

# THE SHADE TREE

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

**Volume 97 – March - April 2024 – Issue 3 & 4**

*This Issue Presents...*

To the School Children of the United States

Less Asphalt Gives Stronger Trees in Urban Areas

Journal Brief: Urban Tree Pit Design Factors for Stormwater  
Management Performance

Hot take – We Need Diverse and Rich Tree Species, Not Just More Trees  
to Reduce the Urban Heat Island Effect

Why, What and How of Community Outreach and Engagement

Calendar of Events 2024

## TO THE SCHOOL CHILDREN OF THE UNITED STATES

President Theodore Roosevelt, April 15, 1907

Arbor Day (which means simply “Tree Day”) is now observed in every State in our Union—and mainly in the schools. At various times from January to December, but chiefly in this month of April, you give a day or part of a day to special exercises and perhaps to actual tree planting, in recognition of the importance of trees to us as a Nation, and of what they yield in adornment, comfort, and useful products to the communities in which you live.

It is well that you should celebrate your Arbor Day thoughtfully, for within your lifetime the Nation’s need of trees will become serious. We of an elder generation can get along with what we have, though with growing hardship; but in your full manhood and womanhood you will want what nature once so bountifully supplied and man so thoughtlessly destroyed; and because of that want you will reproach us, not for what we have used, but for what we have wasted.

For the Nation as for the man or woman and the boy or girl, the road to success is the right use of what we have and the improvement of present opportunity. If you neglect to prepare yourselves now for the duties and responsibilities which will fall upon you later, if you do not learn the things which you will need to know when your school days are over, you will suffer the consequences. So any nation which in its youth lives only for the day, reaps without sowing, and consumes without husbanding, must expect the penalty of the prodigal, whose labor could with difficulty find him the bare means of life.

A people without children would face a hopeless future; a country without trees is almost as hopeless; forests which are so used that they cannot renew themselves will soon vanish, and with them all their benefits. A true forest is not

**BULLETIN OF THE NEW JERSEY SHADE TREE FEDERATION**

**Executive Director: Richard S. Wolowicz**

**Editor & Outreach Coordinator: Emily Farschon**

**Blake Hall, 93 Lipman Drive, New Brunswick, NJ 08903**

**Telephone: (732) 246-3210 Fax: (732) 640-5289**

**e-mail: trees@njstf.org**

**www.njstf.org**

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## **TO THE SCHOOL CHILDREN OF THE UNITED STATES**

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merely a storehouse full of wood, but, as it were, a factory of wood, and at the same time a reservoir of water. When you help to preserve our forests or to plant new ones you are acting the part of good citizens. The value of forestry deserves, therefore, to be taught in the schools, which aim to make good citizens of you. If your Arbor Day exercises help you to realize what benefits each one of you receives from the forests, and how by your assistance these benefits may continue, they will serve a good end.

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## **LESS ASPHALT GIVES STRONGER TREES IN URBAN AREAS**

By Konarska, Tarvainen, et al, University of Gothenburg, Euekalert.org

**Trees planted in urban areas can provide shade and contribute to a lower air temperature. For these services to be optimal, it is important to let asphalt give way to trees, according to research from the University of Gothenburg.**

The role of trees in the urban climate is an issue that has grown in importance in the wake of climate change, where average temperatures are expected to rise. Trees provide shade and lower the air temperature. To get most benefits from your trees, you need to give them the right conditions.

“Our research shows that an important factor is how much of the area around the tree is paved,” says Janina Konarska, researcher at the University of Gothenburg and lead author of the study in the journal *Landscape and Urban Planning*.

### **Bigger trees with less asphalt**

Therefore, the researchers believe that it is a good idea to at least give the trees some extra grass around the trunk.

“We found in our study that 20–30-year-old trees surrounded by grass were on average 2.6 metres taller and the crown was 1.3 metres wider than nearby trees growing with paving close to the trunk. The trees also had a crown that was 61 percent denser and provided twice as much cooling,” says Janina Konarska.

