



i-Tree for funding opportunities

i-Tree Eco for Monitoring, Forecasting, and Strategic Management

*Jason Henning
Krista Heinlin
Phillip Rodbell
Dave Bloniarz
Jay Heppler
Scott Maco*

Plan for today

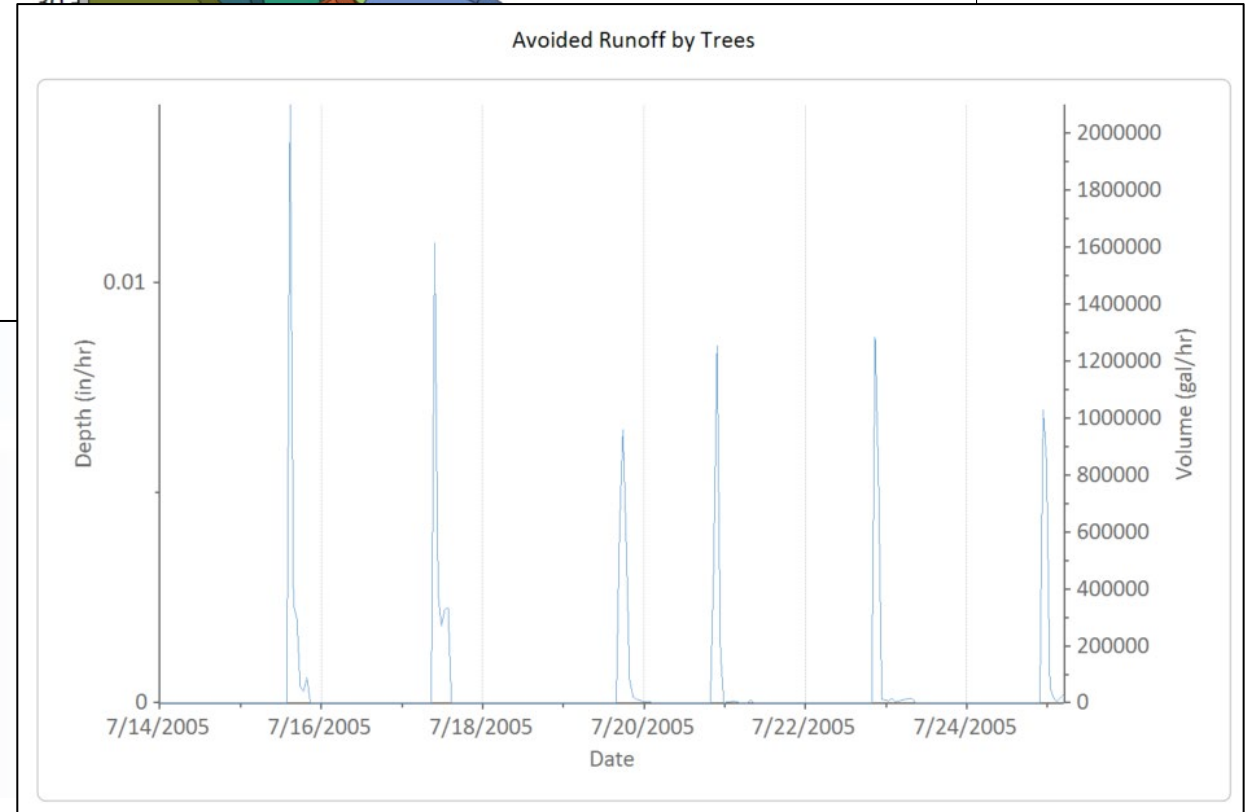
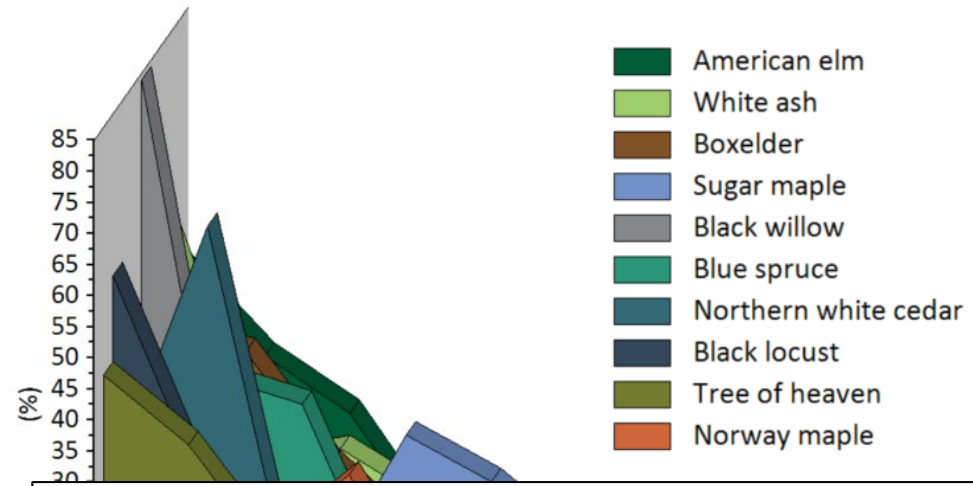
- Intro to i-Tree Eco
- The Philadelphia Story
- 3 example ways to employ i-Tree Eco
 1. i-Tree Eco can be easy
 2. Small and targeted
 3. Expand your view
- Q/A



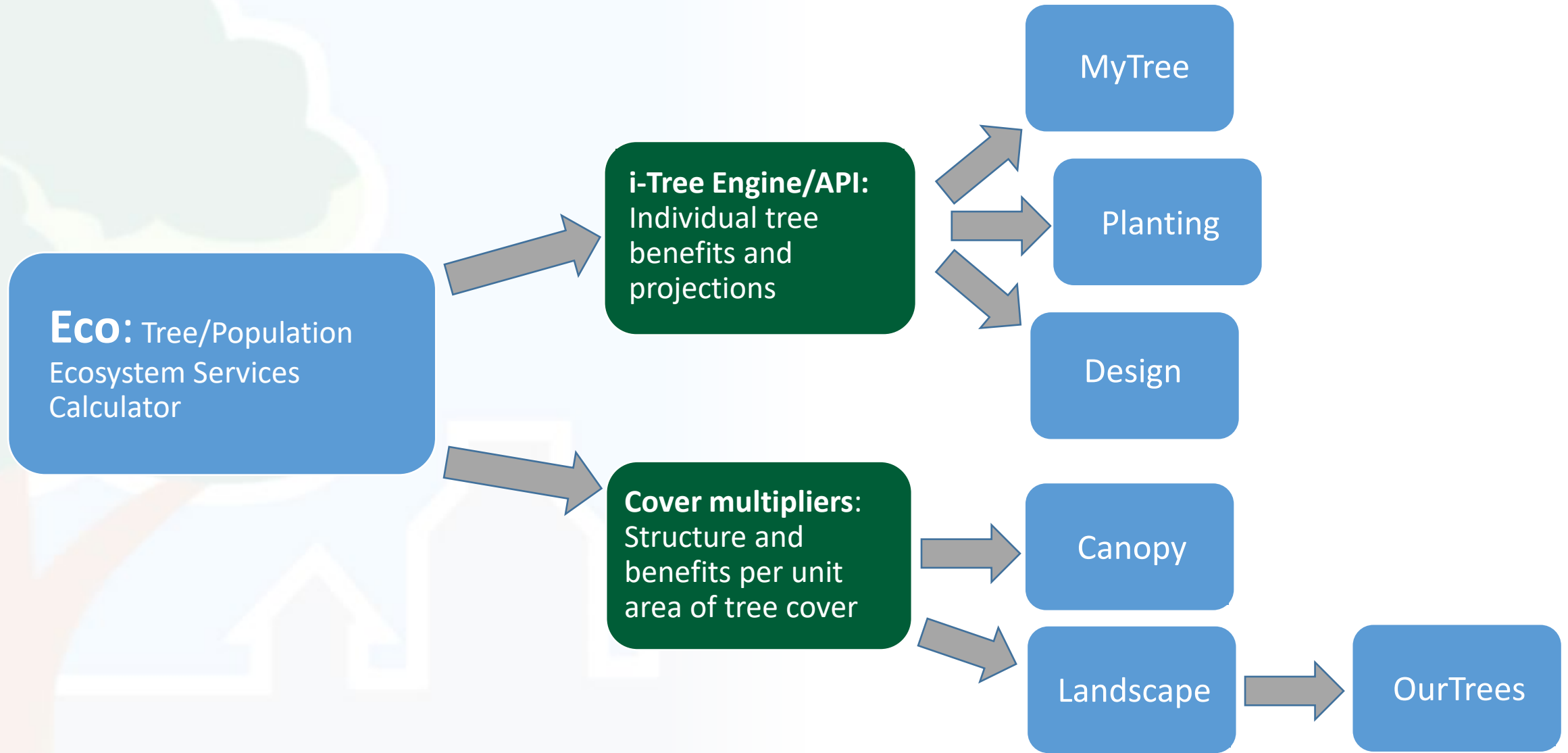
i-Tree Eco

Convert inventory data (sample or census) to a wealth of tree ecosystem service estimates.

