

THE SHADE TREE

A BI-MONTHLY BULLETIN DEVOTED TO NEW JERSEY'S SHADE TREES

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IN MEMORIAM: LAURA K. CHISHOLM

It is with deep regret to share the news of the untimely death of Laura Chisholm. She passed away on June 14, 2024. Being quite active in the tree industry, Laura served on many boards and was a member of many organizations. She also served on the Board of Trustees of the NJ Shade Tree Federation and was the current President of the NJ Society of Tree Experts.

Along with her husband, Stephen, Laura was a co-owner of Aspen Tree Expert Company, operating out of Jackson, NJ. Amongst all of her tree related activities, she was also active in Jackson Baptist Church and an avid participant in the church's music ministry.

Laura's enthusiasm and love of the tree industry, but especially for her family, will surely be missed. The NJ Shade Tree Federation extends our condolences to the Chisholm family during this difficult time.

OLD-GROWTH FORESTS: HOW MUCH IS ENOUGH?

By Kathryn Fernholz and Ed Pepke, PhD, *The Forestry Source*, Vol 29. No. 3,
March 2024

Introduction

In November 2023, Dovetail Partners, Inc. published a report titled "Old-Growth Forests: How Much is Enough?" The report explores the different definitions of "old growth" found throughout North America and Europe, including their scientific basis. The report considers the arguments for and against old growth forests and features a discussion of old-growth forest protection and management. Kathryn Fernholz and Dr. Ed Pepke were the lead authors of this report, summarized below.

BULLETIN OF THE NEW JERSEY SHADE TREE FEDERATION

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OLD-GROWTH FORESTS: HOW MUCH IS ENOUGH?

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The Value of Old-Growth Forests

Many of us have an emotional or even spiritual connection to old-growth forests. This is not just because we like to see big old trees, but because of the multitude of ecosystem services and diverse values they provide. The Forest Stewards Guild lists those services as including wildlife habitat, carbon storage, stabilization of watersheds, nutrient recycling, and biodiversity, amongst others (Evans and Allbee 2023). Old-growth forests have also historically had economic and social value by providing timber products and supporting forest-based businesses and communities. These forests have cultural and social value to Indigenous peoples, First Nations, and Tribes.

Defining Old Growth

The question, “What is old growth?” holds many definitions depending upon the scientific, cultural, and policy lenses that are applied. The variety in these definitions is a recognition that tree species, climate, soil productivity, human interaction, and disturbance history all influence the development of forests. Thus, the question of “How much old-growth forest is enough?” is contextual and there are many answers. There are forests that previous generations chose to protect, which current generations will also say deserve protection, and that future generations will wrestle with in their own debates. With proper management, the creation of secondary old-growth forests is possible and can eventually provide the attributes and benefits of old-growth forests. The emerging practice of managing maturing forest to provide old-growth characteristics is a study strategy deserving of increased attention.

Conclusion

Intact old-growth forests provide multiple benefits, but the type of wood provided from these forests is no longer essential to meeting our raw material needs. Today’s engineered wood products can produce dimensionally stable beams that are structurally superior to equally large beams from larger-diameter trees. Consequently, the value of old-growth timber has fundamentally changed, and innovative management approaches need to be considered. A new relationship with old-growth forests that respects and honors the role of people as part of nature and elevates our capacity to care for forests and engage in these practices is needed.

To read the full report, visit <https://www.dovetailinc.org/porfoliodetail.php?id=655e4803232d4>

HALF OF URBAN TREES ARE OUTSIDE THEIR ‘COMFORT ZONE’ – FUTURE PLANTINGS MUST CONSIDER CLIMATE RESILIENCE

“Science for Environmental Policy”: European Commission DG Environment News Alert Service, edited by the Science Communication Unit, The University of the West of England, Bristol, March 29, 2023

Issue 598: Trees growing in cities world-wide may be at risk from climate change. Urban greening must use species that can cope with future conditions to secure benefits.