# LESS ASPHALT GIVES STRONGER TREES IN URBAN AREAS

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The researchers studied the impact of the surface cover around the trunk on pin oak, horse chestnut and common lime at several sites in Gothenburg and Mölndal. The assessment was based on various parameters, including crown density, tree growth and the amount of water released by the leaves, known as transpiration. All these determine the tree's impact on the microclimate. The density of the crown and the size of the tree determine the shading effect, and releasing water vapour from the leaves in the transpiration process acts as air conditioning that cools the air.

“In addition, the air above an asphalt surface will be warmer than the air above grass or soil. A hardened surface also prevents rainwater from reaching the roots, which impacts the growth of the tree,” says Janina Konarska.

## **Invest in good soil**

There were differences in how much the different tree species were affected by not getting water to the roots. Horse chestnut is least affected by hardened surfaces, but on the other hand it performs worse than pin oak and common lime when conditions are better.

The researchers' conclusion is that while the choice of trees planted is very important, the cooling effect of the trees may be more dependent on how close to the trunk the hardened surface starts.

Planting trees is expensive, and it takes time for a new tree to grow to the desired size. In urban areas, it can often be difficult to provide an optimal growing environment for trees.

“You have to do the best you can when planting trees in urban areas. If it is difficult to create open spaces around the trees, it is a good idea to invest in better soil and preferably to water the tree. It is important that we take care of the trees, they are valuable in many ways,” says Lasse Tarvainen, an environmental scientist at the University of Gothenburg.

**Editor's Note:** The above is a journal news alert. You may read the scientific paper “Surface Paving More Important Than Species in Determining The Physiology, Growth And Cooling Effects Of Urban Trees” online here: <https://www.sciencedirect.com/science/article/pii/S0169204623001913?via%3Dihub>





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# **JOURNAL BRIEF: URBAN TREE PIT DESIGN FACTORS FOR STORMWATER MANAGEMENT PERFORMANCE**

Sustainable Healthy Cities Journal Brief- 2018, No. 6- Urban Tree Pit Design  
FactorsProgram, November 20, 2023

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**This brief is adapted from the following peer-reviewed journal article: Elliott, R.M., Adkins, E.R., Culligan, P.J., & M.I.Palmer. (2018). “Stormwater infiltration capacity of street tree pits: Quantifying the influence of different design and management strategies in New York City.” *Ecological Engineering*, 111(2018), 157-166.**

## **Study Intent and Research Question**

Street trees in the urban environment provide important ecosystem services including stormwater management, reducing pollutant discharges and flooding by lessening surface runoff. Does the design of an urban tree pit affect its ability to absorb stormwater? If so, how? This study identifies key physical design features that affect the stormwater management performance of tree pits. Between June and July of 2014, the study measured the ability of 40 street tree pits in New York City to soak up stormwater, capturing performance measures for multiple tree pit types commonly found in New York and other cities.

## **Key Background Information**

The stormwater management capacity of various types of green infrastructure—green roofs, bioswales, rain gardens, rainwater harvesting, and permeable paving—is determined by the amount of water they can capture and store, their ability to expel stored water through evapotranspiration, and their capacity to infiltrate stormwater into the subsurface.

Street trees can divert urban stormwater in three ways: 1) leaves and branches directly hold rainwater (interception), 2) the tree structure channels water to the base of the trunk (stemflow), and 3) water enters the ground via the tree pit soil surface (infiltration).

For trees housed in tree pits, stormwater capture is a function of the soil’s infiltration capacity at the base of the tree, which determines how quickly a tree pit surface can absorb stormwater.

Common variation in design features of street tree pits include: 1) guarded vs. unguarded; 2) bare surface vs. groundcover (plants or mulch); 3) level, raised, or recessed positioning with the sidewalk; 4) absolute size of pit and tree size.

## **Key Findings**

The most significant factor influencing the stormwater infiltration capacity of tree pits was the presence of a guard, with guarded tree pits having higher water

# **JOURNAL BRIEF: URBAN TREE PIT DESIGN FACTORS FOR STORMWATER MANAGEMENT PERFORMANCE**

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infiltration rates.