- Educate
- Advocate
- Manage



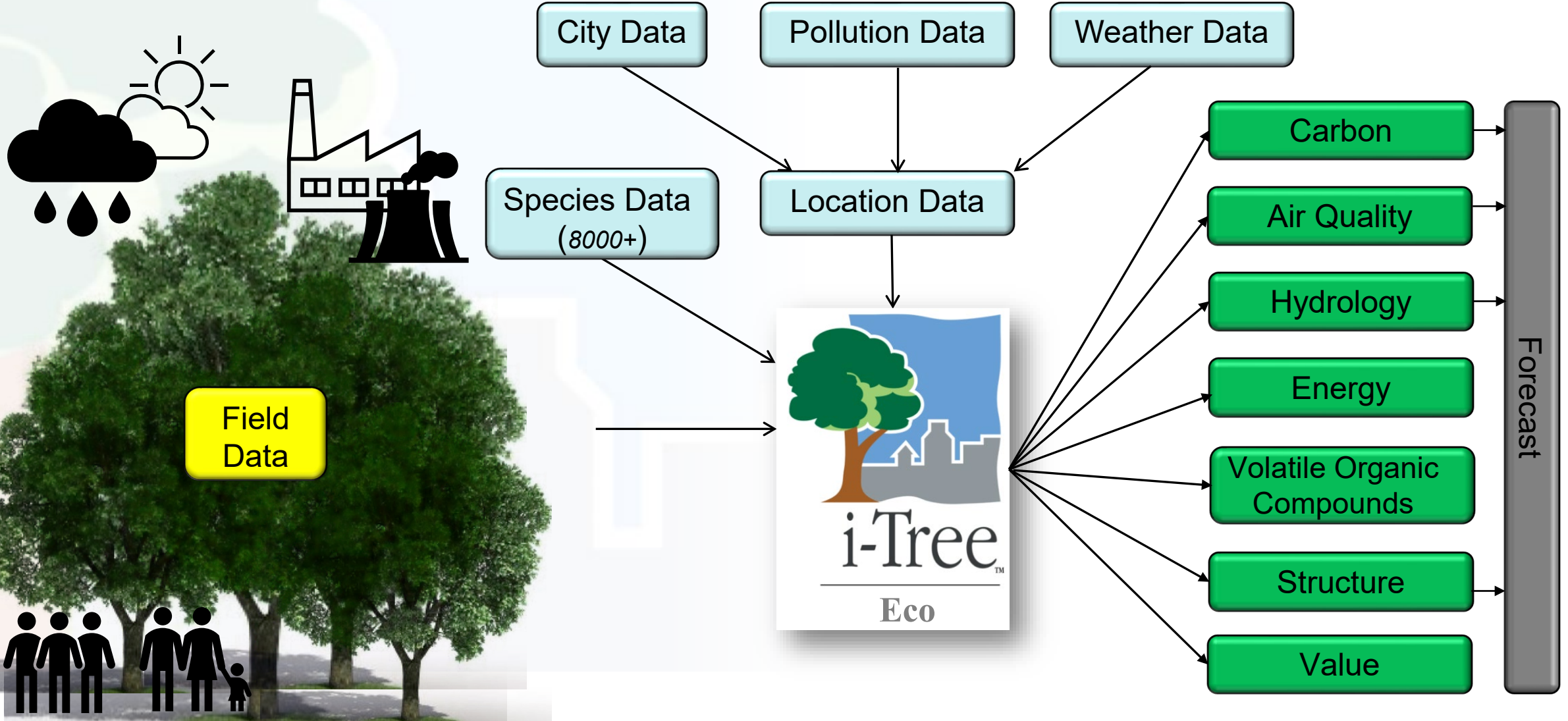
i-Tree Tool Relationships



i-Tree is a Cooperative Initiative among these partners



i-Tree model basics: Inventory data → tree benefits?



The i-Tree Eco Framework

Structure



- Summary of field measurements
- Leaf area
- Condition
- Species distribution
- Diameter distribution

Function



- Air quality improvement
- Energy effects
- Carbon storage & sequestration
- Hydrology effects
- Shade ultraviolet effects (UV)
- Foodscape characteristics - *limited species info*
- Wildlife suitability – avian focus
- Volatile organic compound VOC
- Leaf nutrients

Value

- Monetary value
- Equivalent values
- Health outcomes
- Cost Benefit analysis
- Summaries for management

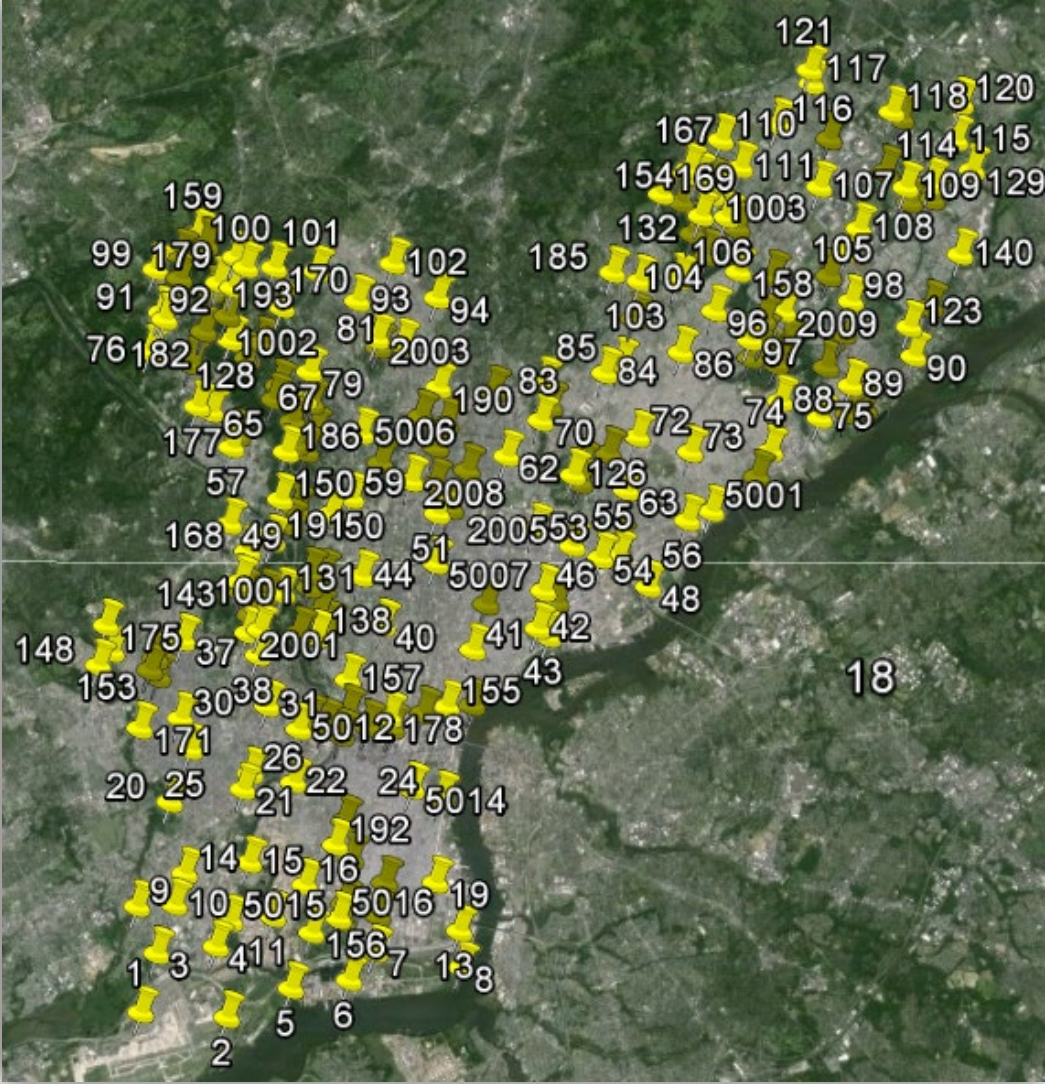
Eligible funding activities



Eligible Activities	<ul style="list-style-type: none">• <u>Foster individuals, groups, and organizations in the communities served to become engaged participants in urban forest planning and management, especially those in disadvantaged communities that do not have adequate resources or are underrepresented.</u>• <u>Protect, enhance, and expand equitable urban tree canopy cover to maximize community access to human health, social, ecological, and economic benefits particularly in disadvantaged and nature-deprived communities experiencing low tree canopy, extreme heat, frequent flooding, and poor access to parks and nature.</u>• <u>Encourage long-term urban forest planning, assessment, and management.</u>• <u>Encourage proactive and systematic maintenance and monitoring of urban trees to improve forest health; assess risk to forest pests, disease, and adverse climate impacts; and formulate adaptive management strategies to improve forest resilience.</u>• <u>Advance the use of tree and forest inventories, monitoring, and assessment tools in priority areas.</u>• <u>Improve preparation for severe storms and the recovery of damaged or deteriorated landscapes to more healthy and resilient conditions.</u>• <u>Protect and enhance watersheds in urban and developing areas with a focus on conserving and managing forest patches, and green stormwater infrastructure.</u>• <u>Support the creation and maintenance of green jobs and economic opportunities for planning and sustainably maintaining trees and forests, and producing and using urban forest products.</u>• <u>Address exotic invasive pest species that adversely impact urban forests.</u>• <u>Work across jurisdictional boundaries, leveraging ideas and resources to increase capacity to provide equitable access to benefits across the larger landscape and at a greater geographic scale.</u>• <u>Aid in planning, goal setting, and skill sharing with other professions such as urban planners, engineers, and public health officials.</u>
---------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

100% fundable activities in Climate and Economic Justice focus communities

i-Tree Eco: The Philly Story



USDA
United States Department of Agriculture

The Urban Forest of Philadelphia

The Urban Forest of Philadelphia cover features a photograph of a large, leafy tree with clusters of pink flowers in the foreground, with modern city buildings in the background. The cover is primarily orange with a white header and footer.

Forest Service
Northern Research Station
Resource Bulletin
NRS-106
November 2016



i-Tree Eco: Citywide results

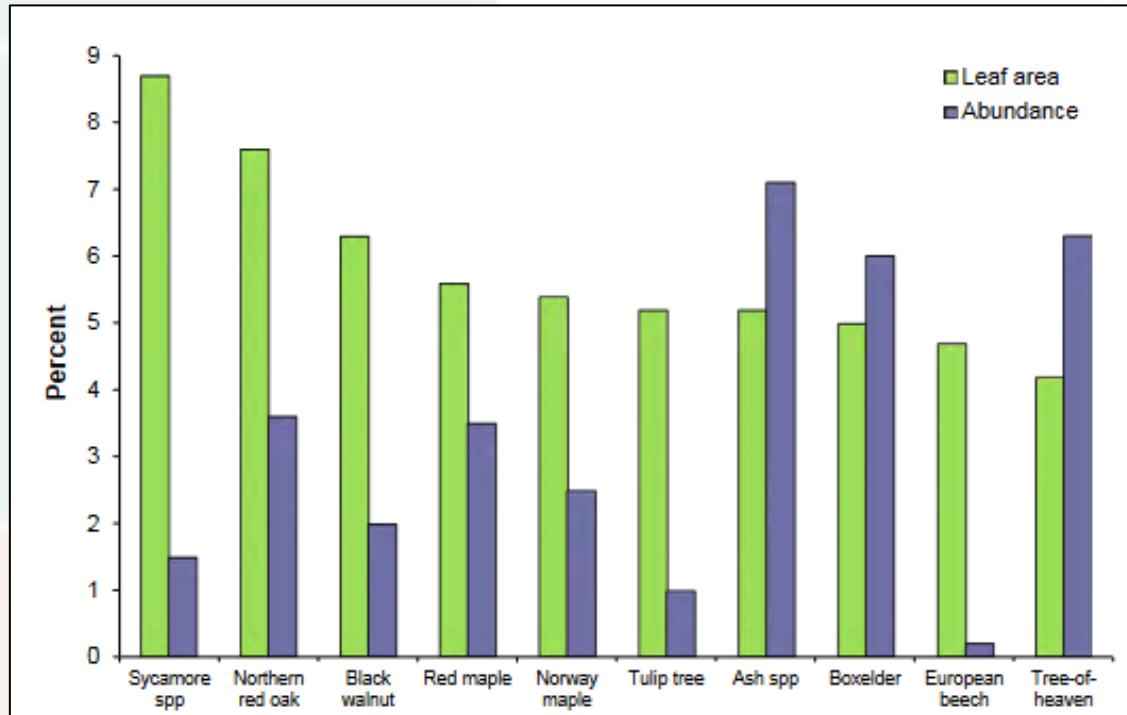


Table 1.—Summary of city-wide urban forest features, Philadelphia, 2012

Feature	Estimate
Number of trees ^a	2,918,000
Tree cover	20% ^b
Most dominant species by:	
Number of trees	spicebush, black cherry, ash species, tree-of-heaven, boxelder
Leaf area	sycamore species, northern red oak, black walnut, red maple, Norway maple
Trees 1 to 6 inches d.b.h.	62.2%
Air temperature reduction ^c	0.3 °F
Pollution removal	513 tons/year (\$19.0 million/year)
VOC emissions	228 tons/year
Carbon storage	702,000 tons (\$50.0 million)
Carbon sequestration	27,000 tons/year (\$1.9 million/year)
Value of reduced building energy use	\$6.9 million/year
Value of reduced carbon emissions	\$764,000/year
Compensatory value ^d	\$1.7 billion
Rainfall interception	81.0 million cubic feet

i-Tree Eco: Power of stratification



City owned parkland is **9%** of the city

Trees on city owned parkland account for **40%** of carbon storage and sequestration

