

Resilient Urban Forests: How the U.S. Forest Service Can Engage Urban America

Part One



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About this Report

Responding to the U.S. Forest Service’s stated goal of engaging urban America (*USDA Forest Service Strategic Plan FY 2007–2012*), the Urban and Community Forestry program asked the Center for Resilient Cities to “take the pulse” of internal and external partners on a wide range of issues, especially the agency’s leadership role relative to climate change. This report is a result of that 2007–2008 independent analysis.

The recommendations herein were informed by input from more than 75 written surveys, personal interviews, and focus group participants; the analysis of 22 potential model urban forestry climate protection projects; learning drawn from five national and regional conferences; a comprehensive review of resilience and urban forestry literature; *Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments* (see the complete Bibliography in Part Two),¹ and the applied resilience planning expertise of the Center for Resilient Cities. The Center collected and evaluated the input of current and potential program partners, examined the program’s existing state and trajectory, considered its ability to influence and deflect stressors on the urban forest system, and reviewed the Forest Service’s capacity for change. Throughout the process, Resilience Inquiry methods served as the underpinning for evaluating challenges and opportunities.

In two parts, this document describes a path for engaging urban America and articulates future focus areas for urban forestry. Part One is a stand-alone piece that includes the findings, conclusions, implications, and recommendations for action. For those desiring additional information, Part Two provides the details of the study, including who and how many said what and why. This background information is available upon request from the Center for Resilient Cities.

By offering this report we hope to challenge assumptions regarding the Forest Service’s existing function and structure; shed new light on the urban forest system—its role, linkages, and drivers; foster more resilient urban forests across America; and recommend specific actions to facilitate the coming together of a more resilient Urban and Community Forestry Network serving our nation’s urban forest resource.

¹ Center for Science in the Earth System (The Climate Impacts Group), Joint Institute for the Study of the Atmosphere and Ocean, University of Washington, King County, Washington in association with ICLEI – Local Governments for Sustainability. *Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments*. September 2007.



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Resilient Urban Forests: How the U.S. Forest Service Can Engage Urban America

Part One

The best way to predict your future is to create it.
-Abraham Lincoln

Introduction

Not since the birth of the environmental movement marked by Rachel Carson's penning of *The Silent Spring* 45 years ago have such powerful and creative forces been at hand. Increases in the earth's average temperature of near-surface air and oceans since the mid-20th century, and its projected continuation, have prompted action and innovation around the world. The U.S. Forest Service, through its Urban and Community Forestry program, has the potential to seize a once-in-a-generation opportunity to adapt to forces and shape strategies that will help safeguard the future of this country. Inaction will have serious consequences. What forces are driving this generational opportunity?

Demographics

According to *USA Today*, the United States is the fastest growing industrialized country in the world. The U.S. population now exceeds 300 million; growth of another 100 million people is expected by 2040. In addition, the United Nations predicts



a global increase from 2.9 billion urban residents to 5 billion by 2030. Shifting populations place ever-increasing pressure on our nation's urban and urbanizing forests.

Further, more than 50% of the nation's population now lives within 50 miles of a major coast (Atlantic, Pacific, Gulf, or Great Lakes). Twenty of the world's largest

cities are located along America's coasts. With so many of our nation's major cities on coasts, the effects of climate change, like rising sea levels, may lead to much larger areas of destruction and displacement, dwarfing those caused by hurricanes Katrina and Rita.

Urban Dynamics

Cities by their very nature are

What Is Resilience Inquiry?

Resilience, under the term's current usage, is the capacity or ability of a system to avoid, adapt to, or recover from shock or change. Emerging best practices in resilience theory include *inquiry processes* designed to identify the *essential features* of a system to be made resilient. Knowledge of a system's essential features informs more focused adaptation strategies. Resilience Inquiry is a process through which humans anticipate change and plan

for the future. Through planning, we can increase capacity for learning and adaptation and prepare social-ecological systems like America's urban forest to absorb disturbance while still retaining the essence of the urban forest's function and ecosystem services. Resilience Inquiry is about seeing the systems, linkages, thresholds, and cycles occurring simultaneously in the world, and recognizing the things that drive them.²



complex and dynamic social-ecological systems. Urban landscapes are comprised of a mosaic of land uses and land cover. Successful cities, either intentionally or by chance, balance ecosystem and human functions. In this balance, the urban forest is the dominant land-based natural resource providing a wide range of social, economic, and ecosystem services. More and more, elected officials, urban planners, city managers, and residents value the urban forest as green infrastructure. Investments in networks of urban plazas, streetscapes, green roofs, and parks increase walkability, and bikeability while improving air, water, and soil quality. Communities

strategically incorporating and sufficiently managing green infrastructure networks attract corporations and a creative work force and have a competitive advantage in today's shifting and uncertain economies. For America's communities, a life-supporting forest is a necessary ingredient in the land use mix if a positive and sustainable urban future is to be realized.

Climate

An overwhelming body of peer-reviewed research indicates forests play an important role in reducing carbon dioxide in our atmosphere and slowing the buildup of greenhouse gasses. During its

lifetime, a tree absorbs carbon and converts it into roots, limbs, leaves, and wood.⁶ Trees provide shade; by transpiring water, they reduce surrounding temperatures and decrease energy consumption at power plants. Tree planting in cities will lower energy use and reduce emissions. Trees release water vapor creating the clouds that shield the planet from the sun's rays and cool the earth's surface.⁷ To achieve lasting results, a population of trees must remain stable over time. As trees are removed, new trees must be put in their place. Sequestration benefits are optimized when canopy cover remains largely intact through a diverse mix of species and ages.

Although predictions surrounding climate change can be confusing, global warming is an issue of growing concern for laymen, foresters, and allied professionals. Many members of Congress expect climate and health care to be the all-encompassing issues under the next administration. Climate models predict dramatic and varied change to our environment. There is consensus among scientists that, during the 100 years ending in 2005, the earth's temperature increased a full degree.⁸ More warming is imminent because of atmospheric carbon and other greenhouse gas emissions. What is not known, however, is the rate of

What Is an Urban Forest?

Urban forestry is defined as "the comprehensive management of trees, forests, and related natural resources in populated areas."³ When caring for the urban forest, the integration of natural, social, and economic systems as they affect and are affected by humans is of primary concern. As a result, the urban forest can be classified as a complex social-ecological system—a natural system whose creation and management is dominated by human activity.⁴

The Forest Service has calculated that "urban" counties comprise nearly 25% of the land area in the United States and 4.4% of the total land area in the contiguous 48 states is considered "urban." Canopy cover in these populated areas is approximately 27%; nationally, canopy cover is estimated at 33% for all lands. The urban landscape is increasing. By 2050, it is projected that at least 14% of America's land will be classified as "urban."⁵

change (how quickly the planet will warm and ice caps melt) or the degree of change (how warm the planet will ultimately become).

What is certain is that it will become more difficult for resource managers to sustain America's forests as they are today. Urban forests will suffer from increases in temperatures, increases or decreases in water, more severe storms, fires of greater frequency and intensity, a greater influx of damaging exotic and invasive species, and canopy loss due to migrating and expanding populations.

Simultaneously, the ecosystem services of urban forests will be in greater demand. The urban forest is simple climate protection technology. It does not require a huge investment in alternative energy sources. Planting a tree is something nearly everyone can do. Important climate protection services include moderating high temperatures through shading and evapotranspiration (with corresponding benefits in reducing energy demands), enhancing local wind patterns, mitigating local precipitation anomalies, managing storm water through absorption and the delay of peak flows, improving water quality, and sequestering carbon and other pollutants from the air. These services will be critical in protecting public health as urban centers, typically four degrees hotter than surrounding landscapes, are predicted to experience dramatic temperature change. For example, a 70% increase in the annual number of heat wave days for the Midwestern region is expected by the late 21st century. Moreover, extreme heat days will be hotter on average than at present.⁹ Catastrophic loss of life reminiscent of the 35,000 people who died

during the summer 2003 European heat wave is a distinct possibility.

Surprisingly, climate change may also create unprecedented opportunities. For example, new monies may be available for the U.S. Forest Service's Urban and Community Forestry program as markets for carbon cap and trade transform under the next administration from the currently unregulated \$50 million industry to a federally regulated \$30 trillion industry.

It is important to note that the U.S. Forest Service, like other federal agencies, is in the early stages of preparing for and adapting to threats posed by climate disruption. (See Appendix A for a sampling of Forest Service climate protection activities.) However, evidence that climate preparedness is not a priority throughout the system is provided by the comments of state foresters. Only 13 of 59 state foresters responded to a questionnaire on climate change and the urban forest. Nearly one-half of the participating state foresters either could not name or said there were no increased threats to the urban forest system should climate changes come to pass. When asked what they could contribute should broad-based, coordinated action be necessary to mitigate the impacts of climate change, those who responded suggested they would offer assistance through "letters of support," grants, and continuing technology transfer.

