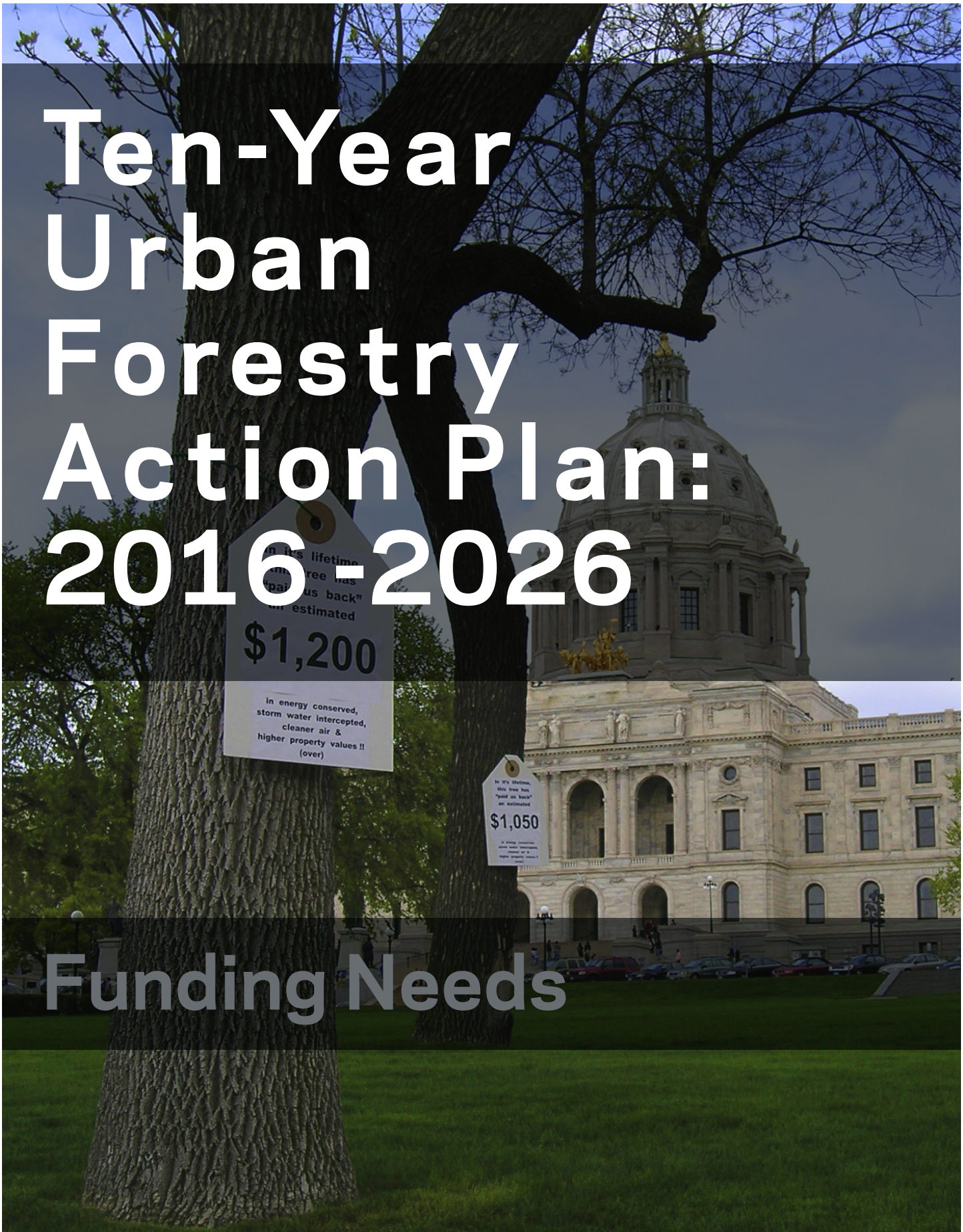
Ten-Year Urban Forestry Action Plan: 2016-2026



Funding Needs

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*Title page photo credit: Kathleen Wolf

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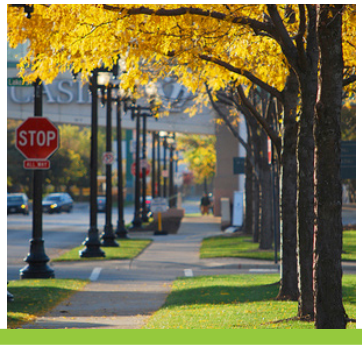

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Executive Summary to the Action Plan

The National Ten-Year Urban and Community Forestry Action Plan is developed by and for the urban forestry community. The plan's purpose is to expand awareness of the benefits that our urban forests, including green infrastructure, provide to communities throughout the nation, and increase investments in these urban forest resources for the benefit of current and future generations. The plan provides specific goals, actions, and recommendations for improving the status of urban and community forestry for the United States and its territories. The plan also identifies research priorities, messaging and communications needs, and innovative funding and collaborative opportunities for urban forestry initiatives. Notably, this plan also serves as a framework for funding and recommendation priorities developed by the National Urban and Community Forestry Advisory Council (NUCFAC) for the U.S. Forest Service's National Urban and Community Forestry program and National Challenge Cost Share Grants. The urban forestry community, including the Forest Service and other applicable Federal agencies, are to use the Action Plan as a guide to implement and expand urban and community forestry for the next ten years (2016 -2026).

Plan Vision

Urban And Community Forests Increase Sustainability, Wellness, and Resilience in All Communities.

Plan Mission

Help All Communities Create Urban and Community Forests that are Diverse, Healthy, and Accessible for All Citizens.

Goal 1. Integrate Urban and Community Forestry Into all Scales of Planning

A: Support inclusion of trees and forests as elements of all community comprehensive and master planning efforts.

B: Support the integration of urban forestry into all scales of city, regional, and state-scale master plans.

C: Launch a public awareness and education campaign to elevate recognition of the value of urban trees and urban forests ecosystems as essential contributors to community sustainability and resilience.