Feature	Estimate
Number of trees	1,100,000
Tree Cover	64%
Carbon Storage	273,000 tons (\$19.4 million)
Pollution Removal	179 tons/yr (\$6.6 million/yr)

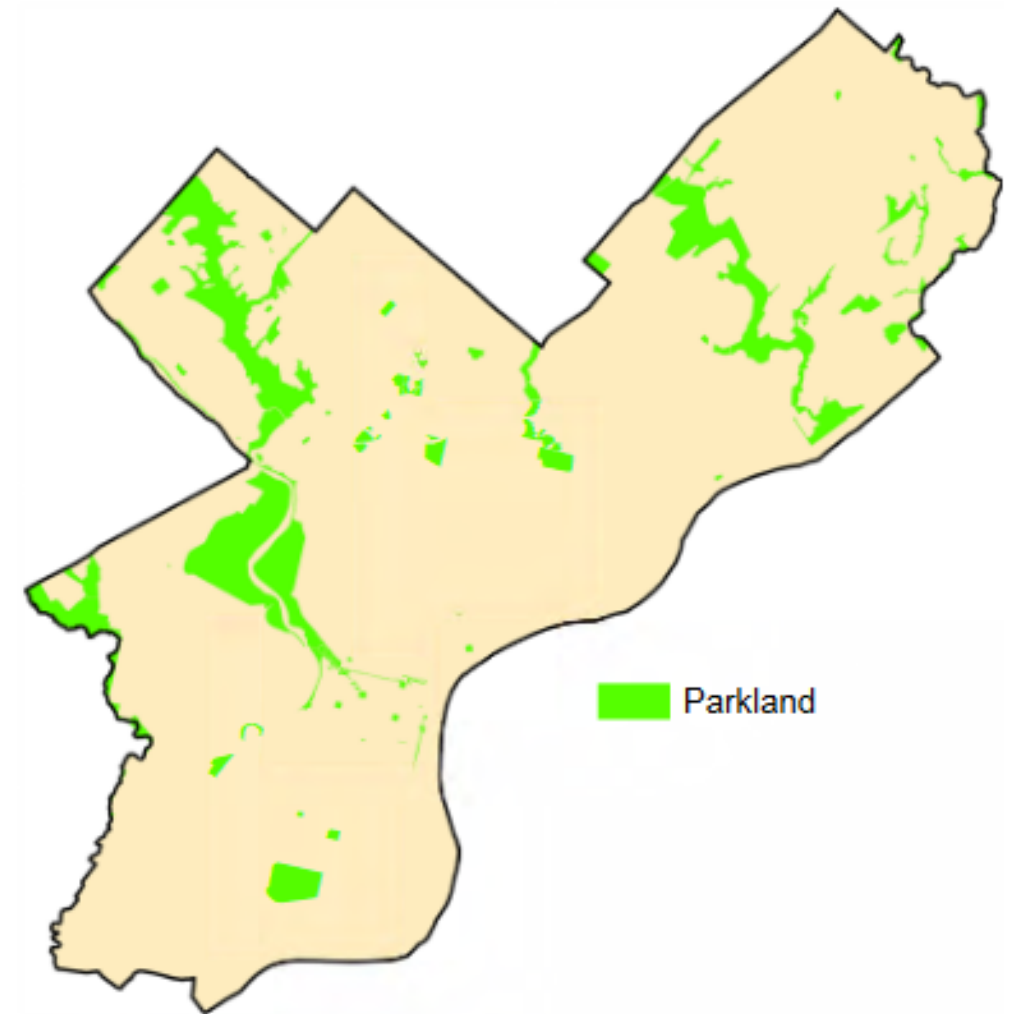
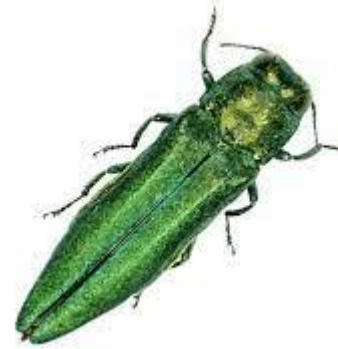


Figure 1.—Philadelphia city boundaries and designated parkland areas, 2012.

i-Tree Eco Example: Large project with targeted results



**Ash Trees:
City stands to lose
7.1% of its forest and
millions in benefits to
emerald ash borer**



Parameter	Estimate	Units	% of Total City	Species Group Rank
Population	206,996	number	7.1	3
Density	2.3	trees/acre		3
Carbon stored	35,742	tons	5.1	7
Carbon sequestered	1,025	tons/year	3.8	11
Net carbon sequestered	935	tons/year	4.0	10
Leaf area	4,818	acres	5.2	7
Leaf biomass	1,936	tons	6.3	3
Trees, diameter 1-3 in.	111,777	number	54.0 ^a	2
Trees, diameter >18 in.	10,557	number	5.1 ^a	12

^a Percent of all ash trees

From inventory to strategic planning



2030 CANOPY PROJECTION

management unit	2018 canopy cover %	2030 canopy cover target %	# trees to reach canopy 2030 target	estimated complete cost/tree	cost to reach 2030 target
Street Trees	10%	17%	142,241	\$ 900	\$ 128,017,000
Residential Yards	19%	23%	136,162	\$ 100	\$ 13,616,000
Commercial Industrial	10%	17%	134,251	\$ 500	\$ 67,125,000
Campuses & Schools	17%	21%	21,675	\$ 800	\$ 17,340,000
City Facilities	11%	18%	30,863	\$ 800	\$ 24,690,000
Public Facilities	10%	17%	37,820	\$ 800	\$ 30,256,000
				tree planting cost subtotal	\$ 281,044,000
				private development contribution*	\$ (34,902,000)
				total cost to reach 2030 target	\$ 246,142,000

Calculated benefits

400 premature deaths avoided / year based on the combined health impacts of a tree canopy cover of 30% in Philadelphia.

+

1,000 full time jobs over the course of 30 years.

+

\$20 million / year in combined environmental benefits including reduced air pollution, carbon sequestration, reduction in residential energy consumption, and stormwater management.

+

\$50 million / year in captured value from reduced robbery and theft based on a projected 12% reduction in crime associated with increased tree canopy cover.

Philly Tree Plan

Growing Our Urban Forest

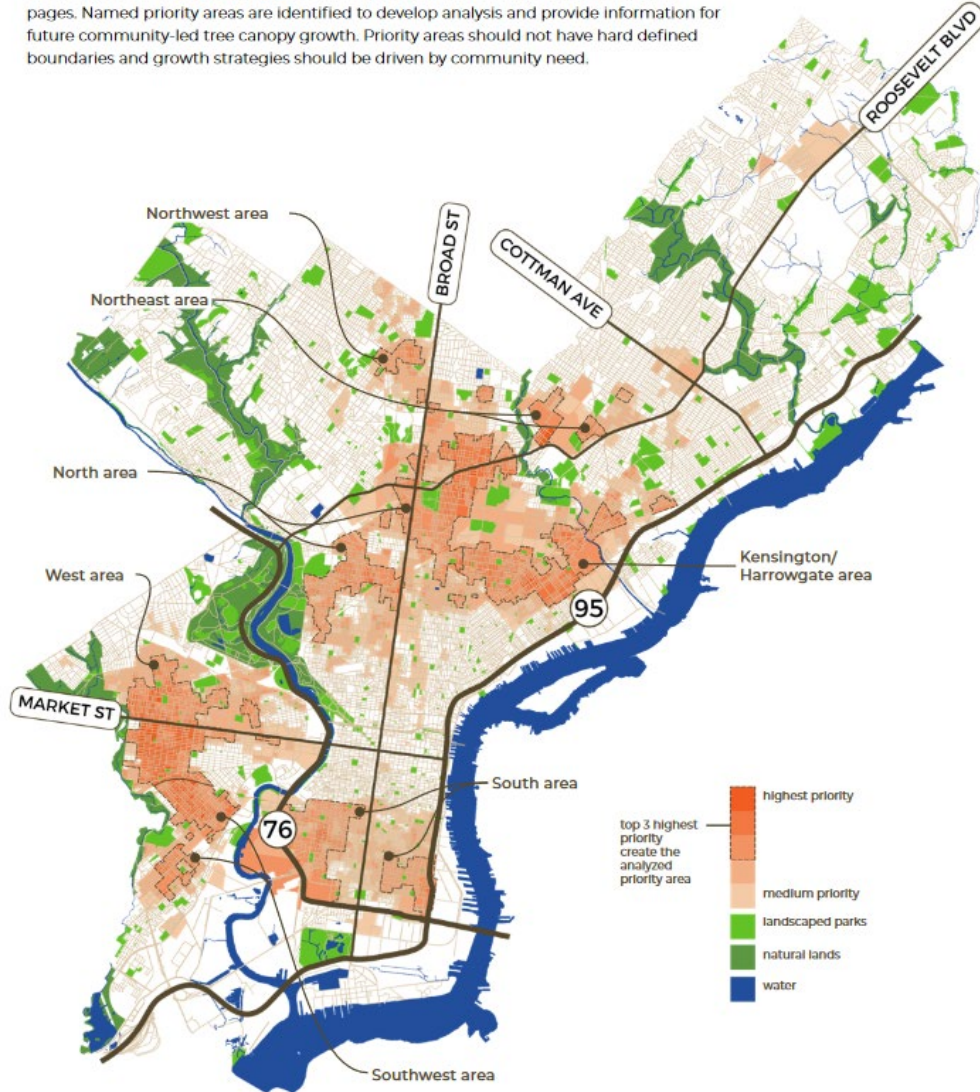
This 30-year investment in trees could have the following benefits:

- 400** premature deaths avoided per year
- 1,000** full time jobs
- \$20 million** per year in combined environmental benefits
- 12%** reduction in crime

Impactful and realistic goals

PRIORITY ANALYSIS AREAS

Dashed lines show the boundaries of the regions that were analyzed in the following pages. Named priority areas are identified to develop analysis and provide information for future community-led tree canopy growth. Priority areas should not have hard defined boundaries and growth strategies should be driven by community need.

