i-Tree for funding opportunities

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

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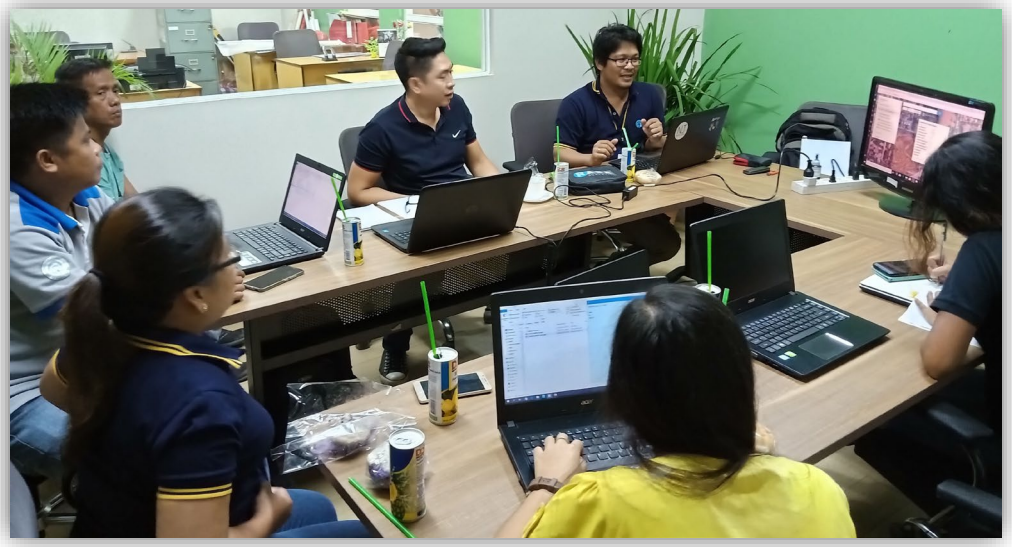
Plan for today

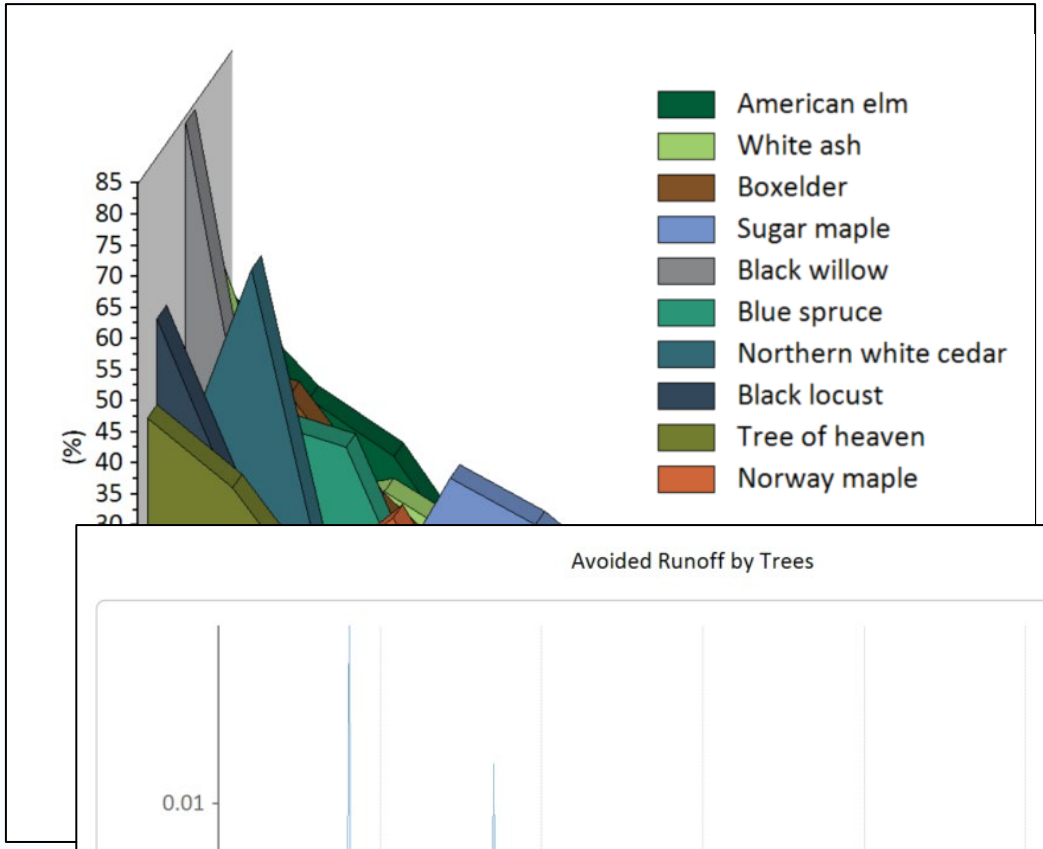
- Intro to i-Tree Eco
- The Philadelphia Story
- 3 example ways to employ i-Tree Eco
  1. i-Tree Eco can be easy
  2. Small and targeted
  3. Expand your view
- Q/A