D: Increase community capacity to use urban trees and forestry in public space planning, infrastructure, and private development.

Goal 2. Promote the Role of Urban and Community Forestry in Human Health and Wellness

A: Expand opportunities for collaboration with the health community.

B: Champion a nationwide marketing campaign that links trees to human health and wellness.

C: Plan, design and manage urban forests to improve human health and wellness.

D: Develop tools to improve and highlight the relationship between improved public health, wellness, and urban and community forestry and green infrastructure.

Goal 3. Cultivate Diversity, Equity, and Leadership Within the Urban Forestry Community

A: Increase diversity, equity, and accessibility in urban and community forestry.

B: Engage underserved communities in urban and community forestry.

C: Develop effective leadership at all levels to build a national voice for urban forestry.

D: Increase workforce development opportunities and green jobs in urban and community forestry, with particular attention to underserved communities.

E: Promote expanded collaboration, training and communication within the field of urban and community forestry to build workforce professional development.

Goal 4. Strengthen Urban and Community Forest Health and Biodiversity for Long-Term Resilience

A: Increase the biodiversity, health, and resilience of trees in urban and community forests.

B: Foster resilience, restoration, and sustainability of urban and community forests facing climate change challenges.

C: Support use of urban forests for increasing community food resilience and access to local foods.

Goal 5. Improve Urban and Community Forest Management, Maintenance, and Stewardship

A: Improve urban and community forest management, maintenance, and arboricultural practices.

B: Develop comprehensive programs, policies, and resources for enhancing urban forestry stewardship.

C: Promote for better use of technology and tools in urban forestry.

D: Facilitate expanded research and delivery of scientific findings to all stakeholders. (See Research Needs)

Goal 6. Diversify, Leverage, and Increase Funding for Urban and Community Forestry

A: Increase funding and grants for urban and community forestry.

B: To leverage and diversify funding, expand collaboration between urban forestry and related fields, agencies, and sectors.

Goal 7. Increase Public Awareness and Environmental Education to Promote Stewardship

A: Create environmental education programs that focus on urban and community forestry issues.

B: Create a nationwide urban forestry public awareness and education campaign.

C: Increase engagement of undeserved and minority communities in urban forestry establishment and stewardship.

Introduction

Endeavors like the development of the National Urban and Community Forestry Advisory Council's Ten-Year Action Plan result in important guiding documents for advancing urban and community forestry. These planning documents become even more powerful when they include an examination of the scale of resources necessary for implementation, as well as the benefits associated with these investments. While the breadth and depth of both the actions included in this plan and the community of practice members who will ultimately carry out those actions precludes a discussion of exactly where implementation dollars for each action may flow from, the University of Maryland's Environmental Finance Center (EFC) offers the following funding discussion, particularly in the context of future urbanization, designed to inform funding and budgeting decision-making.

Benefits of Maintenance Demonstrate Importance of Funding

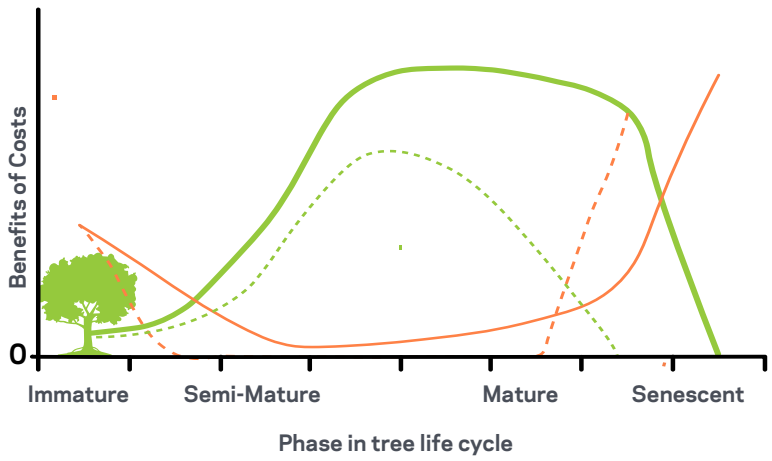
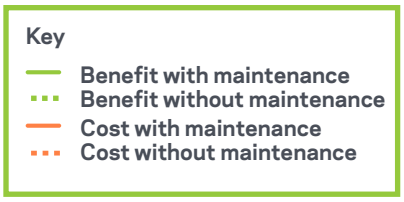


Figure data drawn from Hauer et al., 2014.

The figure to the left demonstrates theoretical costs and benefits profiles over the lifetime of an individual tree, with (solid lines) and without (dashed lines) adequate maintenance. Benefits are maximized during the mature phase of a tree and decline rapidly through senescence, while costs show an inverse pattern. Without sufficient funding for maintenance, benefits are not realized



Investment Return: $1.37 - $3.09

A study on the value of street and park trees in five U.S. cities found that for every dollar invested in urban tree management resulted in benefits valued between $1.37 to $3.09 annually (McPherson, et al. 2005).

$1.95 Billion Dollars in Ecosystem Benefits

Los Angeles' Million Trees Initiative provides an estimated $1.3 to $1.95 billion dollars in ecosystem benefits over a 35-year period (McPherson 2011).