Not-for-profit partners and potential partners are serving their members by gathering and interpreting climate science, and providing helpful decision-making tools to reduce energy emissions. (Appendix B lists many private sector programs gaining national attention.) In general, thousands of professionals



Savannah:

The APA's "Great Places in America: Great Streets and Neighborhoods, 2007 Designees" claims that Savannah, Georgia's, charm comes from its urban forestation. The group named Savannah's most notable Bull Street a "Great American Street." The dense oak canopy cover above Bull Street leads all the way to Forsyth Park. Taking good urban design a step further, the surrounding streets and building lots are arranged around additional open spaces. The beauty of Savannah's wooded streets dates back to its founding in 1896. Even then, citizens realized their city's beauty lay in its urban forest. From its first days, Savannah's Park and Tree Commission ensured the orderly forestation and beautification of the city. Today, Savannah is working to sustain its "Great Places in America" designation by planting 1,000 trees annually and working to install a number of smartly engineered green roofs.

and laymen have been informed and inspired to act in sustainable ways through the research, education, and advocacy agendas of Forest Service partners and potential partners. Each in their own way are implementing programs designed to: meet the needs of specific target audiences, provide hard data, share effective technologies and applications, recognize and reward innovation, and inspire meaningful and coordinated action.

How can the Forest Service address growing climate concerns and harness the powerful and creative forces spurring action today when the world's climate future is uncertain? How can the agency attract federal investments and provide leadership in the development of the country's comprehensive climate strategy? The key to discovering the appropriate and effective Forest Service role comes from the newly emerging field of Resilience Inquiry.

Resilience Inquiry

Resilience Inquiry is a promising new discipline gaining global

attention. It explores how dynamic and complex social-ecological systems can best avoid, adapt to, or recover from systemic threats and thrive in an environment of uncertainty, change, and surprise. True sustainability lies in enhancing a system's ability to recover from stress, not in preserving a resource over time as something static. Resilience Theory, the underpinning of effective planning and management in the face of uncertainty, is gaining attention because it helps sustain vital ecosystem services as populations, technological demands, and resource requirements grow and change (for more information, see www.resalliance.org). Resilience Inquiry aims to enhance the essential characteristics of a healthy system (www.resilientcities.org).

The capacity to plan and manage for resilience requires: (1) a sustained curiosity and willingness to experiment, succeed, and (sometimes) fail, (2) an ongoing and accurate analysis of the system's current state and trajectory, (3) inquiry into the essential

characteristics of a system, (4) an ability to influence stressors and/or their effects on the system, and (5) a social and ecological capacity for change. The federal government has an important role in creating climate resilient cities because successful outcomes emerge from an accurate analysis of what is happening on a *systems-wide* level, and from ongoing political and financial determination to influence threats and change. Therefore, it is the responsibility of the U.S. Forest Service Urban and Community Forestry Program to provide national leadership—declaring a direction, assessing forest health, cultivating influential relationships, experimenting in the hunt for more robust strategies, and increasing local capacity. Through Resilience Inquiry, the Forest Service can engage urban America in climate protection strategies and purposefully, systematically develop the nation's capacity to sustain, enhance, and expand America's increasingly valuable urban forests. It is the responsibility of the Forest Service to join people to a better ecological future.

² Walker, B., and D. Salt. 2006. *Resilience Thinking: Sustaining Ecosystems and People in a Changing World*. Washington, D.C.: Island Press.

³ "Urban and Community Forestry Program Direction," USDA Forest Service, November 24, 1997. Revised July 8, 1999.

⁴ <http://www.resalliance.org/index.php?id+564&sr=1&type=pop>, Resilience Alliance, accessed March 5, 2007.

⁵ "National Research Plan for Urban Forestry: 2005-2015," National Urban and Community Forestry Advisory Council, February 2007.

⁶ McPherson, E.G., and J.R. Simpson. 1999. *Carbon dioxide reductions through urban forestry: Guidelines for professional and volunteer tree planters*. Gen. Tech. Rep. PSW-GTR-171. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture.

⁷ Brahic, C. 2006. "Location is key for trees to fight global warming," *New Scientist*, December 15, 2006. <http://environment.newscientist.com/channel/earth/dn10811-location-is-key-for-trees-to-fight-global-warming.html>, accessed March 5, 2007.

⁸ *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. "Summary for Policymakers" (PDF). Intergovernmental Panel on Climate Change (2007-02-05). Retrieved February 2, 2007.

⁹ Ebi, K. L., and G.A. Meehl. 2007. *The Heat is On: Climate Change and Heatwaves in the Midwest. Regional Impacts of Climate Change: Four Case Studies in the United States*. Arlington, VA: Pew Center on Global Climate Change.

Lesson One: Expand Alliances and Range of Influence

Increase Information Sharing

Today, the success of our nation's Urban and Community Forestry program depends almost entirely upon the actions of state agencies. State foresters see themselves as continuing to work with the Forest Service in this key partnership role. State and private forestry's impact is limited, however, because state foresters interpret their responsibilities as technical assistance providers mainly to other *foresters or municipal employees*. When asked about engaging the public, foresters typically reference the ways in which citizens inform the design of public-sector programs (by participating on Advisory Councils) rather than the ways in which the public (e.g., homeowners, civic clubs) takes private-sector responsibility for the health of the urban forest. Also, troubling to some members of Congress, the flow of federal funds often stops at the state level; Congress wants evidence that federal funding reaches neighborhoods and makes a tangible difference to people's quality of life.

In contrast, private-sector partners see their role as technical assistance providers to segments of the general public and a wide range of *professionals, decision-makers, and influentials*. Expanding alliances with partners and potential partners at the federal agency level has the potential to increase information sharing capacity, helping the Forest Service's Urban and Community Forestry program expand its range of influence. The Urban and Community Forestry program should work even more closely with an ever-increasing network of non-traditional partners to establish peer-to-peer information distribution networks.

Other federal agencies invite the



Urban and Community Forestry program to collaborate on program development and budget issues as well. The Departments of Energy, Interior, Agriculture, and agencies within the EPA are now in the process of developing their climate programs and encourage the cross-pollination of ideas and joint strategic initiatives. This is also true of the Department of Homeland Security and the Department of Defense. The Federal Highway Administration, with its mandate to provide safe transportation routes and open sightlines, is a key agency for expanded Forest Service collaboration.

The *United Nations Forum on Forests* is leading discussions on reducing carbon emissions and the production of bioenergy. Discussions focus on the national forests of countries around the world with little or no consideration given to international opportunities in urban forestry. There is leadership potential for the Urban and Community Forestry program of the U.S. Forest Service to: (1) facilitate model climate protection programs in U.S. cities, (2) develop urban forest sustainability parameters and protocols for collecting, organizing,

and sharing information so that all countries can engage in unified and meaningful measurement of urban forest impacts, (3) create a venue for information exchange of urban forestry lessons learned around the world, and (4) provide financial aide to international communities in need.

Unfortunately, partners across the board do not know how to collaborate with the agency. In many cases, Forest Service employees report, the administrative structure of the agency actually discourages collaboration. Potential partners suggest that the Urban and Community Forestry program should establish a clear path for pursuing collaborative opportunities. How might the Forest Service begin to expand influential alliances?

Reach Out to Non-Traditional Partners

This assessment uncovered a high degree of readiness among existing and potential partners to engage with the Forest Service, should the agency adopt the role of *catalyst*. Not having to invent something



Sacramento Municipal Utility District (SMUD):

Sacramento California's electric utility company, the Sacramento Municipal Utility District (SMUD), seeks to provide the city with reliable energy. For that reason, their power comes from hydro generation, cogeneration, renewable technologies (e.g., wind, solar, and biomass/landfill gas power), and power purchased on the wholesale market. SMUD has become a nationally recognized leader due to their energy diversification and their commitment to expanding renewable energy resources. But SMUD's innovations don't stop there. The Climate Offsets Program follows guidelines set by the Climate Action Registry and allows citizens to neutralize their carbon emissions by purchasing offsets from organizations and companies that invest in green projects like solar power and reforestation. Community Shade, a mitigation effort against the urban heat-island affect, supplies trees free-of-charge—for planting in public areas (e.g., parks, playgrounds, and schools). SMUD's Shade Tree program joined with the Sacramento Tree Foundation in 1990 to mitigate urban heat islands and is responsible for planting more than 400,000 trees. Along with providing free shade trees to homes with eastern, western or southern exposure, the program supplies planters with advice on tree selection and proper planting techniques. SMUD has gone above and beyond providing power to Sacramento's citizens. www.smud.org

from scratch, the Forest Service can simply bring together the existing energies of partners and potential partners in the service of the urban forest. In so doing, the Forest Service can influence the program decisions and budget allocations of a diverse and far-reaching group of collaborating organizations.

