Tree Health and Survival in Urban Settings

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Acknowledgements:
Ed Gilman, PhD

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HOW IT STARTED…

Qu: What should be the appropriate response when an Extension office receives a few phone calls from property owners throughout a county, stating that their HOA leadership committees plan to cut down 1,000 oak trees in the neighborhood because of “too many acorns?”

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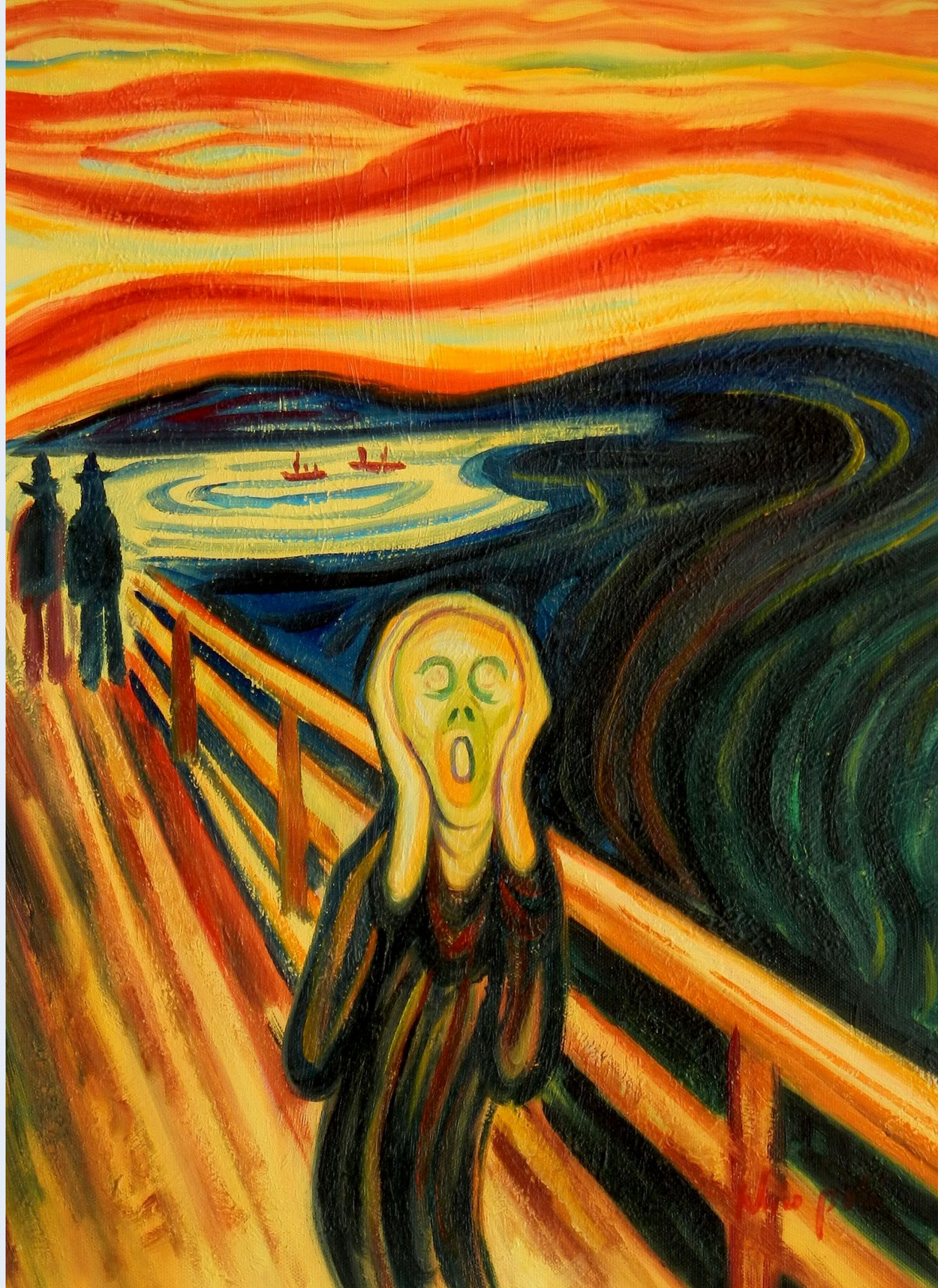

Ans: One response could be to invite the property owners and HOA committee members to attend an urban forestry Extension ***Tree Steward*** program to help provide information on residential tree care.

TREE STEWARD PROGRAMS

MAKING THE CASE FOR URBAN FORESTRY EXTENSION & TREE STEWARD PROGRAMS

In rapidly urbanizing counties in Florida, canopy coverage is declining. **In many states, tree steward programs bolster canopy conservation efforts by promoting awareness of the benefits of urban trees and supporting tree planting events**

STATEWIDE TREE STEWARD PROGRAMS

Virginia Tree Stewards

Tree Fredericksburg

Volunteers Restoring Our Urban Forest

Tree Tenders, Pennsylvania

NATIONWIDE TREE STEWARD PROGRAMS

To date, more than 23 states conduct statewide urban forestry tree steward programs; efforts are underway to add Florida to the list.

NATIONWIDE TREE STEWARD PROGRAMS:

- Delaware Tree Stewards
- Trees Atlanta, Georgia
- Tree Stewards, Minnesota
- CommuniTree Stewards, New York
- Tree Stewards, South Carolina
- Tree Stewards, Indiana
- North Carolina Tree Stewards
- Neighborhood Tree Stewards Oregon
- Tree Stewards, Vermont
- Rooted-in-Cheyenne, Wyoming
- Las Cruces Tree Stewards, New Mexico

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WHY AN URBAN FORESTRY EXTENSION COMMUNITY ENGAGEMENT PROGRAM?

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…BECAUSE IN ADDITION TO THE PROFESSIONALS WHO CARE

***FOR* TREES,**

CANOPY CONSERVATION EFFORTS NEED PEOPLE TO CARE

***ABOUT* TREES**

E.G. TREE STEWARDS

MAKING THE CASE FOR URBAN FORESTRY EXTENSION PROGRAMS & ENGAGING TREE STEWARDS

Urban Forestry Extension and tree steward programs help community members make the connection between the **ecosystem services benefits of trees** and their **quality of life**.

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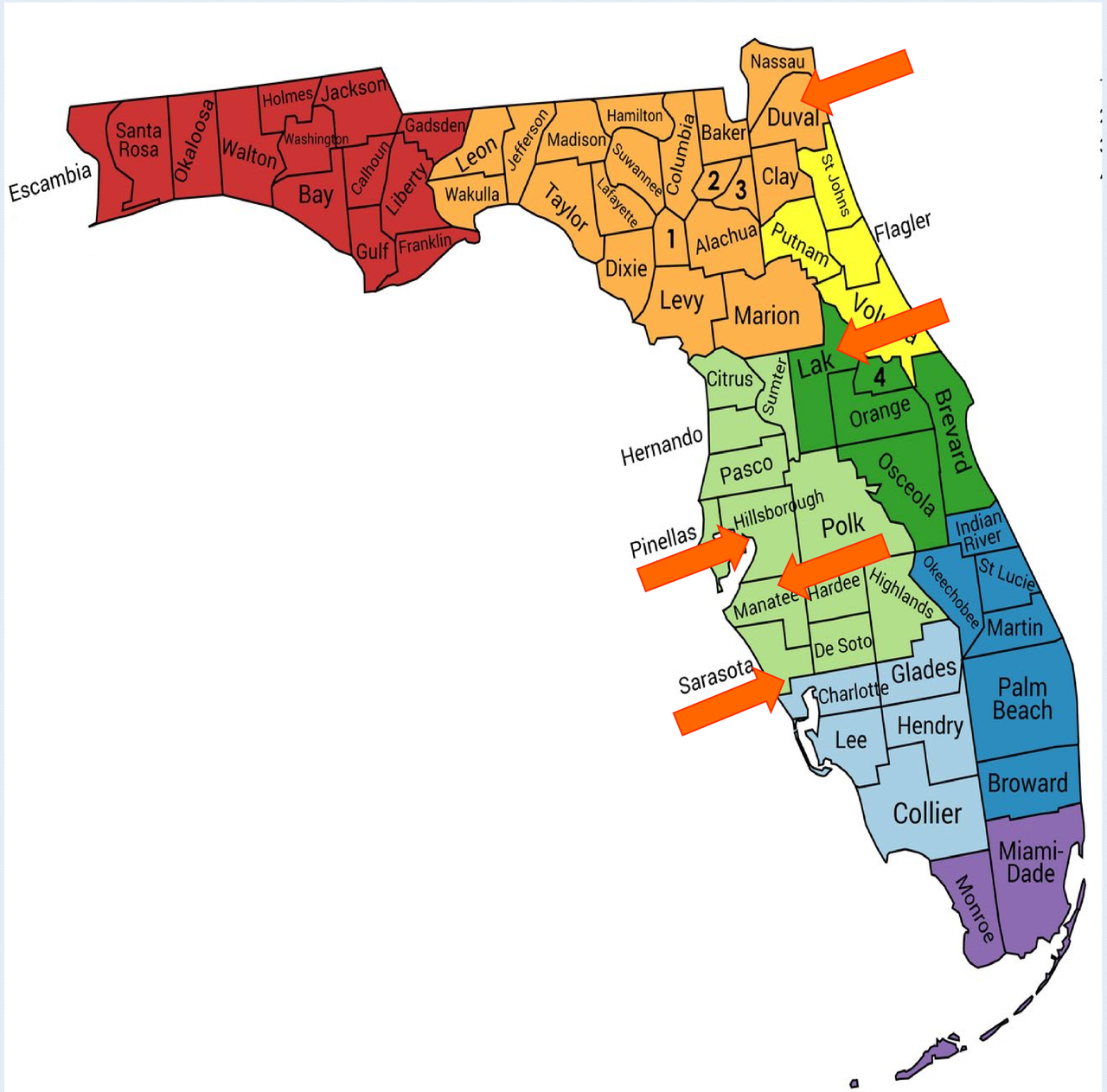
To mitigate canopy loss from tree removal and urban development, the ***Treejuvenation© Florida*** Extension urban forestry program was launched as a pilot project in 2017.