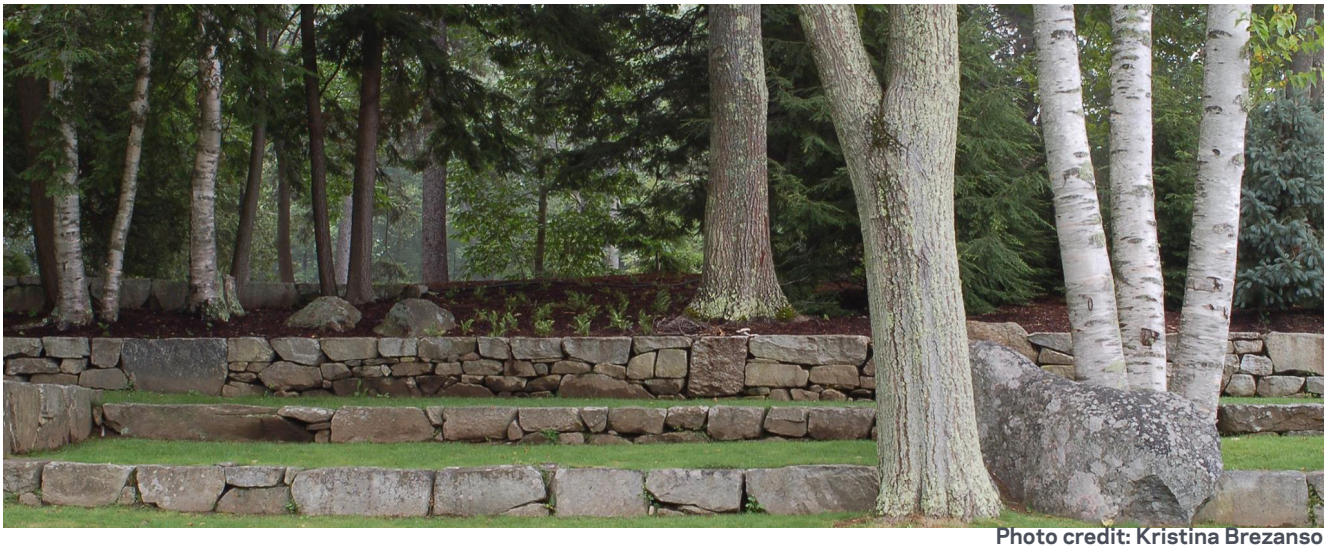


Photo credit: Kristina Brezanso

Approach to Funding

Typically, budgeting is a process which starts at the per unit level, assigning line item cost estimates to programmatic activities that are aggregated into sub-budgets and finally summed into an overarching agency, plan, or organizational budget. For the Ten-Year Action Plan, however, the EFC used an approach that considered historical levels of urban and community forestry funding and examined those in the context of emerging trends and potential return on investment. This was used to develop an estimated range of funding needed to support the advancement and implementation of the Ten-Year Action Plan.

This approach was chosen for several reasons. First, it seemed to be best aligned with USDA Forest Service's traditional approach. While there are a few methods of forecasting future programmatic costs, USDA Forest Service tends to plan future funding allocations based on historical spending and existing formulaic calculations.

Second, the landscape of urban and community forestry includes vast and intricately entwined layers of federal, state, local, nonprofit, and private sector organizations with little standardization in how funding investments and benefits are scaled, recorded, tracked, and communicated. Undertaking an exercise of attempting to assign a line item cost to the activities associated with each of the Action Plan's seven goals and build a "from the ground up" overall cost estimate based on currently available data would have required a level of extrapolation, estimates, and assumptions that would potentially impact the credibility and integrity of the Plan.

There is a growing and compelling collection of good urban and community forestry research that includes a discussion of costs and associated benefits. However, these studies have not occurred at the national, urban forestry community-wide scale in which the Ten-Year Action Plan is founded, nor have they used a consistent set of protocols for data collection and analysis. Extrapolating this data to a national scale, over a ten year time period, across multiple participation groups would result in a funding needs estimate that would be difficult to defend, and any ensuing discussion of the validity of the estimate would distract energy and resources from implementation of the Plan.

Finally, the Ten-Year Action Plan is designed for the full urban and community forestry community, and as such, actions within the plan could ultimately be carried out by any one of a number of stakeholders. The existing knowledge, capacity, location, and resources of the urban forestry community responsible for implementation of a given action could have significant impacts on the level of funding needed to carry the action out, and assigning actions to specific implementers was outside the scope of this project.

Photo Credit: Eric Reed

Influential Trends

Two existing trends tied closely to urban and community forestry formed the core of the analysis – the increasing rate of urbanization and the growing significance of urban and community forestry services.

The United States is rapidly becoming more urban. It is estimated that in the first half of the 21st century, urban land in the United States will increase to 8.1% of total land, or an area larger than the state of Montana. It is also estimated that by 2050, four states – Rhode Island, New Jersey, Massachusetts, and Connecticut – will be more than 50% urban, and the amount of US forestland estimated to be subsumed by urbanization is an area roughly the size of Pennsylvania. This rate of urban growth suggests that integrating urban and community forestry into all levels of planning will be needed to sustain the ecosystem services and forests products required by a growing urban population and will require an associated increased investment of resources.[1]

The United States is rapidly becoming more urban. It is estimated that in the first half of the 21st century, urban land in the United States will increase to 8.1% of total land, or an area larger than the state of Montana.

The scope of urban forestry needs and the significance of urban forestry services appear to be increasing in communities. While the number of communities receiving urban and community forestry assistance over the past ten years has remained relatively flat, at approximately around 7,200 communities, data seems to indicate that there has been an almost 15% transition of communities from "developing" their urban and community forestry program to actually "managing" these natural resources.[2] This suggests that community programs which may have had an emphasis on beautification have gradually shifted to programs which are more robust and provide greater community services and ecosystem benefits.

While the number of communities receiving urban and community forestry assistance over the past ten years has remained relatively flat, at approximately around 7,200 communities, data seems to indicate that there has been an almost 15% transition of communities from "developing" their urban and community forestry program to actually "managing" these natural resources.

