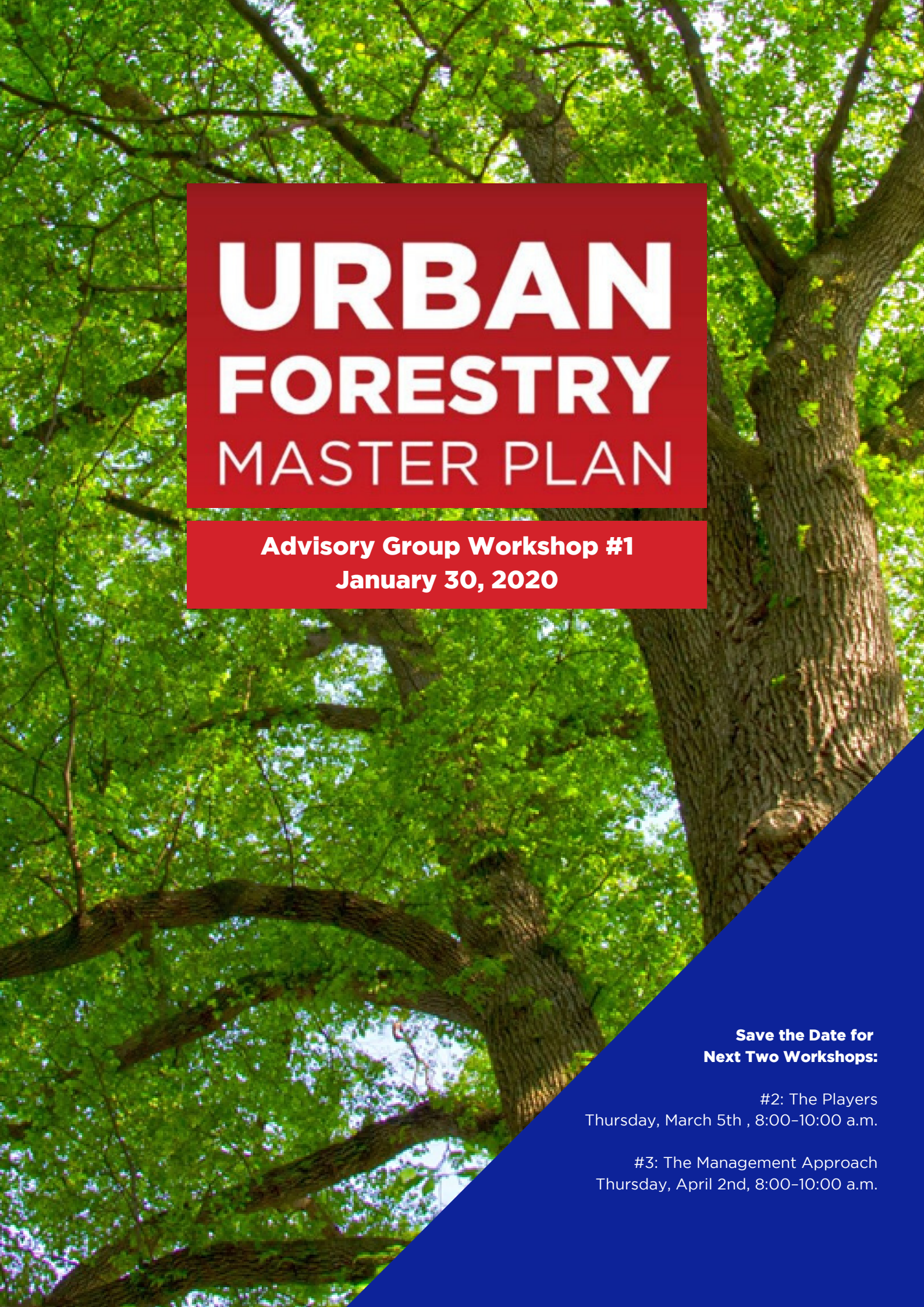


URBAN FORESTRY MASTER PLAN

Advisory Group Workshop #1
January 30, 2020

Save the Date for Next Two Workshops:

#2: The Players
Thursday, March 5th , 8:00–10:00 a.m.

#3: The Management Approach
Thursday, April 2nd, 8:00–10:00 a.m.

About the Project

Why a Master Plan?

- Benefits Provided to Community by Canopy
- Expected Population Growth in Columbus
- Striving for Equity
- Partnerships Needed for Progress
- Importance of Future Climate Resiliency

TREES IN COLUMBUS CURRENTLY PROVIDE OVER $36 MILLION IN BENEFITS AND SERVICES TO CITIZENS EACH YEAR.

