TREE CITY USA®
BULLETIN

The Economics of Urban Forestry

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The benefits of urban trees have been quantified in numerous ways in recent years. Now a new study provides important information about yet another contribution that tree planting and care provides for America.

We all know intuitively that trees in our communities are economically important. But just important? To answer this question, the Arbor Day Foundation, in cooperation with the USDA Forest Service, contracted with the College of Business at the University of Nebraska–Lincoln to conduct a formal, nationwide study of this aspect of urban and community forestry.

The 2021 study was conducted by researchers Drs. Eric Thompson, Mitch Herian, and David Rosenbaum. All 50 states and the District of Columbia are included and the goal is to help determine what economists call the economic footprint of both the private and public sectors involved in urban forestry. For purposes of this project, urban forestry is defined as "growing, planting, maintaining, removing, disposing, and studying trees that are usually located in cities, towns, and other human settlements and that are used primarily to meet needs and enable activities of people." Data used in the study are from the 2017 Economic Census conducted by the U.S. Department of Commerce, the most recent data available for analysis, and information compiled by the Arbor Day Foundation from participants in the Tree City USA®, Tree Campus® Higher Education and Tree Line USA® programs. These data are supplemented with surveys of non-participating cities, campuses, and companies. Consistent, industry-accepted methodology provides the advantage of enabling replication by future researchers to track the growth of urban forestry and its impacts.

The study also includes a section called Quality-of-Life Benefits. This will be of special interest to homeowners because it highlights how landscape trees affect property values. All in all, this new package of information will be a useful addition in the arsenal of tree board members and others who often must defend the importance of landscape trees.

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The National Perspective

The economic footprint of urban forestry is like the concentric rings in a pond. Not only is there the direct value of business sales or agency spending, but there is also a multiplier effect that widely spreads the economic benefits. Here is a summary of findings for the various industries that are part of urban forestry.

Services to maintain the landscape lead all other categories in providing economic benefits.

THE PRIVATE SECTOR

For the purposes of this study, there are six relevant industry segments, as identified in the federal government's North American Industry Classification System. Some 322,931 people are employed in these industries with the total economic footprint being an impressive $61.9 billion. Only activities related to growing, distributing, planting, and maintaining of urban trees were included in the data collection. For example, in the landscape services industry, lawn maintenance was excluded.

The direct economic footprint in the following table is based on annual sales and $15.1 billion in employee wages, salaries, and benefits. IMPLAN, an economic impact assessment software system, calculated the multiplier for each industry segment.

INDUSTRY	DIRECT ECONOMIC FOOTPRINT OUTPUT*	MULTIPLIER*	TOTAL ECONOMIC FOOTPRINT OUTPUT*
Nursery and Tree Products	$2,617.0	$2,105.6	$4,722.6
Support Activities for Forestry	$354.8	$295.5	$650.3
Nursery and Florist Wholesale	$2,426.6	$1,846.3	$4,273.0
Lawn and Garden Equipment and Supply Stores	$1,693.0	$1,472.8	$3,165.9
Landscape Architecture Services	$2,093.7	$2,388.6	$4,482.3
Landscaping Services	$25,074.5	$19,510.2	$44,584.7
TOTALS	$34,259.6	$27,619.1	$61,878.7

*$ in millions

LOCAL GOVERNMENTS AND UTILITIES

This table shows the economic contributions from public entities, such as cities, counties, and some universities, as well as private utilities and colleges. The Arbor Day Foundation provided data for entities participating in its recognition programs, while researchers sampled non-participating entities by questionnaire. Together, these institutions contributed nearly $2.1 billion in 2017.

ENTITIES	DIRECT ECONOMIC FOOTPRINT OUTPUT*	MULTIPLIER*	TOTAL ECONOMIC FOOTPRINT OUTPUT*
Tree City USA Communities	$688.2	$520.4	$1,208.5
Other Cities	$117.8	$92.4	$210.2
County Governments	$52.1	$40.4	$92.5
Tree Campus USA Higher Education Schools	$33.7	$25.5	$59.3
Tree Line USA Utilities	$294.3	$216.8	$511.1
TOTALS	**$1,186.1**	**$895.5**	**$2,081.5**

*$ in millions

EMPLOYMENT

The growing and care of urban forests provides jobs for a large number of employees. The multipliers in this case are the number of people not directly employed in the industries listed, but those workers who benefit and receive part of their support from individuals who are in fields related to urban forestry. Total direct compensation amounts to nearly $16 billion, and $25 billion when considering a multiplier.

