

# UFMP Open House

Virtual - May 4, 2023, 6-7:30 p.m.  
In-Person - May 11, 2023, 4-7pm  
at Cansler YMCA

- **Presentation**  
The Why, The How, What We've Learned
- **Q&A / Discussion**

***KnoxvilleTreePlan.org***

# KNOXVILLE URBAN FOREST MASTER PLAN



## **IN PERSON OPEN HOUSE**

Next week!

May 11: UFMP Open House at Cansler YMCA

*Details can be found at [KnoxvilleTreePlan.org](https://KnoxvilleTreePlan.org)*

# Urban Forest & Tree Canopy Cover

## What are they??

**What is an urban forest?** All the trees within a city.

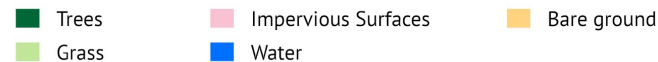
**What is tree canopy cover?** Amount of land covered by trees (during summer when leaves are out) as seen from above.

How is it measured? **Five land classes:**

- Tree Canopy
- Low Vegetation (lawns, shrubs)
- Hard Surfaces (concrete, buildings, roads, anything that is Impervious to water)
- Water
- Bare Soil (agricultural fields, ball fields, construction, desert)



Knoxville, TN Land Cover Classes



This map was produced for the Knox County Urban Tree Canopy Assessment project. Data were collected from Plantix Geo.

# Knoxville UF Master Plan

Community Focused

Over 22,000 acres of tree canopy in  
City of Knoxville (**38%**) as of 2018

Down from 40% in 2008

Approximately 75% on privately  
owned land.

Working to improve urban forest  
since 2011.



# TREES KNOXVILLE



CITY OF KNOXVILLE



Department of  
**Agriculture**

Forestry



# How We Got Here

## Efforts leading up to UFMP

2011: City hired Urban Forester

2011: City tree inventory and management Plan

- 100,000+ trees across 1,000 miles of streets, parks

2012: Improvements to city urban forest program

- Overhauled our planting contract, education, developed a pruning cycle, volcano mulching, updated tree protection ordinance, outreach, etc.

2015: Creation of Trees Knoxville

- Creating tree canopy partner, helping to bridge between public and private stakeholders

2020: Urban Tree Canopy Study - 38%

- Measured amount and change of tree canopy in 2008 and 2018 (GIS analysis)
- Partnerships: Trees Knoxville, City of Knoxville, TN Dept. of Ag/Forestry, Knoxville Utilities Board (KUB), Knox County, TVA, Knoxville Garden Club

2023: Urban Forest Master Plan

- City and Mayor budgeted for 2022-2023 Fiscal Year - 50% of project to be run through TK
- Trees Knoxville raises funds, puts out RFP In July 2022, acquires funding from City, State, KUB, Keep Knoxville Beautiful and TN Dept. of Ag/Forestry
- Consultant Urban Canopy Works selected October, project kick-off December 2022.



# Urban Forest Master Plan

## What exactly is it?

### UF Master Plan

- 10-20 year strategic plan for entire community and entire urban forest.
- Sets goals for urban forest overall
- Dictates initiatives that will be needed over coming decades
- Based on existing conditions data, priorities and goals of community, together with urban forestry best practices



# Phase II: Discovery

## UFMP Process

### Three Phases

Phase I: Project  
Launch (Nov/Dec '22)

### Phase II: Discovery (Jan-Jun '23)

Phase III: Plan  
Development  
(Jul-Oct '23)

**Timeline:** January - June 2022

#### Focus:

1. What exists or is in place currently?
2. Where do we want to go?

#### Research/Analysis

- Tree canopy trends
- City public tree Inventory
- Impact of climate
- Invasives and natives
- Planting strategies
- Prior urban forest efforts
- Broader city plans
- Review of City operations
- Review of City policies/code
- Intersections of Trees  
Knoxville, City and County

#### Engagement

- Advisory Group (80-100 ppl)
  - 3 Workshops
- Interviews (15+)
- Community input form online
  - [www.knoxvilletreeplan.org/you-tell-us.html](http://www.knoxvilletreeplan.org/you-tell-us.html)
  - Open through May
- Community Events
  - Ongoing Speaking Circuit
  - April 19 - UFMP Workshop at UT
  - May 4 - Virtual Open House (Zoom)
  - May 11 - In-Person Open House

# Phase II: Discovery

## UFMP Process

### Three Phases

Phase I: Project Launch (Nov/Dec '22)

**Phase II: Discovery (Jan-Jun '23)**

Phase III: Plan Development (Jul-Oct '23)

### Engagement

- **Advisory Group** (80-100 ppl)
  - 3 Workshops



- **Citywide Community Events**
  - April 19 - UFMP Workshop at UT
  - May 4 - Virtual Open House (Zoom)
  - May 11 - In-Person Open House at Cansler YMCA