Columbus Tree Benefits		Units (lbs)	Unit	Value ($)
AIR QUALITY IMPROVEMENTS	AIR: Carbon Dioxide removed (CO2)	31,700	lbs.	$21,062
	AIR: Nitrogen Dioxide removed (NO_2)	70,620	lbs.	$22,891
	AIR: Ozone removed (O_3)	1,384,840	lbs.	$2,104,116
	Sulfur Dioxide removed (SO_2)	206,780	lbs.	$17,891
	Particulates removed (dust, dirt, soot, smoke, liquid droplets) (PM_{10})	797,700	lbs.	$2,491,337
CARBON ABSORBTION	Carbon Sequestration (CO2 removed from air, held in plant tissue)	137,272	tons	$2,658,038
STORMWATER INTERCEPTION	Avoided Stormwater Runoff (intercepted by trees)	331,183,583	gals.	$29,475,339
			Total Annual Benefits	**$36,790,675**
	Carbon Storage Over Lifetime of Trees	4,256,530	tons	$82,420,631

About the Project

Tree Canopy Services

Reducing Water Pollution
As cities grow, the amount of land that naturally absorbs rainwater (i.e., lawns, parks, fields, woods) tends to shrink, while hard surfaces that cause rain to runoff (i.e., roads, buildings, parking lots) increase in area. After flowing over roads, parking lots, and lawns, rainwater accumulates fertilizers, oil, chemicals, grass clippings, litter, pet waste, and other contaminants, polluting the local lakes and streams. One mature deciduous tree can intercept over 500 gallons of rainwater a year, while a tree that holds leaves all year round (e.g., pine, magnolia) can intercept up to 4,000 gallons per year (Seitz 2008).

Reducing Air Pollution
Trees can remove up to 60% of street-level air pollution, including carbon dioxide, ozone, nitrogen dioxide, sulfuric dioxide (a component of smog), and particulate matter (i.e., dust, ash, dirt, pollen, and smoke) (Coder 1996).

Alleviation of Heat Stress
Heat stress has been proven to cause significant public health problems and even mortality. In fact, each year, more Americans die from extreme heat than all other natural disasters combined (i.e., hurricanes, floods, tornadoes, lightning). Urban trees are widely accepted as one of the most effective long-term solutions to reducing the effects of urban heat islands, and can lower ambient temperatures by 20–45°F (EPA 2015).

Add a little bit of body text

Energy Savings
Trees provide energy savings by reducing cooling and heating costs, both through their shade as well as emissions of moisture. In fact, the cooling effect of one healthy tree is equivalent to 10 room-sized air conditioners operating 20 hours a day (North Carolina State University 2012). The shade of properly-placed trees can save homeowners up to 58% on daytime air conditioning costs, while mobile homeowners can save up to 65% (Smith 1999).

More Successful Business Districts
In multiple studies, consumers showed a willingness to pay 11% more for goods and shopped for a longer period of time in shaded and landscaped business districts (Wolf 1998b, 1999, and 2003).

Higher Property Values
Trees increase residential property and commercial rental values by an average of 7% (Wolf 2007).

Improved Public Health (Mental and Physical)
Trees have been shown to create healthy environments for people by improving air quality and reducing heat island effects. New York City saw a significant decrease of asthma in young children (-29%) after increasing its tree canopy through the installation of over 300 trees for each square kilometer (Lovasi et al. 2008). Studies have also 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 (Ulrich 1984).

About the Project
Tree Canopy Services

Urban Trees Make Streets Safer and More Walkable
In an age where walkability and pedestrian-friendly areas tend to draw the most people, tree cover is a powerful tool in revitalizing districts and neighborhoods. Urban trees have been shown to slow traffic and help ensure safe, walkable streets in communities. 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 (Wolf 1998a, Kuo and Sullivan 2001). According to the Federal Highway Administration, tree canopy along a street discourages speeding (U.S. Department of Transportation 2015). The buffers between walking areas and driving lanes created by trees also make streets feel safer for pedestrians and cyclists.

Reductions in Crime Rates
A study in Baltimore found that a 10% increase in tree canopy was associated with a roughly 12% decrease in crime. It has also been shown that outdoor areas populated with trees tend to suffer from less graffiti, vandalism, and littering than their treeless neighbors (PHS 2015).

Noise/Pollution Reduction
Pollution and noise from busy roadways and rail lines can create unhealthy and undesirable conditions for those living nearby (ALA 2015). Buffers of trees reduce both noise and pollution. A 100-foot-wide, 45-foot-high densely-planted tree buffer can reduce highway noise by 50% (NC State 2012).

Stronger Communities
Tree-lined streets can create stronger communities and attract new residents. While less quantifiable, the tree benefits related to community building are no less important than other services. One study showed that 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 (Kuo and Sullivan 2001).\

Wildlife Habitat
Trees are an essential component to habitat and conservation in urban areas. They intercept and clean large quantities of polluted stormwater, preventing further degradation to vital aquatic and terrestrial habitats. Additionally, as smaller forests are connected through planned or informal urban greenways, trees provide essential habitat to a range of birds, pollinators, and other wildlife that feed on insects (Dolan 2015). A healthy wildlife population indicates a healthy place for people to live too.