Trees and shrubs in streets, parks, urban woodlands and other spaces provide a range of vital benefits in towns and cities – where over half the world’s people live. They connect people with nature and mitigate the adverse effects of climate change, for example through cooling and carbon sequestration. However, climate change also poses a threat to urban trees, which may not thrive in warmer temperatures predicted, or survive heatwaves and drought which are also predicted to increase in severity and frequency. This presents not only a loss of ecosystem services provided to urban residents but also investment.

More knowledge is needed to ensure that urban greening is planned with future climatic conditions in mind. For example, it is better to plant drought-resistant species than to rely on irrigation. Planners and nursery growers would also benefit from an awareness of which extant urban trees may be under stress and face premature mortality. In a new study, researchers therefore conducted a global climate-risk analysis for urban forests, assessing the vulnerability of 3 129 tree and shrub species planted in 164 cities around the world.

They used the Global Urban Tree Inventory database¹ to obtain data on trees and shrubs present in these cities and looked at how each city would be exposed to climate change, using this information to estimate tree vulnerability to changing temperatures and rainfall. The analysis focused on a 2050 scenario based on Representative Concentration Pathway (RCP) 6.0 of the Intergovernmental Panel on Climate Change. This pathway predicts an average temperature increase of 2.2°C by 2100, compared to 2005. Under this projection, cities closer to the equator will experience large decreases in rainfall, while cities at high latitudes in the Northern Hemisphere will be subject to the greatest increases in temperature.

The researchers’ analysis showed that many species growing in cities are already experiencing conditions outside their ‘safety margin’, or conditions usually tolerated, as indicated by their natural geographic range. For example, 15% of species had experienced maximum temperatures outside those to which they are naturally adapted, and a fifth had experienced low rainfall in dry seasons beyond their safety margin. Concerningly, for some cities, including Barcelona, the analysis finds all the trees currently planted are already in an unsafe climate for them.

Many of the species at risk have a narrow safety margin (they will reach the limits of their natural tolerance with a small change in temperatures or precipitation). About 40% of the species in the study had already exceeded their safe mean annual temperature and maximum warmest month temperature by up to 1°C.



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HALF OF URBAN TREES ARE OUTSIDE THEIR ‘COMFORT ZONE’ – FUTURE PLANTINGS MUST CONSIDER CLIMATE RESILIENCE

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Meanwhile, over half the species planted are currently experiencing mean annual temperatures (56%) and precipitation (65%) conditions exceeding those in their geographic range, in at least one of the cities where they are planted. By 2050, these proportions are projected to grow to 76% and 70%, respectively.

In the cities where they are currently planted, two-thirds of tree species are projected to be at risk from warming and changes in annual precipitation by 2050, state the researchers. Risk is highest in low-latitude cities such as New Delhi, India, and Singapore, where all species are predicted to be vulnerable to these changes. Only 62 of the 3 129 species assessed (2%) were at no risk from any climate variables, in any city.

Securing the long-term stability of urban trees and the benefits they provide depends on identifying and using the most climate-resilient species, say the researchers. Irrigation may decouple urban trees from decreasing rainfall but relying on such management actions can be costly or impractical, especially in the face of more frequent droughts and heatwaves. Planting trees most adapted to future conditions is the best way to ensure their survival without intervention.

The researchers acknowledge that measuring the occurrence of species does not account for all factors that influence distribution. This means that the climatic niche identified in this study may be an under (or over) estimate of the conditions a species can tolerate. Suitable growing conditions are also influenced by microclimate, soil and competition, for instance. Additionally, conditions in cities may be beneficial or negative for tree growth, but this is not explored in this study - though the researchers advise that monitoring urban tree growth could provide useful information.

In urban planning, tree selection has often been based on past and current climate, alongside management considerations. Considering trees’ adaptation to future conditions should now be paramount with any new planting, the researchers conclude.