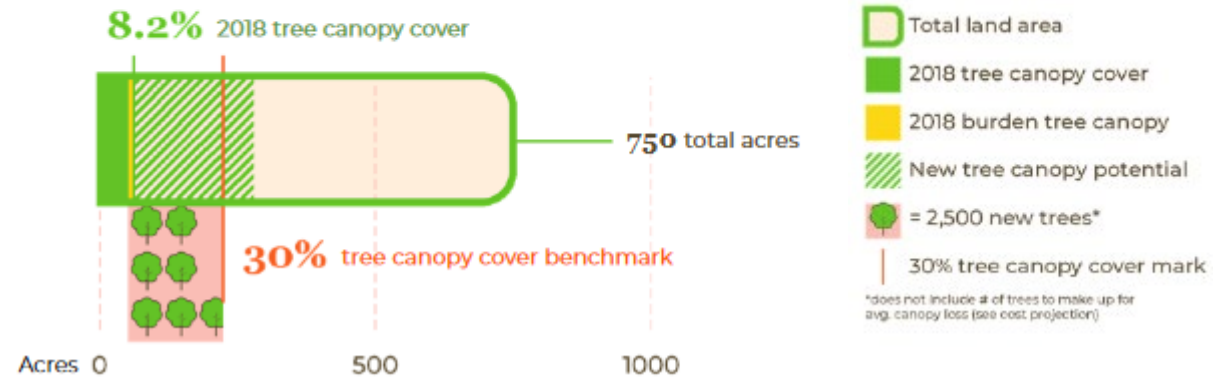


Priority area analysis - SOUTHWEST

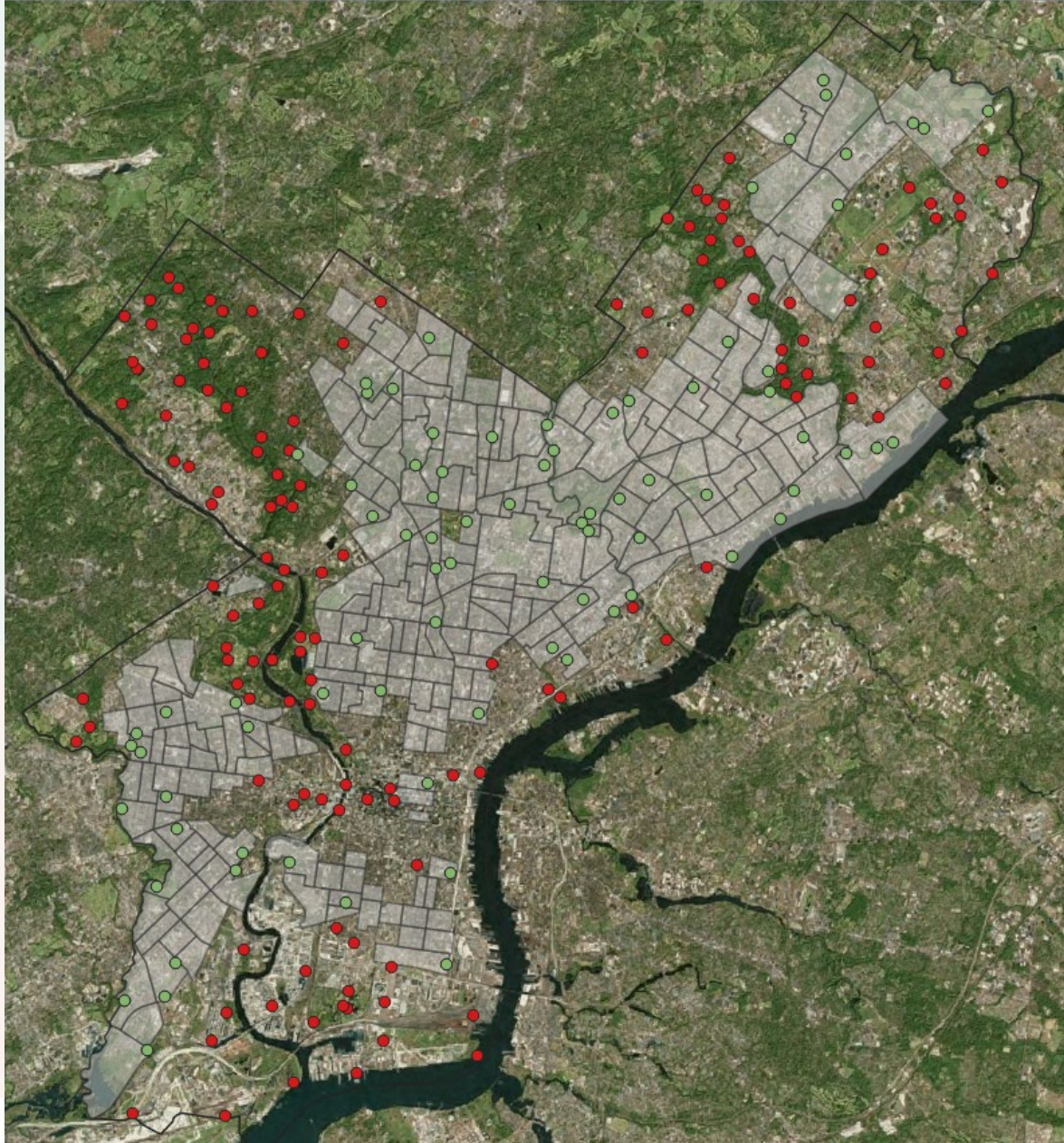
This area is characterized by two- or three-story row homes, commercial corridors with surface parking, and large industrial areas.

To achieve the 30% tree canopy goal strategies must be identified for new tree planting along the streets, in residential yards, and in collaboration with landlords and other commercial or industrial land owners. Opportunities for green corridors that connect the neighborhood to Cobbs Creek Park, Bartram's Garden or other green spaces should be considered.

TOTAL CANOPY



Evaluating relative to Climate and Economic Justice

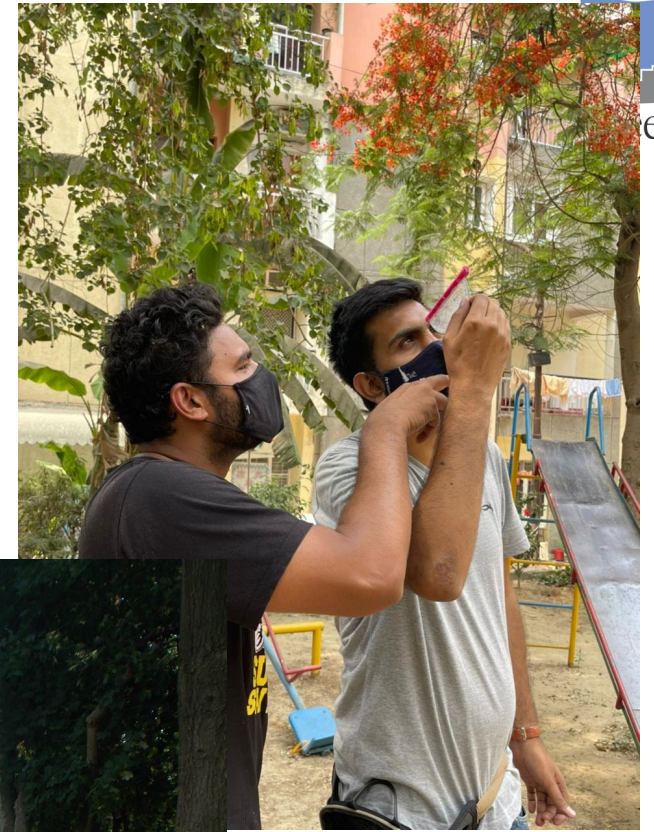
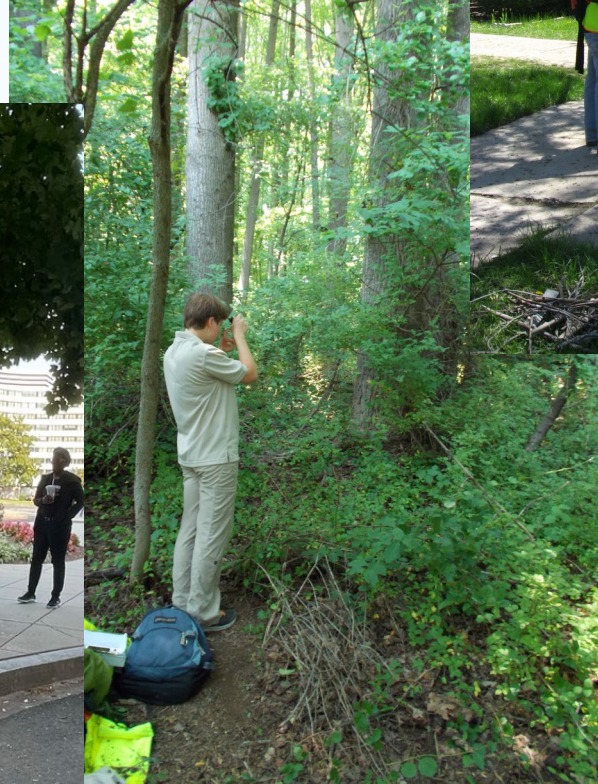


	Non-CEJ	CEJ
Area	58,000 ac	32,600 ac
Trees	88%	12%
Tree per acre	86	21
Carbon	86 tons/ac (96%)	6 tons/ac (4%)
Air pollution	\$39.9 million (83%)	\$8.15 million (17%)
Energy	\$1.71 million (38%)	\$2.83 million (62%)

- **Non-CEJ has 3 times the species richness**
- **Non-CEJ has 3.5 times the leaf area per acre**
- **Trees decrease UV radiation by 45% in non-CEJ, only 16% in CEJ areas**
- **CEJ 5 most important species Boxelder, Tree of heaven, red maple, arborvitae, mulberry**

There is more than one way to i-Tree Eco

1. i-Tree Eco can be easy
 2. Small and targeted
 3. Expand your view
- ...and many more



Eco flexible tree data variables

Minimum Required Tree Data

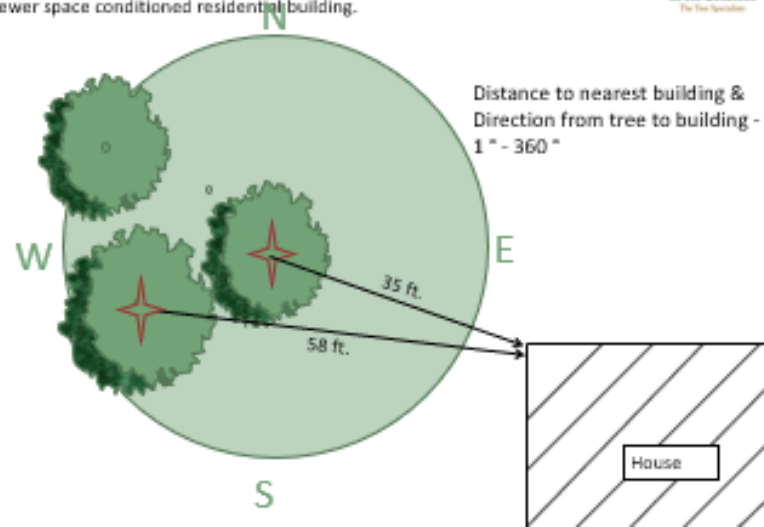
1. Tree species
2. Diameter at breast height (DBH)