TREEJUVENATION URBAN FORESTRY EXTENSION PROGRAM

- When the Treejuvenation urban forestry Extension program was launched, only 2 of 67 FL counties offered tree steward training.

- Since then, urban forestry Extension programs have expanded in several other counties.

- The goal is to expand urban foresty Extension tree steward programming so that it can be offered statewide in Florida



TREEJUVENATION URBAN FORESTRY EXTENSION PROGRAM

The program was designed to increase urban forestry community engagement through tree steward projects & activities which focus on how urban trees improve **quality of life** .

Treejuvenation Program Goals:

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i. to increase community awareness of tree assets

ii. to promote urban forestry community engagement and generate interest in tree steward activities

iii. to support urban forestry partnerships

iv. to develop a network of urban forestry groups

Treejuvenation Urban Forestry Extension

Florida Tree Steward Program

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UF IFAS Extension Sarasota County

FLORIDA TREE CHAMP TRAINING PROGRAM

Multi-module tree steward curriculum;
186 tree steward trainings since 2020

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URBAN FORESTRY EXTENSION

COMMUNITY ENGAGEMENT PROGRAMS

Treejuvenation Urban Forestry Extension Projects

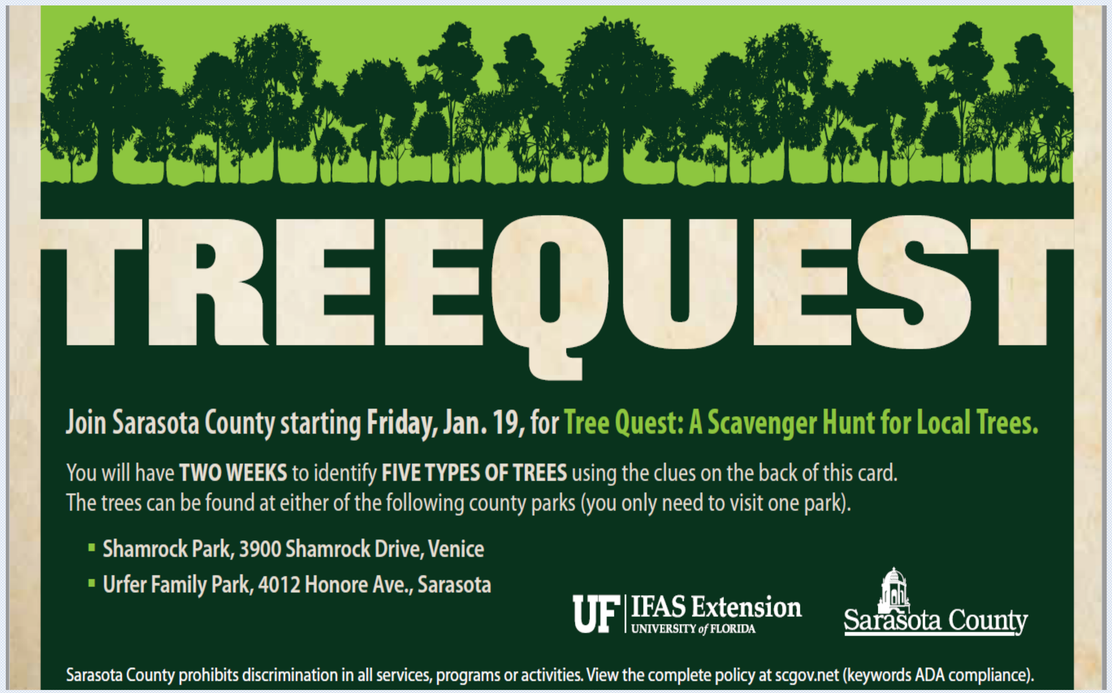
Library Poster Campaign

Florida Arbor Day TreeQuest

SURF Micro-Forest

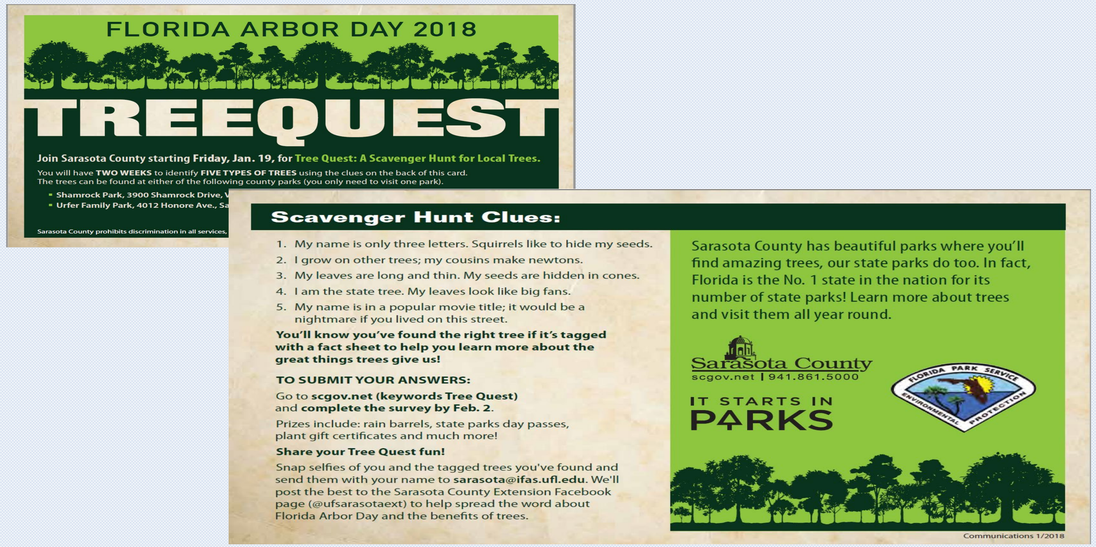
Tree Adoption Events

Florida Arbor Day TreeQuest Scavenger Hunt

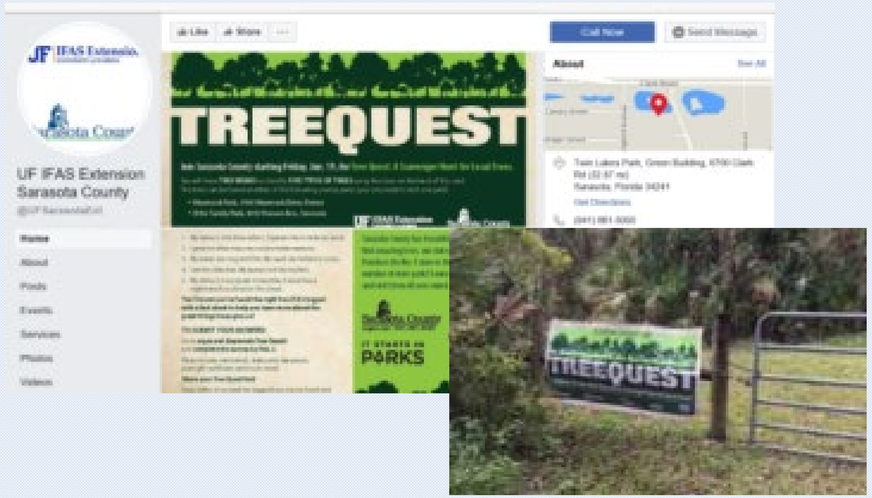


In recognition of **Florida's** *Arbor Day, the* ***Treejuvention*** *program hosts 'TreeQuest' scavenger hunts in county parks.*

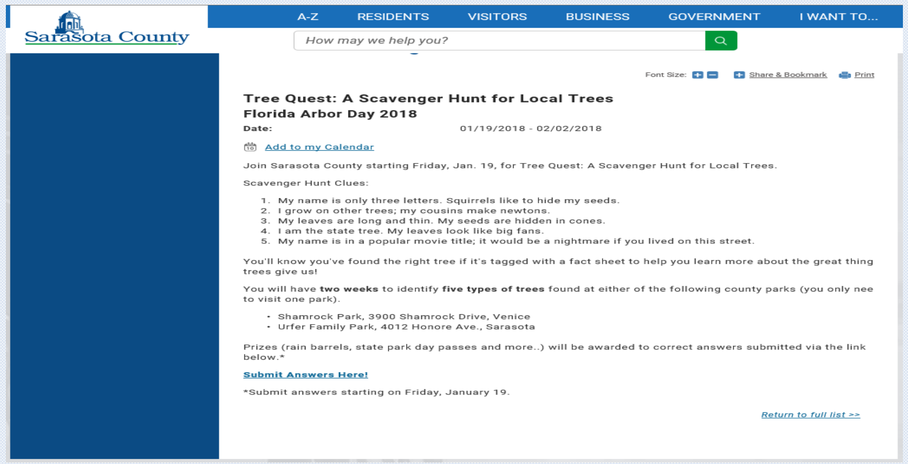
Florida Arbor Day TreeQuest Scavenger Hunt