Six types of partners or potential partners were identified through this assessment. First, there are *individuals, corporations, and foundations in the private sector* that seek scientific grounding and new strategies for advancing healthy cities and individual well-being. Second, *professional practitioners* have discovered and are now applying cutting-edge best practices in a number of related fields. Third, *environmentalists and community advocates* are investing in a national movement to change American behavior. They work collaboratively to build momentum and identify ways to inject new energy into their work. A fourth type identified can be characterized as "*new thinkers*"—academics, writers, think-tank specialists, and educators committed to presenting and clarifying new concepts. Fifth, representatives of *tribes and municipal employees* are working to provide hands-on services at the community or neighborhood level; being locally motivated, they seek financial and technical support to improve their community's basic tree care program. The sixth type of partners or potential partners identified are *elected officials*. These Forest Service "clients" are especially aware of the need to initiate their tree programs correctly from the start; once "in the game," cities carry the responsibility of managing forest health for many generations. Collectively or independently, these partners or potential partners would not

necessarily flock to the U.S. Forest Service Urban and Community Forestry program, but they could be drawn into a catalytic effort in which their investment of time and resources could make a difference nationally and locally.

Specifically, partners and potential partners expressed an interest in multi-agency and public-private ventures in research, education, and policy development. Potential partners want to inform Forest Service research and advise the agency on packaging the information for the most impact. Expanding upon the regional and state forestry network, external partners could share responsibility for disseminating information to their members. Opportunities for collaboration exist in the areas of messaging and public outreach, urban forestry, land use planning for climate preparedness, policy development, identification of funding mechanisms, and the implementation of urban forest adaptation projects.

Cultivating key relationships can begin with the selection of the Urban Forestry Climate Steering Team and the recruiting of speakers and panelists at the Climate Summits for Engaging Urban America (see Conclusion and Next Steps). To inform more resilient urban forests and engage non-traditional partners, the Summits should include leadership from the following capitals:

- **Nature** - Technical experts with scientific knowledge regarding the role of the urban forest in climate mitigation and adaptation.
- **Built** - Planners, landscape architects, architects, and engineers, who can (1) forecast urban infrastructure needs in a changing

environment and (2) define the urban forest's role as cost-effective green infrastructure.

- **Financial** - Economists, policy analysts, and others who can (1) demonstrate the economic and leveraging role of America's urban forests, (2) specify opportunities for entrepreneurialism and green collar jobs, (3) articulate the level of investment necessary to maintain and improve community forests in a changing environment, and (4) develop strategies to diversify funding.
- **Political** - Influentials with the ability to give voice, leverage power, and make connections, thereby positioning America's urban forests as part of the regulation and resource distribution agenda.
- **Social** - Process experts to shape "bonding" (within the urban forestry network) and "bridging" (with those outside the network) strategies, resulting in a shared vision and progressive participation.
- **Human** - Leaders specializing in the science of social behavior (e.g., marketing, education, public health).
- **Cultural** - People with insight into individual and community decision-making or engagement experts from different backgrounds who have diverse ways of "seeing and knowing." Tribal governments are especially interested in exploring the impacts of climate change on culture.

Learn from and Celebrate the Best

Beyond an expansion of partnerships, the Urban and Community Forestry program should identify and promote a select group of "rock stars"—practitioners from the trenches willing to speak candidly about their



experience utilizing the urban forest to create climate resilient cities. Rock stars should demonstrate urban forestry advancements in (1) reducing energy consumption, (2) sequestering carbon, (3) improving public health, and (4) fostering regional economic security. Their climate resilient cities will be recognized for having more canopy cover, species, and engaged institutions; a better and more equitable distribution of ecosystem services; budgeted forestry reserves; proactive policies; and explicit goals to reduce and sequester carbon emissions. Special Forest Service recognition to those achieving a defined ideal would reward desired behavior and provide incentive for others to take action. We recommend that the cities featured in this report be on the "short list" for such recognition. Other candidates may include the forestry initiatives of the Menominee Tribe located north of Green Bay, Wisconsin, and the Nez Perce Tribe—part of the Confederated Tribes of the Colville Reservation in Washington state.

Plan for More Urban Forests

Climate resilient cities and forests are ultimately shaped by commonsense patterns of land use

and infrastructure investments supporting Smart Growth. Because America's urban forests are green infrastructure, a natural part of a sustainable future and an important tool for achieving compact, transit-oriented, walkable, and bicycle-friendly land use, many people believe the Forest Service should play a leadership role in the creation of a National Infrastructure Plan. As infrastructure, the urban forest shapes and informs where growth should go to achieve long-range sustainability. An interconnected system of parks and open spaces is much more beneficial than parks created in isolation.¹⁰ Whenever possible, existing tree canopy and native vegetation should be preserved.¹¹ Putting the urban forest on the table as an essential component of sustainable development is a federal government role. By creating a National Infrastructure Plan, advocates hope to increase green infrastructure investments, promote Smart Growth, identify more stringent regulations, and improve equity as development decisions are made. The Forest Service's Urban and Community Forestry program has a stake in all of these outcomes.

Current Stressor:

By limiting the range of influence to existing state and private forestry networks, the Urban and Community Forestry program misses opportunities to engage urban America and unnecessarily “shrinks” the larger forest ecosystem services message to that of municipal tree care.

Future Stressor:

Today, the Urban Forest alliance network is too small to influence ever-increasing stressors on the forest system. Because the system fails to address all resilience capitals, the Forest Service’s Urban and Community Forestry program has little capacity to change as climate threats intensify.

Recommendations:

1. Form non-traditional alliances representing all resilience capitals (natural, built, financial, political, social, human, and cultural) to reduce climate change vulnerability and risk.
2. Augment technical assistance delivery by working with private-sector partners to establish peer-to-peer information distribution networks.
3. Establish a clear path for outside groups to pursue collaborative opportunities.
4. Play a leadership role in the creation of a National Infrastructure Plan.

5. Create a venue for information exchange of urban forestry lessons learned around the world.
6. Given the global impacts of climate disruption, provide financial aid to climate-vulnerable cities internationally.
7. Identify and promote a select group of “rock stars” (successful practitioners from the trenches) to share their best management practices.
Note: The identification of talented practitioners and model programs should not be limited to the United States.

Resilient Outcome:

Expanding alliances will increase information-sharing capacity. The Forest Service’s ability to adapt to change will grow as human creativity representing all capitals is combined to achieve shared objectives. By strengthening partnerships, the Forest Service’s Urban and Community Forestry program will reduce urban resource vulnerability and risk; this will result in more climate resilient cities.

¹⁰ Lewis, Megan. 2008. From Recreation to Re-creation: New Directions in Parks and Open Space System Planning. PAS Report 551. Chicago, IL: APA Planning Advisory Service.

¹¹ U.S. Green Building Council, Congress for a New Urbanism, and Natural Resources Defense Council. 2007. *LEED for Neighborhood Development Pilot Rating System*. Pp. 66, 78, and 108. <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=148>

Lesson Two: Brand for Climate

For many, the creation of a well-crafted messaging campaign plus the articulation of a national urban forest agenda are thought to be the critical responsibilities—the *meta roles*—of the federal Urban and Community Forestry program.

Assessment participants recommend that urban forest messaging reinforce and clarify the resource’s climate protection role. Most assessment participants supported the notion of branding the urban forest around the climate issue. In contrast, a few participants expressed discomfort with the idea, fearing a climate focus would unnecessarily narrow the urban forest’s message. Those who support climate branding claim a focus on climate does not preclude recognition of the forest’s co-benefits. Supporters see climate as a large enough framework to house the urban forest’s full range of ecosystem services. Further, supporters feel a climate brand would make the urban forest relevant to city populations at a wholly different scale and at this point in time.

As currently framed, the urban forest message is unfocused. When 13 state foresters were asked to name the *overarching cause* that the urban forest addresses—the *single* unacceptable condition the urban forest remedies—16 different answers were given. With few exceptions, efforts by foresters to instill an urban forest appreciation or conservation ethic outside of their agencies are piecemeal and unsuccessful to date. State and local foresters experience sustained frustration regarding their community’s slowness to grasp urban forestry’s costs and benefits. Most mayors reportedly find the urban forest to be a “small idea” not



worthy of more time or investment than current streetscape programs allow. Municipal planners, state foresters claim, frequently lack an understanding of or curiosity about the role of trees in mitigating storm water runoff, reducing temperatures, and providing other environmental services. Dooming the success of urban forest investments as they are made, planners and architects do not consult foresters and often fail to select the correct species or provide adequate space for tree growth for a given location.