The very nature of urban forestry, as well as the USDA Forest Service's broader mission of "Caring for the Land and Serving the People," speaks to investments made and benefits derived "where the people are" – in urban areas. So, in the absence of any other codified projections of the scale and responsible parties for future urban and community forestry needs, and for the purposes of Ten-Year Action Plan implementation discussions, urbanization was used as a proxy for developing a ten-year funding needs estimate that adapts current and advocated funding levels to the anticipated increased urban land area demand scenarios.[3]

Using currently available data and making minimal assumptions, this analysis suggests that simply adjusting to future urbanization, funding in the range of approximately $32 million annually is needed for the USDA Forest Service's Urban and Community Forestry program. This estimate was developed by examining current urban land data and research projections of future urbanization patterns; developing an implied annual urbanization growth rate; and, applying this annual growth rate to current and advocated funding levels to derive an estimate of the funds necessary to maintain current levels of service to manage future increases in urban forestry area. This estimate does not account for supporting important existing urban forestry research and efforts or the many new and urgently needed activities outlined in the Ten-Year Action Plan. In other words, this is a bare bones estimate of the funding required just to maintain the existing level of service in the face of anticipated increases in urbanization and does not account for any desired increase in the level of service that may be associated with implementation of the Ten-Year Action Plan.

Looking at a sampling of actions related to the goals of the Ten-Year Action Plan that are above and beyond existing Urban and Community Forestry Program budget where reliable cost estimates were available begins to suggest the scale at which the current level of urban forestry funding is insufficient.

1 U.S. Urban Forest Statistics, Presentation to the 2014 Partners in Community Forestry Conference, Charlotte, NC, David Nowak.
2 CARS data 2005 – 2014, See Table 1, in Appendix.

3 This estimate relies on a change of one variable, i.e. urbanized area. Our judgment is that this is a factor and a variable that impacts the discussion of urban forestry at all levels. We acknowledge that the rate of urbanization may change when viewing locally; however, we believe that given the granularity of census data, organizations of a local nature may be able to understand and employ the method for planning discussion purposes. This estimate does not include other future factors which may have an effect on program delivery, such as, inter alia, technological efficiencies, economies of scale in program delivery, dissemination of information, efficiencies from increases in standards or level or professionalism, availability of funding, rate of program funding, or rate of program adoption.

Table 1: Base Funding Items

Action Plan Activities	Base Funding (millions)	Associated Action Plan Goal
UC&F Program Funding	$ 31.30	Funding, Management, Multiple
Forest Health Management	$ 7.97	Management
Inventory Analysis	$ 20.00	Planning, Multiple
Tools - iTree	$ 1.30	Planning, Multiple
Urban Tree Canopy	$ 2.80	Planning
Stewardship mapping	$ 1.20	Management
Trees + Crime	$ 1.60	Human Health
Trees + Health	$ 1.00	Human Health
Trees + Water	$ 1.00	Human Health, Environmental Health
Urban Forest Products	$ 1.20	Management
Estimate of additional urban research and action items	$ 14.48	Multiple
Total of Items	$ 83.85	

An estimate of funding needs for a sampling of Ten-Year Action Plan activities outside the Urban and Community Forestry Program was developed by examining input from USDA Forest Service and other urban forestry researchers and data from a review of current funding requests in the context of current urban land area.[1] **Considering this in addition to the baseline Urban and Community Forestry Program needs and then adjusting for the impacts of future urbanization suggests annual funding needs in the range of approximately $85 million.** This estimate was developed by examining current urban land data and research projections of future urbanization patterns; developing an implied annual urbanization growth rate; and, applying this annual growth rate to the combination of current and advocated funding levels and the Action Plan activity estimates (see Table 1) to derive an estimate of the funds necessary to maintain current levels of service to manage future increases in urban forestry area.

Considering this in addition to the baseline Urban and Community Forestry Program needs and then adjusting for the impacts of future urbanization suggests annual funding needs in the range of approximately $85 million.

Again to be clear, this estimate does not represent a comprehensive price tag for implementation of the full Ten-Year Action Plan, it merely uses data available on a sampling of actions to indicate the scale of the urban forestry funding gap. In addition, the extent to which the more than $50 million in additional funds needed would come from direct budget increases to the Urban and Community Forestry or other USDA Forest Service programs, or through further leveraging of the other federal, state, local, nonprofit, and private sector funding streams at play in urban and community forestry will be an important discussion for the urban forestry community moving forward.

1 Please see methodology for detail on sources, estimation method, and caveats.

Limitations, Benefits, Emerging Research, and the Need to Standardize Accounting

As previously indicated, there are multiple levels and organizational units within the urban forestry community, including roughly 7,200 communities, more than 50 states and territories, and over 4,000 service, advocacy, and community organizations. The challenges of developing a detailed, accurate, and lasting estimate of funding needs across this scale and diversity of organizational units, along with the lack of a universally accepted accounting framework are real and there is a risk that a funding estimate of incorrect scope could quickly become outdated or distract from the overall message of the Ten-Year Action Plan.

> **Urban and community forestry is only now being more widely recognized as a public infrastructure service essential for addressing the needs of a nation having more than 80% of residents living in urbanized areas.**

One reason this challenge exists is that urban and community forestry, and the role it plays more broadly as a critical component of urban green infrastructure networks, is only now being more widely recognized as a public infrastructure service essential for addressing the needs of a nation having more than 80% of residents living in urbanized areas. City programs have had to quickly adapt from beautification goals, management, and reporting practices to a focus on the delivery of critical ecosystem goods and services. Meanwhile, the accounting and benefits measurement remain an emerging stage of research, development, and implementation.

The critical need to increase investment in urban and community forestry, or at the very least maintain existing levels, can be well-supported by a discussion of the multiple benefits derived; however, given the emerging state of ecosystem service benefits valuation and accounting, developing a simple equation or mathematical formula to calculate return on funding investment applicable to a national scale is not currently possible across all types of benefits.

To be clear, that is not to suggest that benefit values cannot or have not been calculated. There is a body of strong existing research, technology-based tools, and ongoing initiatives within the urban and community forestry community that could inform the standardization process and be built upon, much of which owes its origins to USDA Forest Service support. In fact, the Ten-Year Action Plan document is rife with examples from across the country that span human health and wellness, water and air quality, energy conservation, recreation, economic development, transportation, and public safety, often in the most vulnerable and underserved communities. While there is currently research into this area, currently what is lacking, as discussed earlier, is a consensus driven process for how these data points can be aggregated to a national, community of practice-wide scale.