Develop scavenger hunt clues*



Promote the scavenger hunt



Live-launch clue submission weblink *on* Florida Arbor Day*

Post contest winners

MyTree Benefits

Tree 1: (Oak at front of building) Oak, Live (Quercus virginiana)
Serving size: 5" dbh, Excellent condition

Carbon Dioxide (CO_2) Sequestered	$1.66
CO_2 absorbed each year	171.09 lbs
Storm Water	$3.32
Rainfall intercepted each year	1106 gal.
Air Pollution removed each year	$0.64
Ozone	3.26 oz
Nitrogen dioxide	0.26 oz
Sulfur dioxide	0.04 oz
Large particulate matter**	1.07 oz
Energy Usage each year*	$0.98
Electricity savings (A/C)	5.83 kWh
Fuel savings (NG,Oil)	0.17 therms
Avoided Emissions	
Carbon dioxide	10.18 lbs
Nitrogen dioxide	0.03 oz
Sulfur dioxide	0.30 oz
Large particulate matter**	0.05 oz

Benefits are estimated based on USDA Forest Service research and are meant for guidance only:www.itreetools.org

*Positive energy values indicate savings or reduced emissions. Negative energy values indicate increased usage or emissions.

**is not greater than 10 microns

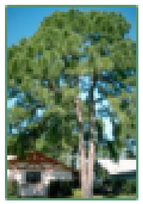
www.itreetools.org
i-Tree MyTree v1.1

TreeQuest MyTree Tag

National Arbor Day Tree Adoption Events

Multiple tree adoption stations at libraries throughout the county, farmers markets and the Extension office

National Arbor Day Tree Adoption



Longleaf Pine

Pinus palustris

Height: 60 to 80 ft. typically; 110 ft. in good soil

Spread: 30 to 40 feet

Light requirement: full sun

Soil tolerances: clay; sand; loam; acidic; slightly alkaline; prefers well-drained soil

Drought tolerance: high

Aerosol salt tolerance: high

Roots: not a problem

Outstanding tree: yes

Ozone sensitivity: unknown

Verticillium wilt susceptibility: resistant

Longleaf pine is not commonly found in landscapes, but its attractive bark and open habit make it well suited for large landscapes, which have a lot of open space overhead. Shedding needles may require ongoing maintenance if planted near paved areas. Longleaf pines mature within 100 to 150 years, and can live up to 500 years under ideal conditions.

Send us your questions: *sarasota@ifas.ufl.edu*

(Ref: UF/IFAS EDIS Factsheet ST649; http://gardeningsolutions.ifas.ufl.edu/plants/trees-and-shrubs/trees/longleaf-pine.html; Photo credit: Ed Gilman)

Tree Care Tags

12-Step Tree Adoption Aftercare Program

1. Look up! Avoid planting under overhead power wires and streetlights.
2. Call 811 to locate underground utilities, before digging a hole.
3. Select a planting location at least 6-8 ft. from pavements, & 15 feet from the nearest building.
4. Dig a hole 2-3 times WIDER, but the SAME length/depth as the root ball.
5. Gently remove root ball from container and check for root defects e.g. circling roots; if present, slit circling roots at diagonal points of an 'X' around the root ball.
6. Carefully place tree in the planting hole and position top of root ball 1-2 inches above the soil level.
7. Straighten the tree.
8. Half-fill the planting hole with soil.
9. Fill planting hole with water to get rid of air pockets.
10. Finish backfilling the hole with soil.
11. Add mulch in an 8 ft. diameter 'doughnut' around the tree but keep it away from touching the trunk.
12. Water (1 gallon) daily first 2 weeks; next 2 months - every other day; next 3 months - weekly.

For more information, watch this video: https://www.youtube.com/watch?v=5Dmmaemw4io

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Increasing community engagement in urban forestry through Extension tree steward programs, can have a positive impact on preserving neighborhood trees now, and well into the future.

An Experiential Urban Forestry Extension Program's Impact…

- Urban forestry Extension community engagement activities can play a significant role in urban re-forestation, and ultimately, climate-change mitigation.
- Since its launch in 2017, *Treejuvenation© Florida* has had 421 residents participating in 31 urban forestry Extension activities, planting more than 5o0 native trees, and contributing to the sequestration of up to 900,000 lbs. of carbon, over the trees' lifetime.

Why do trees matter?

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Urban Forestry

- The term ‘urban forest’ refers to the tree population which exists in built environments e.g. suburbs, towns and cities.

- Urban forestry is the planting, protection, care and maintenance of trees in built environments.

Community Tree Assets

Trees provide communities with many benefits

- decreased flooding potential
- cleaner water
- lower summer temperatures due to reduced heat-island effects
- cleaner air
- improved mental and physical wellbeing
- carbon sequestration
- increased property values

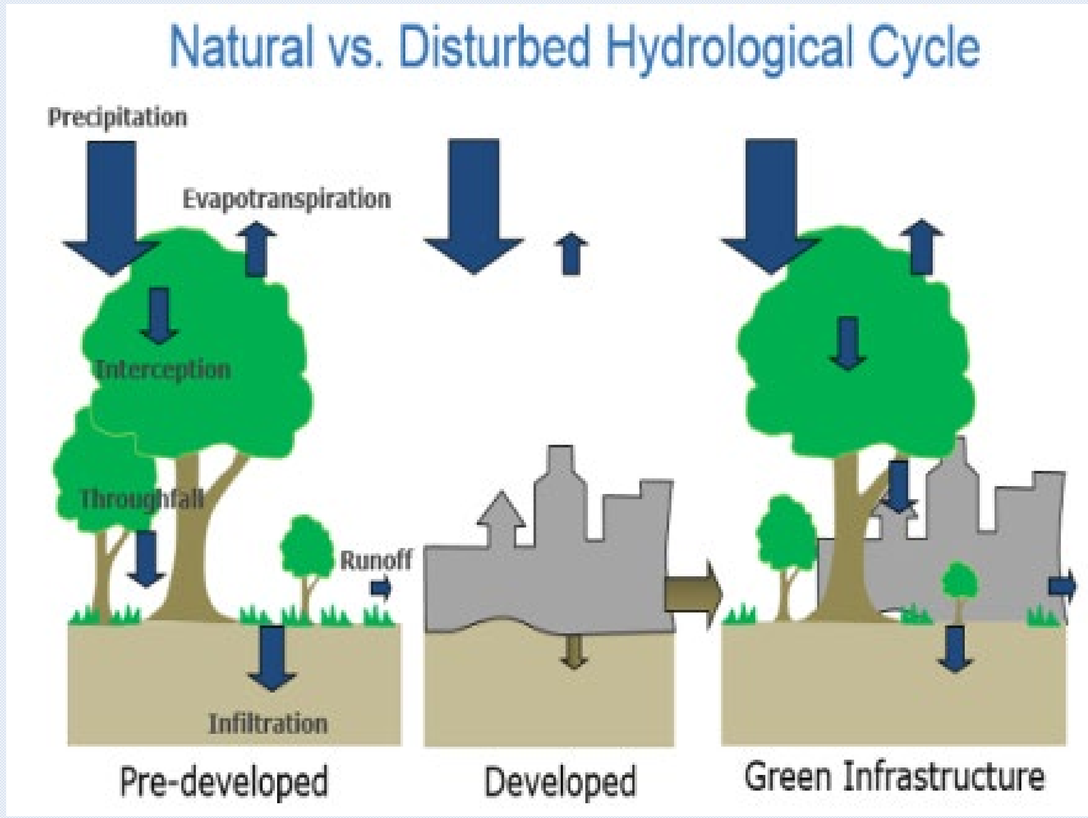
Community Tree Assets

Mature native trees also have the lifetime capacity to sequester more than 3,000 lbs. of carbon dioxide as carbon (iTree/My Tree Benefits, 2019).