- **Group Meetings (outreach presentations)**

- Knoxville Neighborhood Advisory Board 1/11/2023
- Water Quality Forum 1/12/2023
- UT Grounds Management Short Course 1/19/2023
- Dogwood Arts Home and Garden Show 2/10/2023
- 4th and Gill Neighborhood (Woolly Bears) 2/13/2023
- South Knoxville Open House 2/13/2023
- CoK Greenways Commission 2/14/2023
- Knoxville- Knox County Food Policy Council 2/15/2023
- North Hills Garden Club 2/16/23
- East TN ASLA 2/21/2023
- Green Drinks February Meeting 2/21/2023
- UT Urban Forestry Class 2/22/2023
- Knoxville Area Association of Realtors (KAAR) 3/3/2023
- Forest Hts. Neighborhood Association 3/6/2023
- Colonial Village Neighborhood Association 3/9/2023
- Three River Market CO-OP 3/21/2023
- Kiwanis Club of Knoxville 3/23/2023
- Smoky Mtn Wild Ones Chapter 3/29/2023
- Parkridge Neighborhood Meeting 4/3/2023
- Knox County Master Gardeners 4/3/2023
- East TN Ornithological Society 4/5/2023
- WJBE Radio 4/9/2023
- South Knoxville Neighborhoods Meeting 4/10/2023
- Sierra Club Harvey Broom Group 4/11/2023
- East Knoxville Community Open House 4/11/2023
- Sequoyah Hills Neighborhood Meeting 4/25/2023
- Town Hall East's May Meeting 5/8/2023
- ...more coming through May.



# The WHY

## SOLUTIONS to Urban Challenges

- 01 | Public Health
- 02 | Heat Stress in Communities
- 03 | Improving Quality of Life & Neighborhood Revitalization
- 04 | Improving Walkability
- 05 | Aging in Place
- 06 | Successful Business Districts
- 07 | Flooding Reduction with Green Infrastructure
- 08 | Carbon Sequestration / GHG Reduction





# Knoxville Trees

## Key Piece of Improving Human Health

Existing trees in Knoxville removes about **1.4 million pounds of pollutants** each year, **valued at \$4,800,000** of annual benefits.

(County - 9.2 million pounds / \$18 million)

### 01 | POLLUTION REDUCTION

- **Air quality improvements:** Tree canopy filters the air and **removes up to 60% of street-level air pollution** including carbon dioxide, ozone, nitrogen dioxide, sulphur dioxide (a component of smog), and small particulate matter (PM, i.e., dust, ash, dirt, pollen, and smoke).
- Ozone and particulates can especially **aggravate existing respiratory conditions (like asthma) and create long-term chronic health problems** according to the American Lung Association.
- New York City saw **a decrease of almost 30% of asthma in young children** after increasing its tree canopy through installation of over 300 trees per square kilometer.
- A 2020 Harvard University study showed that long-term exposure to air pollution (PM2.5 specifically) **increases the risk of death in those with COVID-19**.
- The American Lung Association has found “growing evidence that vehicle emissions coming directly from those highways may be higher than in the community as a whole, **increasing the risk of harm to people who live or work near busy roads**.”
- **Water quality improvements:** Polluted water is a major cause of human health issues and degrades the local ecology.

### 02 | HEAT/TEMPERATURE MANAGEMENT. Urban areas with trees are 15-25°F cooler

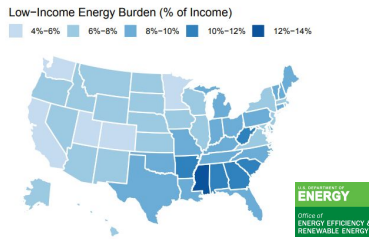
### 03 | DIRECT MENTAL / PHYSICAL HEALTH IMPACTS

- Urban trees create feelings of relaxation and well-being, and provide environments that encourage outdoor activities.
- Studies have shown that individuals with views or access to greenspace tend to be healthier;
  - **employees experience 23% less sick time** and greater job satisfaction, and
  - **hospital patients recover faster with fewer drugs**.
  - Trees have also been shown to have a **calming and healing effect on ADHD adults and teens**.