An especially challenging issue in the fight to be heard is that of language. The words “urban” and “forest” are thought by most to be an oxymoron. Many assessment participants need help connecting and branding these concepts in ways that complement larger, global efforts to link lifestyle choices and environmental impacts. Language—how we talk about the forest in cities—must be considered to effectively shape messages to people of diverse cultural backgrounds and to those embracing different community priorities. Finally, crafting language for outreach to youth also requires a tailored approach.

Put simply, the urban forest message at the federal, state, or local level is not being heard by the most important target audiences.

Respondents also recognize the need to have the urban forest message meet people where they are today. What, they ask, are the most pressing and universal human concerns? Reportedly, many in the urban forest’s target audiences (e.g., elected officials, city staff, and the public at large) are perceived by assessment participants as having no time or particular passion for trees or forests. The urban forest therefore should be reintroduced as a solution to something these audiences do care about: climate change. In the experience of many interviewed, messages and programs already framed within the goals of climate protection are well received. The “climate resilient cities through urban forestry” message should drive home how daily decisions make a difference—on a practical level—to a sustainable future.

In fact, it is thought that the “nature in cities” niche has enormous untapped potential and relevance to



Denver:

Seeking to create a sustainable Denver, Mayor John W. Hickenlooper gave birth to an ambitious aforestation project: Green Print Denver. The goal of the program is to plant one million trees by 2025; 50,000 more trees each year than what was previously planted. Experts predict that—once mature—the million trees will sequester about 120,000 tons of carbon each year. But carbon sequestration is only part of Mayor Hickenlooper’s goal; ultimately, he wants Denver’s residents to understand the importance of planting trees in an urban environment. Surprisingly, some not-for-profits and communities surrounding the city limits have been slow to respond. In contrast, residents have embraced Green Print Denver as a positive step toward a sustainable future. www.greenprintdenver.org

America’s future as the *human forest: by people, for people*. Because of this, participants challenge the Urban and Community Forestry program to brand the resource and frame the issues as part of transforming the program. The urban forest brand should be invitational, they advise, creating a large enough umbrella to include the actions of elected officials, corporations, not-for-profits, philanthropic foundations, planners, landscape architects, homeowners, youth, civil rights groups, and other key constituents.

Sustained repetition of a singular message by scores of partners is thought to be *the route* to engaging the national consciousness and—ultimately—changing behavior. A branding campaign is a prerequisite to engaging urban America. Many partners expressed eagerness to adopt and help spread a well-crafted national urban forestry message; savvy partners value consistent messaging as a tool for advancing allied missions. A sustained national messaging campaign organized by the Forest Service’s Urban and Community Forestry program and implemented through a collaborative public-private effort will place the urban forest’s role in achieving a resilient and sustainable future front-and-center in America’s consciousness.

A compelling urban forestry message, one with the potential to galvanize support for America’s Resilient Urban Forest Action Agenda (see Lesson Three), could go so far as to usher in a new *urban environmental ethic* for the 21st century. An urban environmental ethic can extend naturally from the land ethic of Aldo Leopold as articulated in his seminal book: *A Sand County Almanac* (1949). An urban ethic for today’s generation can be further supported by the national

celebration of Earth Day, a vision of Senator Gaylord Nelson established more than 35 years ago.

Related to branding, assessment participants expressed concern that today’s Urban and Community Forestry program falls short of “packaging” urban forestry best management practices for easy adoption by the full range of end-users. Information tends to be framed for and distributed to foresters, arborists, and tree groups. In addition, the Urban and Community Forestry program as it functions today works through state and private forestry to deliver information and technical assistance; the success of our nation’s Urban and Community Forestry program depends almost entirely upon the communication skills and interests of state agency employees. As an alternative, technical toolkits developed at the national level in collaboration with partners and potential partners can be tailored for use by different audiences. For example, assessment participants encouraged the agency to join with the private sector to publish a *Mayors’ Guide to Reinvigorating the Forest*. Working with not-for-profit groups possessing an inside track on their members’ needs, the Urban and Community Forestry program can produce tailored materials for county executives, planners, public works professionals, architects, landscape architects, homeowners, and activists, to name a few.

Collectively, mayors can be an especially important partner when branding the urban forest. According to the U.S. Conference of Mayors, the public has an increasingly localized view of the world and is becoming more comfortable with local governments taking initiative. As is evidenced by the case studies of cities

featured in this document, mayors play a critical role in the success of the country's most ambitious tree planting programs. The leadership

and advocacy of mayors has the potential to mobilize urban America at the local level. Further, mayors can drive the application of urban forest

ecosystem services in the making of climate resilient cities.

Current Stressor:

Because the urban forest role and brand are unclear, state foresters report frustration around educating state and local officials about the importance of community forests. Foresters find efforts to convey the growing-over-time financial value of the urban forest's ecosystem services especially difficult. Urban forestry budgets suffer and capacity shrinks because the somewhat counterintuitive return on investment is not understood or is simply not believed.

Future Stressor:

Without a clear urban forest brand and compelling urban environmental ethic, regional coordinators and others have the sense that the urban forest is being left behind as protocols are established for implementing, monitoring, and verifying climate protection goals. Urban Forest leadership may move to the Department of Energy or the Environmental Protection Agency, an action resulting in significant lost opportunity costs. The urban forest's adaptive cycle may collapse as political influence and financial investments in the urban forest continue to lessen. Climate disturbance will amplify as better understood but more expensive climate protection strategies take precedence and simple tree technologies go unrealized.

Recommendations:

1. Articulate a new urban environmental ethic and brand the human forest: by people, for people.

2. In concert with the efforts of partners and potential partners to engage urban America, launch and sustain a national urban forestry messaging campaign. Of special importance, the campaign should resonate with minority populations and youth.
3. Encourage allied agencies and partners to adopt and help spread the carefully crafted umbrella message as their own.
4. Meet people where they are today. Frame the urban forest as a solution to something they care about: climate change.
5. Collaborate with partners to package urban forestry best management practices and policies for easy adoption by a diversity of end-users. Tailor the language and content of the urban forest message to the specific needs of target audiences.

Resilient Outcome:

A resilient urban forest system will possess desirable *emergent* qualities. Patterns arise out of a multiplicity of relatively simple interactions through a cooperation of things of an unlike kind. A national urban forestry messaging campaign, implemented by a diverse group of allied partners, will cause a "tipping point" in behavior change. Increased public awareness of climate change will spur participation in implementing America's Resilient Urban Forest Action Agenda (see Lesson Three) and decrease vulnerability and risk to threats.

Lesson Three: Articulate a National Urban Forestry Agenda



Shift Attitudes

As the center of forest and tree management knowledge, the Forest Service is arguably the agency best suited for urban natural resource management. A linear, hierarchical structure of forest managers is already in place blanketing much of the country's federal, regional, state, and local decision-making. While the structure has the potential to be a seamless network, many in the system are operating independently today, taking responsibility for a relatively narrow band of tree management activity. Technical skills and contextual frameworks for decision-making vary in sophistication, especially at the local level. In many ways, the narrow educational context in the training of foresters is part of the problem; expertise in tree care is only one skill set required to sustain a healthy urban forest. But, foresters and their web of partners and citizen advisors *have the potential* to expand, adapt to new threats, and join with other professional and indigenous experts to capitalize upon today's urban forest opportunities. Forest preservation, planning, restoration,

and management requirements in an era of uncertainty and potentially catastrophic change necessitate that foresters work side by side with elected officials, real estate professionals, planners, landscape architects, engineers, economists, policy analysts, community organizers, and human behavior experts, among others. A robust and powerful network can be mobilized by a resounding and clearly articulated call to action.

Limit Geographic Focus

Within the U.S. Department of Agriculture, Urban and Community Forestry is dedicated to improving the condition and extent of trees and forests in cities, suburbs, and towns nationwide. The program's express purpose is to "provide technical, financial, educational, and research services to communities so they can plant, protect, and maintain their community trees and forests, and use the wood from these trees, to maximize environmental, economic, and social benefits."¹²

Reportedly, state foresters responsible for implementing much of the federal program do

not have the capacity to provide technical, financial, educational, and research assistance to every small and geographically dispersed city, suburb, and town in their states. A systematic education and outreach program wrestling with the complexities of climate science for the purpose of cultivating a social and ecological capacity for change could not be delivered to every U.S. community. Because large cities often have forestry staff and budgets, attempts to service the needs of small communities compromise service delivery to larger cities where most people live and where the costs of inaction are arguably the most environmentally, socially, and economically severe.