Benefits of Urban Trees

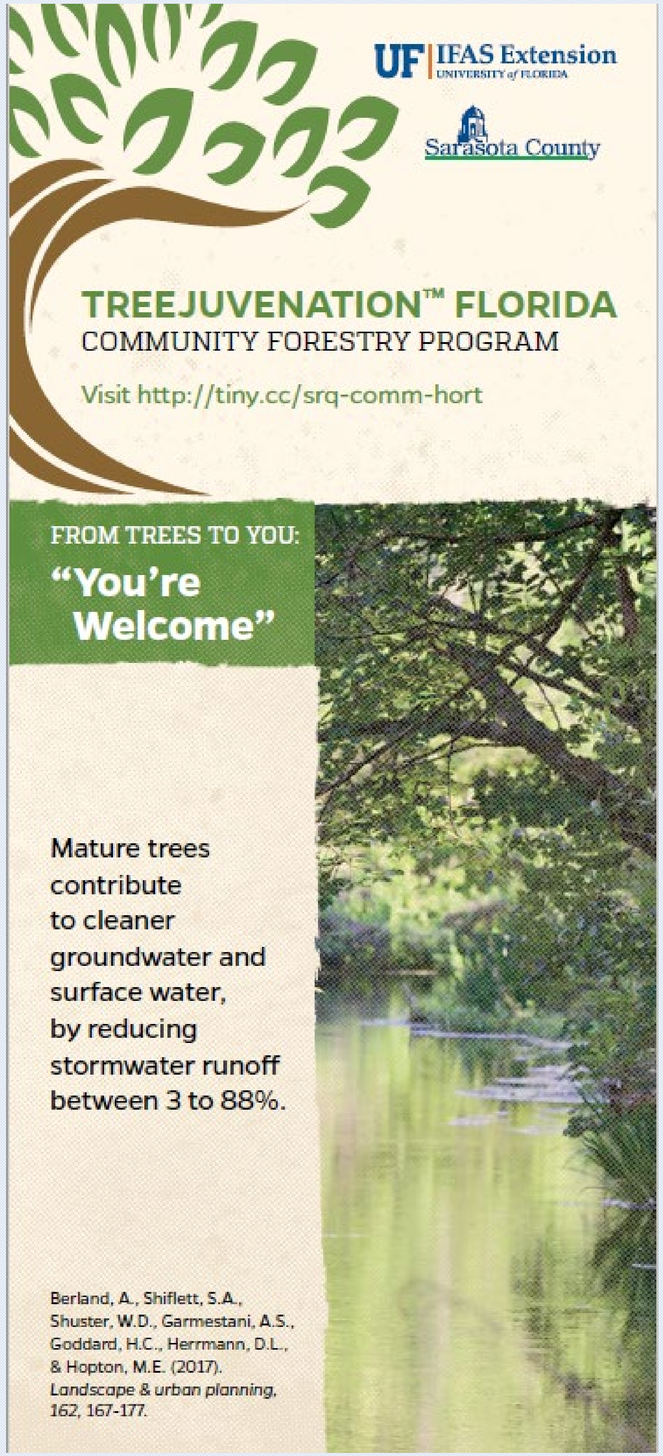
The impact of green infrastructure on neighborhood hydrology

- improved stormwater infiltration
- reduced runoff



Benefits of Trees:

Cleaner water



MyTree Benefits

i-Tree

Tree: American Elm (*Ulmus americana*)
Serving size: 18" dbh, Good condition

Total benefits for this year:	**$17.81**
Carbon Dioxide (CO_2) sequestered	**$12.93**
Annual CO_2 equivalent of carbon[1]	555.89 lbs
Stormwater runoff avoided	**$4.67**
Runoff avoided	523.16 gal
Rainfall intercepted	2,364.70 gal
Air Pollution removed each year	**$0.21**
Carbon monoxide	0.70 oz
Ozone	26.09 oz
Nitrogen dioxide	1.67 oz
Sulfur dioxide	1.22 oz
Particulate matter <2.5 microns	0.97 oz
Carbon Dioxide (CO_2) stored to date[3]	**$80.15**
Lifetime CO_2 equivalent of carbon[3]	3,446.35 lbs

Benefits are estimated based on USDA Forest Service research and are meant for guidance only:
www.itreetools.org

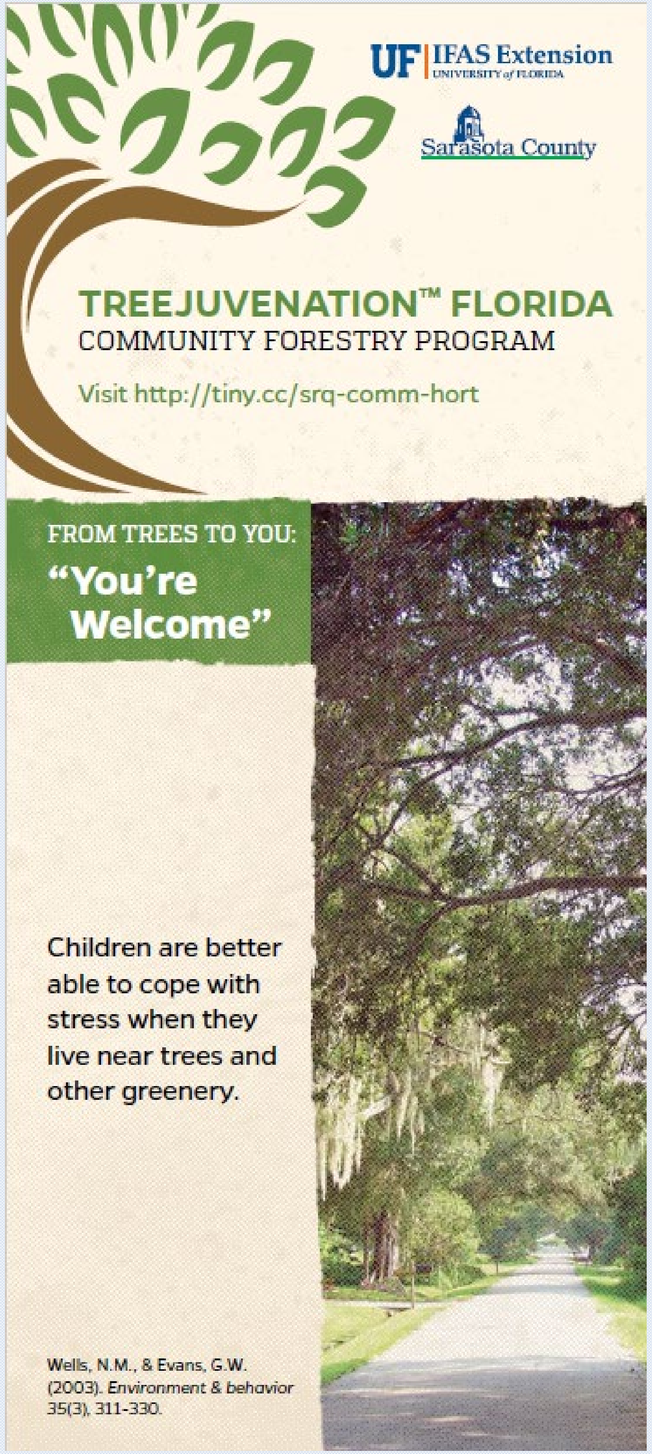
[1] Large trees: sequestration is overtaken by CO_2 loss with decay/maintenance.
[2] Positive energy values indicate savings or reduced emissions. Negative energy values indicate increased usage or emissions.
[3] Not an annual amount or value.

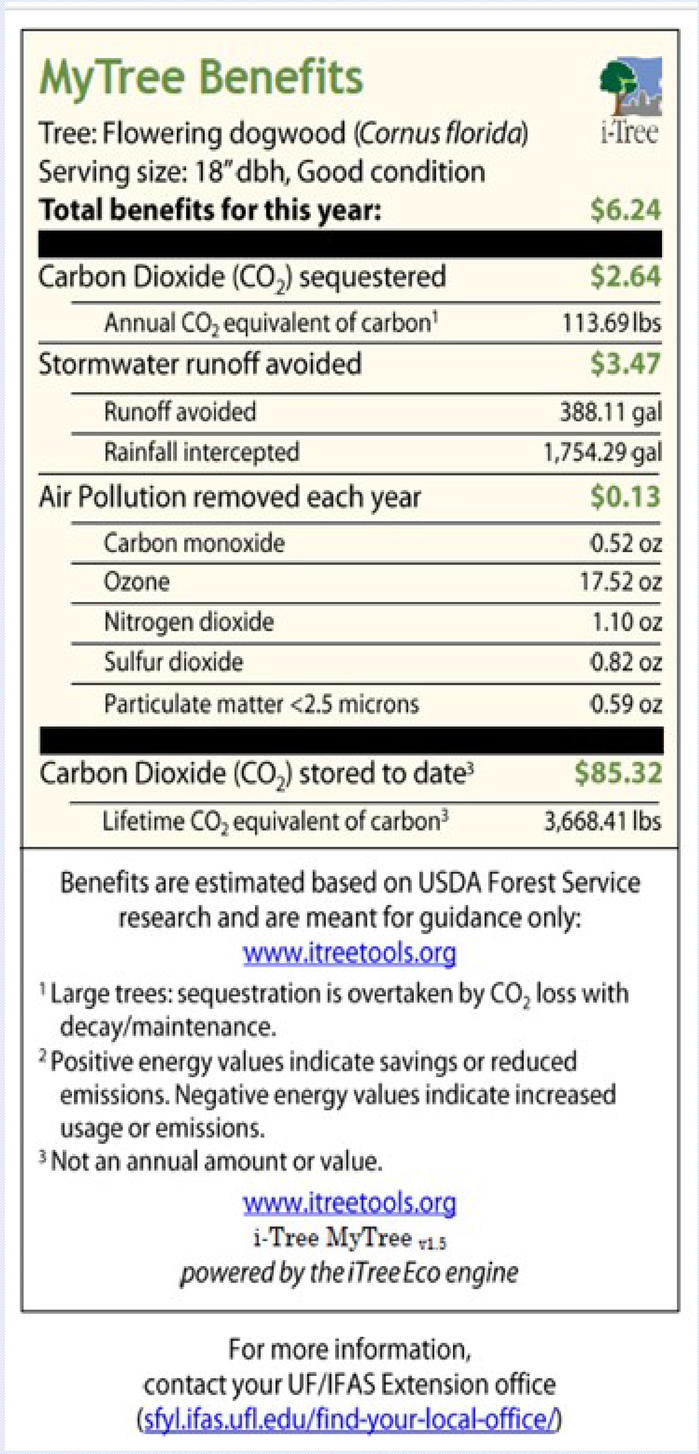
www.itreetools.org
i-Tree MyTree v1.5
powered by the iTree Eco engine