About the Project

Project Timeline

Phase I: Project Set Up (October/November 2019)

Phase II: Team Establishment (October-December 2019)

Phase III: Discovery (January - April 2020)

- Data Analysis & Internal Operations Review
- UTC, Inventory Data and Threats Assessment
- Community Engagement
  - Advisory Group Workshop #1: The Trees - January 30
  - Advisory Group Workshop#2: The Players - March 5
  - Advisory Group Workshop #3: The Management Approach - April 2
  - Public meeting, March 4th
  - One-on-one Interviews
  - Small Group Speaking Circuit

Phase IV: Synthesis & Recommendations / Plan (April -June 2020)

Two Deliverables:

- State of the Urban Forest Report
- Urban Forest Action Plan

About the Project
Input Sources

Urban Tree Canopy (UTC) Assessment
An urban tree canopy (UTC) assessment is an analysis of the amount of tree canopy that covers an area, as seen from aerial photos during summer months (when leaves are on the trees). UTC is expressed in a percent coverage of total land. The first full UTC done for Columbus was completed in 2015 using 2013 aerial imagery. A graphic example of this analysis is shown in the top right image.

City Inventory of Public Trees
The City of Columbus maintains a complete inventory of all public trees, including street and parks trees. This information is collected by physically visiting each tree on public land and collecting multiple data on that tree and is stored and regularly updated in a GIS-based tree management software.

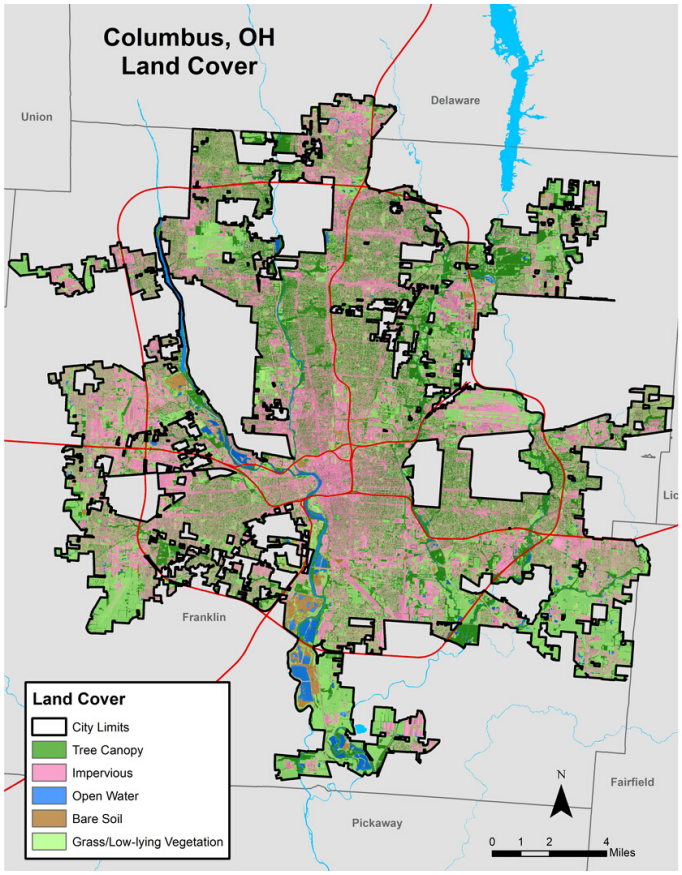
In 1998, the City of Columbus completed an inventory of the city-managed street and park trees. Since then, the inventory has been updated to reflect trees planted and removed. However, other information, like tree size, condition and maintenance needs, has rarely been updated. Of the 127,000 plus trees in the inventory, only about 10% have been updated within the last five years. Due to the data accuracy issues, the tree inventory analysis conducted for this project should be viewed as a snapshot in time, providing a general picture of the state of Columbus' trees. To gain a more comprehensive and accurate assessment, a new street and park tree inventory will need to be completed.

Community Input
Extensive input from the community will also provide valuable information in the development of this plan. This will be collected through three Advisory Group workshops, multiple one-on-one interviews, a public meeting (March 4th), and online comments through the project website - www.ColumbusUFMP.org. Existing city plans and initiatives will also be considered and serve as guiding factors for this effort as well.