Broadly adopted standard metrics would allow for the systematic allocation of budgets and the ability to more precisely determine return on investment and future funding needs. Standardization could also open access to other sources of urban forestry funding to support operations, growth, and the delivery of services. Codified systems for benefit measurement and accounting would enable access to emerging “green” financial markets, socially responsible investment funds, foundations, and impact investing capital pools.

While it may sound like a daunting undertaking, developing an “industry standard” for urban and community forestry accounting could likely build upon existing tools and technologies already in place, but identifying a process with the greatest potential for efficiency, effectiveness, and accuracy would require additional investigation. The complexities of such a task will likely require a collective approach managed by an independent, neutral party that would begin with assembling a diverse panel of experts to evaluate existing data, technologies, and methodologies that can be built upon, determine associated gaps and limitations, and suggest methods for filling data gaps; and then, using this group’s findings to serve as the basis for recommendations for developing a more standardized accounting system for both urban forestry investments made and benefits derived.

National Benefits and Funding

While only a few benefits, such as pollution removal, carbon sequestration, and energy conservation, have actually been quantified, those benefits have been conservatively estimated at $17 billion per year. In other words, the millions invested in urban forestry represent a fraction of a percent of the return on this investment.

To sustain the benefits communities receive from urban forestry requires an investment in the maintenance of the resource, as well. The urban forest is continually evolving and faces constant threat from development, climate change, insects and diseases, invasive plants, and more. Given the number of additional benefits, such as those related to health, drinking water, and the like that have not yet even been quantified on a national scale, the urban forest is clearly a resource that is substantially undervalued.

-- Based on communications with Dr. David Nowak, USFS

28.2 Million Tons/Year

Based on the field data of 10 USA cities and a national urban tree cover data, it is estimated that urban trees in the conterminous USA currently store 708 million tons of carbon ($14,300 million value) with a gross carbon sequestration rate of 22.8 million tC/year ($460/million per year) (Nowak et al. 2002).

20 Million Automobiles

This equals annual carbon emissions from about 20 million automobiles. Thus urban forests annually remove carbon equivalent to about 8% of U.S. registered vehicles (Nowak et al, 2010).

Conclusion

Ensuring that Urban and Community Forestry Programs keep pace with urbanization and the resulting expanded need for urban forestry services will require identifying, diversifying, and leveraging additional sources of funding. In addition, continuing support is needed to standardize, account for, and communicate both the funding investments being made in urban and community forestry, as well as the ecosystem services and benefits that urban forests provide. On a regional and national level, being able to more precisely speak to true costs, ecosystem services, and benefit measurements will enable urban and community forestry's strong network of implementers, policy makers, and grassroots support organizations to better communicate urban and community forestry's value, community impacts, and return on investment, to the urban forestry community external stakeholders, and the breadth of funding sources.

Photo Credit: Eric Reed

Methodology

Background

Background. The USDA Forest Service's Urban and Community Forestry program provides technical and financial assistance to cities, suburbs, and towns across the nation to maintain and enhance urban tree and forest cover, respond to storm and other disturbance events, support integrated containment of invasive pest threats, and manage risks. The program also supports valuation work and cost-benefit analysis, enabling communities to better understand the benefits provided by urban forests to non-forest sectors, such as public health energy conservation, and economic development.

The Urban and Community Forestry program's contribution to moving communities towards greater economic, environmental, and social sustainability has been significant. In FY 2014 alone, the program delivered assistance to over 190 million people, or 60% of the US population, in over 7,000 communities across the country. A key reason for the program's extended reach is that the federal investment made through the Urban and Community Forestry program leverages non-federal funding – often at a match of 2:1 or in many cases significantly more.[1]

Given the leveraged nature of funding deployed by the Urban and Community Forestry program, the University of Maryland Environmental Finance Center elected to focus on urban and community forestry funding data which seemed the most widely accepted and could provide examples when planning for urbanization within the community of practice.

This included data from:

- USDA Forest Service Annual Budget Requests and Justifications
- Studies of Urbanization by USDA Forest Service Researchers
- 2010 United States Census Data
- Advocated Consensus Budget

1 Sustainable Urban Forest Coalition Fiscal Year 2016 House Interior Appropriations Testimony, March 25, 2015.

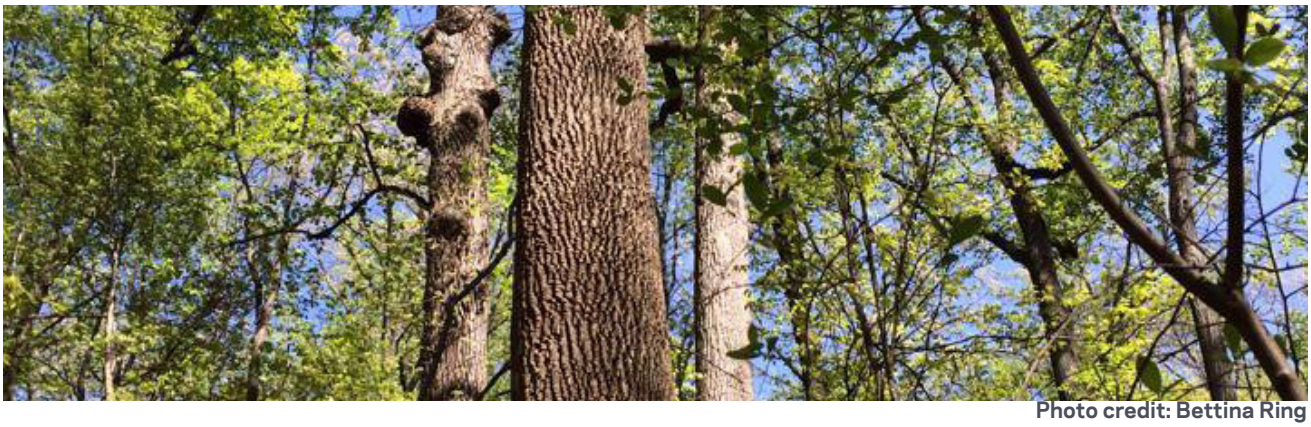


Photo credit: Bettina Ring

Step One: Estimating Change in Urban Land Area

To conduct the analysis, state estimates of the percentage of land by state that will be urban in 2050 were gathered from the study Projected Urban Growth (2000 – 2050) and Its Estimated Impact on the US Forest Resource.[1] The 2010 Census data on total land area and total urban area for fifty states and the District of Columbia was gathered and organized by state.[2] Census data expressed in square meters was converted to square miles.