Optional but Recommended Tree Data

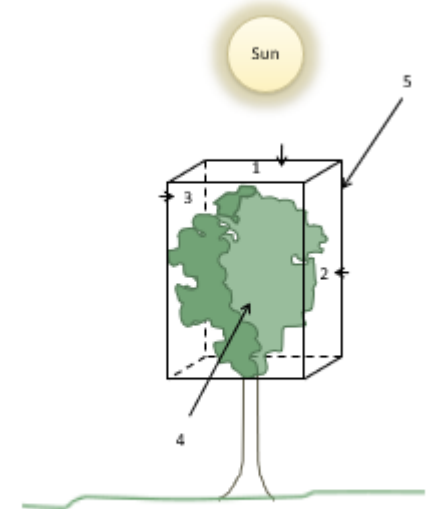
3. Total tree height
4. Height to live top
5. Height to crown base
6. Crown width (N-S)
7. Crown width (E-W)
8. % Crown missing
9. % dieback (condition)
10. Crown light exposure (CLE)
11. Land use

Energy Effect (optional)

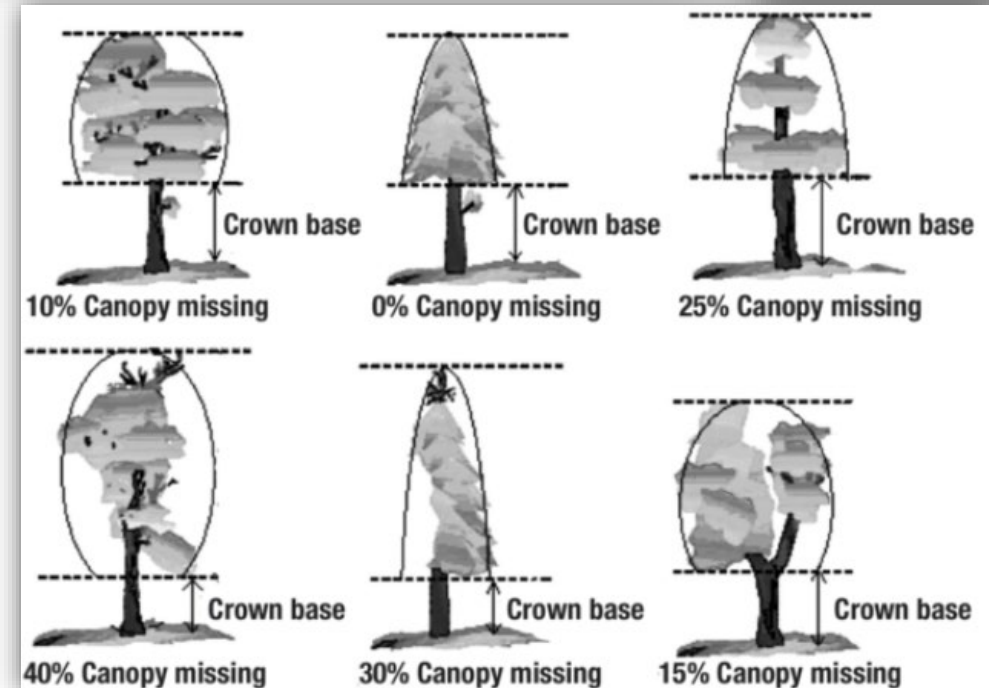
Collect for trees $\geq 20\text{ft}$ (6.1m) tall and within 60ft (18.3m) of a 3 story or fewer space conditioned residential building.



CROWN LIGHT EXPOSURE



CLE affects tree growth rates and accounts for competition with other trees for access to light.



From field data to results

Understanding i-Tree: 2021 Summary of Programs and Methods

David J. Nowak



Table 2.—Summary of which directly field-measured characteristics are used to estimate derived variables and ecosystem services. D= directly used; I= indirectly used; C= conditionally used.

	DERIVED VARIABLES		ECOSYSTEM SERVICES										
	Leaf Area	Leaf Biomass	Carbon Storage	Gross Carbon Sequestration	Net Carbon Sequestration	Energy Effects	Air Pollution Removal	Avoided Runoff	Transpiration	VOC Emissions	Compensatory Value	Wildlife Suitability	UV Effects
DIRECT MEASURES													
Species	D	D	D	D	D	D	I	I	I	D	D		
Diameter at breast height (d.b.h.)			D	D	D						D	D	
Total height	D	D	C	C	C	D	I	I	I	I		D	
Crown base height	D	D	C				I	I	I	I			
Crown width	D	D	C				I	I	I	I			
Crown light exposure			C	D	D								
Percent crown missing	D	D	C	C	C	D	I	I	I	I			
Crown health (condition/dieback)				D	D						D	D	
Field land use				D							D	D	
Distance to building						D							
Direction to building						D							
Percent tree cover						D	D	D				D	D
Percent shrub cover							D					D	
Percent building cover						D							
Ground cover composition							I					D	

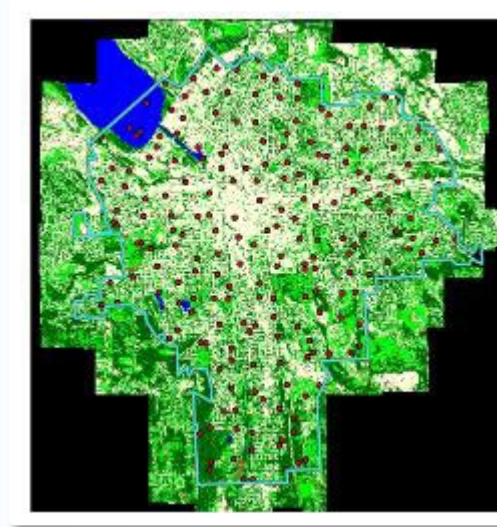
Tree Data

Plot Data

Sample or complete inventory

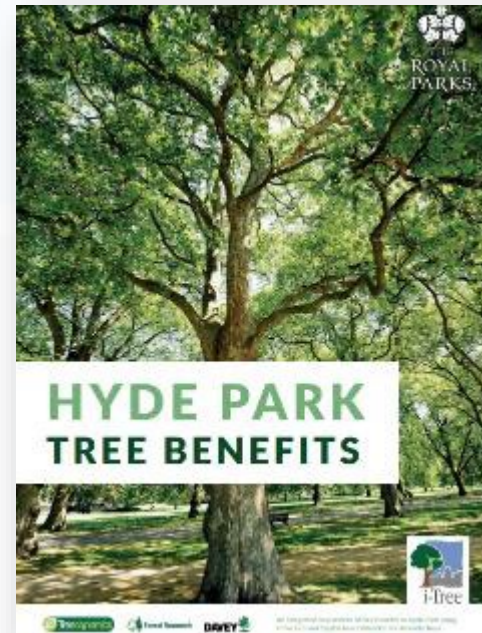
Sample plots

- Regional or watershed
- County
- City
- Where measuring every tree is impractical



Complete inventory

- Residential properties
- Neighborhoods/blocks
- Street tree inventory
- Parks
- Campuses
- Existing data



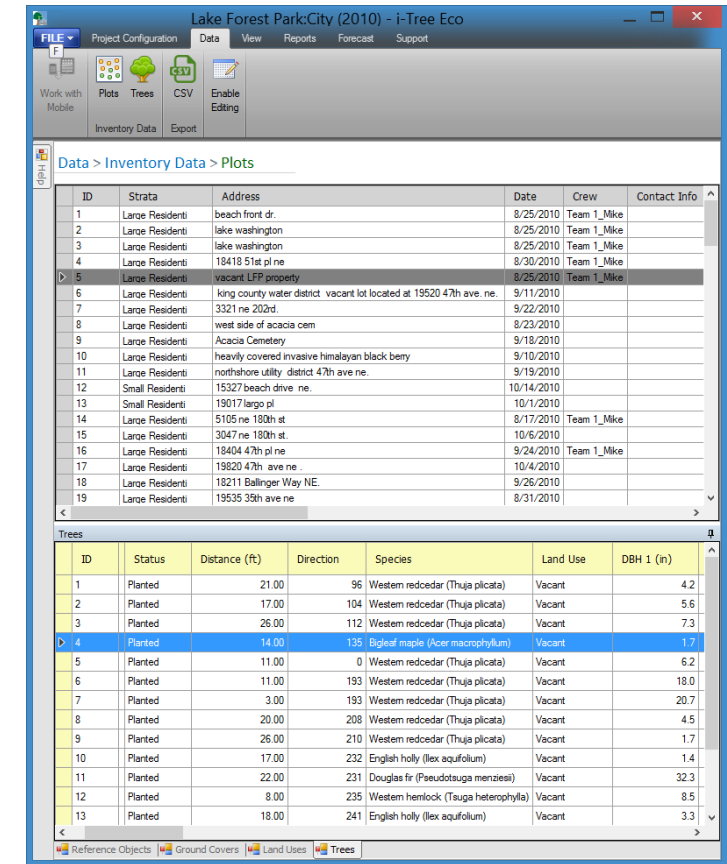
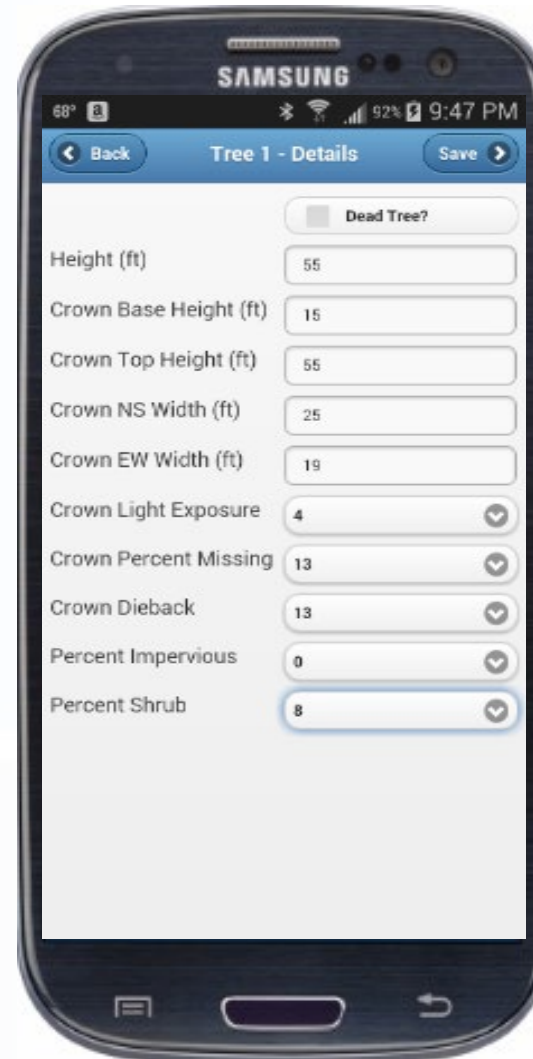
Example 1: i-Tree Eco can be easy



Mobile data entry



<https://bit.ly/3KMHVSr>



Example 1: i-Tree Eco can be easy

- Citizen science
- Engagement/Outreach
- Monitoring
- Diverse audiences
- Connect people to *their* trees



i-Tree Eco Cambridge **PLOT SET-UP** i-Tree Eco Cambridge **SECTION 1: THE LAND**

We estimate that STEPS 1-4 will take you around 30 minutes

We estimate that STEPS 5-9 will take you around 45 minutes

STEP 1: LOCATE YOUR PLOT CENTRE
Use the plot map to locate the plot centre on your property. Use a can of beans or similar to mark the location so you are able to find it again!