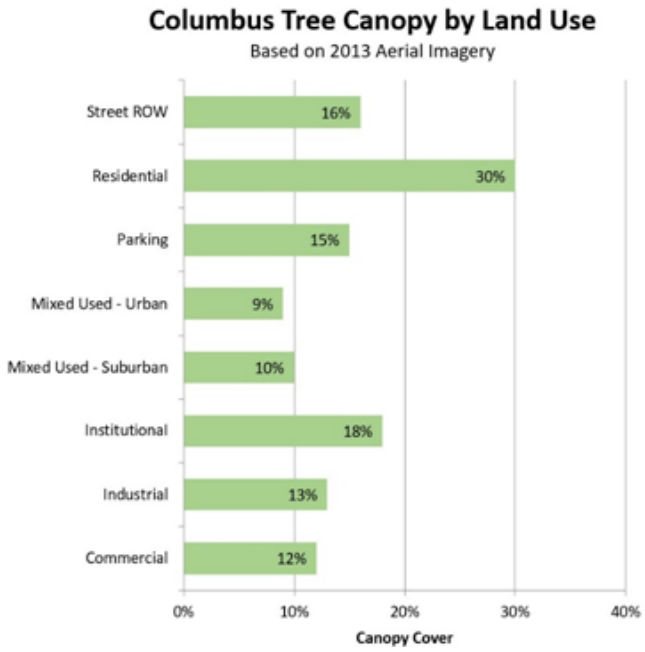
INDICATOR

01 Tree Canopy Cover

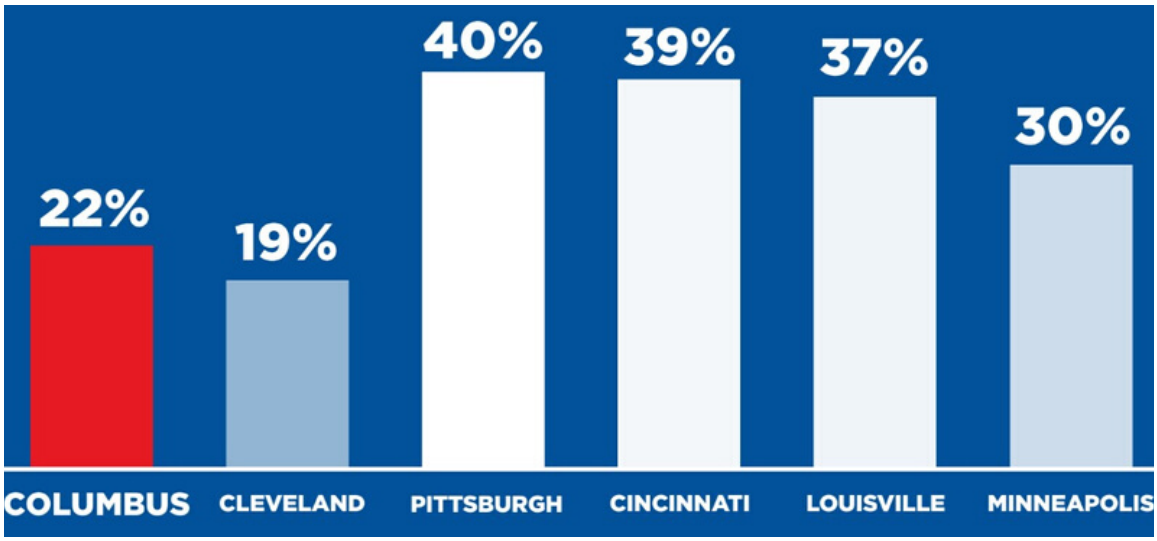
SCORE: LOW



COLUMBUS 2013 TREE CANOPY COVER: 22%



TREE CANOPY COMPARISONS

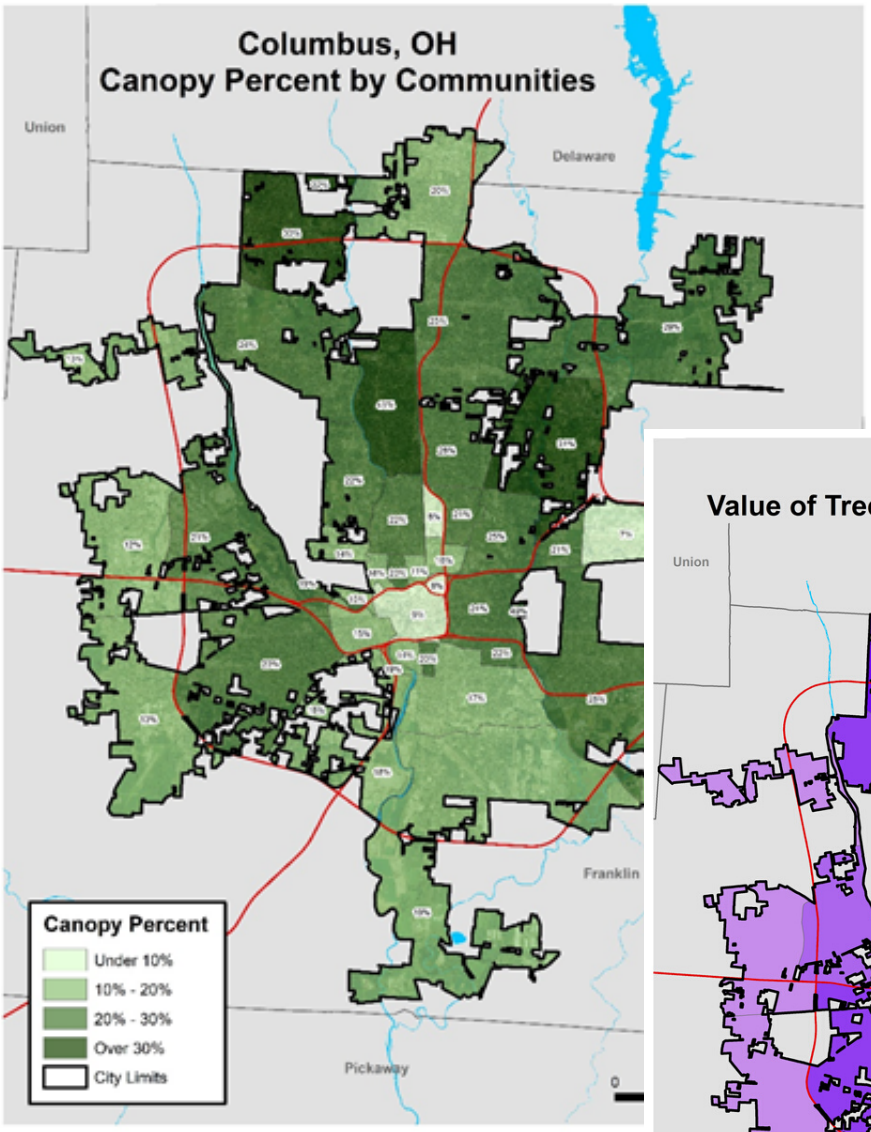


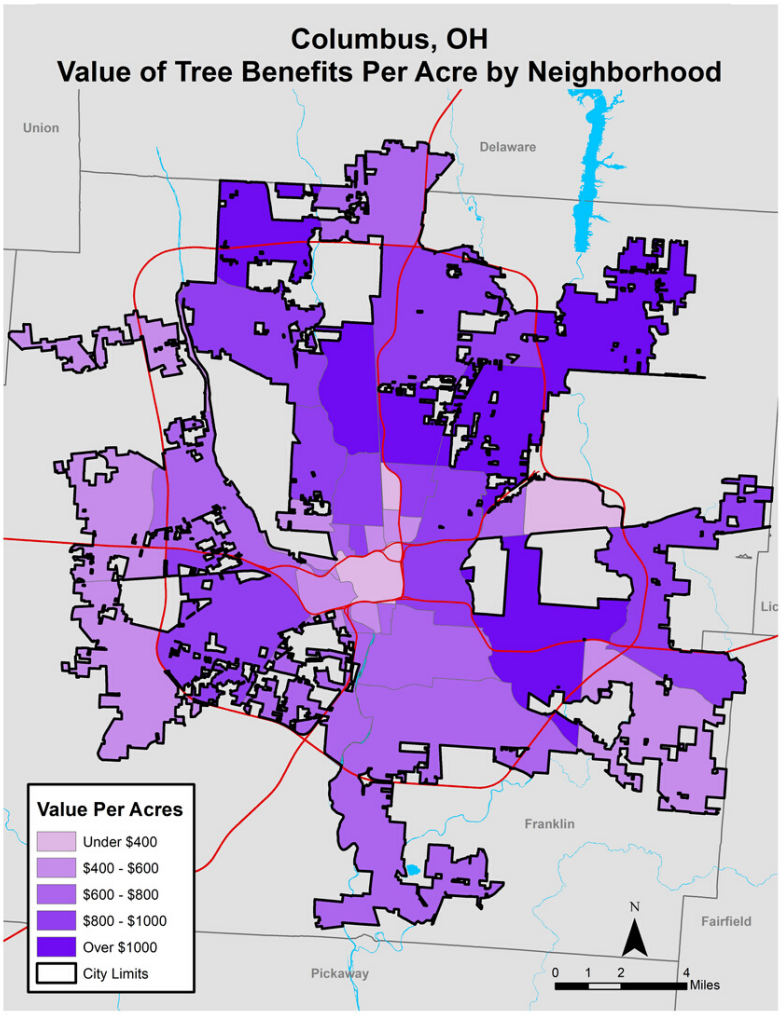
INDICATOR

02 Equity / Canopy Location

SCORE: LOW

TREE CANOPY BY COLUMBUS COMMUNITIES





INDICATOR

02 Equity / Canopy Location

SCORE: LOW

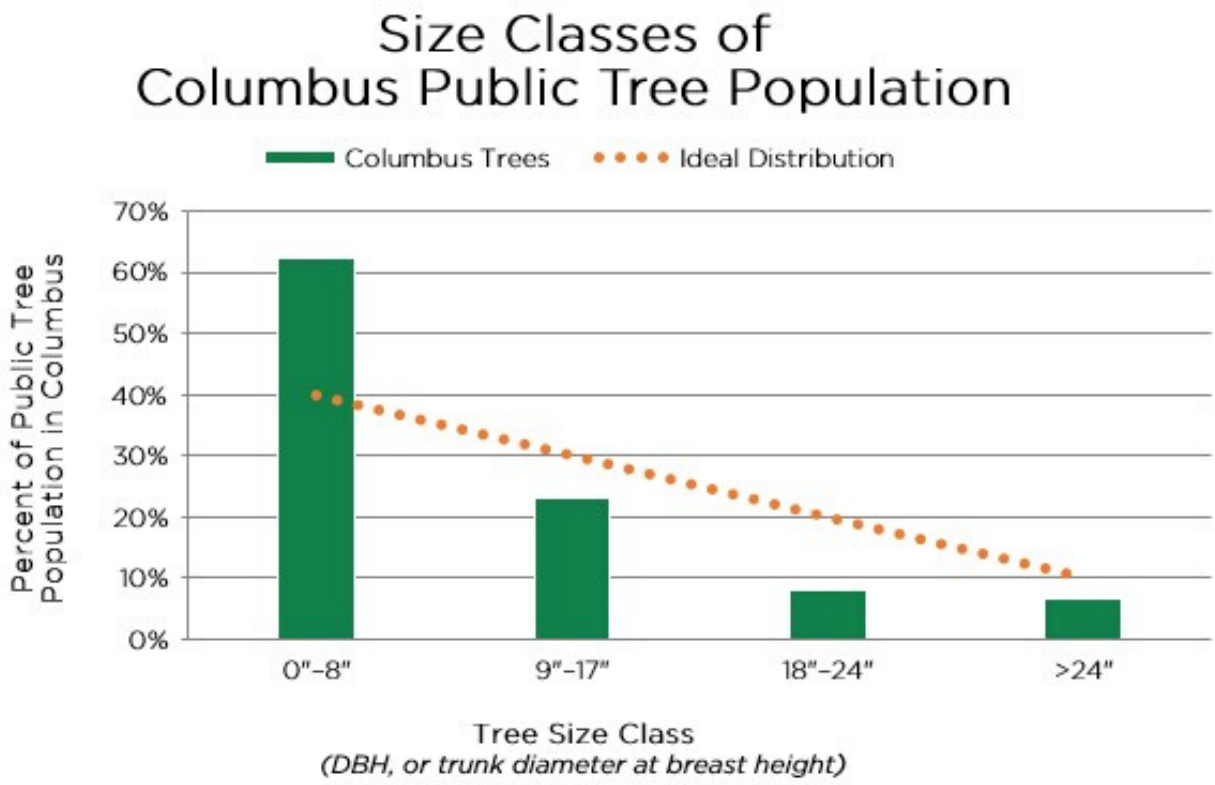
CANOPY AND BENEFITS BY COMMUNITY

Columbus Community	Total Acres of Land in Community	Tree Canopy Cover	Value of Tree Benefits *(Avg per Acre)*
Wolfe Park	87	49%	$1,890
Clintonville	3,796	41%	$1,578
Northeast	5,411	31%	$1,188
Far Northwest	4,434	30%	$1,153
Rocky Fork-Blacklick	7,428	29%	$1,126
North Linden	2,663	28%	$1,070
Mid East	7,579	28%	$1,063
North Central	2,414	25%	$959
Northland	9,770	25%	$955
Far East	8,479	25%	$952