For more information,
contact your UF/IFAS Extension office
(sfyl.ifas.ufl.edu/find-your-local-office/)

Benefits of Trees:

Lower stress





MyTree Benefits

i-Tree

Tree: Flowering dogwood (*Cornus florida*)
Serving size: 18" dbh, Good condition

Total benefits for this year:	**$6.24**
Carbon Dioxide (CO_2) sequestered	$2.64
Annual CO_2 equivalent of carbon[1]	113.69 lbs
Stormwater runoff avoided	$3.47
Runoff avoided	388.11 gal
Rainfall intercepted	1,754.29 gal
Air Pollution removed each year	$0.13
Carbon monoxide	0.52 oz
Ozone	17.52 oz
Nitrogen dioxide	1.10 oz
Sulfur dioxide	0.82 oz
Particulate matter <2.5 microns	0.59 oz
Carbon Dioxide (CO_2) stored to date[3]	$85.32
Lifetime CO_2 equivalent of carbon[3]	3,668.41 lbs

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Benefits of Trees

Improved wellbeing

UF IFAS Extension UNIVERSITY of FLORIDA Sarasota County

TREEJUVENATION™ SARASOTA

COMMUNITY FORESTRY PROGRAM

Visit http://tiny.cc/srq-comm-hort

FROM TREES TO YOU:
"You're Welcome"

People feel more at ease in shaded, open areas of trees, as compared to areas of hardscapes and non-living things.

Burden, D. (2006). 22 benefits of urban street trees.
Glatting Jackson, Walkable Communities, Inc.

MyTree Benefits

i-Tree

Tree: Holly (*Ilex* species)
Serving size: 18" dbh, Good condition

Total benefits for this year:	$8.49
Carbon Dioxide (CO_2) sequestered	$7.14
Annual CO_2 equivalent of carbon[1]	307.07 lbs
Stormwater runoff avoided	$1.24
Runoff avoided	138.35 gal
Rainfall intercepted	625.33 gal
Air Pollution removed each year	$0.11
Carbon monoxide	0.19 oz
Ozone	10.80 oz
Nitrogen dioxide	0.76 oz
Sulfur dioxide	0.49 oz
Particulate matter <2.5 microns	0.61 oz
Carbon Dioxide (CO_2) stored to date[3]	$77.23
Lifetime CO_2 equivalent of carbon[3]	3,320.82 lbs

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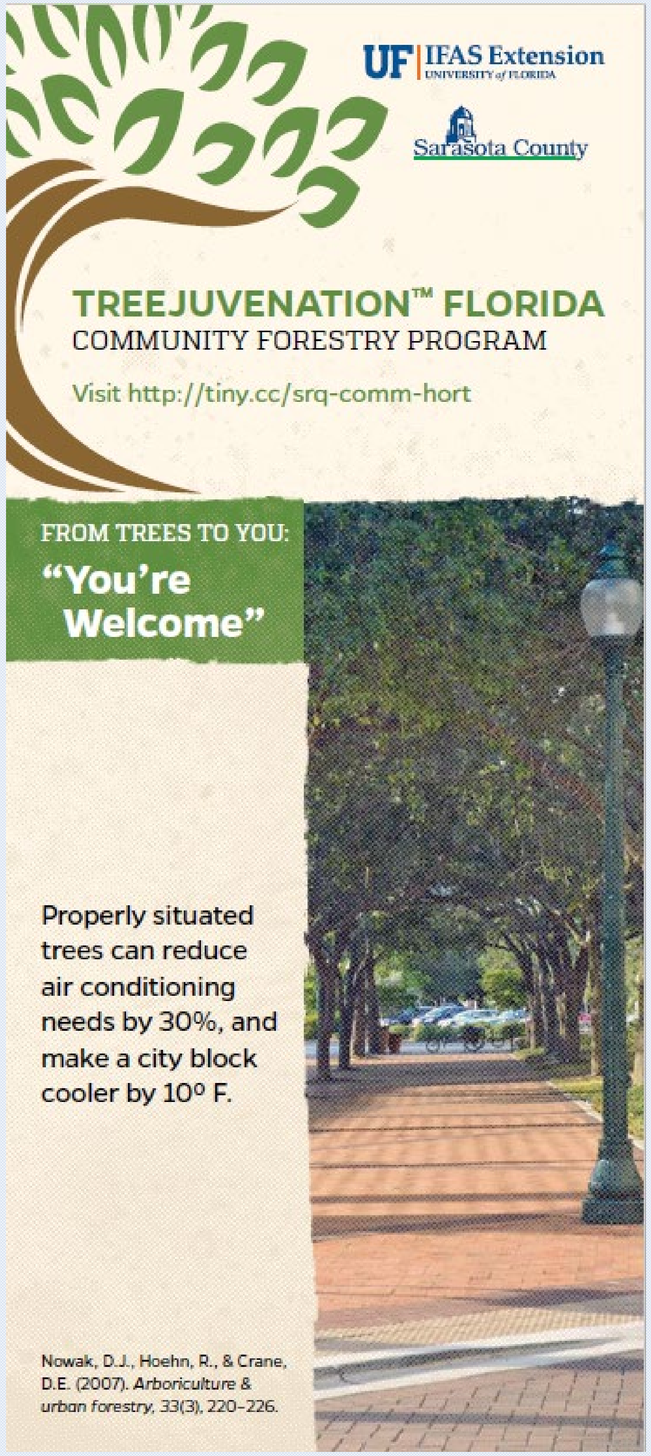
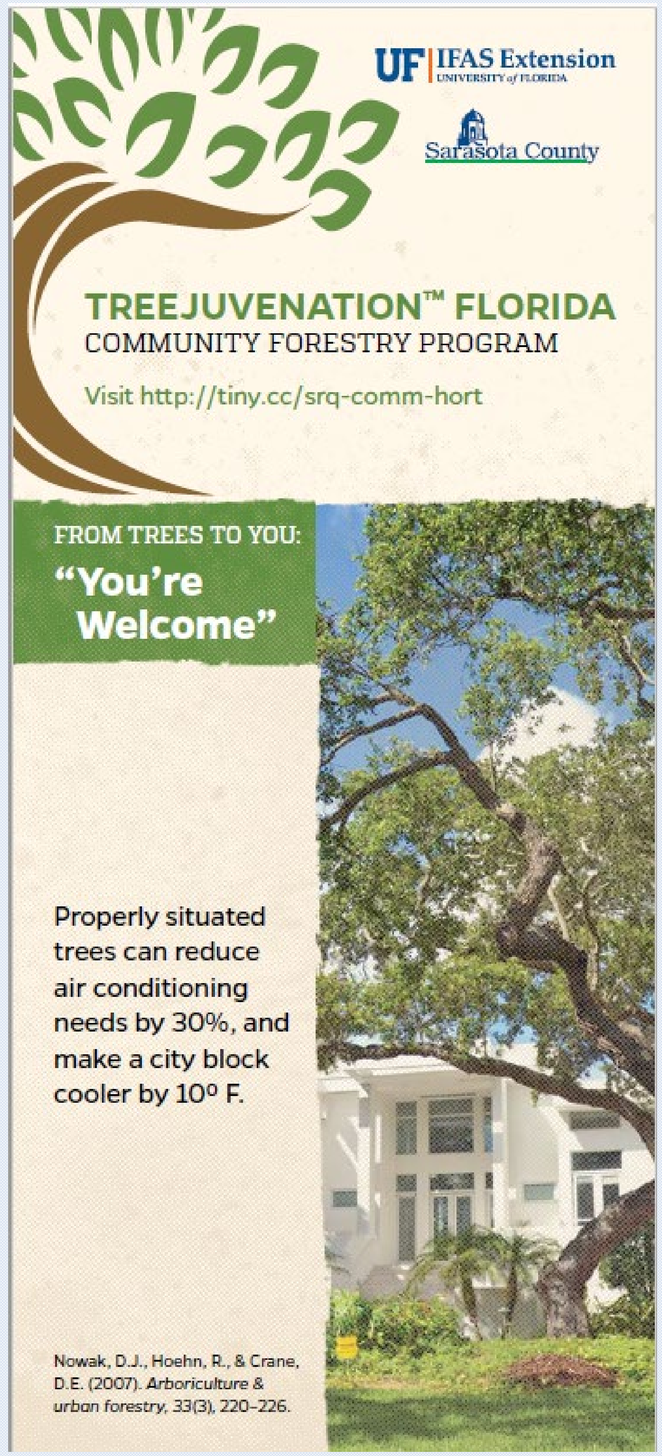
Benefits of Trees:

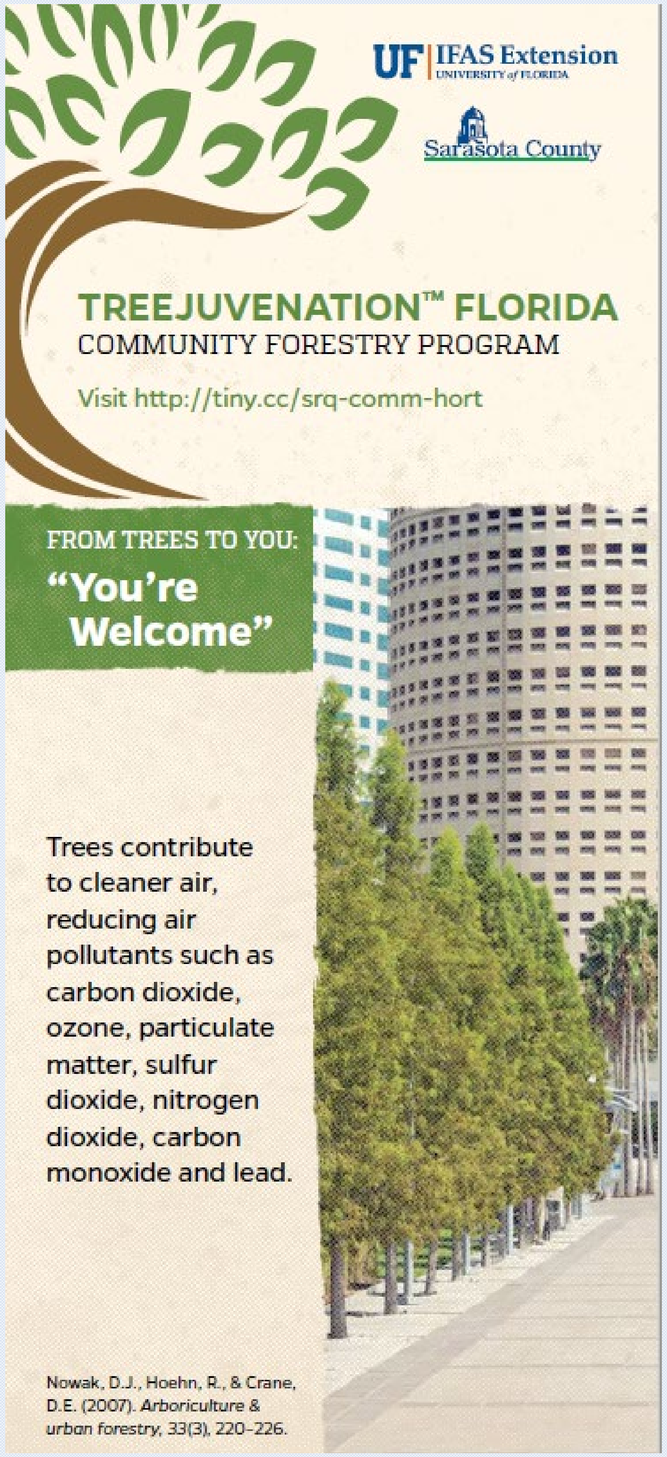
Cooler temperatures





Benefits of Trees:

Cleaner air



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The Macro-benefits of Micro-forests

© WGCU-PBS-NPR

Why micro-forests?

© BernNews

- Many rapidly urbanizing communities recognize the importance of preserving and expanding tree canopy.

- Balancing competing priorities between providing greenspace with land development demands continues to present a challenge.

- Micro-forests can provide a feasible solution to this challenge by providing the ecosystem benefits of tree canopy expansion, on relatively small parcels of greenspace.

What are micro-forests?

© RichmondNews

- Micro-forests are a bio-diverse group of densely planted native trees, based on the Miyawaki Method.

- The World Economic Forum estimates that planting micro-forests can increase the worldwide capacity of communities to sequester up to 10 gigatons of carbon by the year 2050.

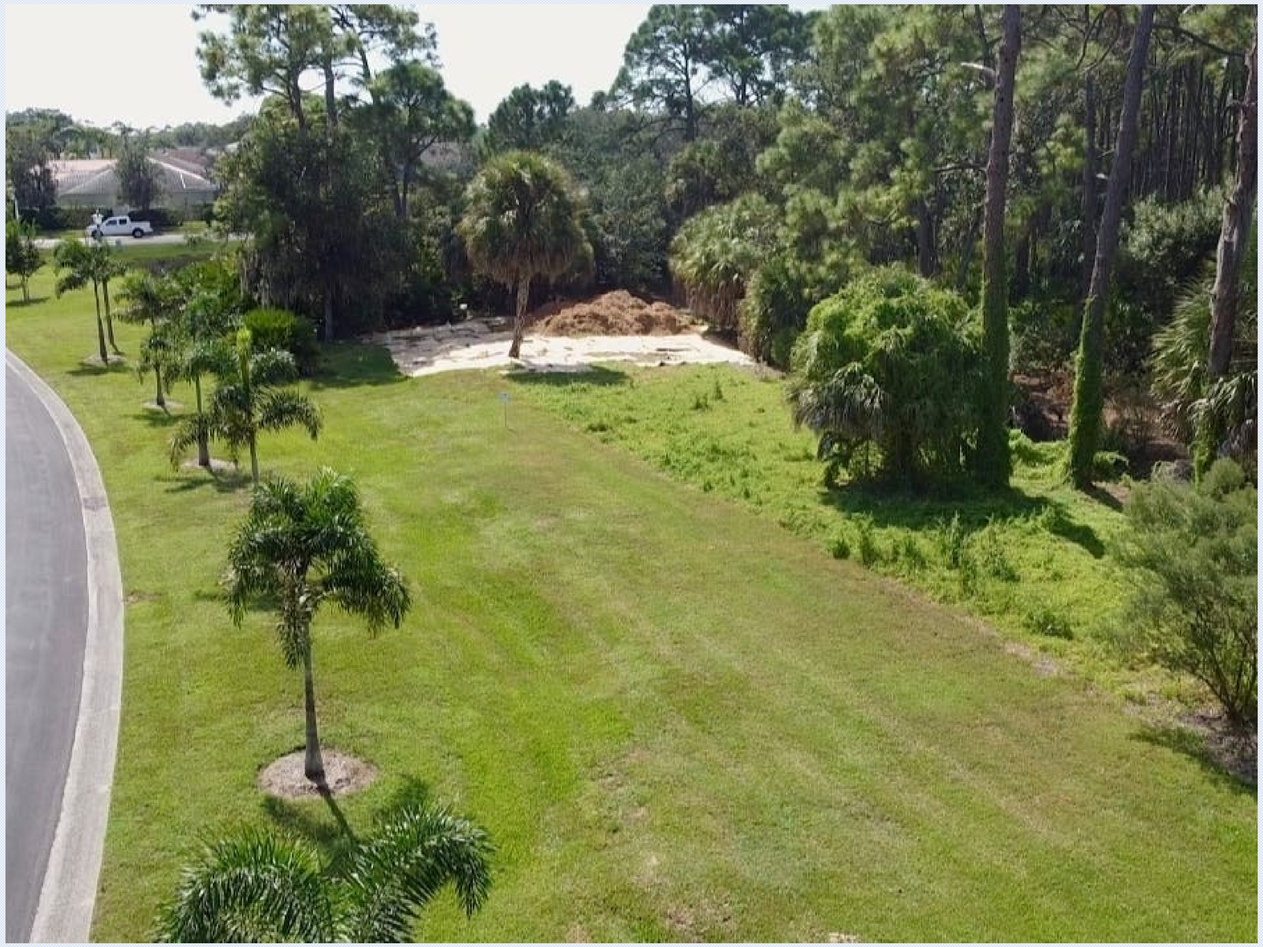
Community Park Micro-Forest Project

- To promote the ecosystem benefits of increased tree canopy, the *Treejuvenation* program launched a ‘Tree Trail Tour’ in collaboration with two community volunteer groups to promote a micro-forest afforestation project.

- The SURF micro-forest was established with 250 trees, on a strip of land approximately 14,000 sq. ft., in a local park. The goal of the ‘Tree Trail Tour’ scavenger hunt was to educate visitors on the specific ecosystem benefits of each tree.