Note: This European Union piece was written in reference to an international scientific study “Climate Change Increases Global Risk to Urban Forests” published in Nature: <https://www.nature.com/articles/s41558-022-01465-8>

For more localized, climate change and species range information consider exploring the NJ Climate Change Resource Center: <https://njclimateresourcecenter.rutgers.edu/> and its web-based NJ Forest Adapt tool: <https://njforestadapt.rutgers.edu/#/splash>



SELFISH GENES AND MOTHER TREES

Editorial, *Nature Plants*, Vol. 10, May 23, 2024

Metaphors are excellent tools for explaining complicated concepts. But sometimes the concepts can become driven by the metaphors.

Words are powerful but slippery. However much we might wish that they had simple, defined meanings, agreed upon by everybody, they bring with them a host of associated allusions that are dependent on the culture and personal history of whoever is hearing or reading them. Poets use this to conjure images and emotions with ‘the best words in the best order’, as Samuel Taylor Coleridge put it in the early 19th century. For scientists this becomes a problem. Like Lewis Carroll’s Humpty Dumpty, when we use a word we want it to mean “just what [we] choose it to mean — neither more nor less”, but this is hard to achieve, especially when scientific words and phrases escape into general usage.

Charles Darwin did not describe his theory of evolution as ‘the survival of the fittest’, that term was coined by the philosopher and polymath Herbert Spencer. Alfred Russel Wallace (whose own theory of evolution was essentially the same as Darwin’s and was presented at the same to the Linnaean Society in London) urged Darwin to use it instead of ‘nature selection’ and Darwin did include the term in a few places in later editions of his ‘Origin of Species’ but he preferred his own term. The problem is that when we hear the word ‘fittest’, we think of physical fitness and strength. It is thus almost impossible to not immediately think that those that will survive and so pass on their genes are the strongest or fastest of a population. It takes an effort of will to remember that ‘fit’ here relates to being adapted to an organism’s environment and lifestyle. Fitting like a jigsaw puzzle piece not fit like an athlete.

A little more than a hundred years later Richard Dawkins caused a similar confusion by titling his book about a neo-Darwinist view of evolution ‘The Selfish Gene’. Such a title, although not the book itself, seemed to negate or deny the possibility of altruism, collaboration, morality or culture; everything boils down to the propagation of individual genes at the expense of all others. This may have been a stroke of marketing genius, the book being as popular as it was controversial, but in the forward to the edition published in 2006 Dawkins admitted that the title might give an inadequate impression of the book’s contents, and he should perhaps have followed his publisher, Tom Maschler’s, suggestion: ‘The Immortal Gene’.

Editors are not always so helpful. Nobel Laureate Leon Lederman’s 1993 book about the history of particle physics would likely have been called “The Goddamn Particle” had not the publisher insisted on “The God Particle” instead. That title refers to the Higgs Boson an elementary particle involved in giving matter mass whose existence was hypothesized in 1964 but not confirmed until half a century later by data from the Large Hadron Collider. Peter Higgs after whom the particle is named and who died in March this year, didn’t like either name preferring to call it “the scalar boson”.

In plant biology we may have another prominent example. In 1997, Suzanne Simard and colleagues published a paper in *Nature* with the title ‘Net transfer of carbon between ectomycorrhizal tree species in the field. The Letter does not contain the term ‘wood-wide-web’ and neither does the accompanying News & Views by David Read (entitled ‘The ties that bind’). Those were the words on the



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SELFISH GENES AND MOTHER TREES

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cover of the August issue of the journal, but no one can remember which member of staff came up with them. Nevertheless ‘wood-wide-web’ is the term that has become adopted for the idea that the roots of trees and the hyphae of mycorrhizal fungi form a network beneath the ground capable of exchanging nutrients, carbon sources and perhaps much more.

The metaphor of a wood-wide-web is almost too good. It immediately suggests that fungal hyphae are acting like the data cables that connect the servers and computers of the internet (in this analogy the trees and other plants), communicating chemically to transmit distress signals to warn of diseases or predators. The forest then appears as a super organism reminiscent of the semi-sentient ‘Old Forest’ in J.R.R. Tolkien’s ‘Lord of the Rings’. Simard herself has gone on to develop a theory of trees using the subterranean fungal networks to support their saplings growing around this central ‘mother tree’.