STEP 2: MARK OUT THE EDGE OF YOUR PLOT
Now measure 11.3m from that centre point towards North. (you could pace it, or cut string or garden twine to this length if your tape measure is not long enough). Add another marker. Repeat for South, East and West. Well Done, you have now marked out your plot!

STEP 3: DRAW A ROUGH SKETCH MAP OF YOUR PLOT
Drawing a rough sketch map onto your plot map will be really helpful when we make a couple of estimations. Add to your map anything which is permanent such as, grass, patio, decking, flower beds, shrubs and trees. Try to keep it to scale as best you can. Don't worry!! We do not award marks for artwork!!

STEP 4: TAKE SOME PHOTOS OF YOUR PLOT
It would be really helpful for us if you are able to take some photos of what your plot looks like. We would suggest taking at least one photo of the entire plot.

STEP 5: RECORD YOUR UNIQUE REFERENCE
Decide whether you will complete your survey using the paper form or online (the link to online forms can be found at the bottom of this page). Paper forms will already have a unique reference recorded. If using the online form, you will need to log in using this Unique Reference (it can be found on any of your documentation). Check the manual for full instructions.

STEP 6: RECORD HOW MUCH OF THE PLOT CAN BE SEEN & MEASURED
If you can see and measure all of your plot, this will be 100%. Check the manual for what to do if you cannot see and measure all of your plot.

STEP 7: RECORD SOME GROUND COVERS IN THE PLOT
How much of your garden is covered with Tree Cover? And how much by Shrub Cover? Any space which is not covered by trees, shrubs or hard surfaces we call 'potential plantable space' (this does not mean it will be planted, just simply gives an idea of how much space is available). How much of your garden would you estimate is potential plantable space?

An infographic titled 'i-Tree Eco Cambridge' and 'SECTION 1: THE LAND'. It details the first seven steps of setting up a plot. Step 1: Locate your plot centre. Step 2: Mark out the edge of your plot (11.3m in all directions). Step 3: Draw a rough sketch map of your plot (including shrubs, pond, patio, tree). Step 4: Take some photos of your plot. Step 5: Record your unique reference. Step 6: Record how much of the plot can be seen & measured (100%). Step 7: Record some ground covers in the plot (e.g., 20% Shrub, 50% Plantable, 30% Tree). The infographic includes illustrations of a person measuring a plot, a person taking a photo, and a person recording data on a tablet.

Example 2: Small and targeted



Abington Township Montgomery County, PA



Introduction

Master Tree Action Plan

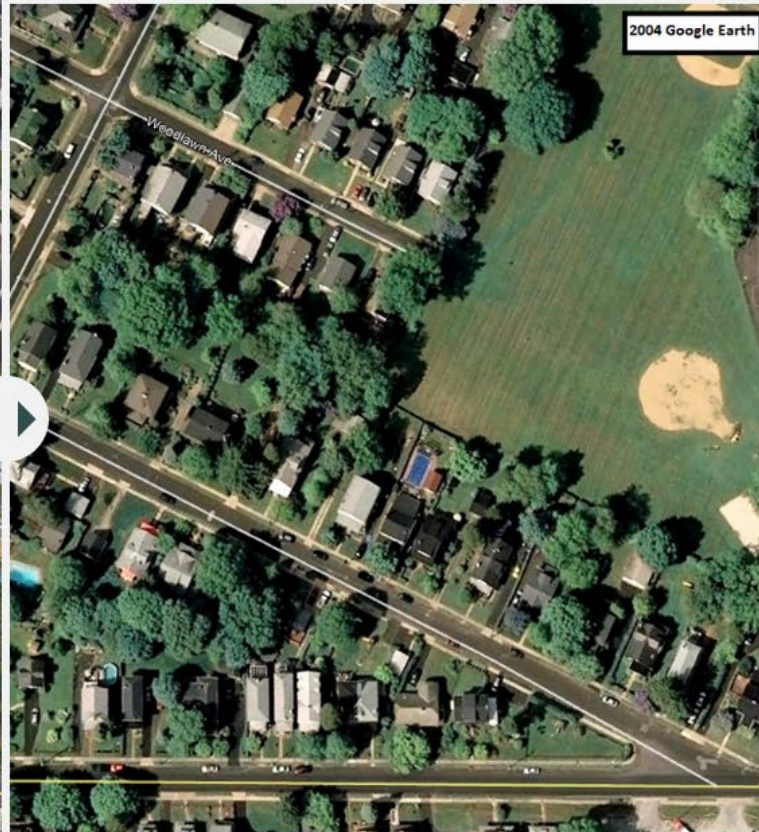
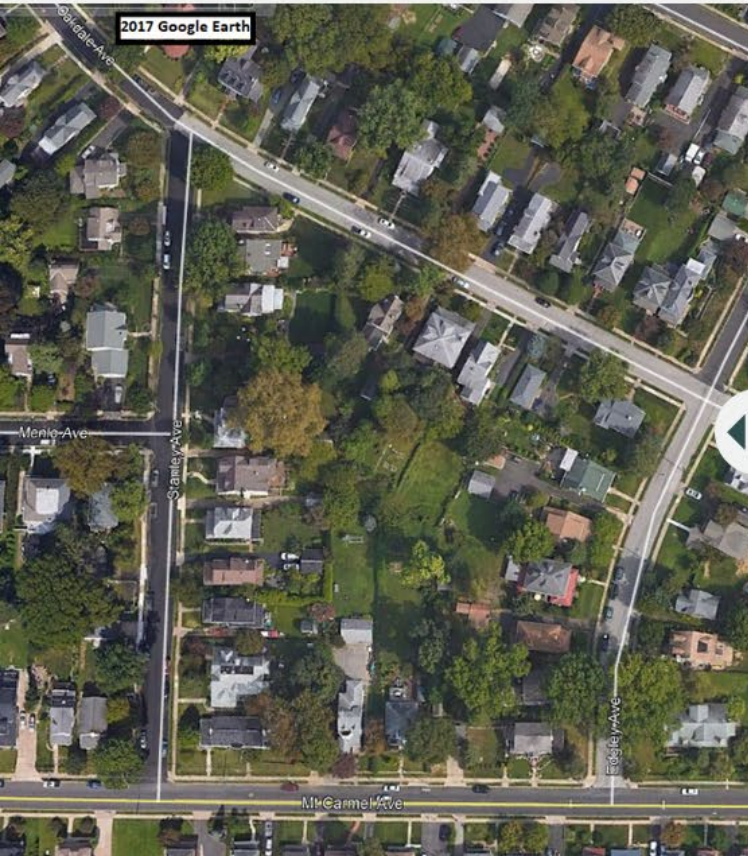
Abington's Urban Tree Canopy

A Closer Look

Tree Canopy Cover by Populatio...

Selected Land Uses

Summ



Tree size matters. The neighborhood's large, mature shade trees have the most leaf area and provide the greatest benefits. **While trees 30" or greater in diameter make up only 8% of the population - their canopies make up 27% of the neighborhood's leaf area.** A comparison of the benefits of an 11" diameter Dogwood tree and a 30" diameter Maple tree growing in the neighborhood shows that the Maple provides nearly 8 times the ecosystem benefits as the Dogwood.

To maximize the benefits Abington's tree canopy provides - we should focus our private property efforts on preserving our existing large trees and planting species that will grow to be large shade trees to replace those we have lost or will lose in the future.

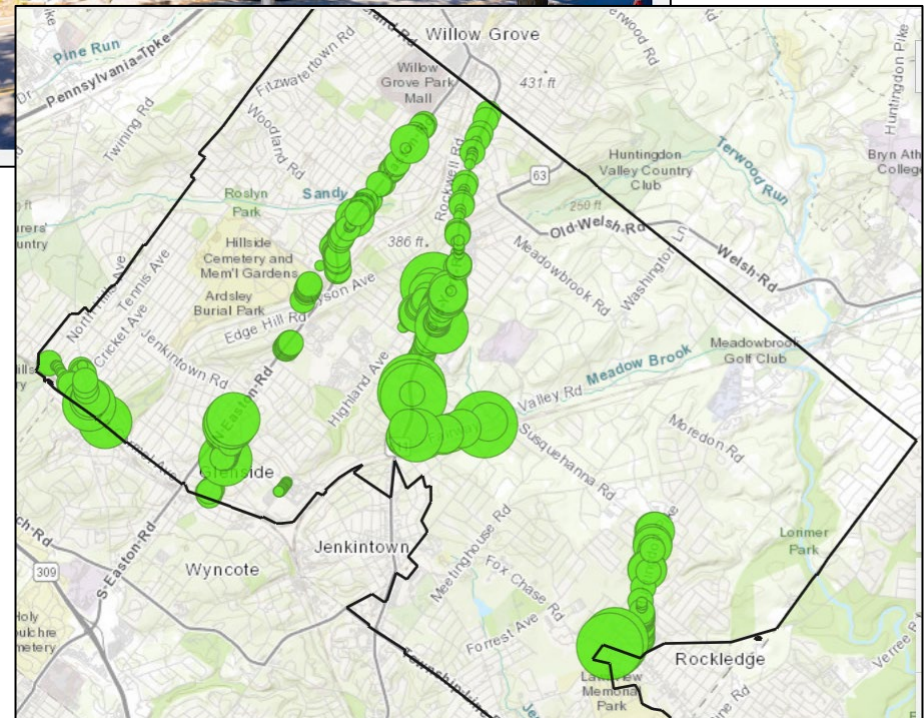
“These six trees store 14,291 lbs of carbon and continue to sequester 470 lbs of carbon each year. For comparison, the 1,316 small trees between 1-4 inches DBH in this study store a combined total of 16,567 lbs of carbon”



Example 2: Small and Targeted

- Focus on only the trees and places of interest
- Neighborhood, block, park, ... inventories
- High development/high turnover
- All the i-Tree Eco results
- Impact policy
- Benchmark
- Monitor