Greenbelt
Micro-Forest Project

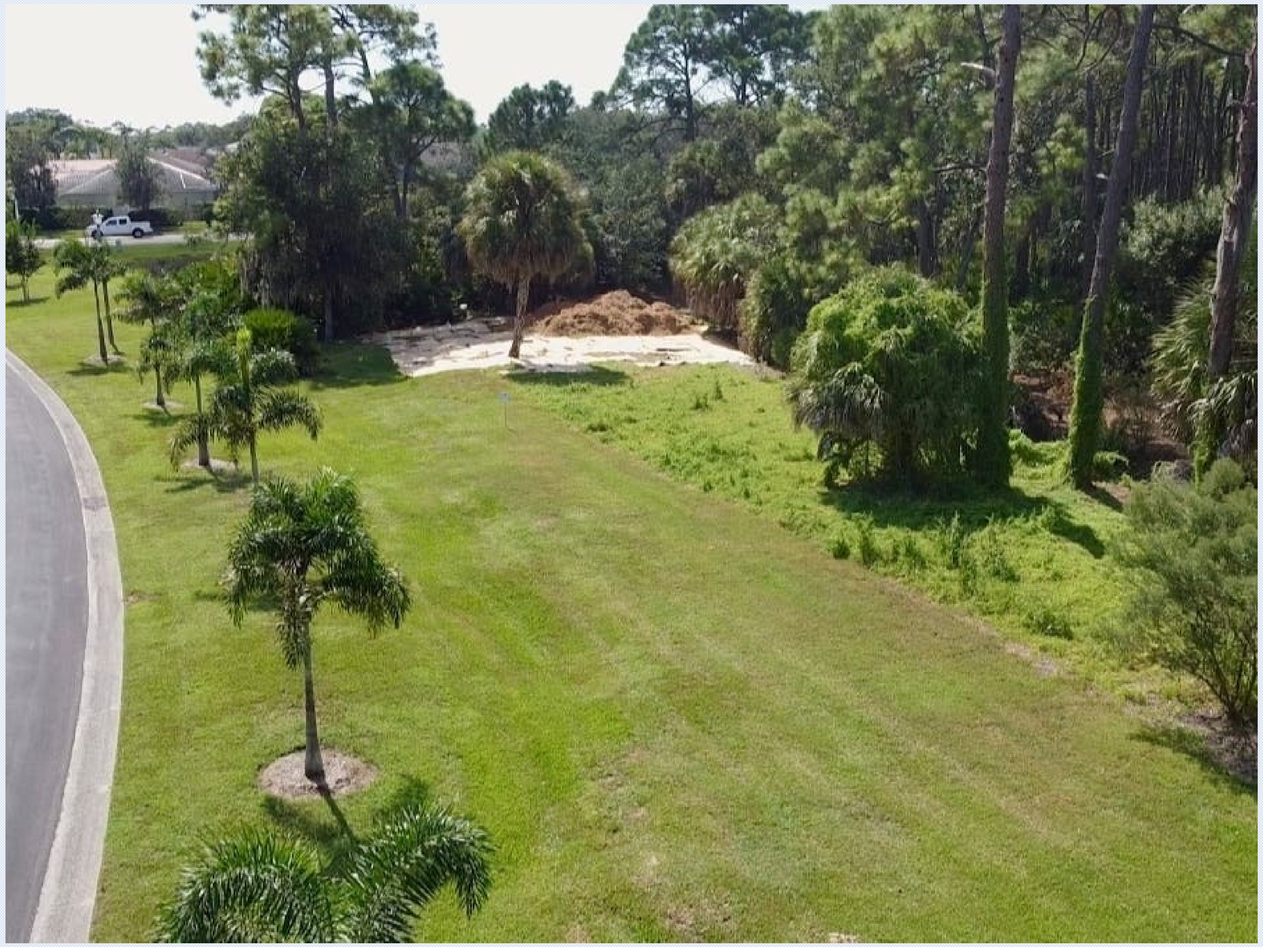
As a result of the successful partnership on the park micro-forest, a second micro-forest was installed with 1,000 trees in collaboration with an HOA community.



© PATCH

Project Impacts

The installation of 1,250 trees on these two projects demonstrate that micro-forests present a feasible solution to addressing the challenge of balancing urban communities' needs for ecosystem benefits of increased tree canopy, with limited land availability.



© PATCH

Micro-Forest Impacts

With the estimated **lifetime capacity of a native tree to sequester 3,000 lbs. of carbon (iTree, 2019),** using **micro-forests** as urban forestry Extension demonstration sites, can promote awareness of the benefits of urban trees, as well as increase the contribution of **urban afforestation** efforts to support **climate change mitigation.**

© BernNews

Why does tree health matter?

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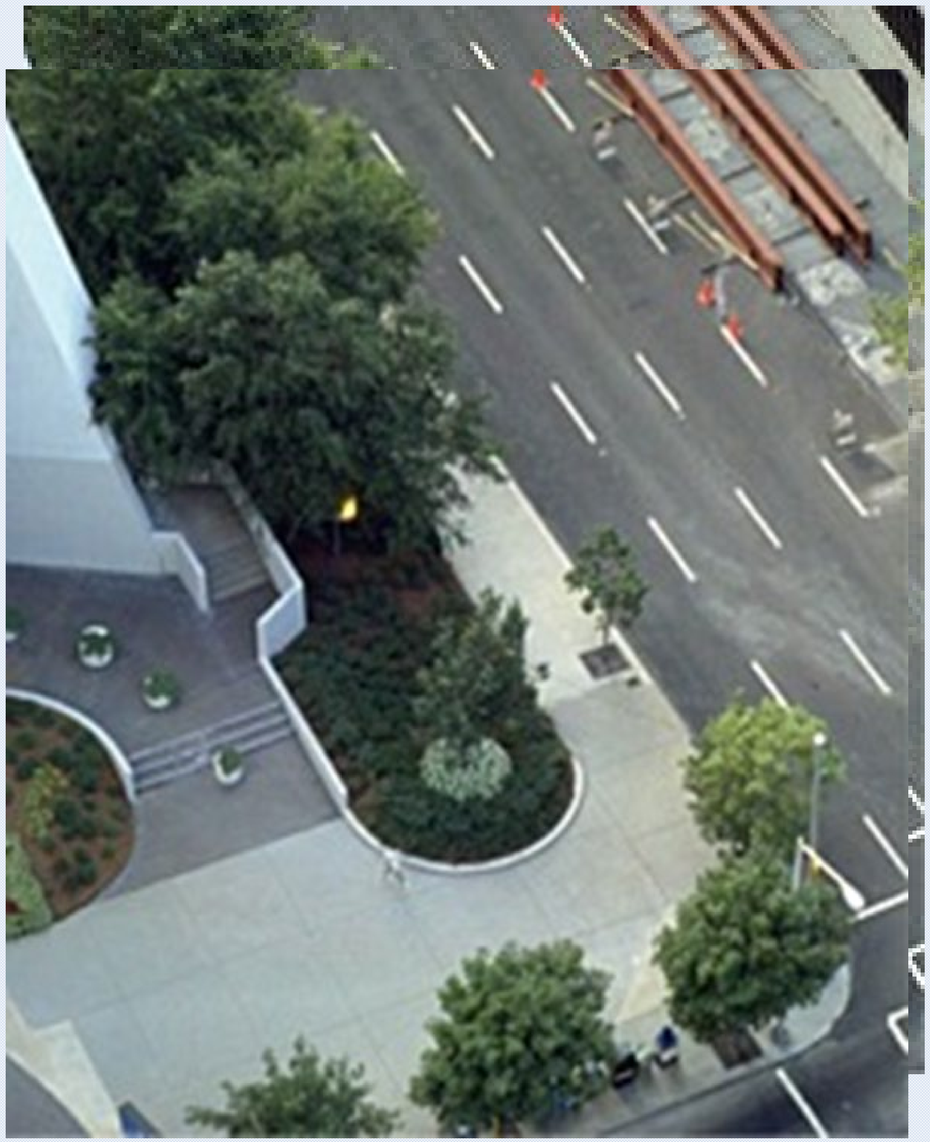
Few residents want cities without trees

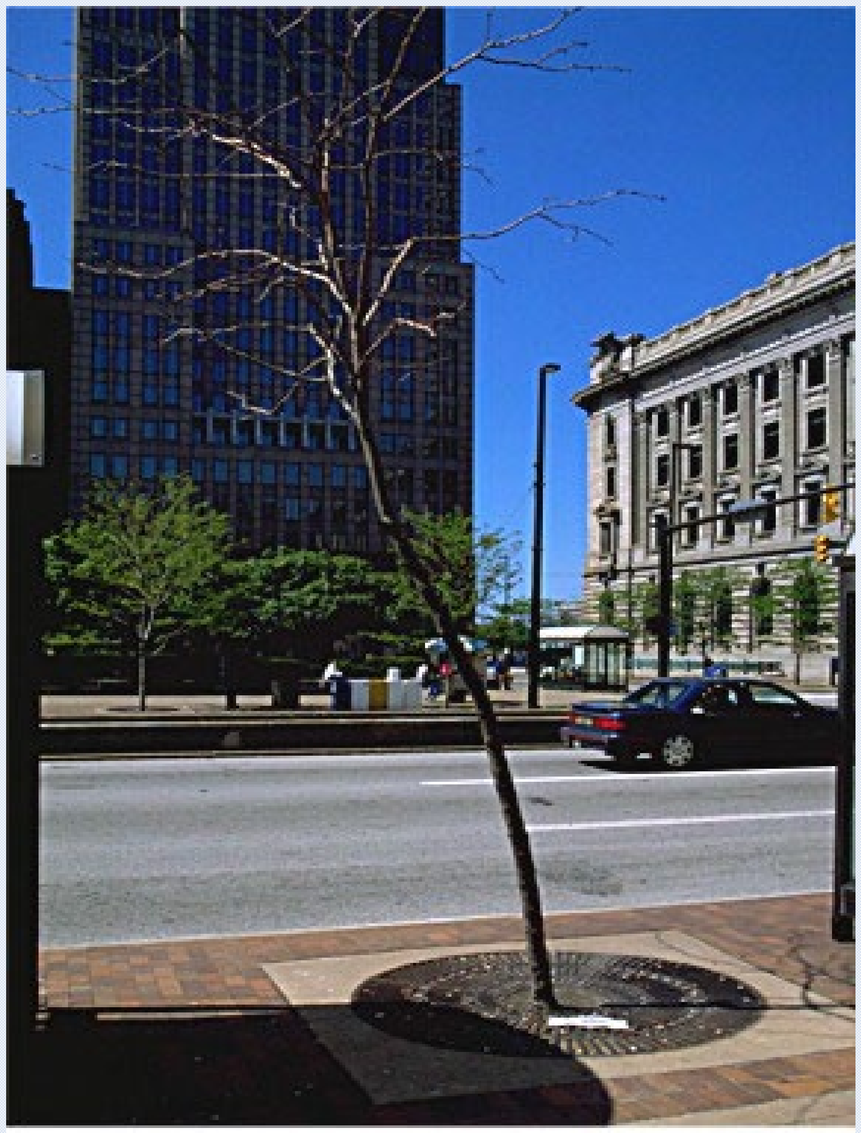
A city without trees is hotter in summer, receives less rainfall, has greater runoff following storms, has fewer shoppers, and is not inviting

Urban design and tree health



Trees often grow poorly in urban areas unless the infrastructure has been specially designed to accommodate tree root growth

Poor urban design leads to tree failure



- Trees struggle to survive if greenspaces are not designed appropriately
- When tree projects are funded without guidance from knowledgeable professionals, it wastes time, money, and trees - no one wins

Good design leads to success – everyone wins!