Consequently, as an early step in agency transformation, the Urban and Community Forestry Program should—as a community—explore narrowing its geographic focus and stopping the proactive delivery of technical, financial, educational, and research services to small communities. The program should be re-titled: Urban (not "Community") Forestry. In an effort to serve the greatest number of people with what will always be limited federal investments, foresters across the country should—through facilitated discussion—take an honest look at what can and should be accomplished given the looming climate crises. Upon reflection, foresters may elect to focus federal assistance on meeting the dynamic green infrastructure needs of America's largest cities—the 262 incorporated areas in the United States and Puerto Rico with populations greater than 100,000. Alternatively, foresters may elect to focus services on America's fastest growing mega-regions so as to optimize urban forest planning with broader investments in transportation

infrastructure and food security systems. (Note: it may be advisable for other branches of the U.S. Forest Service to address the needs of smaller, more rural communities).

Urban forestry in larger cities or fast growing regions—especially those landscapes recovering from post-industrial land uses or the outward migration of populations—is an art and science unto itself. Narrowing the focus of urban forestry service delivery would enable the Forest Service, and public and private-sector partners helping implement federal goals and objectives, to tailor efforts to the unique challenges and opportunities of dynamic urban centers. Effective urban forest strategies should be pioneered and modeled in these areas, and lessons learned in larger communities could be adapted in time to meet the needs of smaller communities. Knowing that the Forest Service cannot be all things to all people, a realignment of resources toward more densely populated areas will make credible the Forest Service’s commitment to engaging urban America.

Alternatively—but a decision with considerably less impact—the Urban and Community Forestry program could hire dedicated staff to focus solely upon needs and opportunities in America’s 20 largest cities.

Employ the Urban Forest to Make Climate Resilient Cities

Assessment participants report a readiness among citizens to adopt behaviors that reduce the impacts of climate change. Furthermore, people want our nation to anticipate and prepare for the inevitable changes climate disruption will bring. A transformed Urban and Community Forestry program should create a vision for climate resilient cities by articulating a leadership role for the

urban forest in strategies that reduce threats and lessen risks associated with rising temperatures. Climate change is reportedly the most compelling issue around which to mobilize urban America. But how can today’s federal program provide leadership and fully articulate the urban forest role?

A route for program transformation and public engagement can be navigated by turning to well-traveled guides: standards and innovations in participatory planning, resilience inquiry methods, and climate preparedness processes. Especially informative to this task is the publication *Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments*, by The Climate Impacts Group, King County, Washington, and ICLEI Local Governments for Sustainability. Collectively, these planning resources, standards, and methods inform a sound strategy for moving forward. A detailed, step-wise process for Resilience Inquiry and agency transformation is provided in the Conclusions and Next Steps section of this report.

¹² Email from Keith Cline, Program Manager Urban and Community Forestry Program to Heather Mann, Executive Director, Urban Open Space Foundation, March 16, 2007.



Seattle:

Determined to meet the tough standards laid out by the Kyoto Protocol, Mayor Greg Nickels of Seattle, Washington, launched a bold program for environmental sustainability and livability: planting a tree for every man, woman, and child. ReLeaf, the city’s not-for-profit partner was created to help plant 649,000 trees in the next 30 years (21,633 trees per year). This is a far cry from the 400–500 trees Seattle had been planting annually. Money to fund the maintenance of trees on both public and private property continues to be in short supply. However, the ReLeaf program’s return on investment is clear. The public is increasingly engaged in environmental protection, the city will be cooler under a 30% canopy cover, and—when fully mature—the trees will remove 77,066 tons of carbon from the atmosphere each year. www.seattle.gov/trees

Current Stressor:

While there are many dedicated people working very hard under challenging circumstances in the Urban and Community Forestry Network, they are working in an uncoordinated manner under disparate agendas. Management issues stem from line-staff organization when an officer in the system is not personally engaged with or sympathetic to the urban forest. Hopes for service delivery to cities, suburbs, and towns exceed finite capacities. Gaps in data undermine the ability of urban forest advocates to leverage resources and secure political influence. Attempting to operate beyond capacity generates a culture of efficiency and stifles experimentation and learning.

Future Stressor:

Although urban forestry is not a panacea to global warming, it is one of many actions offering immediate benefits in offsetting and reducing carbon emissions. Foresters need hard data linking climate conditions and the urban forest. They call for evaluation tools, ongoing inventory data, carbon offset research, and model projects demonstrating carbon mitigation and energy reduction. Without federal assistance, our nation's foresters and allied partners will be ill-prepared for climate leadership, cities will not understand the nuanced links between climate disruption and resilient forests, meaningful priority actions will not be identified, and urban America will fail to be engaged.

Recommendations:

1. Focus on urban forestry and limit the proactive delivery of federal technical, financial, educational, and research services to professionally vetted geographic priority areas.
2. Undertake an inventory of the urban forest resource in the newly defined geographic priority areas to document the state of the urban forest and how it is affected by development, invasive species, growth, and canopy decline.
3. Create a vision for climate resilient cities among foresters, partners, allied professionals, and the public. Use data from ULTRA and LTER sites (see Appendix A) to help inform policy makers on the latest scientific information on climate change, and other sets of information now available to the scientific community.

4. Issue from the U.S. Forest Service Chief's office a public statement on how the forest canopy combats and buffers climate change impacts. The statement should briefly detail the threats posed to various regions of the country and announce a strategy for creating *America's Resilient Urban Forest Action Agenda* (see Conclusion and Next Steps).
5. Under the guidance of a diverse and savvy Urban Forestry Climate Steering Team, host a series of national and regional *Climate Summits for Engaging Urban America* (see Conclusion and Next Steps). These Summits will secure broad consensus around new program directions for the U.S. Forest Service's Urban and Community Forestry program. Augment transparent and participatory decision-making with written publications, webinars, and other Internet communications.
6. Demonstrate the urban forest's offset potential in the reduction of energy consumption and the sinking of atmospheric carbon to increase protocol implementation flexibility and lower compliance costs. Specifically, researchers should make the case for:
 - a. Urban forest conservation and restoration as an eligible source of climate protection funds when subsidies are made available, and
 - b. Urban forest restoration as an accepted offset mechanism.
7. To help cities evaluate their strengths and weaknesses, and to identify strategies for improved resilience, the Urban and Community Forestry program should create a Resilient Urban Forest (Self) Assessment.

Resilient Outcome:

Climate Summits for Engaging Urban America will develop a broad-based shared understanding of the changes climate disruption poses to urban centers and will increase the technical capacity of resource managers and urban forest advocates to adapt. Participants will become climate protection leaders in America's population centers, transforming the role of the urban forest in achieving positive and sustainable urban futures.

Lesson Four: Solve the Money Riddle

The federal Urban and Community Forestry program should help cities and states find more non-federal resources to make large urban forest investments. Cost-benefit analysis models should employ full-cost accounting and consider environmental, economic, and social impacts of urban forestry investments. The Urban and Community Forestry program should investigate, test, package, and educate communities about various urban forestry funding mechanisms (e.g., ballot initiatives, special taxing districts). The Forest Service should identify the full range of market-based funding strategies and help cities make certain the urban forest is represented in development transactions. Some communities generate revenue by integrating



urban forest requirements into broader development and economic development decisions; the Forest Service should make those strategies

more widely known. Sharing strategies and success stories, and real-life examples of financing options, will facilitate local action.

Current Stressor:

Too often, assessment participants claim, local costs associated with tree preservation, maintenance, or replanting are shouldered by developers or state Departments of Transportation. Without regulation, developers often appear unmotivated or even “tone deaf” to urban forest opportunities. Urban forest preservation or enhancement is not typically a state Department of Transportation charge. America’s cities need a suite of options for funding and protecting the urban forest.

Future Stressors:

As the ecosystem service needs of green infrastructure networks increase, urban forestry costs will grow. Without an increase in capacity, urban forests will become less robust as climate disruption is realized.

Recommendation:

Bring the full resource base of the U.S. Forest Service to answer the question plaguing cities: what are the ways in which urban forestry conservation, restoration, and stewardship can be funded?

Resilient Outcomes:

Identifying methods for funding resilient urban forests will expand the forest resource in America’s cities, helping them adapt, and increasing the climate-protection ecosystem services they provide.