The estimated percentage of 2050 urban land by state was then applied to current total state land area to derive an estimated "2050 urban area square mile by state." The difference between estimated 2050 urban land area by state and 2010 Census Urban Land Area was then calculated and expressed as a percentage of 2010 Census Urban Land Area by state. The total 2010 Census Urban Land Area by state and the Estimated 2050 Urban Land Area by state was aggregated to arrive at totals for the fifty states and the District of Columbia.[3] Table 1: Estimating Change in Urban Land Area below provides this data.

1 Projected Urban Growth 2000 - 2050 and Its Estimated Impact on the Forest Resource. Nowak, David and Walton, David. Journal of Forestry. December 2005

2 United States Census Bureau, Geography, 2010 Census Urban Lists Record Layouts, 2010 Percent Urban and Rural by State, File Name PctUrbanRural_State.xls, https://www.census.gov/geo/reference/ua/ualists_layout.html, accessed February 7, 2015

3 Please note that the table does not include United States territories as data on future urban land areas was unable to be located.

Table 1: Estimating Change in Urban Land Area

State	Census 2010 State Area (AREA_ST) (m2) [1]	Census 2010 Urban Area (AREA_URBAN) (m2) [1]	Census 2010 Urban Area (mi2)	Estimated Percentage of State Land that will be urban in 2050 [2]	Estimated 2050 Urban Area (mi2)	Estimated Increase in Urban Land Area (mi2)	Estimated Increase as a % of Census 2010 Urban Area
Alabama	131,170,787,086	5,716,365,701	2,207	10.70%	5,419	3,212	145.53%
Alaska	1,477,953,211,577	673,703,920	260	0.05%	285	25	9.69%
Arizona	294,207,314,414	5,663,221,936	2,187	5.10%	5,793	3,607	164.95%
Arkansas	134,771,261,408	2,841,198,188	1,097	5.80%	3,018	1,921	175.12%
California	403,466,310,059	21,287,926,350	8,219	15.00%	23,367	15,148	184.29%
Colorado	268,431,246,426	3,956,737,225	1,528	3.90%	4,042	2,514	164.58%
Connecticut	12,541,641,427	4,730,500,209	1,826	60.90%	2,949	1,123	61.46%
Deleware	5,046,703,785	1,053,792,304	407	39.50%	770	363	89.17%
District of Columbia	158,114,680	158,114,680	61	100.00%	61	0	0.00%
Florida	138,887,481,596	19,173,902,265	7,403	27.90%	14,961	7,558	102.10%
Georgia	148,959,236,603	12,423,724,190	4,797	14.30%	8,224	3,428	71.46%
Hawaii	16,634,529,975	1,018,212,915	393	6.12%	393	0	0.00%
Idaho	214,044,680,857	1,292,606,730	499	1.80%	1,488	988	198.06%
Illinois	143,793,362,385	10,218,955,838	3,946	14.60%	8,106	4,160	105.44%
Indiana	92,789,193,658	6,540,696,730	2,525	16.70%	5,983	3,458	136.91%
Iowa	144,669,296,857	2,468,980,575	953	4.90%	2,737	1,784	187.11%
Kansas	211,754,095,913	2,519,183,616	973	3.20%	2,616	1,644	168.98%
Kentucky	102,269,141,641	3,653,655,859	1,411	8.80%	3,475	2,064	146.32%
Louisiana	111,897,594,452	5,097,451,640	1,968	11.10%	4,796	2,827	143.66%
Maine	79,882,800,680	931,423,305	360	3.80%	1,172	812	225.90%
Maryland	25,141,638,381	5,191,942,757	2,005	37.50%	3,640	1,636	81.59%
Massachusetts	20,202,057,805	7,735,338,848	2,987	61.00%	4,758	1,771	59.31%
Michigan	146,435,075,220	9,384,151,623	3,623	13.70%	7,746	4,123	113.78%
Minnesota	206,232,309,199	4,416,575,848	1,705	4.80%	3,822	2,117	124.14%
Mississippi	121,530,715,928	2,864,191,371	1,106	7.00%	3,285	2,179	197.02%
Missouri	178,039,716,301	5,320,506,862	2,054	6.90%	4,743	2,689	130.89%
Montana	376,961,878,670	769,702,271	297	0.80%	1,164	867	291.80%
Nebraska	198,973,681,461	1,357,102,386	524	1.80%	1,383	859	163.91%
Nevada	284,331,937,541	1,987,575,459	767	2.20%	2,415	1,648	214.72%
New Hampshire	23,187,259,277	1,668,054,122	644	17.10%	1,531	887	137.70%
New Jersey	19,047,341,691	7,561,624,746	2,920	63.60%	4,677	1,758	60.21%
New Mexico	314,160,748,240	2,141,181,968	827	2.10%	2,547	1,721	208.12%
New York	122,056,806,947	10,597,911,232	4,092	18.50%	8,718	4,627	113.07%
North Carolina	125,919,791,207	11,937,724,456	4,609	19.10%	9,286	4,677	101.47%
North Dakota	178,711,239,147	475,973,352	184	1.00%	690	506	275.46%
Ohio	105,828,706,692	11,448,575,862	4,420	22.90%	9,357	4,937	111.68%
Oklahoma	177,660,021,556	3,384,365,635	1,307	4.70%	3,224	1,917	146.72%
Oregon	248,607,802,255	2,866,510,400	1,107	3.50%	3,360	2,253	203.55%
Pennsylvania	115,883,064,314	12,186,542,023	4,705	22.10%	9,888	5,183	110.15%
Rhode Island	2,677,566,454	1,037,649,938	401	70.50%	729	328	81.92%
South Carolina	77,856,841,944	6,168,413,106	2,382	18.30%	5,501	3,119	130.98%
South Dakota	196,349,580,075	586,090,288	226	1.00%	758	532	235.02%
Tennessee	106,797,885,992	7,524,311,791	2,905	15.30%	6,309	3,404	117.16%
Texas	676,586,997,978	22,651,009,601	8,746	7.00%	18,286	9,541	109.09%
Utah	212,818,329,473	2,369,045,186	915	2.50%	2,054	1,140	124.58%
Vermont	23,871,030,489	404,380,140	156	5.30%	488	332	212.87%
Virginia	102,278,849,309	6,902,790,588	2,665	12.60%	4,976	2,311	86.69%
Washington	172,119,001,610	6,150,546,552	2,375	9.20%	6,114	3,739	157.46%
West Virginia	62,258,675,601	1,658,489,502	640	7.70%	1,851	1,211	189.05%
Wisconsin	140,268,064,888	4,866,498,071	1,879	8.30%	4,495	2,616	139.23%
Wyoming	251,470,069,067	503,865,599	195	0.60%	583	388	199.45%
Total	**9,156,460,226,723**	**279,879,819,054**	**108,062**		**238,034**	**131,648**	