Urban trees thrive when good designs are executed properly

Healthy trees…

- intercept air pollutants
- reduce wind speed
- reduce runoff from storms
- increase property value

Good design leads to success: win-win!

Healthy trees…

- buffer temperatures and keep cities cooler
- encourage people to relax
- create a more inviting community, increasing revenue for local shops and restaurants

Site evaluation

A thorough site evaluation ensures that the right tree will be selected for the right planting site, thus supporting tree health

Species selection

Popular preference can influence species selection and tree/space conflicts can occur if the trees are chosen based on popularity but are not suited for the site conditions.

Match species to site characteristics

- Do research to choose the <u>right tree</u> that will grow in the conditions present at the site

…or…

- Design the <u>right place</u> to fit the trees you want

- Sites which are not designed to support specific tree characteristics will adversely affect tree health

Match species to site characteristics

- Some trees which are tolerant of tough urban conditions may grow well in small soil spaces but can lift hardscape
- Trees that require larger soil spaces to survive and grow well in the urban landscape will need to be placed in large spaces
- If large soil space for root expansion is not included in the design some trees fail in 20 years.

Diversity can be the key to adversity

Examples of trees that have been commonly selected because they have grown well in urban areas include American elm, eucalyptus, redbay and others ***but…***

If a monoculture of trees develops major pest problems this can cause havoc in the urban forest

Species selection for hardscape compatibility

- Trees have a long life span especially because they compartmentalize decay well, so they are resilient

- It is best to choose trees which are free of serious pest problems

Other selection criteria

Bronze loquat

Pink tabebuia

- Showy flowers/bark
- Canopy density/texture
- Attracts wildlife/or not
- Leaf size/messiness
- Nice fall color
- Single/multi-trunked
- Pruning requirement
- Canopy form/habit

Root flare needs room to expand

Note: Flare is commonly 2.5 to 3.5 times trunk diameter

- The root flare (swelling at the base of the tree where the large roots meet the trunk) is commonly referred to as the buttress
- Roots normally raise out of the ground as shown here
- Adequate open soil space must be designed into the system to accommodate expansion of the root flare

Misfits and poor design

The oaks planted in this narrow soil strip have two choices:

- grow poorly due to the limited amount of soil space available for root expansion, or
- grow well by sending roots under the pavement which will quickly crumble the curb and asphalt

Misplacement of large maturing trees

- The honeylocust trees planted between the walk and the wall are capable of growing to a large size. In order to thrive in this site, the trees' roots will have to grow under the wall and into the lawn behind the wall

- The wall is likely to be displaced as the root flare develops and the roots expand in diameter beneath the wall

Young trees likely to disrupt hardscape as they grow

- The trees planted in this three to four ft. wide strip are likely to cause disruption to the curb, sidewalk, and driveways along this street
- These repairs cost communities in the US approximately $2B dollars annually

Young trees likely to grow to disrupt hardscape

This well-intentioned project could have made the same impact by situating the sidewalk next to the curb and placing the trees placed on the right side of the sidewalk giving roots easy access to the soil in the landscape beds.

Hardscape damage

Large maturing trees located too close to walks can cause structural damage that is costly to repair

Sidewalks lifted

- Roots often grow just under the slab because that is where moisture and oxygen are abundant
- Roots lift the walk as they grow in diameter

Choosing slow growing trees can help with tree/space conflicts

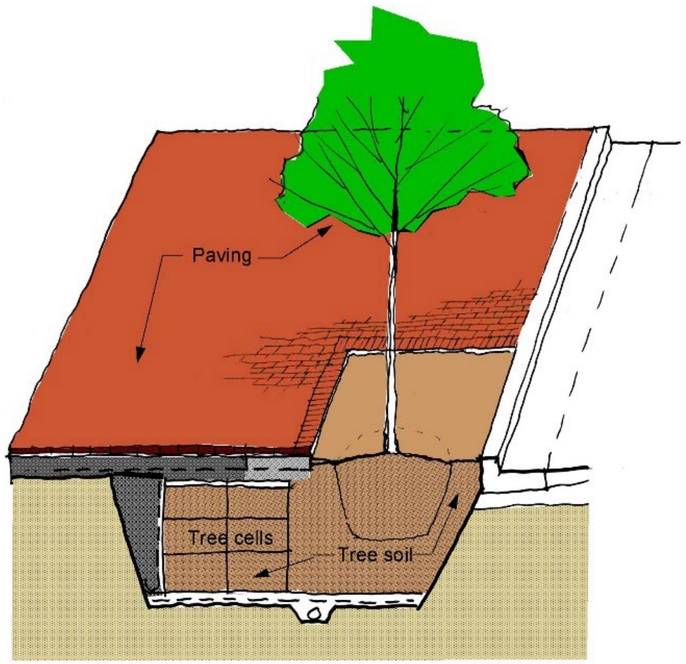
- Trees that remain small at maturity often cause less damage than large trees
- Planting smaller trees will require a larger number of trees planted at a spacing of approximately 25 ft. to develop a closed canopy vs. planting fewer large-maturing trees

Re-routed sidewalk

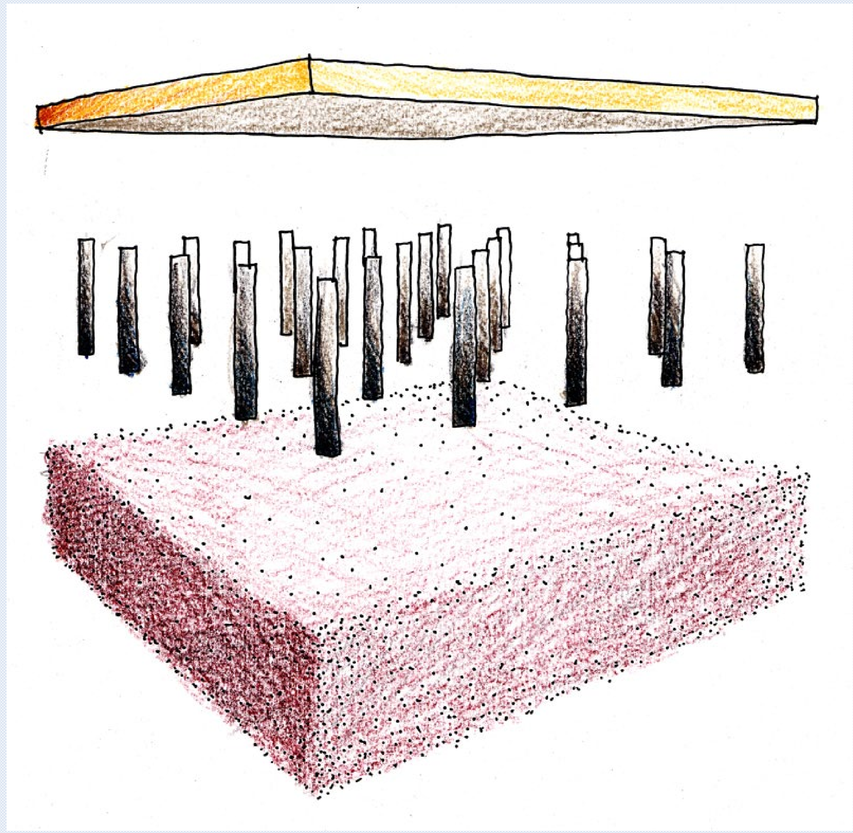
- When damaged sidewalks are repaired, they can be re-routed around the tree trunks

- This can eliminate the need to prune roots that caused the walk to lift

Suspended sidewalk



Finished system



Pavement

Support structure

Soil

- The specifications for a suspended walk ensure that soil is loosely placed in the planting area before installing slabs on the pilings and lateral support pieces
- The drainage system ensures that excess water moves away from the soil system

Tree grates can kill if not maintained

- The tree has grown well as a result of access to unlimited soil space several feet from this planting pit.

- However, if grates are used, there must be a plan for cutting, maintaining, or removing them as needed.

Porous parking surfaces

Only the sections of the parking lot next to trees are constructed of porous material.

Larger islands for large trees

- Designing parking lots with large islands allow large-maturing trees to be planted with less risk of them disrupting hardscape
- Large diameter buttress roots that can damage hardscapes are farther away from curbs and sidewalks

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QUESTIONS?

Tree Health and Survival in Urban Settings

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