Boston:

“What is good for the environment is good for a city and its citizens,” claims Boston, Massachusetts’ mayor Thomas Menino—the visionary leader behind “Growing Boston Greener.” Under this program, Boston aims to plant 100,000 trees by 2020, ultimately expanding the existing canopy cover from 20% to 35% by 2030. A strong sense of environmental justice is inspiring action. Many of Boston’s neighborhoods are underserved possessing a mere 12% canopy cover. Impressively, Mayor Merino has tripled Boston’s tree planting budget. However, these public-sector investments have yet to be fully leveraged, as residents in underserved neighborhoods are slow to plant trees in their own yards. Program coordinators believe the Growing Boston Greener initiative has increased Boston’s tree planting efforts ten-fold, but this cannot be confirmed due to a lack of information describing actions on private property. <http://www.growbostongreener.org/>

Lesson Five: Fund It, or Forget It

Today, there is widespread agreement among urban foresters, partners, and potential partners that the purpose, need, and potential of the Urban and Community Forestry program is not understood, appreciated, or adequately funded within the larger U.S. Forest Service. Assessment participants claim the Forest Service budget—a budget dominated by the care of 156 national forests—must be radically amended if the Forest Service is to meet today’s urban forest demands and protect America from the catastrophic effects of climate change. Current efforts at technology transfer that are dependent upon the states to implement, offer a piecemeal approach to funding discrete projects; collectively, they are not having the necessary impact. Local, state, and—especially—federal funding is below the threshold where the Urban and Community Forestry program can make a difference. Federal investments will not be of much assistance until funding is significantly increased. State and Private Forestry should be given a larger budgetary footprint in the agency and urban forestry should comprise a larger portion of the State and Private Forestry budget.

State and local foresters have nearly lost hope and express desperation and pessimism about the urban forest’s future. Doing the best they can with what they currently have, urban foresters ask for federal leadership and direction—especially in the arena of climate mitigation and adaptation. There is a sense that, if urban forestry is not a significant part of the national agenda, it is not and will not be a significant part of the state or local agenda. Yet, partners know that continued underinvestment in

America’s urban forests threatens our national security, the public’s health, the quality and safety of our infrastructure, and a sustainable economic future.

To accomplish what must be done, federal staff and partner organizations estimate annual funding for an effective urban forestry program should immediately increase ten-fold to a minimum of \$300 million annually; further, in the near term, as the complexities of climate science are sorted out and a comprehensive climate strategy emerges, funding should grow to at least \$500 million annually. Only then, assessment participants claim, will the Forest Service fulfill its emerging responsibility of helping to make cities more habitable by optimizing the forest resource as part of the climate solution.

There is a price for inaction on the part of the U.S. Forest Service. Specifically, members of Congress today are entertaining a substantial shift in funds away from the Forest Service and toward other federal agencies perceived as bringing innovation to the challenges at hand. For example, many feel the Department of Energy or the Environmental Protection Agency are better suited to manage the urban forest because these agencies possess a melting pot of professional skills, making them better equipped to address the needs of cities.

A major shift or reprioritization of Forest Service programs is not unprecedented. Historically, the Forest Service has adapted to changing U.S. priorities. For example, the agency has shifted from a focus on timber harvesting to ecosystem management. Other

examples include evolutions away from fiber production toward recreation, and—most recently—a

change in resource distribution from state formulas to competitive awards.

Current Stressor:

There is too much program efficiency and not enough program effectiveness. America’s urban forestry programs at every level have been chronically underfunded. In a seemingly endless cycle, shrinking urban forest investments spiral into shrinking ecosystem service returns. Today, the program is so lean that actual ecosystem services are minimal and the perceived relevance of the resource to America’s future is negligible.

Future Stressors:

Resilience theory identifies a “release phase” in the cycle of systems, and the Urban and Community Forestry program is fast approaching release. A loss of all federal funding for the Urban and Community Forestry program as threatened will produce significant losses in all capitals. Lost opportunity costs include:

- Human Capital - in both the public and private sector, people that specialize in urban forest restoration and management will be displaced from their positions.
- Social Capital - the urban forestry national network of resource managers, citizen advisors, and partner organizations, will—perhaps irreversibly—be dismantled at a time when services are needed most.
- Cultural Capital - deep learning and ways of seeing the urban forest by people of different cultures are at risk of being lost.
- Political Capital - political gains made through urban forest advocacy and education at the local and state level may be undone as people and relationships of influence disperse.
- Financial Capital - opportunities for green collar jobs and environmental entrepreneurialism will be diminished.
- Built Capital - community dependence on more costly “gray” infrastructure will increase as cost-effective urban forest alternatives go unrealized.
- Natural Capital - the quality of the urban forest resource will further diminish as necessary investments for maintaining and improving urban forests are postponed. Further, the environmental impacts of climate disruption will be amplified by an absence of the urban forest.

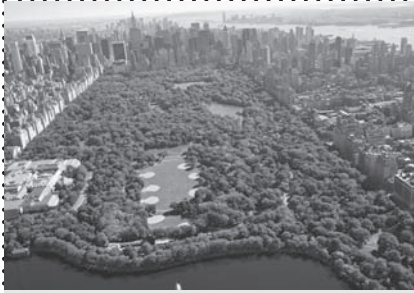
Note: resilience theory tells us that the time of greatest potential for either destructive or creative change appears as a system approaches the release/reorganization phase.

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Los Angeles:

On the first day Mayor Antonio Villaraigosa of Los Angeles was sworn into office, he announced a plan to reduce carbon emissions that would achieve standards outlined in the Kyoto Protocol. Los Angeles, he forecasted, would become the “greenest and cleanest” big city in the nation. To help achieve that vision, the city’s not-for-profit partner—Million Trees LA—joined forces to plant a million trees, increasing the city’s planting rate eight- to ten-fold. Current canopy cover in the city is 21%. Given the density of Los Angeles, researchers at the U.S. Forest Service, city planners, and staff at Million Trees LA have struggled to identify enough sites for planting the trees. LA is conducting tree canopy analysis to locate where to focus planting efforts. Costs are high because a lot of concrete must be removed to get to the soil that lies beneath the city. Less concrete and more trees will, however, reduce the urban heat island effect, potentially lowering energy demands. Finally, unfamiliar with the natural lifespan of trees, LA residents sometimes object to the removal of unhealthy or structurally unsound trees. www.milliontreesla.org



New York:

MillionTreesNYC—a strategic initiative to pepper one million trees through all five New York City boroughs—is one of many components of Mayor Bloomberg’s sustainability plan: PlaNYC 2030. With the planting of one million trees, New York City’s urban forest will increase 20%. Bloomberg predicts neighborhoods will be revitalized, streets will be cooled, and harmful pollutants that cause respiratory problems will be removed from the air. The trees planted through MillionTreesNYC will not only ensure the health of New York City’s growing population, but will also beautify the city. As they seek to recruit large numbers of qualified professionals to accomplish the city’s ambitious goal, project leaders are challenged by what appears to be a shortage of urban foresters. www.milliontreesnyc.org



Recommendations:

1. Do not continue to fund the Urban and Community Forestry program at its current funding level. The U.S. Forest Service and allied partners should advocate to Congress \$300 million in immediate funding for a transformed Urban and Community Forestry program.
2. Aggressively transform the Urban and Community Forestry program, breaking the cycle of shrinking investments and diminishing ecosystem service returns.
3. If Congress does not increase or elects to “zero out” Urban and Community Forestry funding, significant investments in tree planting and urban forest management should be made—without interruption—to another federal agency so as to minimize the loss of capitals across the nation.

Resilient Outcome:

Increased funding, and the transformation of the Urban and Community Forestry program’s function and structure, will bring the full measure of the U.S. Forest Service to the job of engaging urban America, thereby creating more resilient forests and sustainable urban futures.

Conclusion and Next Steps

Today's Urban and Community Forestry program is in a weak position because of a lack of commitment, leadership, and money from the larger U.S. Forest Service system. These disadvantages seriously handicap outreach to and coordination of non-governmental organization activities. Historical weaknesses can be transformed by realigning a greater portion of Forest Service talents and resources toward the goal of engaging urban America in climate protection. The Forest Service—through a transformed Urban and Community Forestry program—can be the federal agency best prepared and most skilled to:

1. Set geographic priorities.
2. Declare a climate focus.
3. Monitor the nation's urban forest resource.
4. Shape an urban forest vision for climate resilient cities.
5. Strengthen and enhance partnerships to reduce climate change vulnerability and risk.
6. Create—through a participatory process—America's Resilient Urban Forest Action Agenda.
7. Coordinate and monitor the Agenda's impacts.
8. Brand the urban forest resource as central to a 21st century urban environmental ethic.
9. Articulate the many ways in which cities can fund resilient urban forests.
10. Plan for the urban forest in cities through a National Infrastructure Plan.
11. Facilitate learning in and from cities around the world.

To begin, the Urban Forestry network of public and private sector partners and potential partners should be forward-thinking and avoid historical fears. Agency leaders and a diverse group of partners are invited to engage in a process of sustained and open inquiry. Foresters themselves are invited to transform their historical role from “consulting forest experts” to “co-creators” of programs and strategies heretofore unknown. Uncertainty, unconventional perspectives, and novelty should characterize the process. Everyone is encouraged to be flexible in their approach, embracing temporary solutions while learning. Participants should not seek to create an idealized past that never existed. Transformation of the Urban and Community Forestry program will require an active stance, not a defensive posture protecting what currently exists.