Street Trees & Our Business Districts





Example 3: Expand your view

City of Tempe's canopy

Different species and varieties

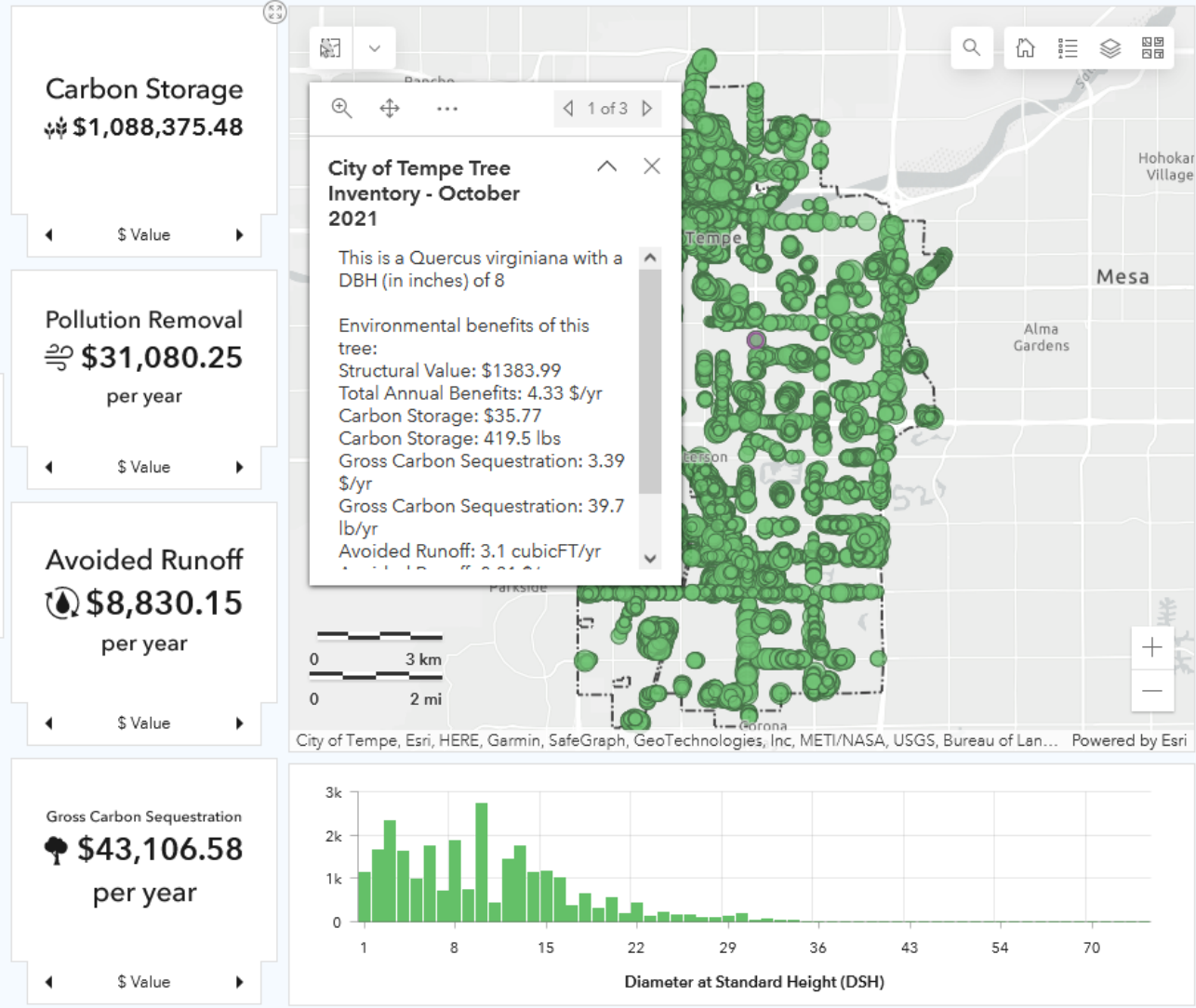
Total t

205

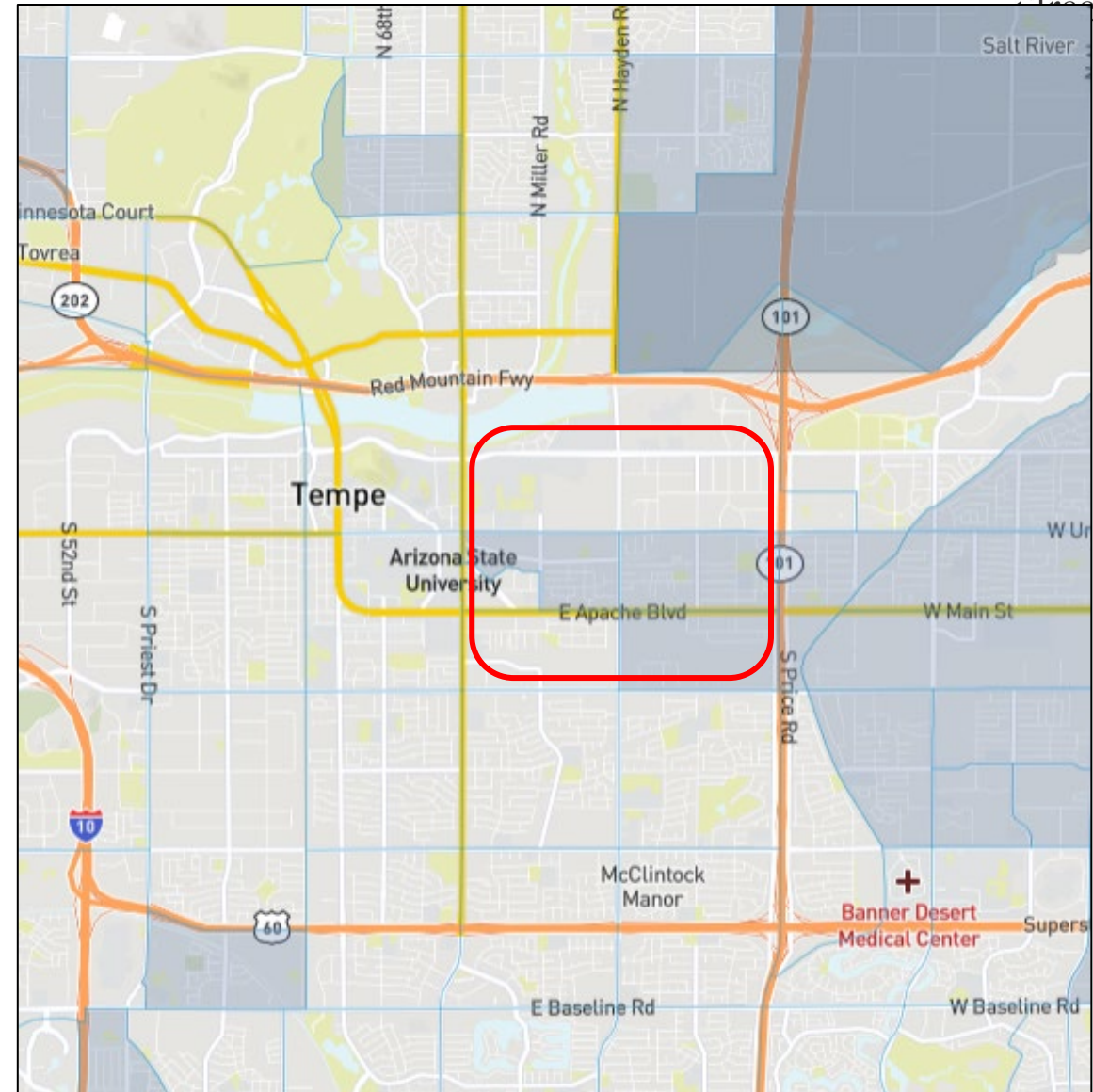
City of Tempe Tree Canopy Cover

11.4%

City of Tempe - iTree Dashboard October 2021 by West Coast Arborists, Inc.



Example 3: Expand your view



<https://screeningtool.geoplatform.gov/en/#3/33.471-97.5>



Planning your i-Tree Eco project

- Timeline
- Cost/budgeting
- Templates
- Learn from others
 - [i-Tree Reports](#)
- State Urban Forestry Coordinators
- Contractors

Project Planning and Management

Documents and resources to help plan and manage an i-Tree Eco project such as examples of notification letters, plot maps, equipment lists and project time lines. Most planning resources were developed and provided as a courtesy by past Eco project managers to help future project managers.

Which i-Tree Tool Should I Use?

- [Which i-Tree Tool Should I Use?](#) - A decision making matrix developed by the Urban Forest Assessment Subcommittee of the Urban & Community Forestry Committee of the Northeast-Midwest Alliance of State Foresters with input from the Davey Institute and support from the USDA Forest Service.

Project Creation Guides

- [Idaho Treasure Valley Dot Grid Reference Sheet](#) - This document provided courtesy of David Stephenson, Idaho Department of Lands Community Forestry Program, provides instructions for using an English dot grid for aiding in determining land use cover percentages. Refer to the Idaho Eco Management Guide above for more details.
- [City of Milwaukee - Eco Plot Map](#) - This is an example of Eco plot maps utilized by the City of Milwaukee.

Project Management

- [Idaho Treasure Valley i-Tree Eco Project Management Report](#) - This document developed by David Stephenson, Idaho Department of Lands Community Forestry Program, provides suggestions, methods, tips and tools to help future Eco project managers.
- [Eco Project Cost Estimation](#) - This document, developed by Eric Kuehler from Urban Forestry South, offers a cost estimate for an Eco project. Note - Numerous factors can affect project cost and this is provided only as a general guideline.
- [Eco Project Time Estimation](#) - This document, developed by Eric Kuehler from Urban Forestry South, provides time estimations for planning and conducting an Eco project.
- [Eco Project Time Line](#) - This document, developed by Eric Kuehler from Urban Forestry South, is an example of a Eco project time line for a county assessment.

<https://www.itreetools.org/support/resources-overview/project-planning-and-management-2>

Example 3: Expand your view

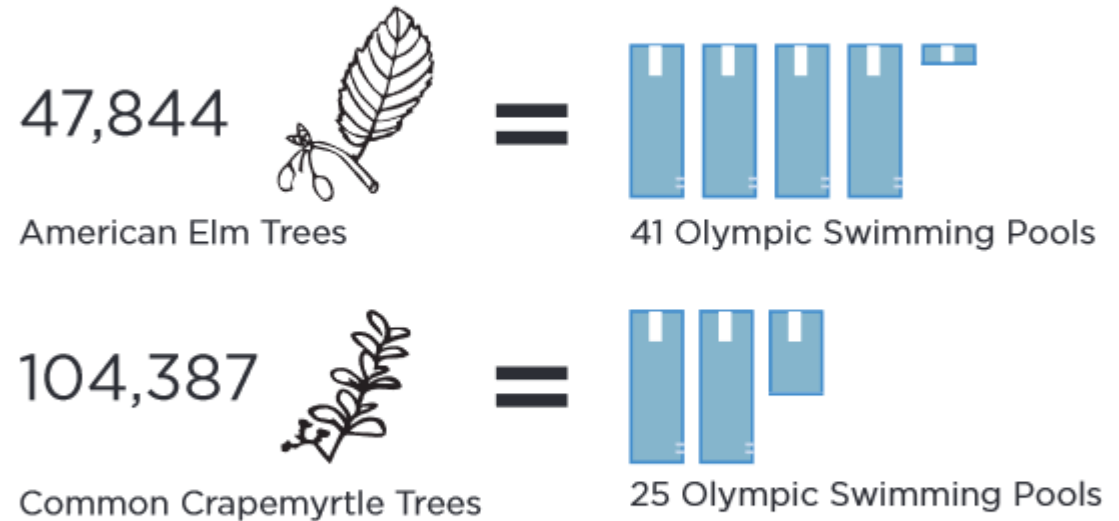
- Import your existing data in an hour or less
- Majority of trees are on private property
- Your existing data makes the case for larger projects
- Broader data and more results support better management and future funding

HOW MUCH DO DC'S TREES HELP FILTER STORMWATER?