# Knoxville Trees

## Key Piece of Heat Reduction

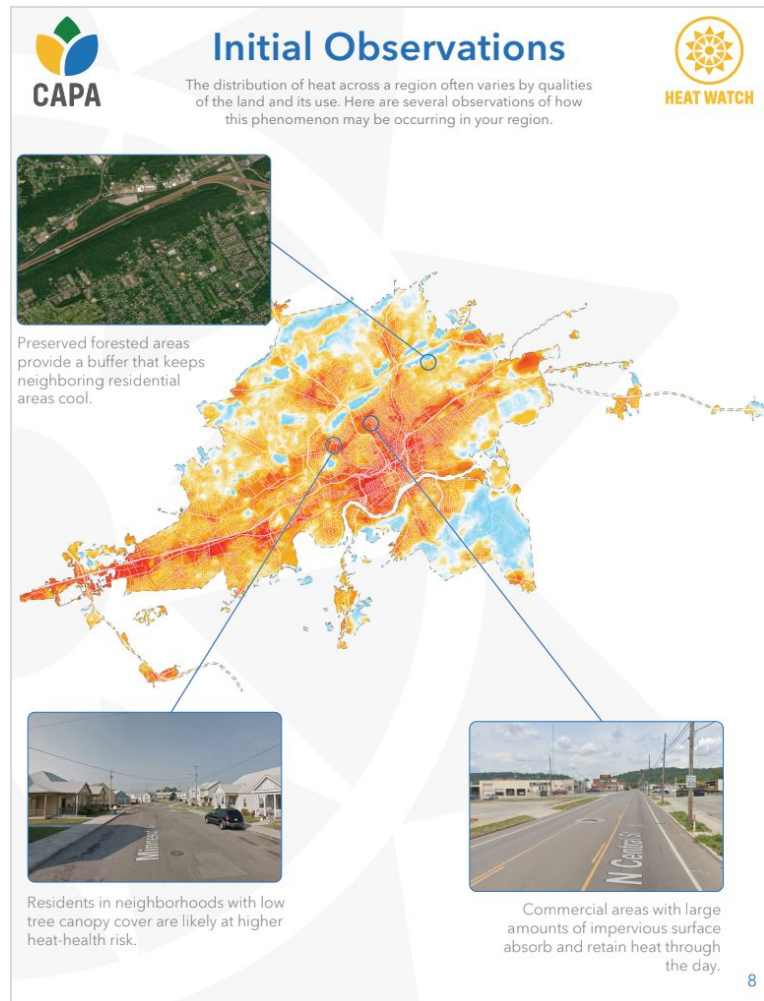


Urban areas without trees are 15-25°F hotter than nearby, less developed areas. Heat stress has been proven to cause significant public health problems and even mortality.

- Each year, **more Americans die from extreme heat** than all other natural disasters combined (i.e., hurricanes, floods, tornadoes, lightning).
- The cooling effect of one healthy tree is equivalent to **10 room-sized air conditioners operating 20 hours a day.**
- The shade of properly-placed trees can **save residents up to 58% on daytime air conditioning costs**, while mobile homeowners can save up to 65%.

### CRITICAL to Vulnerable Groups - Trees are part of EQUITY Conversation!

- **All Knoxville must have access.**
- **AGE.** Those **over 65 or under age 5** are especially vulnerable to heat-related health problems.
- **INCOME.** Low income households have high “energy burden.” One recent study found that low-income households face an energy burden three times higher than other households.



# Knoxville Trees

## Improving Quality of Life & Neighborhood Revitalization

**01 | ...via ambient temperatures** (15-25 degree reduction)

**02 | ...via less noise and pollution from nearby highways**

A 100-foot-wide, 45-foot high densely-planted tree buffer can reduce highway noise by 50%. Up to 60% reduction in air pollution.

**03 | ...via stronger sense of community**

Residents of apartment buildings surrounded by trees reported knowing their neighbors better, socializing with them more often, having stronger community, and feeling safer and better adjusted than did residents of more barren, but otherwise identical areas.

**04 | ...via less crime**

A Baltimore study found that a 10% increase in tree canopy was associated with a roughly 12% decrease in crime.

Another study showed outdoor areas populated with trees tend to suffer less from graffiti, vandalism, and littering than their treeless neighbors.

**05 | ...via real estate values**

Trees increase residential property and commercial rental values by an average of 7%.





# Knoxville Trees

## Improving Walkability



### 01 | COMFORT (pleasant experience)

**...via shade:** temperature reductions 15-25 degrees

**...via ambience:** pleasant surroundings matter in vibrant communities

**...via noise reduction:** A 100-foot-wide, 45-foot high densely-planted tree buffer can reduce highway noise by 50%.

### 02 | SAFETY

**...via slower traffic:** According to the Federal Highway Administration, tree canopy along a street provides a narrowing speed control measure by creating a “psycho-perceptive sense of enclosure” that discourages speeding.

**...via less aggressive driving:** Traffic speeds and driver stress levels have been reported to be lower on tree-lined streets, contributing to a reduction in road rage and aggressive driving.

### What does walkability mean to Charlotteans?

Over 500 people participated in a visual preference survey to help determine the specific characteristics of a Safe, Useful and Inviting walk. Participants were asked to choose from among 11 different options in each category, or write in their own. The percentages listed below indicate the percent of participants who voted for that option as their top choice in each category. In each case, the top three images in each category - Safe, Useful, and Inviting - account for over half of the total vote.

#### SAFE - What types of treatments make you feel safest when you walk?



#1 Sidewalks: (36%)



#2 Planting Strip  
(buffer from cars): (13%)



#3 Streetlights: (13%)

#### USEFUL - If you could, what places and activities would you walk to?



#1 Grocery Store/Market: (20%)



#2 Restaurant/Bar: (19%)



#3 Park/Greenway: (15%)

#### INVITING - What types of features make a walk comfortable and attractive?



#1 Street Trees: (25%)



#2 Wide Pathways: (22%)



#3 Buildings and Activities near  
the Sidewalk: (14%)



# Knoxville Trees

## Important to Aging Populations

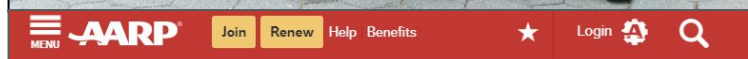
02 | ...via moderated temperatures

15-25 degrees less

02 | ...shaded rest areas

i.e. benches under trees

02 | ...via slower traffic



## AARP Livability Fact Sheet - Street Trees



To quote a Chinese proverb, "The best time to plant a tree was 20 years ago. The second best time is now." Here's why tree-lined streets matter

### AARP Livable Communities

Is there a tree on the street where you live? Hopefully there's a least one tree, ideally there are many!