Near East	2,322	24%	$930
Northwest	6,351	24%	$915
Greater Hilltop	7,813	23%	$870
Victorian Village	293	23%	$866
Olentangy West	2,486	22%	$858
Livingston Avenue Are	699	22%	$836
University District	1,858	22%	$828
South Linden	1,021	21%	$821
East Columbus	915	21%	$800
West Scioto	6,201	21%	$798
German Village	238	20%	$779
Far North	5,167	20%	$767
Far South	16,097	19%	$729
Harmon Road Corridor	219	19%	$714
South Side	4,520	18%	$681
Southwest	3,958	18%	$679
Harrison West	362	16%	$633
Milo-Grogan	592	16%	$598
Dublin Road Corridor	346	15%	$589
Franklinton	1,318	15%	$576
South East	7,557	15%	$563
Fifth by Northwest	695	14%	$534
Brewery District	396	14%	$530
Hayden Run	2,748	13%	$513
Westland	6,325	13%	$504
Far West	5,368	12%	$456
Italian Village	282	11%	$429
Downtown	1,561	9%	$329
State of Ohio	431	8%	$290
Fort Hayes	188	7%	$279
Airport	2,595	7%	$261

INDICATOR

03 Size Classes

SCORE: LOW



DBH Class	Columbus Trees	Ideal Distribution
0"-8"	62%	40%
9"-17"	23%	30%
18"-24"	8%	20%
>24"	6%	10%

INDICATORS

4-6 Condition & Risk

SCORES: LOW & MODERATE

Indicator #4: Knowledge of Condition & Risk on Public Trees

SCORE: MODERATE

To-date, comprehensive data has been collected on public trees, but is now out-of-date, making condition and risk determination not possible.

Indicator #5: Knowledge of Condition & Risk on Trees in Natural Areas

SCORE: LOW

Information on condition and risk in natural areas like woodlands, ravines and stream corridors is not currently available.

CONDITION IS IMPORTANT INFORMATION AS AN INDICATOR OF RISK, BUT CAN ALSO PROVIDE AND GLIMPSE INTO FUTURE CANOPY

Indicator #6: Knowledge of Trees on Private Land

SCORE: MODERATE

Knowledge of trees on private land is limited to the amount of tree canopy cover. Condition, species, risk data is not available.