Tree guards prevent pedestrians from walking on the soil surface, thus preventing compaction and associated decrease in infiltration capacity. Unguarded pits were found to be significantly more compacted than guarded pits. For guarded tree pits, higher infiltration rates were associated with larger pit areas, raised surface elevations, and the combined presence of ground cover planting and mulch. Tree size was found to be a less significant indicator of the infiltration rate. Single design factors including raised pit elevation, mulched ground cover, and planted ground cover were not significant individual factors affecting infiltration by themselves.

In guarded pits, the combined design factors of mulch and planted groundcover increased infiltration capacity. In guarded pits, larger surface area was found to have a positive relationship with the infiltration rate. This may be due to larger, guarded areas being able to support healthier soil ecosystems.

In unguarded pits, larger surface size was found to have a slightly negative relationship with infiltration rate. A potential explanation is that the larger pit areas, without a guard, are more subject to compaction from foot traffic. Nearly all the tree pit soils examined in the study were coarser (a feature associated with less compaction) than required by design standards, yet still exhibited significantly reduced water infiltration rates, indicating that soil guidelines alone are not enough to ensure long-term stormwater infiltration.

## **Policy and Practice Implications**

Many engineered green infrastructure (GI) systems can occupy small spaces in the urban landscape, but they can also be costly and difficult to integrate into a dense, builtup environment. Measuring and optimizing the performance of existing urban vegetation can help justify the expense of future GI investments and on-going maintenance.

City design standards for tree pits should prioritize guarded pits (as opposed to unguarded pits), especially in areas with heavy foot traffic. Not installing a guard can lead to significant soil compaction reducing the ability of the tree pit to absorb stormwater.

Noting street tree design characteristics during street tree census efforts would help generate tree pit design data that can help inform whether a community can expect high or low stormwater infiltration performance from its street tree pits. This type of information can contribute to neighborhood stormwater management



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# JOURNAL BRIEF: URBAN TREE PIT DESIGN FACTORS FOR STORMWATER MANAGEMENT PERFORMANCE

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planning efforts.

*Editor's Note:* The above journal brief was based on a 2018 scientific study. You may read the study: "[Stormwater infiltration capacity of street tree pits: Quantifying the influence of different design and management strategies in New York City](#)" online.

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## **HOT TAKE – WE NEED DIVERSE AND RICH TREE SPECIES, NOT JUST MORE TREES TO REDUCE THE URBAN HEAT ISLAND EFFECT**

By Jessica Wright, Envirobites, July 12, 2021

In the heat of the summer, walking under the shade of a nearby tree can almost feel like jumping into a pool, especially if you are in a city and can feel the heat radiating off of your concrete surroundings. On a hot summer day, being in a city can feel almost unbearable. The excessive heat we associate with walking around a city on a hot day is caused by a phenomenon called the urban heat island effect (UHIE). The UHIE is defined as the experience of hotter temperatures in urban areas, as compared to nearby rural areas, due to the lack of vegetation, extensive concrete surfaces, and hub of activity and energy consumption in cities. Unfortunately, the UHIE has become a big concern for urban planners across the world as temperatures continue to rise and the occurrence of heat-related morbidity and mortality in urban areas have become a major public health concern. Urbanization is expected only to increase in coming decades, and with that, so will the intensity of the UHIE. Therefore, researchers across the world are looking for solutions to help keep temperatures down in cities and promote public health as more and more people flock to urban centers.

### **Vegetation as a solution**

One well-documented solution for helping to reduce the intensity of the UHIE is the planting of trees to increase vegetation in cities. Green spaces, such as parks, sports fields, street trees, and nature conservation areas, have multiple benefits to urban populations including improved urban sustainability and livability, improved air quality and stormwater management, and helping to reduce the intensity of the UHIE. Trees and vegetation help to cool the temperature in urban areas in two ways: 1) providing shade to reduce the amount of heat that reaches the surface, and 2) through a process called evapotranspiration that occurs when a plant uses heat to absorb water through their roots and release it as vapor into the air. Both characteristics make vegetation an effective tool for reducing the UHIE in cities.