In a neighborhood setting, street trees provide shade, safety, greenery, storm mitigation, energy savings and fresh air. Trees also buffer street noise, enhance privacy and help hide unattractive views. (What would you rather look at? A tree or a brick wall!?)

The U.S. Forest Service estimates that the presence of street trees increases adjacent home values by an average of \$13,000. The National Main Street Center reports that a good tree canopy can increase retail sales by 12 cents on the dollar in large cities and 9 cents on the dollar in small ones

### Street Trees

LIVABILITY FACT SHEET

There are many benefits to having trees on your street. They provide shade, safety, greenery, storm mitigation, energy savings and fresh air. Trees also buffer street noise, enhance privacy and help hide unattractive views. (What would you rather look at? A tree or a brick wall!?)



# Knoxville Trees

## More Successful Business Districts

Consumers showed a **willingness to pay 11% more** for goods and **shopped for a longer period of time** in shaded and landscaped business districts.

Consumers also **felt that the quality of products was better** in business districts surrounded by trees.

*Where would YOU rather shop?*



# Knoxville Trees

## Reductions in Flooding

...intercept rain a number of ways

- **Holding water** (on leaves, trunk) to delay water reaching ground
- **Better ground infiltration** thanks to roots and leaf litter
- **Using water** - rain is absorbed into tree itself
- **Reduces erosion** from runoff
- **Cleans runoff** - especially important around streams, etc.

**Especially important with our cities growing and climate warming resulting in more storm events.**

- Reductions in **stormwater management costs accounted for over 60% of the environmental services** provided by street trees.
- A single **oak tree can absorb over 40,000 gallons** of stormwater each year.

NOTE: Put them where they can do the most!

Existing trees in Knoxville intercept / avoid **2.2 billion gallons of runoff** each year, **valued at \$3,100,000** annually.

(County - 14.6 billion gallons / \$12 million)





# Knoxville Trees

## Carbon Sequestration / GHG Reduction

**Reducing/Slowing Climate Change** by intercepting CO<sub>2</sub> in a number of ways (mitigation)

- One large tree can **absorb** 48 lbs of CO<sub>2</sub> every year to make sugars for food. AND release O<sub>2</sub> in the process.
- One acre of trees **stores** the same amount of carbon dioxide released by driving 26,000 miles.

Planting new trees is one of many avenues to reduce atmospheric carbon dioxide (CO<sub>2</sub>).

### Adapting to climate change (KEY)

- Temperature reductions & air and water quality improvements

Trees are a part of climate change goals.



Existing trees in Knoxville:

STORES:

**767,000 tons of carbon, valued at \$130 million.**

ABSORBS (“sequesters”) ANNUALLY:

**4,000 tons of CO<sub>2</sub>, valued at \$3.6 million annually.**

County:

Stores 5.5 million tons / \$946 million

Sequesters 100,000 tons annually / \$17 million annually





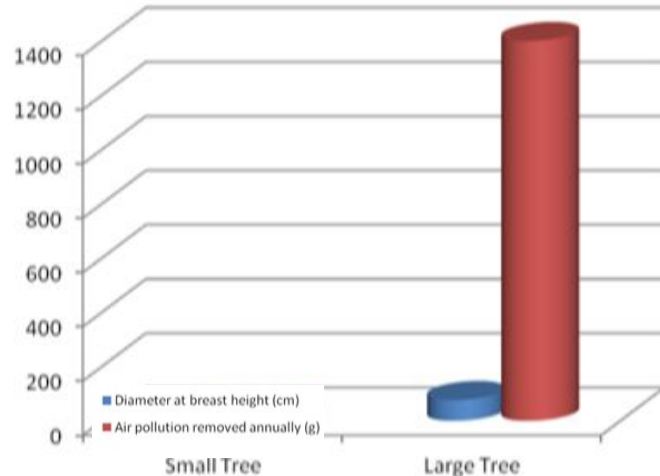
# Knoxville Trees

## Two Important Points to Note

### 1. Mature trees do more.

Larger, mature trees provide exponentially more services.  
**Preservation of existing trees is extremely important!**

*A 30" diameter oak removes 70 times more pollutants from the air than a 8" diameter oak.*



### 2. Trees pay off.

**Positive ROI:** A five-city study found that cities accrued benefits ranging from \$1.50–\$3.00 for every one dollar invested in trees (EPA 2015).