It would be difficult to overstate the importance of the frequently symbiotic interactions between plants and fungi. However, despite the more than a quarter of a century since Simard’s paper showing that carbon assimilated in one tree could be found in other trees connected by a fungal hyphae, data unequivocally supporting a fully functioning wood-wide-web can be hard to find. A recent Perspective in Nature Ecology & Evolution concluded that the field is dogged by overinterpretation of results and biased citations, a view shared by many in the ecology community.

Of course, it is challenging to perform robust experiments in this area. In this issue of Nature Plants, Vincent Merckx and colleagues suggests that one approach to simplifying the system is to study mycoheterotrophic plants, which have no photosynthetic ability and instead obtain all their carbon from mycorrhizal fungi. There are many such plants from a variety of clades most notably the orchids, all of which are initially mycoheterotrophs although most develop some degree of photosynthesis as they grow.

Science demands rigorous thought and reasoning, but the language we use can be ambiguous and poorly defined. We must guard against letting our metaphors make us run ahead of our facts.

CALENDAR OF EVENTS 2024

September 4th	NJSTF Tree Talk Zoom, 7:00-8:30pm
October 17-18	NJ Shade Tree Federation 99th Annual Conference, Harrah’s Atlantic City, NJ
December 11th	NJSTF Tree Talk Zoom, 7:00-8:30pm



SAVE THE DATE: NJ SHADE TREE FEDERATION 99TH ANNUAL CONFERENCE OCTOBER 17-18, 2024

Location: Harrah's Resort Atlantic City, 777 Harrah's Blvd,
Atlantic City, NJ 08401

Date: Thursday, October 17 & Friday, October 18, 2024

Conference Registration to open soon, check our website for preliminary information and updates: <https://njstf.org/upcoming-conference.php>

Planning to stay overnight? Our event hotel room block is open for reservations. Secure a significant discount on your Wednesday, Oct 16, and/or Thursday, Oct 17, night accommodations by booking within our NJ Shade Tree Federation event group. Make room reservations with Harrah's online using our group's unique booking "passkey" weblink anytime or by calling the Harrah's reservations call-center (8am-2am EST, 7 days a week) and providing our group code.

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CAN ‘SENTINEL TREES’ WARN OF DEVASTATING PESTS?

By Gabriel Popkin, *Science*, Vol. 367, Issue 6485, March 27, 2020

By planting groves of exotic species, nations hope to identify potential insect invaders.

It’s become an all-too-common tale: An introduced insect takes hold in a new home and then spreads, wreaking havoc with ecosystems and economies. Take, for instance, the emerald ash borer, an Asian beetle first spotted in North America in 2002; researchers estimate it has killed hundreds of millions of ash trees and caused more than \$10 billion in damage.

Now, in a bid to prevent such catastrophes—and get an early warning of which exotic pests are likely to cause trouble—researchers from the United States, Europe, and China are trying a new approach: planting “sentinel trees” from their own regions in distant nations, and then observing which insects attack. The findings should help authorities more quickly recognize and snuff out threatening introduced insects if they show up in the trees’ native countries. Sentinel trees are “the new frontier” in fighting forest pests, says entomologist Jiri Hulcr at the University of Florida.

Already, groves of North American and European trees planted in China have enabled scientists to identify and start to study more than a dozen insects of concern. In Europe, 23 nations have launched a €5 million project that will, among other activities, establish sentinel nurseries in North America, Asia, and South Africa—and enable researchers to plant trees from those areas in Europe. And next month, if the coronavirus pandemic doesn’t interfere, researchers will plant the first sentinel grove of Asian trees in the United States.