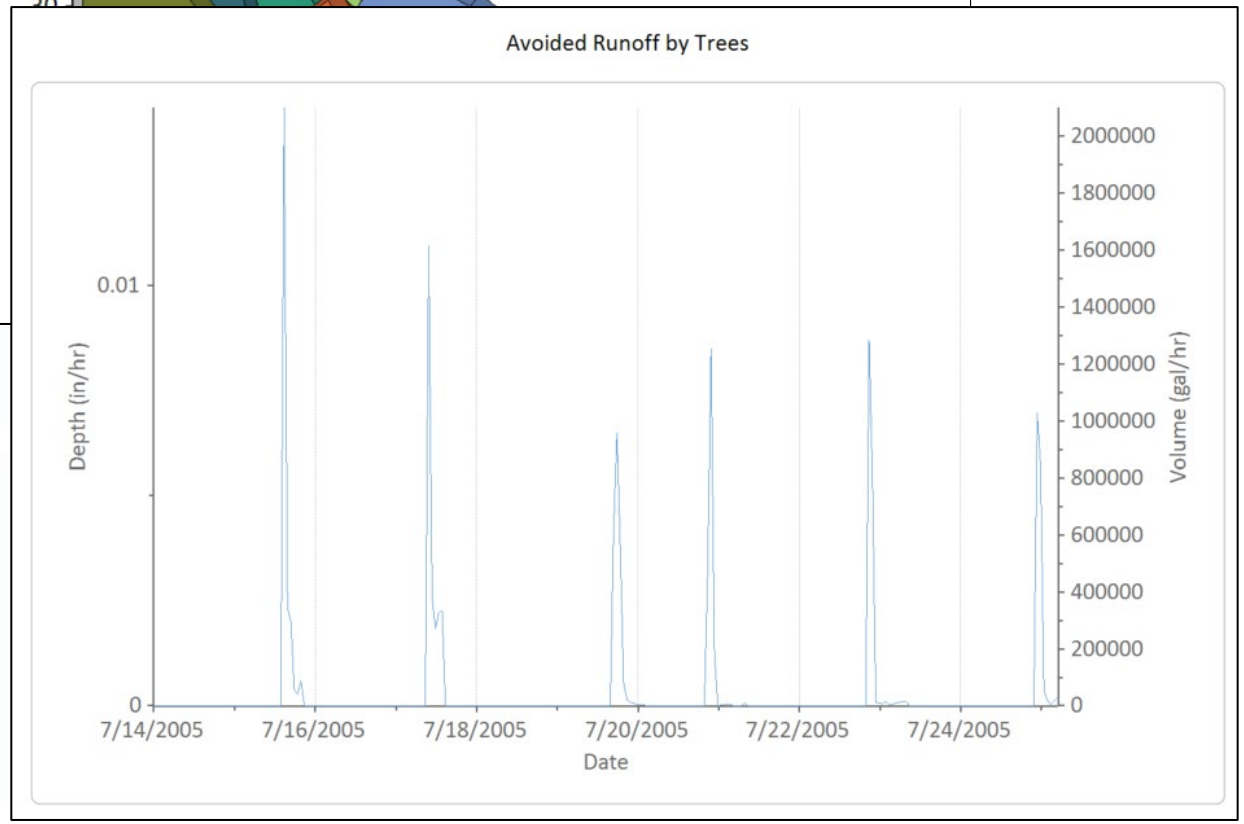


i-Tree Eco

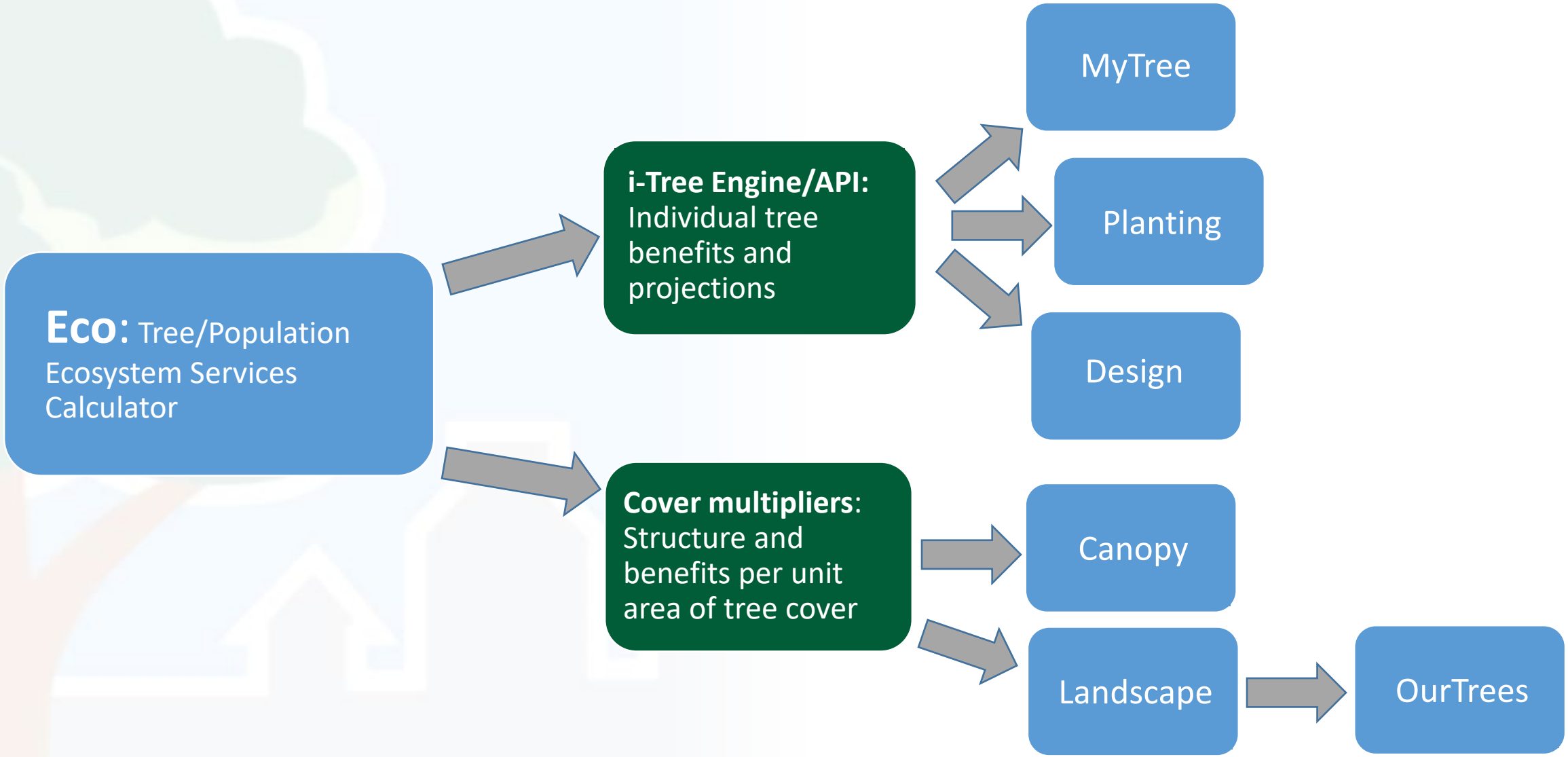
Convert inventory data (sample or census) to a wealth of tree ecosystem service estimates.