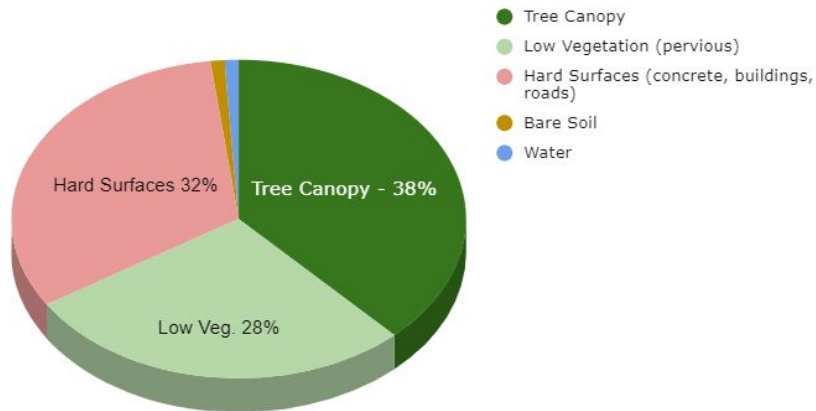


# Learnings To-Date

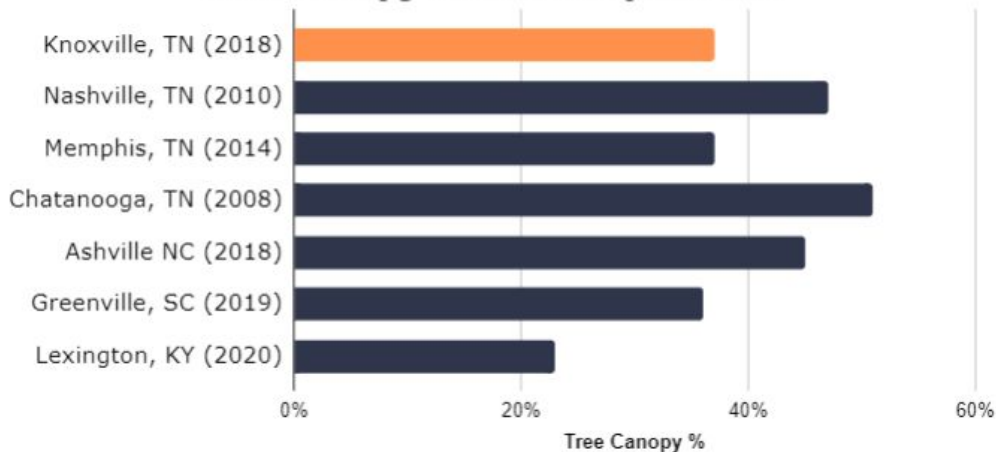
# Tree Canopy Cover

## What do we have?

- **38% Tree Canopy Cover** in Knoxville (as of 2018)
- Down from 40% in 2008.
- No canopy goal in place currently.
- **¾ of all tree canopy is located on private lands.**



### Tree Canopy Cover Comparisons



# Tree Canopy Cover

Where is it? Is it equitable?

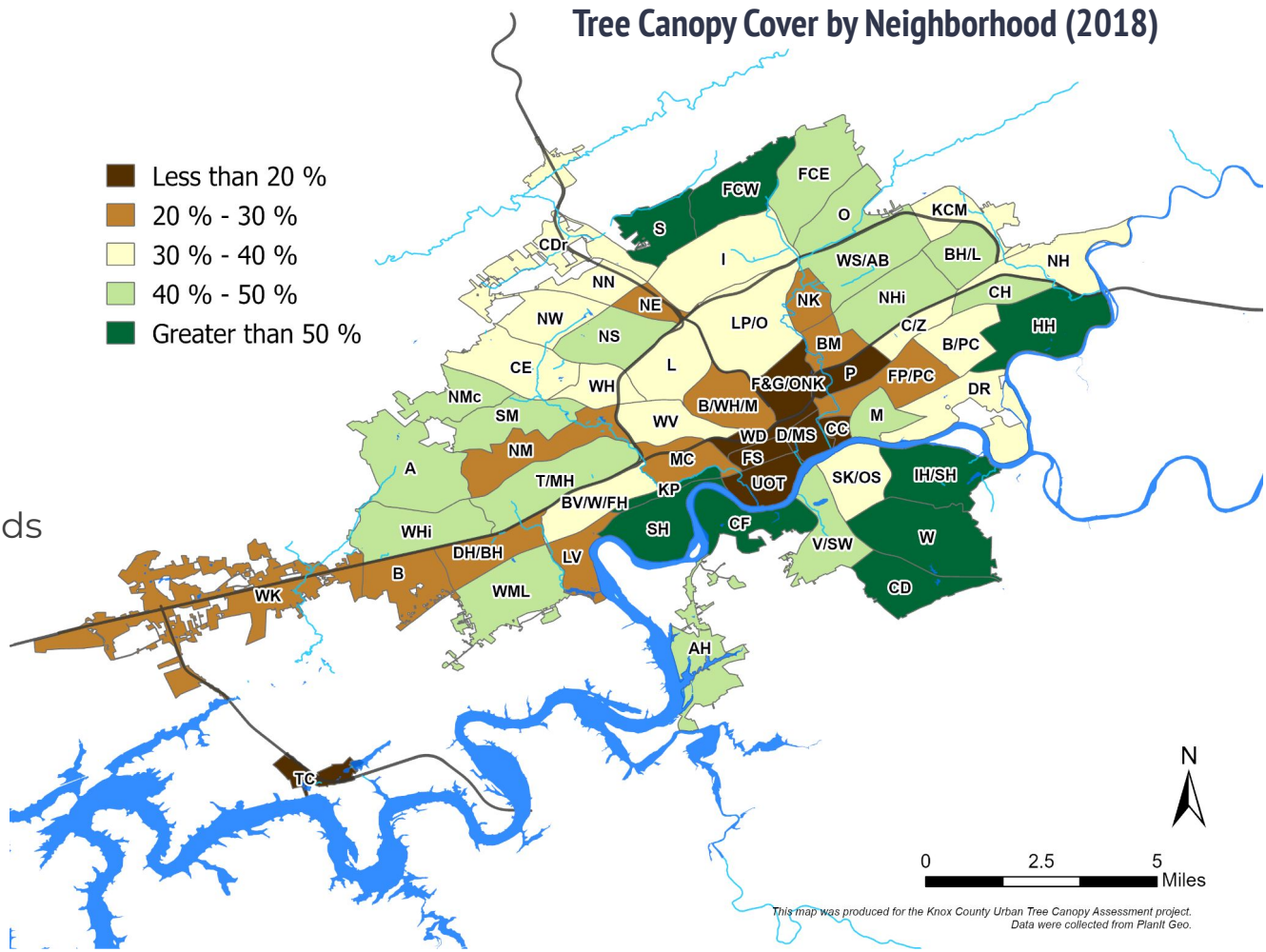
Percent of tree canopy cover in Knoxville neighborhoods ranges from 5% to 63%.