	EMPLOYEE COMPENSATION FOOTPRINT*			NUMBER OF JOBS		
INDUSTRY	Direct	Multiplier	Total	Direct	Multiplier	Total
Nursery and Tree Products	$1,315.8	$977.6	$2,293.4	35,585	23,503	59,087
Support Activities for Forestry	$322.0	$97.4	$419.4	4,745	1,173	5,918
Nursery and Florist Wholesale	$1,135.3	$883.1	$2,018.4	20,272	24,283	44,555
Lawn and Garden Equipment and Supply Stores	$748.7	$565.2	$1,313.9	19,440	12,035	31,474
Landscape Architecture Services	$1,089.7	$843.3	$1,933.0	13,421	17,866	31,287
Landscaping Services	$10,568.8	$5,328.2	$15,897.0	229,469	72,760	302,229
TOTALS	**$15,180.4**	**$8,694.8**	**$23,875.2**	**322,931**	**151,619**	**474,550**

	EMPLOYEE COMPENSATION FOOTPRINT*			NUMBER OF JOBS		
ENTITY	Direct	Multiplier	Total	Direct	Multiplier	Total
Tree City USA Communities	$492.1	$205.5	$697.6	8,773	3,436	12,209
Other Cities	$84.9	$42.2	$127.1	1,833	684	2,517
County Governments	$30.5	$15.4	$45.8	660	246	906
Tree Campus Higher Education Schools	$25.8	$11.5	$37.3	573	184	757
Tree Line USA Utilities	$115.4	$171.9	$287.3	2,473	8,222	10,693
TOTALS	**$748.8**	**$446.4**	**$1,195.2**	**14,313**	**12,769**	**27,082**

*$ in millions

QUALITY-OF-LIFE BENEFITS

Landscape trees impact property values, but they also provide external benefits to society, such as improved air and water quality. In this study, the benefit to homeowners was based on a count of urban homes in each state, average tree coverage on private property, and a review of literature quantifying the relationship between tree cover and property values. External benefits were calculated using the i-Tree Landscape program developed by the USDA Forest Service. Results show that tree cover in the U.S. increased the value of private homes by more than $604 billion in 2017, based on the present value of annual services provided — the aesthetics, shading, and related energy cost savings over a 50-year lifespan for mature trees. On an annual basis, $31.5 billion worth of services are provided to homeowners, and an additional $73 billion in benefits are delivered to society in the form of air pollution and stormwater runoff mitigation.

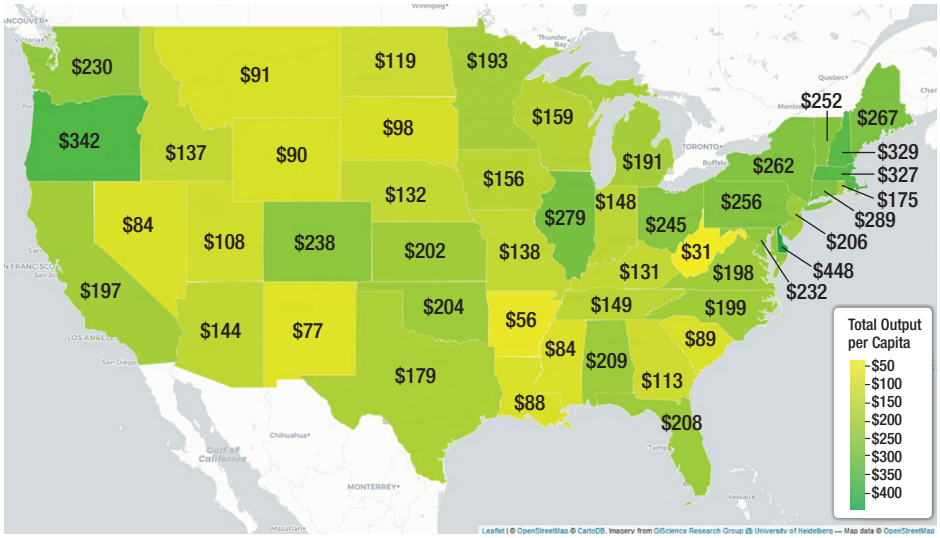
ECONOMIC BENEFITS (MEASURED IN 2017)	VALUE
Property Value Impact	$604,167.4 million
Annual Value of Services by Trees to Property Owners	$31,518.4 million
Annual Value of Pollution and Runoff Mitigation	$73,436.5 million
TOTAL ANNUAL VALUE	**$104,954.9 million**

