From the USDA Forest Service and Partners
Growing Resilience in Our Urban and Community Forests

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Photos by Rich Hallett

The Nature Conservancy's Leaders for Environmental Action for the Future (LEAF) interns participate in tree health assessment training in 2015 for the Healthy Trees, Healthy Cities initiative.

Resilience can seem like a buzzword in natural resource management, but it is also a concept with deep roots in ecological and sustainability science. In the context of urban forests, resilience has many meanings, including ecological, social, and institutional components, which are often intertwined. Broadly speaking, resilience refers to the capacity of systems to absorb stresses and changes, and recover from disturbances (Huff et al. 2020).

For instance, trees are increasingly recognized as green stormwater infrastructure that absorbs precipitation, and some cities have formal programs supporting such installations, seeking to boost resilience to extreme weather events and prevent flooding. Additionally, for communities that have endured natural or man-made disasters, planting young trees can be a socially powerful step in recovery. In this article, we present several approaches, projects and tools from the USDA Forest Service and partners that support managing for resilience in urban forests from both ecological and social perspectives.

Climate Change Adaptation

A changing climate threatens urban forests due to unpredictable precipitation patterns, more extreme heat events, and increased pests and diseases (Reynolds et al. 2020). Municipal arborists and urban foresters are on the front lines in protecting forests and demonstrating how trees can help to mitigate climate impacts by improving air quality, reducing the urban heat island effect, and storing carbon.

A recent climate change adaptation demonstration project in Providence, Rhode Island provides an example of how to compile and present data, set tree planting and management goals, and engage the community to achieve results. This is just one example of several urban applications developed through a new Climate and Health Action Guide. Free training and other resources are available to help managers build resilience and sustainability in their urban forest through the Climate Change Response Framework.

Planting Trials

A key source of vulnerability for urban forests is low species diversity. In the past, over-reliance on a few species like elms and ashes produced monocultures that eventually crashed due to invasive pests and diseases. Even with increased awareness of the problems posed by low species diversity, many planting initiatives still rely on a small set of tried-and-true species. With climate change, the existing species in our cities and towns today are also vulnerable to shifting temperature and precipitation patterns (Brandt et al. 2020).

Re-thinking the planting palettes for urban tree programs means that new species and cultivars need to be evaluated in experimental trials to ensure their viability in different regions. The Forest Service has been engaged in several such trials with university and community partners, including the Climate-Ready Trees experiment in California, which seeks to evaluate new species candidates for the hotter, drier conditions expected in that state with climate change (McPherson et al. 2018, McPherson et al. 2019). i-Tree Species is an example of a tool available online that guides managers and homeowners in discovering site-appropriate tree species that can help to achieve specific climate adaptation and mitigation goals. This tool is applicable across the U.S. and even internationally.

Tree Health Monitoring

To sustain and grow resilience in the urban forest over time, planted trees need to survive and thrive, and mortality of existing trees needs to be minimized. For example, tree planting and giveaway programs that aim to shade homes and reduce building energy consumption can only provide those benefits if the trees live and grow (Ko et al. 2015). Monitoring urban tree growth, health, and mortality is therefore critical to assess program performance, learn from current practices, and adjust to changing conditions.

New technical guides from the Forest Service provide detailed field protocols and best practices that have been applied to street, yard, and park tree monitoring projects across the U.S. (Roman et al. 2020, van Doorn et al. 2020). There is also an accompanying set of training videos, and a Spanish translation of these monitoring resources is in the works. >>

Participants in a 2018 tree health assessment training for Milwaukee County Parks' employees at the Milwaukee County Urban Ecology Center learn to use the Healthy Trees, Healthy Cities tree health assessment application.

USDA Forest Service Scientist Nancy Sonti collects crown transparency data in 2013 for a study assessing the impact of saltwater flooding on tree health after Hurricane Sandy.

Green City Force personnel learn tree health assessment in October, 2020 as they begin to inventory trees on New York City Housing Authority's campuses.

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Specific to finding new pests and diseases originating in cities that might threaten the health and resilience of the entire North American forest ecosystem, the Forest Service has developed a protocol and training that can be applied by civic scientists and professionals alike. In partnership with The Nature Conservancy and University of Georgia, the mobile phone application Healthy Trees, Healthy Cities has been applied in 18 U.S. cities to track tree health, stewardship activities, and to record signs and symptoms of important pests and diseases. Video training materials offer guidance to ensure reliable accurate data collection.

Social Dimensions of Resilience

Stewardship activities, simple though they may seem, can play a key role in helping community and individual long-term recovery from natural and man-made disasters. While planting and caring for trees can help neighborhoods and green spaces recover physically, research has shown that the act of coming together, working side-by-side, and creating change and beauty helps individuals and communities recover emotionally, psychologically, and spiritually (Campbell

et al 2019). In fact, stewardship helps communities become stronger than they were before the trauma by strengthening social cohesion through acts of shared creation, memorialization, storytelling, and care.

In the wake of so many stresses—both natural disaster and human-caused—that have affected the U.S. in recent years, understanding how to grow the resilience of communities through the stewardship of trees and forests is a leadership opportunity for our profession, driven by science. 🍃

Literature Cited

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City Trees Recommended

Reading

City Trees Editorial Review Committee Member Georgia Silvera Seamans published an essay on Medium called "The Risks and Rewards of Being Black in Nature," which explores her experiences and observations within the context of urban forests especially.

From *City Trees* contributor Peter Vujakovic comes these two suggestions:

- The Plant Blindness issue in Plants People Planet

- An exploration of why more trees are in London's urban areas than the surrounding rural areas

YouTube

City Trees Editorial Review Committee Member Dr. Adrina C. Bardekjian of Tree Canada is hosting a discussion series on YouTube with her colleague Liza Paqueo of the US Forest Service. It's called Where Women Choose to Walk: Paths to Improving Cities and Nature.

Podcast

Your Bird Story, hosted by Washington Square Park Eco Projects Director Georgia Silvera Seamans, explores tree and bird intersections, local ecology, nearby nature, and engrossing stories of interactions with birds.