and garden stores (1995)	8,125
Growers of flowers and ornamental plants (1995)	9,756[z]
Manufacturers of lawn and garden equipment (1995)	95[z]
City, county, two federal (FY94-95), and state (FY96-97) parks	9,871
Golf courses (1995)	13,470
City (1995) and state roadway (FY94-95) agencies	4,401
All K-12 schools and public universities, CSU and UC (FY94-95)	14,288
Electric utilities (1992)	272
Cemeteries (1995)	3,218
Arboreta and botanical gardens (1995)	331
Zoos (1995)	150
Total	128,842

[x]jobs attributable to exports

Operating expenses and capital expenditures for golf course maintenance were not included in the $5.023 billion estimate for 1987. Spending on course maintenance was $683 million in 1995 and exceeded spending for care of all other types of landscapes except residential yards in that year (Table 1). This estimate was based, however, on secondary data for the western U.S. The total area of facilities with golf courses was 131,108 acres (Table 1). Golf course maintenance entailed 13,470 jobs (Table 2). These estimates, however, were based on the median area and jobs at a private 18-hole course in 1995.

To update and improve the reliability of these estimates, the California Golf Course Superintendents Association and seven other major professional golf organizations have sponsored a survey of golf course facilities in the state. Responses from 20% of the state's 891 facilities and a preliminary empirical distribution of the types of facilities have been used to estimate some direct economic impacts. In particular, superintendents and their staffs worked the equivalent of 14,210 full-time jobs to care for 145,386 acres of landscapes at golf courses in 2000. Maintenance expenses were $705 million. Capital expenditures for major equipment and landscape improvements were $159 million. In total, facilities with golf courses in California spent $864 on environmental horticulture in 2000.

In addition to creating interest among superintendents for the current research on golf courses, the study of economic impacts in California of environmental horticulture in 1995 also enabled a retrospective estimation of the whole industry's growth. In particular, estimates of expenditures and sales by Californians in 1998 were $9.81 billion and $11.5 billion because of 258,517 new housing units, 2.8% annual increases in household spending on horticultural goods and services that reflect 2.8% annual increases in real income per capita, 57 more golf courses, stricter regulation of vegetation management around power lines, and 2% annual inflation since 1995 (Templeton *et al.* 2000). The new golf course study suggests that, notwithstanding the degree of data comparability, real spending on golf course maintenance increased 2.1% annually during 1995-2000. Landscape area for facilities with golf courses also increased by the same annual percentage while the number of jobs associated with golf course maintenance increased 1.1% per year during the same period. A more reliable indicator of growth of environmental horticulture is that the inflation-adjusted value of production of greenhouses, nurseries, and flower growers in California grew 4.5% annually during 1992-2000 (Table 3).

Table 3: Farmgate sales of California's and South Carolina's greenhouses, nurseries, and floricultural growers, 1992-2000

	California			South Carolina		
	Nominal Sales	Real Sales		Nominal Sales	Real Sales	
Year	($1000s)	($1000s in 2000)	Share of Ag Sales	(1000s)	($1000s in 2000)	Share of Ag Sales
2000	$3,099,888	$3,099,888	0.118	$255,889	$255,889	0.196
1999	$2,793,384	$2,643,483	0.108	$200,648	$189,881	0.164
1998	$2,547,817	$2,409,042	0.104	$180,373	$170,548	0.136
1997	$2,498,345	$2,403,170	0.098	$179,065	$172,243	0.118
1996	$2,324,650	$2,108,315	0.097	$160,478	$145,544	0.110
1995	$2,102,425	$2,152,806	0.092	$155,060	$158,776	0.120
1994	$2,029,646	$2,155,771	0.091	$144,998	$154,008	0.115
1993	$1,944,632	$2,021,035	0.089	$127,745	$132,764	0.113
1992	$1,901,303	$2,179,925	0.096	$120,379	$138,020	0.111

Sources: Bureau of Labor Statistics (2002c), California Agricultural Statistics Service (Various Years), and South Carolina Agricultural Statistics Service (Various Years).

ENVIRONMENTAL HORTICULTURE IN SOUTH CAROLINA'S ECONOMY

Economic impacts of environmental horticulture have also grown in South Carolina. For example, the annualized growth rate of the real value of production of greenhouses, nurseries, and flower growers in South Carolina during 1992-2000 was 8.0% (Table 3). Moreover, the direct economic impact of businesses in the state that sold not only these ornamental plants but also related goods and landscaping services was $127.5 million in 1986 (Tuten *et al.* 1988, 43). Retail sales of marketed goods and services of this industry grew from $513 million in 1994 to $948.5 million in 1999 (Evatt 2002). These retail sales, if adjusted for inflation, increased 10.6% per year during 1994-1999 (Bureau of Labor Statistics 2002b). In-house labor expenses for golf course maintenance of $54.1 million in 1994 (Barkley *et al.* 1995, 11) were almost 2.5 times larger than similar expenses of $21.0 million in 1986 (Tuten *et al.* 1988, 38). Economic impacts of other in-house horticultural services have not been studied but have probably grown.

Employment has increased as well. In 1986, 3,523 full-time employees and 1,983 part-time employees produced or sold nursery stock, greenhouse plants, or landscaping services (Tuten *et al.* 1988, 35). In 1994, people worked the equivalent of 18,478 full-time jobs to produce or sell ornamental plants, turfgrass, related goods, and contractual landscaping services (Rathwell *et al.* 1995, 6). In 1999, employment in the same activities was 24,710 full-time equivalent jobs (Rathwell *et al.* 2001, 7). Golf course maintenance directly accounted for 1,503 full-time positions and 695 part-time jobs in 1986 (Tuten *et al.* 1988, 37) and 2,992 full-time equivalent positions in 1994 (Barkley *et al.* 1995, 7). Jobs associated with provision of other in-house horticultural services have not been estimated.