25 of the 60 neighborhoods fall below the citywide average.

Full neighborhood list at [KnoxvilleTreePlan.org](http://KnoxvilleTreePlan.org)

## Tree Canopy Cover by Neighborhood (2018)

- Less than 20 %
- 20 % - 30 %
- 30 % - 40 %
- 40 % - 50 %
- Greater than 50 %



This map was produced for the Knox County Urban Tree Canopy Assessment project. Data were collected from Plant1 Geo.



# Tree Canopy Cover

Where is it? Is it equitable?

Heat is higher overall and longer lasting in low canopied neighborhoods.

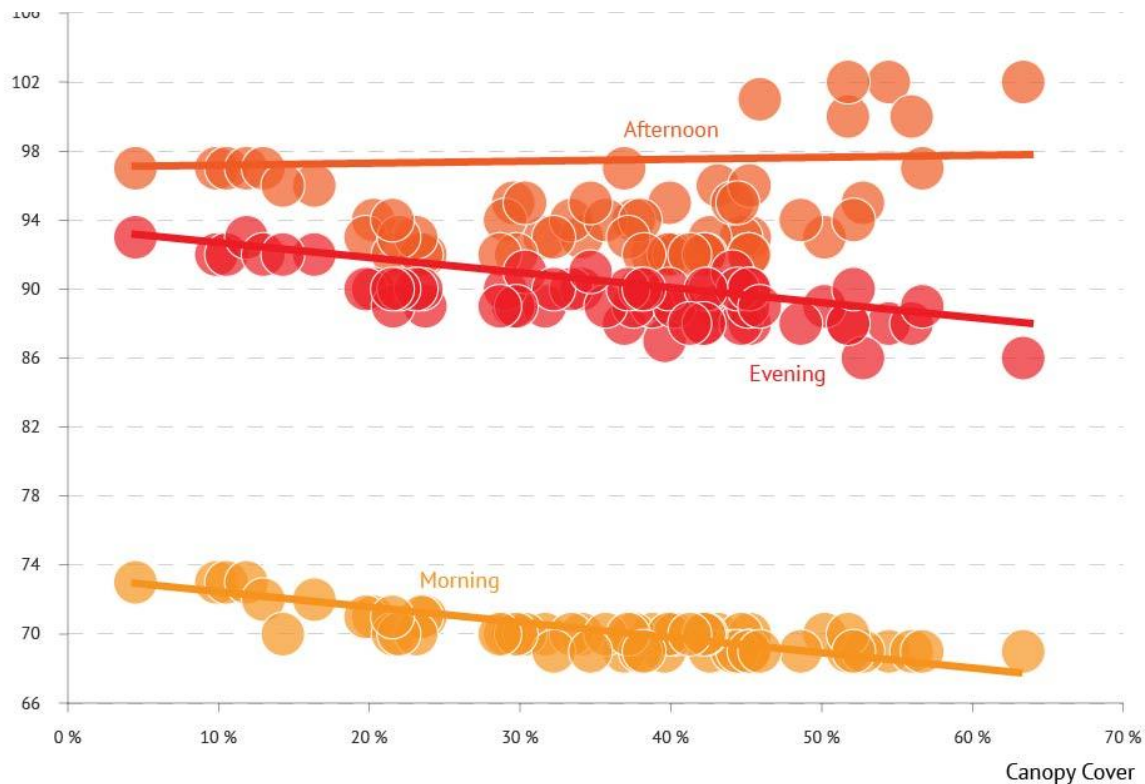
Higher income, higher canopy.

Areas redlined in 1930s based on race and poverty have lower canopy.

Areas of lower canopy also often have higher concrete (impervious surfaces)

High canopy is not high quality.