- Educate
- Advocate
- Manage

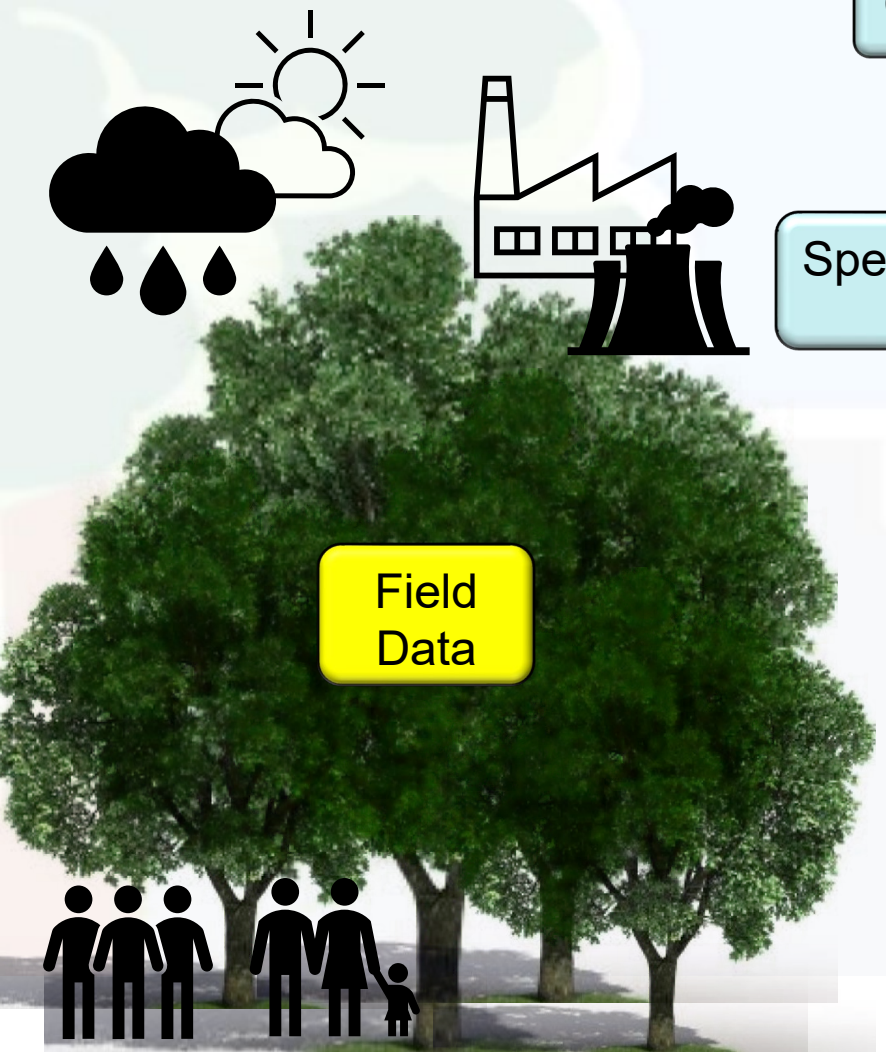




i-Tree Tool Relationships



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



Field Data

City Data

Pollution Data

Weather Data

Species Data (8000+)