Note 1: United States Census Bureau, Geography, 2010 Census Urban Lists Record Layouts, 2010 Percent Urban and Rural by State, File Name PctUrbanRural_State.xls, https://www.census.gov/geo/reference/ua/ualists_layout.html, accessed and downloaded February 7, 2015.

Note 2: Projected Urban Growth 2000 - 2050 and Its Estimated Impact on the Forest Resource. Nowak, David and Walton, David. Journal of Forestry. December 2005)

Step Two: Derive the Implied Annual Growth Rate

The implied annual growth rate,[1] calculated at 1.99%, was then applied to an estimated annual funding amount in order to approximate additional funding needs related to annual increases in urban land. Table 2: Estimated Implied Annual Growth Rate demonstrates the application of the growth rate formula to the 2010 and 2050 data using the footnoted calculation.

1 Implied Annual Rate = (2050UrbanArea/2010UrbanArea)^(1/40)−1

Table 2: Estimated Implied Annual Growth Rate

108,062	238,034	1.99%

Step Three: Compile a List of Current Estimated Funding Needs for Items such as Programs, Actions, Tools, and Research

Table 3: Estimated Funding Needs before Adjusting for Urbanization below lists a sampling of the Ten-Year Action Plan activities in need of funding, the estimated funding needed for each, the associated Ten-Year Action Plan goal, and the basis or source for each estimate. The data builds on the consensus driven Sustainable Urban Forests Coalition needs estimate with data layers from a number of sources including USDA Forest Service researchers. In the absence of available data, an estimate was derived applying urban land area to 2016 funding levels. When summed, we arrive at total current funding need estimate of $83.85 million.

Table 3: Estimated Funding Needs before Adjusting for Urbanization

Action Plan Activities	Base Funding (millions)	Associated Action Plan Goal	Notes
UC&F Program Funding	$ 31.30	Funding, Management, Multiple	SUFC consensus recommended funding for Urban and Community Forestry Program 1
Forest Health Management	$ 7.97	Management	Line item in federal budget is $99.6 million. The estimate uses assumption that 8% allocated towards urban
Inventory Analysis	$ 20.00	Planning, Multiple	Estimate from Dr. Nowak. Assumes 200 plots in 100 metro areas per year at a cost of $1000 per plot
Tools - iTree	$ 1.30	Planning, Multiple	Estimate from Dr. Nowak
Urban Tree Canopy	$ 2.80	Planning	Northern Research Station Data Multiplied by 4 Research Stations. Please see caveats.
Stewardship mapping	$ 1.20	Management	Northern Research Station Data Multiplied by 4 Research Stations. Please see caveats.
Trees + Crime	$ 1.60	Human Health	Northern Research Station Data Multiplied by 4 Research Stations. Please see caveats.
Trees + Health	$ 1.00	Human Health	Northern Research Station Data Multiplied by 4 Research Stations. Please see caveats.
Trees + Water	$ 1.00	Human Health, Environmental Health	Northern Research Station Data Multiplied by 4 Research Stations. Please see caveats.
Urban Forest Products	$ 1.20	Management	Northern Research Station Data Multiplied by 4 Research Stations. Please see caveats.
Estimate of additional urban research and action items	$ 14.48	Multiple	This number is total Urban R&D Estimate less the specific research items above. Line item in Federal Budget is $291 million. This estimate makes an assumption that 8% of R&D is allocated to Urban Land. This results in a total R&D budget of $23.28 million annually.
Total of Items	$ 83.85		

The first line item is specifically funding for the USDA Forest Service Urban and Community Forestry Program. The estimate uses a funding base of $31.3 million as was recommended by the Sustainable Urban Forests Coalition (SUFC) in March 2015 when SUFC recommended program funding return to pre-sequestration levels.[1] In our judgment this represents a consensus funding estimate and represents an increase of more than $7 million when compared to the FY 2016 budget of $23.686 million.[2]

The additional line items in the table represent a sampling of Ten Year Action Plan activities that have traditionally been funded by programs other than the Urban and Community Forestry Program. These include restoring resilient landscapes, forest health management, inventory analysis, tool, monitoring, and research. Urban and community forestry is not always accounted for as a separate funding item within USDA Forest Service budgets making it difficult to discern between urban forestry needs and overall forestry needs.[3] USDA Forest Service researchers and 2016 budgets data offered a sampling of funding requests which impact urban and community forestry at the national level include:

- Forest health management, which comprises all land areas of forest health management including urban, $99.6 million annually.[4]

- Inventory Analysis, at $90 million annually, includes urban inventory analysis.[5]

- Research and Development, at $291 million annually, includes research focused on urban applications.[6]

- Northern Research Station Research funding needs of $2.35 million annually for items such as urban tree canopy, stewardship mapping, urban forest products, trees and crime, trees and health, and trees and water.[7]

1 Sustainable Urban Forests Coalition Fiscal Year 2016 House Interior Appropriations Testimony, March 25, 2015.
2 USDA, United States Forest Service, Fiscal Year 2016 Budget Justification, Urban and Community Forestry, Page 117 http://www.fs.fed.us/sites/default/files/media/2015/07/fy2016-budgetjustification.pdf accessed March 19, 2015
3 This is not to imply that urban and community forestry was to have been accounted for separately, or should be accounted for separately, rather in our analysis, it was difficult to discern a separation. For some of these items, it is difficult to see where a dividing line between urban and community forestry and general forestry maybe be drawn.

4 United States Department of Agriculture, United States Forest Service, Fiscal Year 2016 Budget Justification, Urban and Community Forestry, Page 84 http://www.fs.fed.us/sites/default/files/media/2015/07/fy2016-budget-justification.pdf accessed March 19, 2015.
5 United States Department of Agriculture, United States Forest Service, Fiscal Year 2016 Budget Justification, Urban and Community Forestry, Page 57 http://www.fs.fed.us/sites/default/files/media/2015/07/fy2016-budget-justification.pdf accessed March 19, 2015.
6 United States Department of Agriculture, United States Forest Service, Fiscal Year 2016 Budget Justification, Urban and Community Forestry, Page 57 http://www.fs.fed.us/sites/default/files/media/2015/07/fy2016-budget-justification.pdf accessed March 19, 2015.
7 Deploying Trees to Improve Quality of Life in Cities: Research Needs. Grove, Rains, Westphal. USDA Forest Service, Northern Research Station. February 2015. The table below was developed by NRS and does not represent all regions in terms of priorities and costs. It does appear to represent national perspectives for bringing urban tree canopy and stewardship mapping to enterprise mode. Please note that these needs do not include i-Tree or investments in place-based research undertaken by the urban field stations/place-based units, etc. This information is offered as an exemplar and is not meant to be an indication of total research needs. These numbers would need to be augmented to avoid underestimating urban research investment recommendations or under-representing southern, western, and other regional research needs.

Table 4: Exemplar Chart of Northern Research Station Research Needs

	Year 1	Year 2	Year 3	Year 4	Year 5
Urban Tree Canopy	$700,000	$700,000	$500,000	$500,000	$350,000
Stewardship mapping	$300,000	$300,000	$250,000	$250,000	$175,000
Trees + Crime	$400,000	$300,000	$250,000	$250,000	$200,000
Trees + Health	$400,000	$400,000	$400,000	$400,000	$400,000
Trees + Water	$250,000	$250,000	$250,000	$250,000	$250,000
Urban Forest Products	300,000	300,000	250,000	200,000	200,000
Total Investment	2,350,000	2,250,000	1,900,000	1,850,000	1,575,000

Step Four: Use the Implied Annual Growth Rate to Estimate Additional Funding Needs Related to Future Urbanization.

Table 5: Estimated Additional Need Based on Future Urbanization and Total Estimate of Annual Funding applies the implied annual urbanization growth rate from Step 2 to the funding need estimate derived in Step 3, resulting in an estimated annual funding need adjusted for urbanization over the next ten years.

Step Five: Estimate Present Value Over the Ten Year Period

As a final step, the EFC made an estimate of the present value of the funding needs over the next ten years. The intent of this exercise is to express estimated plan funding needs in terms of present value for discussion purposes only. The exercise does not assume either the source or recipient of the funding, but applies a 3% discount rate to estimated future funding needs to discount the stream of future funding needs back to present. We are not suggesting this is the case, but a question could arise, how one might compare different funding options to make up a financing gap in the era of sequestered budgets. A present value exercise is one method employed which can advance plan discussion, with the caveat that it is not the only path, with the caveat that estimates of present value become very uncertain and can vary widely the longer into the future projections are made, and with the caveat that the method is not employed, and thus may not be useful, across all organizations in the urban forestry community.

Table 5: Estimated Need Based on Future Urbanization and Total Estimate of Annual Funding

Item	Amount (million)
Total Funding from Table of Items	$83.85

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Present Value of 2016 - 2025 Future Estimated Funding Need
Additional Estimated Funding need above SUFC related to Estimated Urbanization Increase	$1.67	$1.71	$1.74	$1.77	$1.81	$1.85	$1.88	$1.92	$1.96	$2.00	$15.54
Annual Funding Need	$85.52	$87.23	$88.97	$90.74	$92.55	$94.39	$96.28	$98.20	$100.15	$102.15	

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Funding Needs References

1. U.S. Urban Forest Statistics, Presentation to the 2014 Partners in Community Forestry Conference, Charlotte, NC, David Nowak.
2. Nowak and Walton. Projected Urban Growth and Its Estimated Impact on the U.S. Forest Resource.
3. CARS data 2005 – 2014, See Table 1, in Appendix.
4. This estimate relies on a change of one variable, i.e. urbanized area. Our judgment is that this is a factor and a variable that impacts the discussion of urban forestry at all levels. We acknowledge that the rate of urbanization may change when viewing locally; however, we believe that given the granularity of census data, organizations of a local nature may be able to understand and employ the method for planning discussion purposes. This estimate does not include other future factors which may have an effect on program delivery, such as, inter alia, technological efficiencies, economies of scale in program delivery, dissemination of information, efficiencies from increases in standards or level or professionalism, availability of funding, rate of program funding, or rate of program adoption.