Economic Benefits State by State

In the University of Nebraska study, basically the same methodology was applied on a state and regional basis. A summary is shown here with the economic values displayed per capita.

URBAN FORESTRY OUTPUTS PER RESIDENT IN 2017

The map at right shows total economic output, per capita, for each state. This includes both direct and indirect economic impact of the various industries associated with urban forestry, and the multiplier effect for each. As you can see on the map, the largest total economic footprints are found in the Northeast, coastal Northwest, and industrial Midwest of the country. The strong influence of the nursery industry accounts for much of the impact in Oregon and New Jersey. In the government sectors, cities that participate in the Tree City USA program account for the largest share of the economic footprint.



QUALITY OF LIFE BENEFITS

In economic terms, trees and urban forestry play a large role in the lives of urban residents. In the full study report, urban and rural counties are reported separately. In the table on page 5, however, the data is aggregated. The first column reports the contribution of tree cover to property values in each state. The other columns are the quantified values of some of the ecoservices trees provide.

STATEWIDE IMPACT OF TREE COVER ON PROPERTY VALUES AND ENVIRONMENTAL AMENITIES					
		Value* from i-Tree			
State	Property Value *	Carbon	Pollution	Hydrology	Total
Alabama	$17,995	$3,367	$193	$114	**$3,675**
Alaska	$29	$0	$0	$0	**$0**
Arizona	$877	$181	$3	$1	**$184**
Arkansas	$9,984	$2,439	$71	$84	**$2,594**
California	$17,570	$3,023	$136	$62	**$3,221**
Colorado	$6,989	$577	$16	$10	**$603**
Connecticut	$10,285	$285	$122	$64	**$472**
Delaware	$2,110	$73	$13	$6	**$93**
District of Columbia	$805	$2	$6	$1	**$9**
Florida	$38,657	$3,889	$303	$240	**$4,432**
Georgia	$33,688	$4,141	$344	$254	**$4,739**
Hawaii	$15	$0	$0	$0	**$0**
Idaho	$1,564	$740	$22	$15	**$777**
Illinois	$10,725	$500	$111	$66	**$676**
Indiana	$7,092	$576	$47	$29	**$652**
Iowa	$1,624	$295	$7	$11	**$314**
Kansas	$1,991	$328	$12	$12	**$351**
Kentucky	$12,123	$1,235	$83	$71	**$1,388**
Louisiana	$12,387	$2,981	$110	$130	**$3,222**
Maine	$6,701	$1,474	$55	$54	**$1,583**
Maryland	$15,417	$407	$114	$46	**$567**
Massachusetts	$21,426	$390	$249	$160	**$799**
Michigan	$20,380	$1,799	$123	$125	**$2,047**
Minnesota	$5,301	$760	$26	$26	**$812**
Mississippi	$11,356	$3,983	$110	$84	**$4,176**
Missouri	$10,370	$935	$91	$67	**$1,094**
Montana	$1,628	$874	$28	$25	**$927**
Nebraska	$472	$114	$3	$3	**$121**
Nevada	$549	$254	$9	$2	**$265**
New Hampshire	$6,833	$388	$36	$35	**$458**
New Jersey	$20,267	$298	$173	$71	**$543**
New Mexico	$1,508	$592	$11	$3	**$606**
New York	$33,723	$1,484	$302	$135	**$1,922**
North Carolina	$36,577	$3,921	$248	$157	**$4,326**
North Dakota	$108	$60	$2	$1	**$62**
Ohio	$21,698	$954	$202	$118	**$1,274**
Oklahoma	$5,823	$1,106	$62	$33	**$1,201**
Oregon	$11,579	$1,785	$115	$101	**$2,001**
Pennsylvania	$37,746	$1,780	$313	$125	**$2,218**
Rhode Island	$3,667	$56	$45	$26	**$127**
South Carolina	$20,470	$2,498	$114	$85	**$2,698**
South Dakota	$509	$58	$4	$2	**$63**
Tennessee	$20,513	$1,467	$154	$107	**$1,727**
Texas	$30,786	$5,624	$297	$231	**$6,153**
Utah	$3,238	$390	$21	$13	**$423**
Vermont	$2,923	$363	$15	$23	**$400**
Virginia	$27,033	$2,208	$151	$110	**$2,469**
Washington	$21,099	$1,588	$83	$119	**$1,790**
West Virginia	$9,036	$1,264	$48	$42	**$1,354**
Wisconsin	$8,738	$1,295	$49	$41	**$1,386**
Wyoming	$184	$433	$4	$3	**$440**
TOTALS	**$604,167**	**$65,234**	**$4,857**	**$3,345**	**$73,437**