Forest Service partners report that there is a great need for collaborative learning around the subject of climate change. Today, people are speaking in different languages and from vastly different knowledge bases in the climate discussion. Collaborative climate learning—facilitated through a series of Climate Summits for Engaging Urban America—is necessary for issues to become ripe for resolution.

A step-wise process for Resilience Inquiry and agency transformation is offered as follows:

1. Lock down the climate science. In particular, researchers must provide hard data regarding the urban forest's role in reducing energy demands. Also, while much is known about the carbon sequestration capacity of a single tree, little is understood about



Detroit Edison:

Detroit Edison, the electric utility company serving 2.2 million customers in southeastern Michigan, donated to the Conservation Fund in 2007 \$100,000 for land acquisition and \$80,000 for reforestation of the Shiawassee National Wildlife Refuge near Saginaw. Detroit Edison's generosity stems from its desire to offset carbon dioxide emitted from its power plants. Fifty-three thousand native tree seedlings now taking root will generate carbon emission credits for the utility while at the same time restoring wildlife habitat and enhancing recreational opportunities for the community. In addition, the company secured from the U.S. Fish and Wildlife Service the right to restore additional lands in the refuge; a study funded by Detroit Edison will inform the company on the amount of land it should restore, based upon carbon accrual rates. According to Larry Selzer, president and CEO of The Conservation Fund, “carbon sequestration offers corporate America a new tool for preserving and restoring natural areas.” <http://www.conservationfund.org/node/716>



Chicago:

The Building Green/Green Roof Initiative of Chicago is designed to promote sustainable building practices through innovative policies, technical assistance, and financial support. The voluntary program encourages green roof installations on both new and existing structures to enhance the well-being of occupants and promote construction and maintenance cost efficiencies. The program began with the city installing a green roof on its city hall. According to project leaders, every 10.76 square feet of green roofs remove an estimated .2Kg of airborne particulates each year. In addition to the green roofs project, public schools have partnered with the Chicago Park District and the Public Building Commission since 1996 to create 70 new campus parks around public schools. Lastly, the American Planning Association's "Great Places in America: Great Streets and Neighborhoods, 2007 Designees" recognized Chicago's Michigan Avenue for its use of nature in an urban center. This street is home to small open spaces and parks, locust and pear trees, and seasonal plantings. Most notable of all is the use of mature, stately elm trees to complement the surrounding skyscrapers. <http://egov.cityofchicago.org/Environment>

the sequestration role of the urban forest (including green infrastructure elements like roof gardens). Scientists must articulate the role of the urban forest in carbon sequestration at the level of urban green infrastructure. Furthermore, scientists must be prepared to articulate the advantages and disadvantages of tree canopy cover as demands for solar power increase.

2. Simultaneously, the U.S. Forest Service should provide a clear directive from the Forest Service Leadership Team to agency staff to optimize the urban forest in making climate resilient cities. Urban and Community Forestry program leaders should begin formal and frequent communications with the newly formed Climate Council—a committee of select Forest Service staff from the Washington Office charged with monitoring and assessing the agency's response to climate change.
3. The U.S. Forest Service should notify internal and external audiences of the agency's renewed commitment to optimizing the urban forest in making climate resilient cities by selecting an effective spokesperson, anticipating questions and concerns, and distributing an announcement of next steps.
4. The Urban and Community Forestry program should appoint a multidisciplinary Urban Forestry Climate Steering Team comprised of people from inside and outside the Forest Service ranks to guide a transparent and inclusive decision-making process. The Steering Team should include non-traditional partners: influential and highly interested individuals, professional practitioners, leaders of a national movement to change American behavior, "new thinkers," tribal representatives, and elected officials. In addition, Steering Team members should represent all capitals of climate resilient cities (e.g., natural, built, financial, political, social, human, and cultural).
5. The Urban Forestry Climate Steering Team should select Resource and Agency Planning Focus Areas—discrete centers of concern within the field of urban forestry around which strategic analysis, decision-making and resource planning can occur.
 - a. **Resource Focus Areas** include those defining *management challenges and opportunities* (e.g., funding, land use planning/ environmental equity, flooding/ drought, urban heat islands, recreational use, exotic and invasive species, fire, culture, and forest health). Resource Focus Areas also define *ecosystem service challenges and opportunities* (e.g., the urban forest's contribution to energy conservation, public health—including increased socialization, well-being, and active living, recreation, transportation, community economic development, water quality, storm water management, and public safety).
 - b. **Agency Focus Areas** include the areas of *geographic focus, research, technical assistance, financial assistance, and public education and engagement*.
6. Over the course of a year at a series of national and regional *Climate Summits for Engaging Urban America* hosted by the Urban Forestry Climate Steering Team, Summit participants should

review the most current climate science and change models, asking:

- a. For better or worse, how will the climate patterns shift in each of the Forest Service’s 10 regions?
- b. What climate threats are of particular concern to the largest or fastest growing population centers?
- c. How will shifts in climate patterns affect Resource or Agency Focus Areas?
- d. What stressors or threats to Focus Areas are of most concern?
- e. What opportunities for increasing resource and programmatic resilience are most attractive?

Note: to minimize costs and maximize participation, the one-day Summits can dovetail with previously scheduled national and regional meetings.

7. As part of the Summit activities, the Urban and Community Forestry program should engage the services of a professional marketing company to explore with Summit participants the *human forest: by people, for people* message and develop an urban forest brand. The initiative should articulate a new urban environmental ethic for the 21st century and detail a marketing plan to introduce the brand and engage target audiences in realizing the new ethic.
8. With an eye toward minimizing disruptions and costs, Summit participants should evaluate each Focus Area’s capacity to adapt to or accommodate change. The Urban Forestry Climate Steering Team should engage leading practitioners from the trenches in Summit discussions as capacity is evaluated.

- a. Can animal or plant communities relocate or modify behavior?
 - b. Are there barriers to adaptation (e.g., perverse policies, conflicting resource or agency demands, cumbersome management and decision-making layers, physical or environmental limitations, or preexisting stressors such as Emerald Ash Borer, fire hazards, or budget shortfalls)?
 - c. Can systems within the Resource or Agency Focus Areas adjust at the rate of climate change?
 - d. Are there complementary efforts to reduce stressors in Resource or Agency Focus Areas?
9. Summit participants should prioritize Resource and Agency Focus Areas of concern by identifying systems characterized by:
- a. High risk of harm and low capacity to adapt.
 - b. High risk of harm and moderate capacity to adapt.
 - c. Moderate risk of harm and low capacity to adapt.
10. The Urban Forestry Climate Steering Team should continue to employ a participatory, transparent decision-making process as Summit participants set specific goals and objectives to build resilience in Resource and Agency Focus Areas.
- a. Look to strengthen all of the qualities or capitals of resilient systems. Resilience capitals include human, social, cultural, political, financial, built, and natural.
 - b. Include measurable objectives: who will do what by when?
 - c. Create an expectation of a cyclic process: plan, implement,

evaluate, repeat.

11. Summit participants and urban forestry researchers should identify a broad universe of actions to achieve goals and objectives and determine specific ways in which the urban forest should be part of America’s climate solution. Actions might involve:
 - a. Modifying best management practices.
 - b. Creating a national comprehensive urban forestry standard, regional checklists, decision models, a Resilient Urban Forest (Self) Assessment, and restoration models. *Note:* national standards should be informed by ongoing urban forest inventory and analysis.
 - c. Providing a leadership role in the creation of a National Infrastructure Plan.
 - d. Realign federal urban forestry grant programs to demonstrate, among other things, the urban forest’s offset potential in the reduction of energy consumption and the sinking of atmospheric carbon to increase protocol implementation flexibility and lower compliance costs.
 - e. Diversifying resource and program options—tree stock, funding sources, support for urban agriculture.
 - f. Establishing an awards program to recognize urban forest innovation in making climate resilient cities.
 - g. Developing new regulations and practices as collective learning is translated into planning, policy, and investment decisions.