INDICATOR

07 Diversity / Pest Vulnerability

SCORE: MODERATE

10/20/30 RULE FOR DIVERSITY

Industry best practice often cites the 10/20/30 Rule for tree population diversity: Plant no more than 10% of any species, 20% of any genus, and 30% of any family.

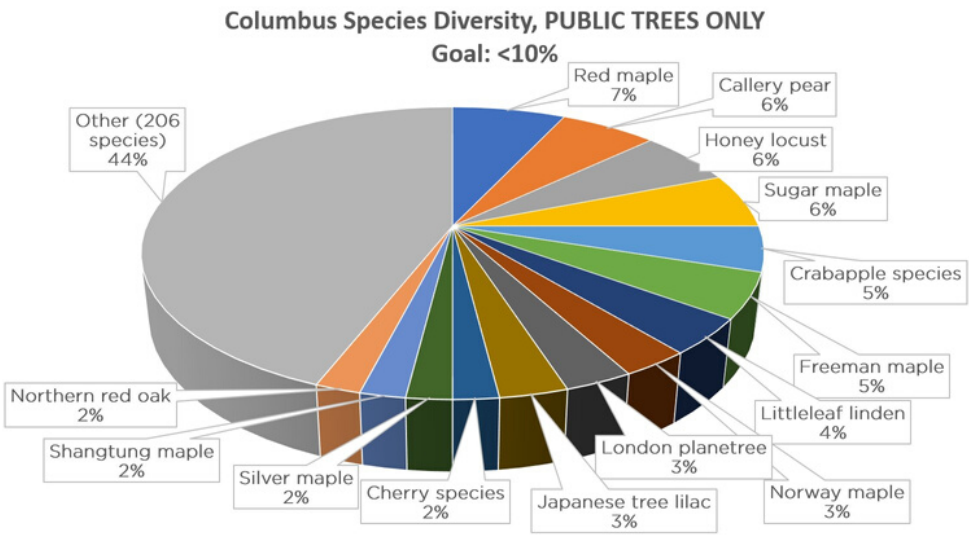
Diversity has a significant impact on pest vulnerability. In the event Columbus would experience an infestation of new pests, the impact on the total population will be lessened with a diverse tree population.

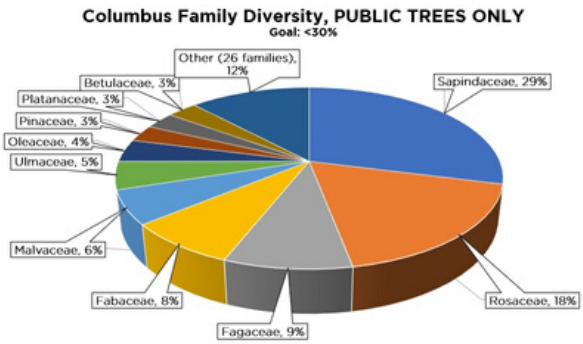
COLUMBUS PUBLIC TREE DIVERSITY

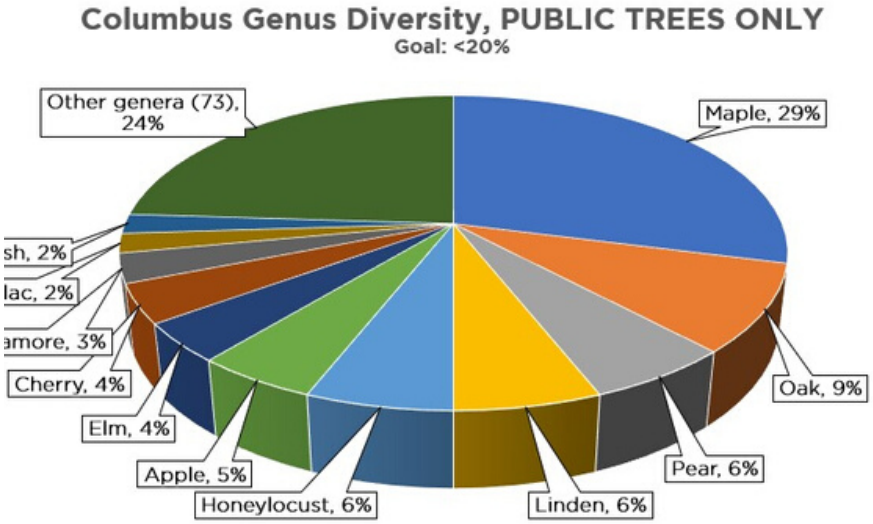
Species Goal <10%: No species exceeds the 10% recommended limit.

Genus Goal <20%: The maple genus (Acer, 29%) is the only to exceed the 20% limit.

Family Goal <30%: No family group exceeds the 30% recommended limit.