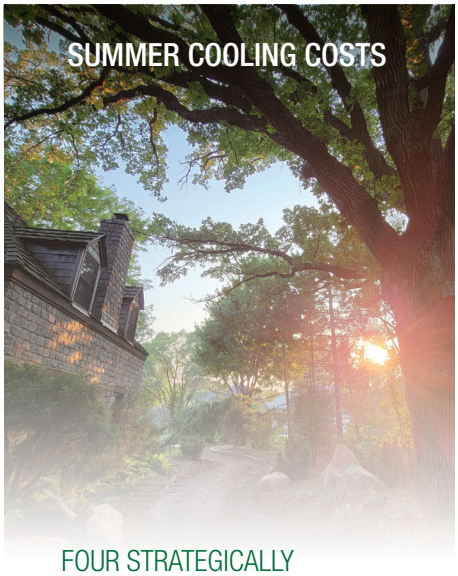
*$ in millions

More on Economic Benefits

There are many more findings from a variety of research studies about the positive economic impact of trees. Even when weighed against the costs of planting and maintenance, trees make good sense as investments — both for individuals and communities.

TREES AT HOME AND IN THE COMMUNITY

While values will vary depending on climate and local conditions, the contribution of trees will still be significant. Here are some examples.



SUMMER COOLING COSTS

FOUR STRATEGICALLY PLACED TREES at a home in Sacramento, California save up to 30% on energy costs each year after the trees gain some size.

If 1 million more trees were planted in Sacramento, $10 million would be saved annually.

ONE WELL-PLACED TREE can reduce air conditioning costs alone up to 50%.

Reduced energy demand means reduced need for power plants, which can result in less air pollution.

PROPERTY VALUES

YARD TREES IN GOOD CONDITION may add 10% to 20% to the resale value of your home.

In Portland, Oregon, street trees in front of or near a home added an average of $8,870 to sale prices — and reduced time on the market.

SHADED STREETS

STREET TREES BY YOUR HOME beautify the neighborhood, provide safety from traffic, and add summer comfort — as well as contribute to resale value.

Shade protects asphalt surfaces, with the potential of reducing repaving costs by as much as 58% over a 30-year period.

WINTER SAVINGS

TREES USED AS WINDBREAKS can save 20% to 50% in energy used for heating.

Windbreaks can also control blowing snow, saving on plowing costs.

CLIMATE CHANGE

GLOBALLY, TREES HELP by removing fossil fuel emissions.

A USDA Forest Service study found that trees removed about one-third of fossil fuel emissions each year from 1990 to 2007.

TREES ARE
GOOD FOR BUSINESS.
TREES IN A
SHOPPING DISTRICT:

$ Attract customers

$ Lower utility costs

$ Cool parking spaces

$ Increase resale value

$ Stimulate economic development

$ Increase tourism

$ Ease stress

TREES IN THE BUSINESS DISTRICT

Considerable research on trees in business districts has been done by Dr. Kathleen Wolf at the University of Washington. She concludes, "Trees are a positive atmospheric for business districts. They create a retail mood that appeals to shoppers and visitors. Trees greet shoppers with a message of welcome even before entering a merchant's door." Her studies have found that when trees are present:

- Customers perceive merchants in a much more positive light. Trees send a message of care and service commitment.
- Customers tend to stay longer and visit more frequently.
- Shoppers say they are willing to pay higher prices — as much as 12% more.
- Visitors rate pedestrian-oriented pocket parks highly and prefer trees that are large with enclosing canopies.