Each year DC's trees filter 44,274,580 cubic feet of water equating to about \$779 million per year. That is equal to about 500 Olympic size swimming pools.

Not all trees filter water the same way.

Larger tree species filter more water than smaller trees do, so even though there may be fewer of them, they put in much more work.



i-Tree Eco – Toward strategic management

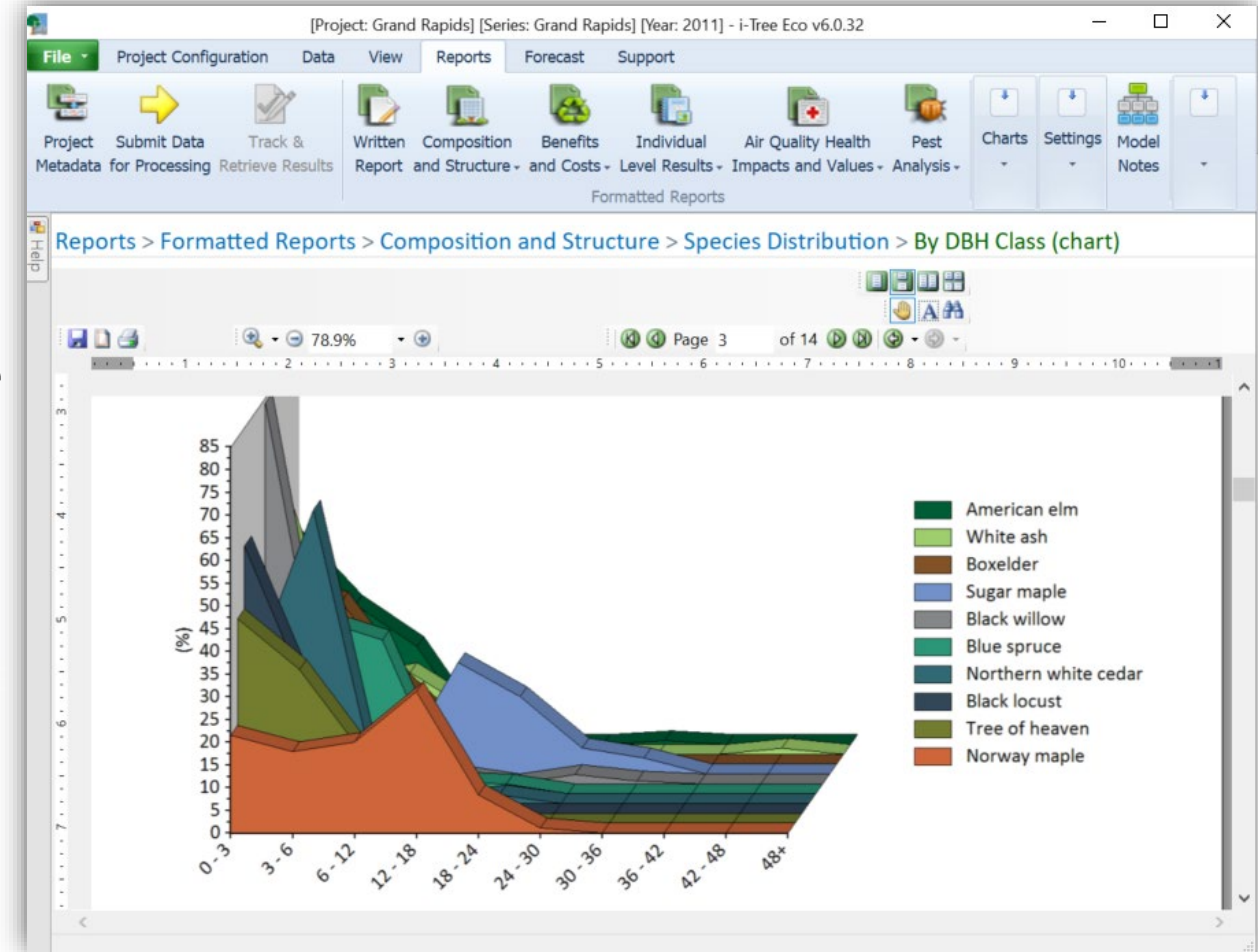


Fundable projects

- Tree Inventories are fundable activities
- Support strategic management
- Make the case for current and future funding and its targeted use

Why i-Tree Eco?

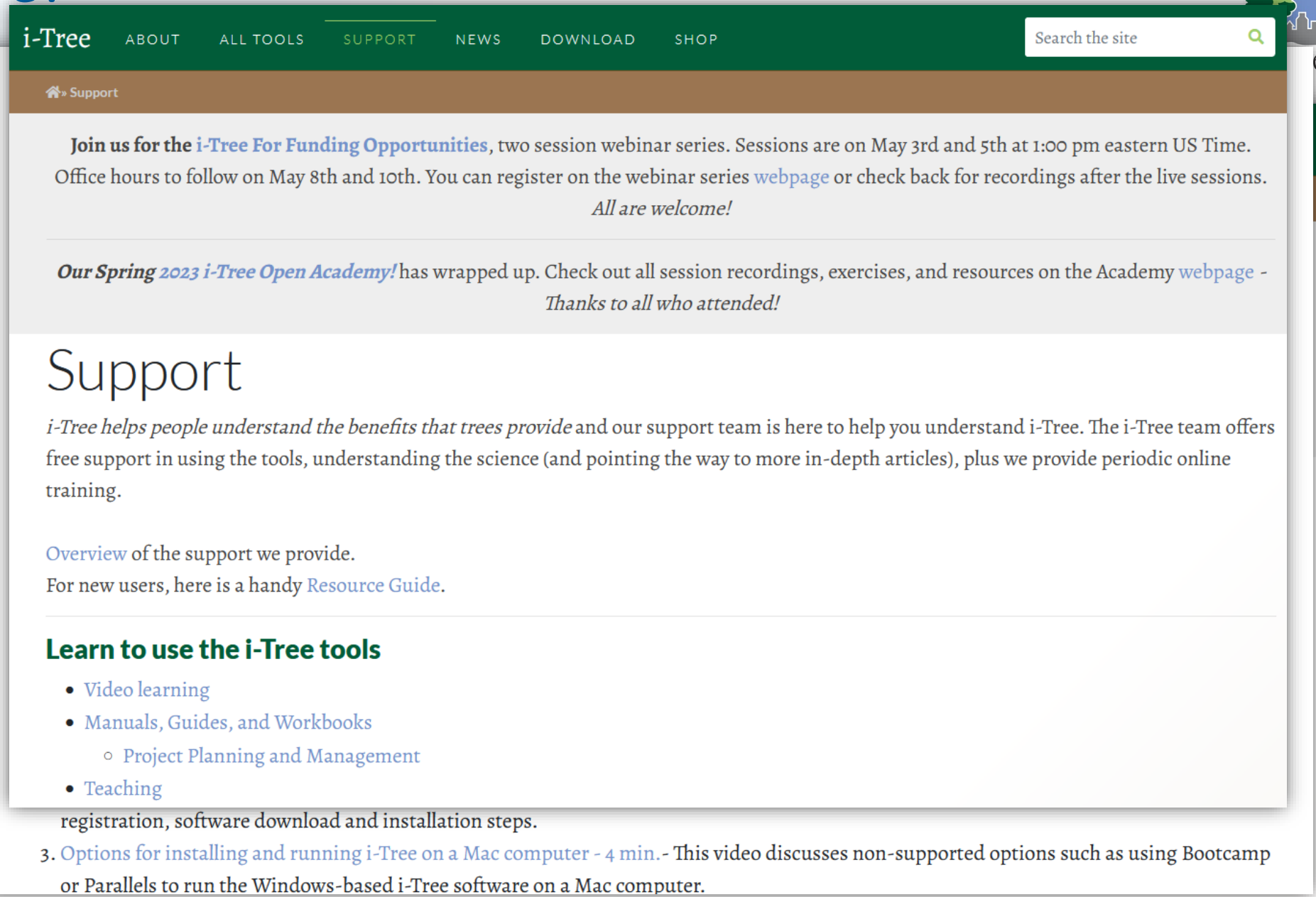
- Science backed
- Wealth of results and uses
- All lands (rural to urban, public parks to private back yards)



Want to learn more?

- Start at the [Funding Opportunities page](#)
- [i-Tree Academy page](#)
- [Video learning page](#)
- [Support page](#)
- Office hours – 5/8 and 5/10 1:00-2:00 pm ET

info@itreetools.org



The screenshot shows the i-Tree website's Support page. The navigation bar includes links for ABOUT, ALL TOOLS, SUPPORT (which is highlighted), NEWS, DOWNLOAD, and SHOP. A search bar is located in the top right corner. The main content area features two announcements: one for the 'i-Tree For Funding Opportunities' webinar series and another for the 'Our Spring 2023 i-Tree Open Academy!' wrap-up. Below these announcements is a large 'Support' heading, followed by a paragraph explaining the support team's role. There are also links for an 'Overview of the support we provide' and a 'Resource Guide' for new users. A section titled 'Learn to use the i-Tree tools' lists resources such as video learning, manuals, guides, and workbooks, and teaching materials. The bottom of the screenshot shows the beginning of a list item: '3. Options for installing and running i-Tree on a Mac computer - 4 min.'.

i-Tree ABOUT ALL TOOLS **SUPPORT** NEWS DOWNLOAD SHOP

Search the site

Home » Support

Join us for the **i-Tree For Funding Opportunities**, two session webinar series. Sessions are on May 3rd and 5th at 1:00 pm eastern US Time. Office hours to follow on May 8th and 10th. You can register on the webinar series [webpage](#) or check back for recordings after the live sessions.
All are welcome!

Our Spring 2023 i-Tree Open Academy! has wrapped up. Check out all session recordings, exercises, and resources on the Academy [webpage](#) -
Thanks to all who attended!

Support

i-Tree helps people understand the benefits that trees provide and our support team is here to help you understand i-Tree. The i-Tree team offers free support in using the tools, understanding the science (and pointing the way to more in-depth articles), plus we provide periodic online training.

[Overview](#) of the support we provide.
For new users, here is a handy [Resource Guide](#).

Learn to use the i-Tree tools

- [Video learning](#)
- [Manuals, Guides, and Workbooks](#)
 - [Project Planning and Management](#)
- [Teaching](#)

registration, software download and installation steps.

3. [Options for installing and running i-Tree on a Mac computer - 4 min.](#) - This video discusses non-supported options such as using Bootcamp or Parallels to run the Windows-based i-Tree software on a Mac computer.

Thanks from the team



Supported by:

USDA Forest Service

Urban and Community Forestry Program

Jason Henning

Phillip Rodbell

Krista Heinlin

Dave Bloniarz

Jay Heppler

Scott Maco

Success stories?

Questions?

Suggestions?

info@itreetools.org