# HOT TAKE – WE NEED DIVERSE AND RICH TREE SPECIES, NOT JUST MORE TREES TO REDUCE THE URBAN HEAT ISLAND EFFECT

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While there is ample evidence that vegetation helps to alleviate some of the UHIE, there is little research exploring what characteristics of greenspace are important in determining the amount of cooling greenspace can provide. A team of researchers lead by Dr. Xinjun Wang undertook field research to better understand what characteristics of plant community structure improves the cooling effect of green spaces without increasing their size. To do this, the research team looked at the cooling effect of a variety of tree community structures across Changzhou, China. The team compared the temperature drop, using temperature data from Landsat 7 ETM+ and Landsat 8 TIRS, of 15 different greenspaces during each of the 4 seasons. Specifically, the authors examined 156 sample plots with different tree community structures within the 15 greenspaces.

## **Greenspace characteristics are crucial**

To understand the impacts of greenspace characteristics on the ability of the greenspace to cool, the authors utilized land surface temperature satellite data and compared the temperature within the green space and the temperature of the surrounding built area. The authors performed these measurements for 156 plots that were each 400m<sup>2</sup>. Within each plot, the research team counted the number of trees and recorded their diameter, species, height, crown height and width, and the health of the crown. From these measurements, the authors were able to assign two metrics of tree diversity (or the number of species) and the Shannon-Wiener diversity index (combines species richness and the relative frequency of these species).

## **Results and moving forward**

From their analyses, the authors found that the tree community structure of urban greenspaces indicate the strength of the cooling effect. The authors discovered that the Shannon-Wiener diversity index, tree species richness, and tree canopy coverage were all positively correlated with the cooling effect of the greenspace meaning that the higher value for these three characteristics means more cooling effect can be achieved from that greenspace. However, it is important to note that the strength of the cooling effect changes with the seasons. The results also showed mean crown width to be positively correlated with cooling during the summer and fall. Lastly, greenspace tree density was negatively correlated with cooling in the winter.

The authors hope that results from this paper can help to inform urban planners and city officials when it comes to the design and species diversity of their greenspaces. Greenspaces are crucial for helping to alleviate some of the public health and environmental stressors of urbanization but ensuring that these resources are used to their full potential is even more critical.

*Editor's Note:* Envirobites is devoted to providing accessible summaries of scientific research papers. Envirobites website: <https://envirobites.org/>

# **HOT TAKE – WE NEED DIVERSE AND RICH TREE SPECIES, NOT JUST MORE TREES TO REDUCE THE URBAN HEAT ISLAND EFFECT**

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The above summary was written about the paper: Wang, X., M. Dallimer, C.E. Scott, W. Shi, J. Gao. (2020). Tree species richness and diversity predicts the magnitude of urban heat island mitigation effects of greenspaces. Science of the Total Environment 770(20):145211

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## **WHY, WHAT AND HOW OF COMMUNITY OUTREACH AND ENGAGEMENT**

By Molly E. Donovan, University of New Hampshire Cooperative Extension

### **Why reach out and engage your local community?**

Healthy communities have an active and engaged citizenry. There are many ways to engage. Civic engagement is a broad term used for the many ways community members are involved in civic life, from volunteering on a town committee to coaching youth hockey, taking care of local trails, or joining the garden club. All of these activities add to the health of the community and create strong social connections or social capital. Public engagement is involvement in local decision-making – decisions that have an impact on the whole community.

Most people associate public engagement with local governance. New Hampshire has a strong tradition of local governance and citizen participation. Most towns generally operate with the town meeting form of government, where the registered voters in the town act as the town legislature, and a board of selectmen acts as the executive of the town. The community is invited to gather and decisions are made at the annual town meeting.

Communities also deliberate and make decisions about community issues such as planning for a new development project, school-related topics, and local budgets outside of the annual town meeting. Community members must have an opportunity to participate in the discussion and decision-making, and community leaders have a responsibility to reach out and engage their citizens. Residents often have personal knowledge or experience with a community issue; ideas, alternate plans, or solutions not previously considered; suggestions for resources; or offers to lend their skills to projects and tasks. Community interest, understanding, and support for an issue, project or program will increase with engagement of citizens.