A team led by entomologist Alain Roques of France’s National Institute for Agriculture, Food, and Environment pioneered the approach between 2007 and 2011, when it planted seven tree species in Fuyang and near Beijing in China. By 2015, the researchers had identified more than 100 kinds of insects that had sampled the trees. They considered five species to be dangerous, and they took one—a bagworm moth—back to Europe to study its appetite for broadleaved trees. That study, conducted under quarantine, showed the moth can destroy numerous trees, Roques reported in January at a U.S. Department of Agriculture conference in Annapolis, Maryland.

Hulcr became a convert after colleagues in China discovered a beetle demolishing American sweetgum trees that had been planted near Shanghai. Sweetgum is an ecologically and economically important species in the southeastern United States. If the beetle, which he and his colleagues named the sweetgum inscriber, gained a foothold in North America, it could pose a serious threat, they reported in 2017.

The discovery prompted China to ban imports of the tree, to avoid further damage. And it spurred Hulcr in 2018 to plant his first sentinel grove of North American trees in China’s Fujian province. Hulcr and colleagues in China has



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CAN ‘SENTINEL TREES’ WARN OF DEVASTATING PESTS?

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since established two additional plantations, which hold pines, oaks, and citrus trees, in Yunnan and Shandong provinces, and plans a fourth in Liaoning province. So far, Huler’s team has detected eight insect species of concern, which the researchers are now rearing and studying. Such studies could alert authorities to look for the pests, some of which were unknown to science, and lead to better monitoring traps and control measures.

Establishing sentinel orchards in a foreign nation can be fraught, Roques says. A Chinese farmer destroyed one of his plantings after seeing insect damage, not realizing the attacks were by design. He lost access to other potential sites after collaborators balked, fearing his trees would also bring European pests to Asia.

Funding agencies are ramping up support for sentinel groves. Europe’s new project, called Holistic Management of Emerging Forest Pests and Diseases, is expected to run through 2024. And the U.S. Forest Service (USFS) is funding several projects, including one led by Ohio State University, Columbus, plant pathologist Enrico Bonello that, in April, is scheduled to plant the first sentinel trees from Asia and Europe—including beeches, hollies, maples, and pines—in Ohio and New Hampshire. Collaborators have already planted North American and Asian trees in Sweden and Italy.

It could take years to know whether the sentinels provide useful intelligence. Some insects won’t attack young trees, for instance, so researchers will have to wait to see what the mature trees attract. And some trees become stressed and more vulnerable to insects when growing outside their native range, potentially making observations less relevant to predicting the impacts of invasions.

Governments, meanwhile, are still figuring out how they might incorporate any findings into biosecurity policies and practical actions. “Science and regulation are disjoint a lot of times,” Roques says. But Elizabeth Lebow, who directs invasive species programs for USFS’s international office, believes new sentinel trees are “a really smart approach ... [to] informing our early detection efforts.”

Note: If the topics of this article were of interest be sure to catch Paul Kurtz’s presentation on the second day of the NJ Shade Tree Federation’s 99th Annual Conference, Friday October 18, 2024 **Future Forests: Invasive Pests, Global Research, Mitigation, and the Sentinel Garden Program**

Session Synopsis: What are future trees and forests and going to look like and how will we be able to mitigate and treat pests and diseases as world trade grows? The increasing rise global commerce is paralleled by the introduction of plant pests and diseases historically. This is a global reality and a negative impact on natural resources and food crops. Why are these pests getting by our safety nets and what role do other countries play in researching potential pest threats? What is the sentinel garden program and what has it shown us so far? <https://njstf.org/upcoming-conference.php>

STUDY DETAILS STRATEGIES FOR SUCCESSFUL URBAN TREE PLANTING INITIATIVES

by Aaron Kupec, University of Massachusetts Amherst

Collaborative research led by the University of Massachusetts Amherst outlines five essential themes to promote equitable and sustainable urban tree planting initiatives (TPIs), which is especially timely given the \$1.5 billion for urban and community forestry contained in the 2022 Inflation Reduction Act.