- h. Expanding tools (e.g., urban land preservation strategies that legally secure canopy cover in perpetuity through binding contracts, easements, and ordinances).
 - i. Coordinating a multiagency public and private sector outreach, education, and engagement campaign.
 - j. Expanding alliances—federal agencies, elected officials, academic institutions, philanthropic leaders, and other private sector partners.
 - k. Building alliances with global networks and sharing lessons of innovation from around the world.
12. The Urban Forestry Climate Steering Team, together with Urban and Community Forestry staff should create *America's Resilient Urban Forest Action Agenda* and budget. The Action Agenda should:
 - a. Build urban forest and climate literacy.
 - b. Protect and expand the existing urban forest resource.
 - c. Optimize urban forest ecosystem services that buffer and protect cities from climate disruption.
 - d. Integrate urban forest concerns into every level of decision-making. For example, “nature” should sit at the table early in community development discussions when deals are being made because deal-making may generate revenue opportunities supporting resilient urban forests.
 - e. Increase coordinated actions between foresters and allied partners.
 - f. Demonstrate the offset potential of the urban forest in the reduction of energy consumption and the sinking of atmospheric carbon to increase protocol implementation flexibility and lower compliance costs.
 - g. Outline specific actions for America's largest cities, foresters, allied partners, and urban America to implement.
 - h. Identify target audiences within urban America and strategies for inspiring behavioral change. For example, target audiences may include: homeowners, elementary school children, community gardeners, and business owners.
 - i. Achieve resilience benchmarks (e.g., evidence of more people, increased financial capacity, decreased climate threats, shared management, proactive polices, environmental equity).
 13. The Urban and Community Forestry program staff should present the budget and its rationale to Forest Service leadership, the federal administration, and members of Congress. The Urban Forestry Climate Steering Team should coordinate partner support in advocating budget increases.
 14. The Urban and Community Forestry program, Summit participants, and urban forestry partners should implement the Action Agenda:
 - a. Optimize the role of partners in service delivery to priority audiences. Coordinate a broad-based and phased implementation strategy.
 - b. Increase the public's technical understanding of the role of the urban forest in offsetting climate disruption.
 - c. Engage urban America in implementing specific action steps.
 - d. Reward innovation.
 - e. Secure continuing support.
 15. Annually thereafter, the Urban and Community Forestry program should reengage an Urban Forestry Climate Steering Team and host evaluation

Summits to consider the effectiveness of America's Resilient Urban Forest Action Agenda, and to consider program benchmarks, outcomes, and success at meeting resilience goals.

- a. Review new science and program assumptions.
- b. Develop new standards for resilience.
- c. Confirm system priorities relative to risk of harm and capacity to adapt.
- d. Adjust America's Resilient Urban Forest Action Agenda and budget.

The transparent and broad-based participatory process envisioned for the Summits will (1) expand regional and national alliances, (2) build support for shifts in budget priorities, (3) vet a myriad of potential action steps, (4) give shape to a comprehensive strategy, and (5) put into place an ongoing process for optimizing the ecosystem services of the urban forest. America's Resilient Urban Forest Action Agenda will mobilize urban America in meaningful preservation, restoration, and stewardship initiatives. Our nation's urban forests and the communities they service will be



made more resilient as diverse groups work in concert toward a shared vision of the future.

The United States, our cities and natural resources, will be shaped by the decisions we make today to transform the assumptions and practices of the past. The first test of the U.S. Forest Service's resilience—and ultimately the resilience of America's forests—is the agency's ability to adapt. Can the Forest Service become more relevant to the public by stepping up and delivering life-sustaining ecosystem services where 80% of the U.S. population lives? Or should Congress fund

other federal agencies judged "better equipped" to respond to the pressing and escalating needs of cities?

Assessment participants predict that under the next administration this country will marshal tremendous resources and creative energy in the fight against climate change. Because trees offer a simple, cost-effective and accessible technology, urban forests will be a part of America's response. Ultimately, however, questions remain:

- What federal agency will provide the necessary urban forestry leadership?
- Will that leadership come in time?



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Appendix A

What Is the U.S. Forest Service Doing for Climate Protection?

Although not in a systematic or systemic way—the U.S. Forest Service is already preparing for and adapting to threats posed by climate disruption. Specifically:

- Forest Service Chief Gail Kimbell recently identified responding to climate change as the first of three agency-wide strategic initiatives, the others being water and kids in the woods.
- Forest researchers are evaluating specific protocols for the forestry sector under the California Climate Action Registry. While links between urban tree planting and energy consumption are not yet fully understood, researchers have until 2012 (when the California regulations come into effect) to accurately measure the energy savings impacts of trees. Researchers seek to develop project guidelines wherein credit offsets have scientific credibility and integrity. In addition, researchers are exploring the benefits of massive, grassroots citizen engagement as a justification for paying people to plant trees as carbon offset markets will present a revenue source for new tree planting programs. Finally, researchers are on the hunt for model carbon sequestration projects that optimize climate benefits.
- Urban and Community Forestry funding supported the development of iTree, a suite of tools for assessing and managing community forests. With the ability to measure the amount of carbon sequestered by community trees, iTree is a valuable tool in climate decision-making.
- Smart Growth—environmentally, fiscally, and economically sound development based on innovative land-use planning techniques—values long-range, regional considerations of sustainability over a short-term focus. The Urban and Community Forestry program has addressed the 10 Keys of Smart Growth by (among other things) completing an agency-wide *Open Space Conservation Strategy*, funding green infrastructure training programs, accelerating urban ecosystem research, fostering sustainable management of forests on public and private land, and soliciting and responding to broad public input.
- Forest Service Research and Development is accelerating research into urban ecosystems through a network of Urban Long Term Research Areas (ULTRAs). Under this program, nearly two dozen experimental forests supporting long-term research span the country. In an effort to understand all elements of forests and related landscapes, long-term research includes climate, fire, and carbon cycles and the interplay between urban forests, human health, and environmental quality. Especially relevant is the project's climate variability research, explorations into carbon management and belowground ecosystem processes, and carbon tools. (For more information, see <http://www.ncrs.fs.fed.us/4401/focus/face/meteorology>.)
- Federal funds have supported wood utilization initiatives that offset energy consumption, and other cutting-edge climate protection proposals.
- In 2008 Forest Service researchers together with partner institutions in major urban ecological research published the 10-year Baltimore Ecosystem Study as part of the National Science Foundation's Long-Term Ecological Research (LTER) Network. These integrative studies were conducted to provide policy makers and the scientific community a framework to understand and predict the dynamics of urban ecosystems. Research is continuing in Phoenix, Arizona, and other LTER sites.
- The Forest Service, American Forests and the American Planning Association will publish a report later this year on urban forestry. The report is as part of the Planning Advisory Service (PAS) series provided by the American Planning Association.
- By 2012, the Urban and Community Forestry Program, through its Center for Urban Forest Research Pacific Southwest Research Station, intends to provide technical assistance to 14 states as they establish carbon trading markets.

Appendix B

What are Partner Groups Doing for Climate Protection?

Not-for-profits are assembling innovative partnerships and organizing around climate protection issues. For example:

- The International Council for Local Environmental Initiatives (ICLEI) lists more than 800 cities worldwide that participate in its Cities for Climate Protection Program (ICLEI, 2007).
- The American Planning Association, whose mission encompasses research, education, and advocacy, has adopted the design, architecture, and planning of green communities as a “Super Topic.” A green community diagnostic tool is currently under member review.
- American Forest Foundation, an organization committed to creating a future where North American forests are sustained by the public, joined with the Trust for Public Land and more than 20 other organizations to facilitate a highly technical and politicized dialogue on integrating working forests into carbon sequestration strategies.
- The American Society of Landscape Architects has launched a Sustainable Sites Initiative—a program to evaluate sustainable sites by developing objective standards, guidelines, and metrics for all designed landscapes. The program focus includes the cooling benefits of trees on energy use, and the role of vegetation in atmospheric carbon absorption.
- The National Association of Counties offers to its members a Climate Protection Program Resolution pledging counties to take action to mitigate the possible sources of climate change. Further, NACo supports its members by offering a forum to exchange best practices and case studies.
- In 2005, the U.S. Conference of Mayors launched a climate protection program to advance the goals of the Kyoto Protocol. Under the Climate Protection Agreement, cities strive to meet or beat Kyoto Protocol targets, advocate supporting state and federal policies, and urge congress to establish a national emission trading system. Reportedly, more than 800 cities have signed on to the Climate Protection Agreement to date.
- The Sierra Club’s Cool Cities Campaign aims to solve global warming one city at a time. The campaign emerged organically from the U.S. Conference of Mayors’ adoption of the Climate Protection Agreement. The campaign is seen as a unifying effort, a strategic organizing vehicle for Sierra Club citizen activists to support public-sector commitments through private action.
- Over time, American Forests has planted 4 million trees to sequester atmospheric carbon and reduce air conditioning use.
- Urban Land Institute has published *Growing Cooler: The Evidence on Urban Development and Climate Change*. The book documents how key changes in land development patterns could help reduce vehicular greenhouse gas emissions.¹³ Furthermore, the Urban Land Institute is advocating that the federal government create a National Infrastructure Plan. The preservation of natural systems through green infrastructure would be an important component of the effort.
- The Center for Resilient Cities offers applied resilience planning services and pioneers model programs to weave resilient green landscapes into the built environment (www.resilientcities.org).

¹³ Ewing, R., K. Bartholomew, S. Winkelman, J. Walters, D. Chen. *Growing Cooler: the Evidence on Urban Development and Climate Change*. Washington, D.C.: Urban Land Institute.



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