## Heat Index & Tree Canopy by Neighborhood



# Tree Canopy Cover

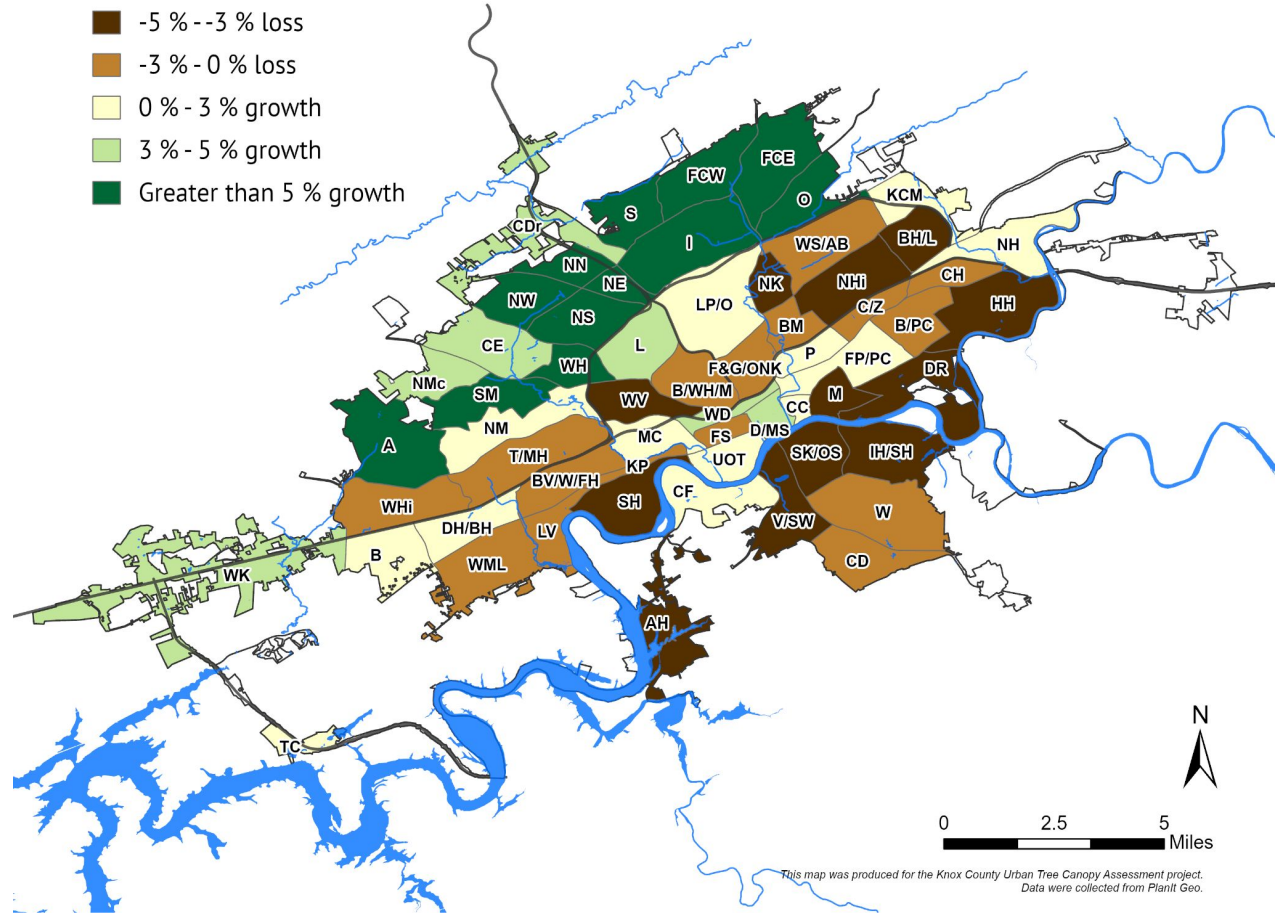
Changes 2008 to 2018

Gains occurred in  
19 neighborhoods

Losses occurred in  
41 neighborhoods

## Change in Tree Canopy by Neighborhood (Between 2008 and 2018)

- -5 % --3 % loss
- -3 % - 0 % loss
- 0 % - 3 % growth
- 3 % - 5 % growth
- Greater than 5 % growth



This map was produced for the Knox County Urban Tree Canopy Assessment project. Data were collected from Planit Geo.

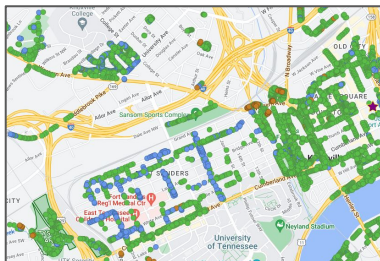
# More Detailed Data on Trees

## Lacking knowledge.

- **Tree Age** (size)
- **Condition**
- **Diversity** (vulnerability)
- **Suitability**
  - **Space to Grow** (above and below)
  - **Soil Conditions**
  - **Invasives**
  - **Climate Adaptability**

### Data Sources:

1. Streets/Parks: 25,000+ public trees inventoried, 5 mgmt zones (City)
2. Natural Areas / Woodlands: Lacking data on woodlands and trees on private property.
3. All Other Lands: Mostly privately owned. Lacking data.



City Inventory

KNOXVILLE (TN) Indicators of a Sustainable Urban Forest		Assessed Score			
		Low	Mod.	Good	
<b>The Trees</b>	Urban Tree Canopy Cover				
	Equitable Distribution				
	Streets & Parks <i>(public, landscape)</i>	Age/Size Distribution			
		Condition			
		Diversity / Pest Vulnerability			
		Suitability - Overhead	No data.		
		Suitability - Ground Level	No data.		
		Suitability - Soil Conditions	No data.		
		Suitability - Invasives			
		Suitability - Climate Adaptability			
	Natural Areas / Woodlands <i>(public or private)</i>	Age/Size Distribution	No data.		
		Condition	No data.		
		Diversity / Pest Vulnerability	No data.		
		Suitability - Overhead	No data.		
		Suitability - Ground Level	No data.		
		Suitability - Soil Conditions	No data.		
		Suitability - Invasives	No data.		
		Suitability - Climate Adaptability	No data.		
	All Other Lands <i>(primarily private)</i>	Age/Size Distribution	No data.		
		Condition	No data.		
		Diversity / Pest Vulnerability	No data.		
		Suitability - Overhead	No data.		
		Suitability - Ground Level	No data.		
		Suitability - Soil Conditions	No data.		
Suitability - Invasives		No data.			
Suitability - Climate Adaptability		No data.			