PARKS AND OPEN SPACE

Americans value their parks and open spaces, most of which are enhanced with trees and other vegetation. Studies have shown that homebuyers prefer to be near such spaces and are often willing to pay 8% to 20% more for the privilege.

OTHER VALUES

In addition to cash values and major external (societal) benefits quantified in the University of Nebraska study, there are many others. For example, numerous studies have shown how trees reduce human stress and contribute to better health and even longevity. Then there are the famous studies by Dr. Kuo at the University of Illinois at Urbana-Champaign that link trees to improved child development and the reduction of domestic violence. These and others go beyond dollars when viewed in terms of human happiness.

Beneficiaries — The Bottom Line

The ultimate benefits of urban forestry are the contributions trees make to the comfort, health, and happiness of people. The Arbor Day Foundation has collected examples from every state, and you can see all of them at ***arborday.org/faces****.*

WHEN ALMA GAUL turns off Bettendorf, Iowa's, four-lane thoroughfare and enters her neighborhood, the world around her changes. The noise, lights, and bustle of the city are left behind. "It's like driving into a park," Alma says. "It's calm and quiet — very surreal."

Alma and her neighbors are the beneficiaries of forward-thinking city officials and developers of long ago. When the area was transformed from cornfields into houses, they planted oaks, maples, river birches, and a diverse mixture of other species along the streets of the development. Alma appreciates the results. "Trees make my neighborhood," she says.

Carrying on the tradition is Trees Are Us, a dedicated group of volunteers who work under the direction of Bettendorf's Parks and Recreation Department. In cooperation with the city's tree board and supported with funds from the local utility, corporations, and gaming authorities, more than 2,000 trees have been added to Bettendorf's streets.

Neighbors of Alma Gaul, newspaper feature writer in Bettendorf, Iowa, add more trees to the streets of their city.

FOR MORE INFORMATION

For links to the entire report of the Economics of Urban Forestry and other information related to this issue, please visit **arborday.org/treereport**.

AS AN INVESTOR who renovates neglected homes, Evelyn Ware-Jackson looks at blighted areas a little differently than most people. Where others see despair, Evelyn sees opportunity. She also realizes restoring one home alone is not enough. You must redevelop the whole neighborhood. Nowhere has she been more successful than in Melrose East, a once thriving neighborhood in Baton Rouge, Louisiana, that has suffered years of disinvestment, neglect, crime, and disillusionment.

This turned around when Evelyn accepted an offer from Baton Rouge Green for 300 trees funded by a USDA Forest Service grant through the Louisiana Office of Forestry. The trees enabled Evelyn and residents of the neighborhood to complete a community reforestation program. The residents and other volunteers worked together to plant the trees.

The trees not only added shade and beauty, but the planting project served as a catalyst for other neighborhood improvements and provided a way for citizens to get involved with their neighborhood's turnaround.

THE UNIVERSITY OF IDAHO is located in Moscow, Idaho, a small city surrounded by some of the nation's most productive acreages of winter wheat. As early as 1909, university officials recognized the importance of trees as part of campus education, and a 36-acre arboretum was planted. The site became so popular for community recreation that an additional 63 acres of farm land adjoining the university was acquired to plant a variety of trees and shrubs from all over the world.

In cooperation with community leaders, foresters, and private donors, the farmland has become a diverse and nationally accredited arboretum. And despite economic hard times at the state university, state funds have consistently been allocated to the arboretum's maintenance and improvement. The expanded arboretum has become a place where on any day of the year, community residents of all ages can be found walking, watching birdlife, meditating, and enjoying the benefits of a bit of wooded area between the wheat fields and the city.

The site so affected Jim and Cindy Fisher that when it came time to buy a house, they sought one within an easy walk to the arboretum. "We became enamored with that part of town," they said, and like so many others, this oasis of trees is now an important part of their daily lives.

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