COMPARISONS BETWEEN CALIFORNIA AND SOUTH CAROLINA

Environmental horticulture undoubtedly generates smaller economic impacts in South Carolina than California. For example, annual production of greenhouses, nurseries, and floricultural growers in the Palmetto state was one-sixteenth to one-twelfth of that in the Golden state during 1992-2000 (Table 3). However, the direct economic impacts of environmental horticulture relative to those of traditional agriculture have grown faster and are larger in South Carolina than California. For example, the value of production of greenhouses, nurseries, and flower growers grew 1.78 times faster per year in South Carolina than California during 1992-2000 and represented 19.6% and 11.8% of each respective state's agricultural crop and livestock production by 2000 (Table 3). Similarly, South Carolina had 384 golf courses in 1997, or only 40% of the 955 courses that California had in 1998, but there were 3.5 times more courses per resident in the Palmetto state than the Golden state.

Economic impacts of environmental horticulture relative to those of traditional agriculture have grown faster and are proportionately larger in South Carolina than California for at least two reasons. First, the state economy grew faster in South Carolina—7.4% per year—than California—6.7% per year—during 1982-1997 (Bureau of Economic Analysis 2002). As a result, the area of 'developed' land increased by 55.5% in South Carolina but only 31.9% in California between 1982 and 1997 (Natural Resources Conservation Service 2000). 'Developed' land includes yards, golf courses, school grounds, and other horticultural landscapes. Thus, 'developed' land's share of all non-Federal land increased from 7.4% in 1982 to 11.6% in 1997 for South Carolina but from 7.7% in 1982 to 10.3% in 1997 for California (Natural Resources Conservation Service 2000). Second, during the same period, the population grew slower in South Carolina—1.1% per year—than California—1.8% per year (Population Estimates Program 1999; Population Estimates Branch 1996). Slower demographic growth induced land 'development' that was less dense in the Palmetto state than the Golden state. New residential and commercial lots that were more numerous, larger, or both meant more horticultural business.

ENVIRONMENTAL HORTICULTURE IN THE U.S. ECONOMY

Retail expenditures on marketed goods and services for environmental horticulture grew from $40.0 billion in 1991 to $54.8 billion in 1998 (Johnson 1999, 2). If adjusted for inflation (Bureau of Labor Statistics 2002a), these retail expenditures increased 1.9% per year during 1991-1998. Furthermore, the estimates for California can be used with auxiliary information to cautiously characterize economic impacts of not only marketed but also in-house environmental

horticulture for the U.S in 1995. In particular, households nationwide spent $34.787 billion in 1995 for indoor houseplants and yard-related environmental horticulture, except water (NGA 1996). Californians spent $3.320 billion for the same purposes, or 9.5% of the national figure. If this percentage is, on average, California's share of national expenditures for other horticultural landscapes and cut flowers, the statewide expenditure of $8.518 billion implies that people in the United States spent $89.252 billion. Moreover, since net imports of flowers and nursery products were $616 million, environmental horticulture directly contributed $88.636 billion in 1995 to the U.S.'s gross domestic product. Given 2.5% inflation per year during 1995-2001 (Bureau of Labor Statistics 2000a), these purchases for and revenues from marketed and in-house environmental horticulture at the end-user level would have been $103.7 billion and $103.0 billion in 2001. Economic and demographic growth since 1995 has undoubtedly induced real increases in these impacts.

IMPLICATIONS FOR POLICY-MAKING AND RESEARCH

National and state-level information about the economic impacts of environmental horticulture should be and, to a limited extent, has been important for public and private decision-making. For example, businesses have used the information on the breakdown of sales by landscape type and jobs by employer type to develop marketing strategies and new products in California. Industry representatives have used these results to educate legislators. Government officials have used our estimates about the areas of types of horticultural landscapes in California to estimate use of water and pesticides. Public officials in South Carolina and California have used this information in making decisions about the size of budgets for education, extension, research, and regulation associated with this industry.

Future research on this growing industry should focus on improved estimation of direct economic impacts of marketed and in-house environmental horticulture for all types of landscapes. For example, the most current information about the U.S. and South Carolina does not address in-house provision of horticultural services and goods. The most current information about California needs to be updated, does not cover some important horticultural landscapes, such as grounds around industrial parks and corporate offices, and underestimates the impacts of marketed landscape services (Templeton *et al.* 2000).

Knowledge about the size of economic impacts is not sufficient to accurately forecast the effects of continued economic and demographic growth on environmental horticulture or the costs to the industry of bans on the use of specific horticultural inputs, such as water, pesticides, and leaf blowers. Thus, researchers should also analyze the determinants of behaviors that underlie economic impacts. In particular, researchers should estimate the supply of marketed and in-house horticultural products, the demand by householders, golf course superintendents, and others for these goods and services, and the demand for labor and other inputs that are used to create these products. These types of analyses could be helpful, for example, in evaluating impacts on the industry of policies that promote high-density development and, thereby, reductions in average yard sizes. Moreover, information about the determinants of household expenditures of time and money for specific activities--such as managing yard pests or soil fertility--could be used to improve product marketing, expenditure forecasting, and public education. Research on these subjects is relatively scarce and new (e.g., Gineo and Omamo 1990, Templeton 2001).

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