# Lacking data on trees.

## Why is it important?

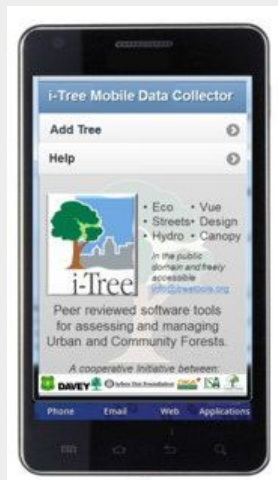
Why?

1. **Diversity / Resilience to disease**
2. **Invasives**
3. **Future canopy** (sustainability & resilience)

Data not available.

## Example: Syracuse

1.5 million trees (99 trees per acre) according to sampling study. Most common species: European buckthorn, sugar maple, tree-of-heaven. 36% invasives



Vacant lot urban forests are low quality, not resilient



Red lining = vacant lots

City owned vacant lot portfolio:

- 1,000+ parcels and growing
- 5,749 acres in city ownership



# Impact of Climate Change on Trees

## Public Trees (streets, park)

**24%** of public inventoried trees expected **to fare better over the next 100** years due to climate change.

- willow oak (5% of public trees today)
- common hackberry (4%)
- Southern magnolia (2%)
- American elm (2%)
- Eastern redcedar (1.3%)
- boxelder maple (1.2%)
- American sweetgum(1.0%)
- black cherry(1.0%)
- river birch (0.9%)
- black gum (0.7%)
- ...remaining list on handout.

**23%** of public inventoried trees expected to **decline over the next 100** years due to climate change.

- red maple (7% of public trees today)
- sugar maple (7%)
- Eastern redbud (4%)
- silver maple(2%)
- tulip poplar (1.4%)
- serviceberry (0.5%)
- Eastern hemlock (0.5%)
- black locust (0.4%)
- Virginia pine (0.4%)
- scarlet oak (0.3%)
- ...remaining list on handout.

*Tree Species that may find new habitat within the Region: florida maple, black hickory, black ash, swamp tupelo, ashe juniper, slash pine, bluejack oak, laurel oak, live oak, gum bumelia, & cedar elm*

# What we've heard so far

## Emerging Goals & Priorities

- **More trees.** Many ideas on focus areas - schools, urban core, subdivisions, areas in most need, where people walk/bike.
- **Better quality tree canopy.** To ensure longevity.
- **Development that accounts for and preserves trees.**
- **Focus on equity and environmental justice.** Important that all in Knoxville have access to the services trees provide.
- **More awareness on role of trees.** Lots of ideas of audiences to target.
- **Use trees in ecosystem restoration and climate resilience.** Ensure trees a part of eco and climate work in Knoxville.
- **Utilize partnerships.** Find stewards with direct connection to public.
- **Financial assistance for tree care.** Low-income homeowners with mature trees.
- **Find creative and alternative spaces to add tree canopy.** Decreasing impervious surfaces, adjusting roads/sidewalk infrastructure, rooftops, community gardens.

## CHALLENGES

- Not enough resources.
- Lack of knowledge.
- Lack of engagement.
- Lost canopy in development.
- Conflicting priorities and space constraints.
- Trees on private property.
- Political climate
- Climate change

## SOLUTIONS

- More engagement and better communication/education.
- Assistance in tree care.
- Better policy/enforcement.
- Funding.
- More space for trees.
- More data.



# What's Next?

## 1. Complete collection of community input

*Discovery complete by end of May.*

- a. Next Week: In-Person Open House  
May 11th, 4-7 pm at Cansler YMCA
- b. Invite us to meet with your community group.
- c. Fill out online input form.

## 2. Final Phase

*Complete by end of 2023.*

- a. Goal Setting
- b. Plan Development
- c. Open to Public Comment



## Get Involved

### We need your input and involvement

As a majority of the tree canopy in Knoxville is located on privately-owned land, any progress in improving and growing the canopy will require a true community effort. Please consider getting involved and providing your input on this UFMP (urban forest master plan). Encourage your community to get involved as well!

[April 2023 Press Release on UFMP Engagement is now available!](#)

### Come to an event...

We want to share with you all more on the urban forest and what we've learned so far. But more importantly, we want to provide another way to hear from you on what YOU would like the future Knoxville urban forest to be. Come to one of our community engagement events or [fill out the online survey](#)

### or we'll come to you!

Who needs ANOTHER meeting to go to, right? Why not invite us to come to YOUR next event? We are looking for opportunities to come talk to your groups or clubs of any kind about this project, the importance of trees, and provide a forum to collect even more input from your group. Think neighborhood groups, libraries, church functions, homeowner associations, industry meetings - we're open and available. [Get in touch with us to schedule.](#) As of mid March, we've attended and collected input from multiple groups, and have many more scheduled.