### **What is outreach?**

Outreach and engagement are two distinct ways to connect with your community. Outreach is one-way communication that tells community members about an issue, problem, opportunity, or decision. Outreach can be postcards sent to homeowners, fliers placed throughout a community, website postings, and meeting



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# WHY, WHAT AND HOW OF COMMUNITY OUTREACH AND ENGAGEMENT

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announcements, for example. Community leaders inform the public of an upcoming discussion and invite them in to comment or participate. Many communities require this important step in working closely with residents, and outreach can be essential when the public senses that the topic is not controversial or interesting and would likely not attend.

## **What is engagement?**

Community leaders often look for ways to broaden public participation. Public engagement can lead to broader participation and wider community input in decision-making. Through deliberate, well planned public engagement, community members become informed about, participate in, and influence public decisions. Community members go beyond just knowing about a pending decision to participating in the decision-making process—they become a part of the community change. The engagement process includes listening, discussion, deliberation, and decision-making. Successful community engagement builds relationships in the community which, ultimately, strengthens the community’s social fabric and develops new leaders.

## **Ways to engage**

Engagement should be neutral – it is not advocacy work or advocating for a certain view. It opens up the discussion and encourages broad participation. Consider the format for engagement—the methods you choose should reflect your purposes and engagement goals. Do you want your community to dive deeply into a complex issue or just gauge their reaction to a pending change, issue, or idea? Do you seek a solution to a community problem or help in creating a vision for the next 20 years? Be sure to fit the process to your participants and your goal. Engagement processes abound: visioning session, forums, charettes, issues open houses, world cafés, web-based and online tools, and asset mapping, to name a few. All foster broad public participation but each has a unique format and purpose. All, however, require planning, knowledge of the format, and usually, a leader or facilitator.

All methods have value as long as they help you build relationships and allow the public to share their thoughts. In some cases you may use a number of engagement tools – like a facilitated vision session and social media to gather ideas for the future.

## **Identifying your public**

Inviting the public to community discussion and decision-making can be challenging because, ideally, you should include everyone. So, where do you start to engage everyone in your community? Consider who may be affected by or interested in your issue. Think about all of the civic infrastructure that makes up

# WHY, WHAT AND HOW OF COMMUNITY OUTREACH AND ENGAGEMENT

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your community such as schools, businesses, hospitals, nonprofit organizations, civic groups, service organizations, senior center, faith-based organizations, library, town boards, boy and girl scouts, 4-H, recreation organizations, and others. Invite a contact from each organization to the discussion. Also ask them to encourage their respective networks to participate. Your outreach and engagement effort should reach out to all of these groups but remember to reach out (send postcard, flier etc.) and engage (ask them directly) for the greatest success.

How Can Underrepresented Populations be brought into Decision-Making?

Some community members may have never participated in community discussions before and may be underrepresented in decision-making. Underrepresented community members may include youth, seniors, minorities, veterans, limited income populations, and residents with disabilities. The list may be different in your community. Make a special effort to include all community members. Often the location, time, language, format, or topic may be challenging for underrepresented groups. Make an effort to go to them to talk at a time and location convenient and comfortable for them. An organization or leader with experience connecting with the community may be your best first contact, as you may find a greater level of trust. Take the time and do the planning to build these important new relationships. Underrepresented populations have ideas, concerns, and insights of great value.

## **How to handle disagreements or conflict in community engagement**

Your engagement process should encourage a range of views, plan for disagreement, and prepare to manage it. Some level of conflict or disagreement is acceptable and constructive—allow thoughts and ideas to flow and manage the tension. Above all, respect every participant no matter their view. A strong engagement process will incorporate time and space for everyone to participate while limiting unproductive conflict and pre-empting individuals from taking over the discussion. A good facilitator will allow disagreements to be shared and recorded but will help keep the discussion on track. Set ground rules at the beginning of an engagement session. These may include taking turns talking, acting respectful, not making personal statements, and staying on topic. The participants should review and approve the ground rules and can even suggest new ones. This will encourage the whole group to follow the rules and provides support to the facilitator. Make your process open and work for everyone.



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## **CALENDAR OF EVENTS 2024**

April 9th	NJAPZA/NJSTF Webinar Series Session 3: The NJDEP Model Ordinance & Municipal Tree Ordinances in NJ, 10:00-11:30am
April 26th	National Arbor Day
May 8th	NJSTF Tree Talk Zoom, 7:00-8:30pm
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



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