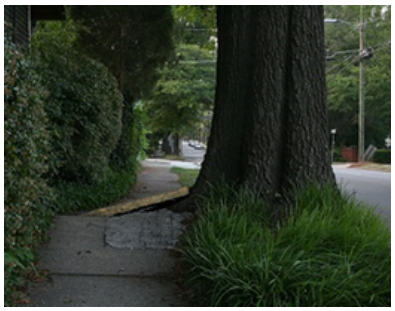




INDICATOR

08 Suitability

ABILITY OF A SITE TO SUSTAIN A TREE LONG TERM



Suitability covers a number of factors that evaluate the ability of a site to sustain a tree in the long term. These can be broken down into five subcategories:

8a. Space Above (overhead utilities)
No data is currently available to assess this suitability factor.
SCORE: LOW

8b. Space Below (utility & hardscape conflicts)
No data is currently available to assess this suitability factor.
SCORE: LOW

8c. Soil Conditions
No data is currently available to assess this suitability factor.
SCORE: LOW

8d. Invasives
Tree inventory shows Callery pears make up 6% of the public tree population. No data available on invasive trees on private land.
SCORE: LOW

8e. Climate Change Adaptability
Using the US Forest Service's Tree Atlas model, the importance value (prevalence) of a number of species in Columbus' urban forest is expected to change over the next 100 years from expected climate changes.
See table on next page.
SCORE: GOOD

INDICATOR 08 Suitability

PREDICTED CLIMATE CHANGE IMPACT ON TREES IN COLUMBUS

Species Winners and Losers in Ecoregion 117 Eastern Broadleaf Forest (Continental) Province Central Till Plains Beech-Maple Section

	Proportion of Columbus Inventory	Common Name	Botanical Name	Species Importance Value (IV) Today	IV Change with Hadley Climate Model: High Emissions Scenario	IV Chamber with PCM Climate Model: Low Emissions Scenario	IV Change with General Circulation Climate Model: High Emissions Scenario	IV Change with General Circulation Climate Model: Low Emissions Scenario	Average IV Change Across All Models	Predicted IV by 2100	Expected Change *(average across all four scenarios)*
Species Habitat Suitability is Predicted to Decrease for these Species by 2100	0.6%	white ash	Fraxinus americana	9.1	-8.0	-2.6	-7.8	-6.6	-6.2	2.8	-69%
	5.6%	sugar maple	Acer saccharum	8.7	-8.7	-1.1	-7.9	-5.6	-5.8	2.9	-67%
	0.4%	black cherry	Prunus serotina	4.9	-4.5	-2.5	-4.3	-3.1	-3.6	1.4	-73%
	0.4%	white oak	Quercus alba	2.9	-1.6	0.8	-1.5	-0.4	-0.7	2.2	-23%
	0.7%	black walnut	Juglans nigra	2.6	-2.6	2.3	-1.6	1.6	-0.1	2.5	-4%
	2.1%	northern red oak	Quercus rubra	2.3	-1.9	0.6	-1.1	0.1	-0.6	1.7	-25%
	6.9%	red maple	Acer rubrum	2.1	-0.7	-0.4	-0.8	-0.8	-0.7	1.4	-31%
	1.6%	American basswood	Tilia americana	1.8	-1.7	-0.8	-1.2	-1.5	-1.3	0.5	-72%
	1.5%	swamp white oak	Quercus bicolor	0.9	-0.7	0.2	-0.7	-0.2	-0.4	0.5	-40%
No Change	0.7%	eastern white pine	Pinus strobus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
Species Habitat Suitability is Predicted to Increase for these Species by 2100	1.5%	hackberry	Celtis occidentalis	2.7	-0.8	2.3	-0.3	1.9	0.8	3.5	29%
	2.2%	silver maple	Acer saccharinum	1.9	0.4	1.4	0.9	0.8	0.9	2.8	45%
	6.0%	honeylocust	Gleditsia triacanthos	1.7	0.9	1.9	0.9	1.6	1.3	3.0	79%
	0.4%	sycamore	Platanus occidentalis	1.6	-0.3	0.6	-0.2	0.6	0.2	1.8	11%
	0.7%	green ash	Fraxinus pennsylvanica	1.4	1.8	1.7	1.7	1.8	1.8	3.1	128%
	0.3%	eastern cottonwood	Populus deltoides	1.3	0.1	0.8	0.3	0.9	0.5	1.8	38%
	0.9%	pin oak	Quercus palustris	0.8	0.0	0.7	0.1	0.6	0.4	1.1	45%
	0.9%	eastern redbud	Cercis canadensis	0.3	-0.3	0.7	-0.3	0.7	0.2	0.5	54%
	1.2%	sweetgum	Liquidambar styraciflua	0.0	1.5	0.7	1.2	0.5	1.0	1.0	will begin to emerge
	0.5%	river birch	Betula nigra	0.0	0.1	0.1	0.2	0.0	0.1	0.1	will begin to emerge

Prasad, A. M., L. R. Iverson., S. Matthews., M. Peters. 2007-ongoing, A Climate Change Atlas for 134 Forest Tree Species of the Eastern United States [database]. https://www.nrs.fs.fed.us/atlas/tree, Northern Research Station, USDA Forest Service, Delaware, Ohio.