While many cities and towns across the U.S. have undertaken large-scale TPIs, their success in the past has been mixed due to insufficient community engagement, inadequate tree care and lack of institutionalization.

Yet, there are constructive steps that municipal leaders can take to improve these urban greening programs, detailed in an article published recently in the *Journal of the American Planning Association*.

Led by Theodore Eisenman, associate professor of landscape architecture and regional planning at UMass Amherst, along with colleagues at the U.S. Forest Service and the Nature Based Solutions Institute, the study outlines a strategy for TPIs to allocate adequate resources across three phases: pre-planting, installation and post-planting.

This is a departure from business-as-usual—documented in a nationwide survey of TPIs, also led by Eisenman—where the majority of funding is dedicated to tree purchasing and installation.

Often predicated on ambitious planting goals, this approach leaves limited resources to engage community members, especially in marginalized neighborhoods, in developing pre-planting objectives and landscape design plans. It can also lead to inadequate support for post-planting watering and management of newly planted trees during their vulnerable establishment years.

This is not a minor consideration given that the average cost of planting a new urban tree can range from \$500 to \$3,500, and 30% of trees planted in urban settings typically die within five years.

“It is reasonable to ask if we would accept this level of failure for other kinds of public works and infrastructure, such as streetlights, bridges and sewer systems,” notes Eisenman. “We need to dedicate significant resources not just to tree planting, but to the process leading up to the planting as well as post-planting stewardship.”

According to Eisenman’s co-author and frequent collaborator, Lara Roman, a research ecologist with the U.S. Forest Service, “Post-planting tree care like watering is essential to ensure the survival of urban trees, and deep engagement with local communities is a critical component for trees to serve

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A detailed photograph of various arborist equipment. The items include a large coil of rope, several pulleys of different sizes, a hand saw, a chainsaw, various carabiners and shackles, and other climbing hardware. The items are arranged on a wooden surface.

STUDY DETAILS STRATEGIES FOR SUCCESSFUL URBAN TREE PLANTING INITIATIVES

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neighborhood needs and priorities.

“I’ve collaborated with some amazing urban forestry organizations that have innovative strategies for both young tree maintenance and community engagement.”

In addition to supporting all phases of a TPI, the researchers—who have more than 90 years of combined experience in related work—recommend that communities undertaking TPIs carefully consider tree species selection and location as part of a place-based approach to landscape planning and design guided by cultural and environmental context; conduct deep civic engagement in every phase of the effort; follow arboricultural best practices to ensure tree health; and consistently monitor the performance of projects and make changes when necessary.

Drawing upon a robust body of applied research, each of these five cross-cutting themes is described in a table in the article that lays out the three phases of a successful TPI.

While well-executed TPIs have the potential to increase the livability and sustainability of cities, Eisenman cautions that “greening is not a panacea.” He says large-scale planting efforts and environmental interventions should be approached as one of many strategies, including those that address socioeconomic conditions, civic services and traditional hard infrastructure, to improve urban settings and enhance human health and well-being.

Note: The study discussed is available online, the referenced table is on page 4 of the pdf linked here: https://www.fs.usda.gov/nrs/pubs/jrnl/2024/nrs_2024_eisenman_001.pdf

Learn more! About communicating the message of planting the right tree, in the right place, in the right way at the NJ Shade Tree Federation’s 99th Annual Conference. Visit the exhibit hall and talk to the NJ Tree Foundation, a national leader in effective community-based planting initiatives. Attend the **NJ DEP FS Urban & Community Forestry Program’s Community Representative (CORE) Training**, a full-day course running concurrent to the Conference Day 1 sessions on October 17. On Conference Day 2, October 18, hear **Dr. Jason Grabosky** speak in the morning in his session “**So, What’s the Point... Just Because it is Alive does not make it Valuable**” and in the afternoon municipal track the theme continues with **John Linson’s “Street Trees and Infrastructure-The Path to Co-existence.”** <https://njstf.org/upcoming-conference.php>



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