Location Data

i-Tree Eco

Carbon

Air Quality

Hydrology

Energy

Volatile Organic Compounds

Structure

Value

Forecast

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

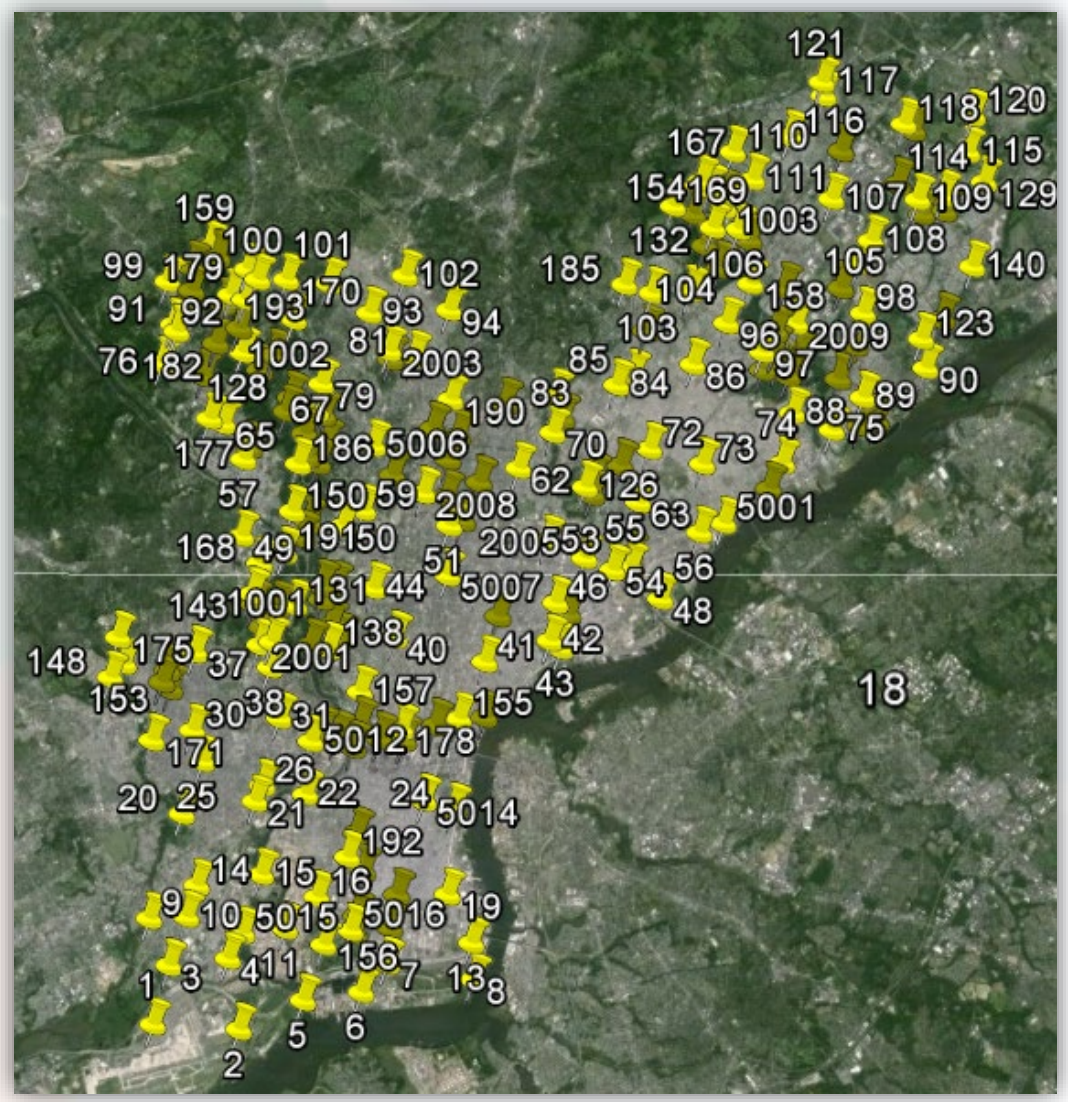
Eligible funding activities

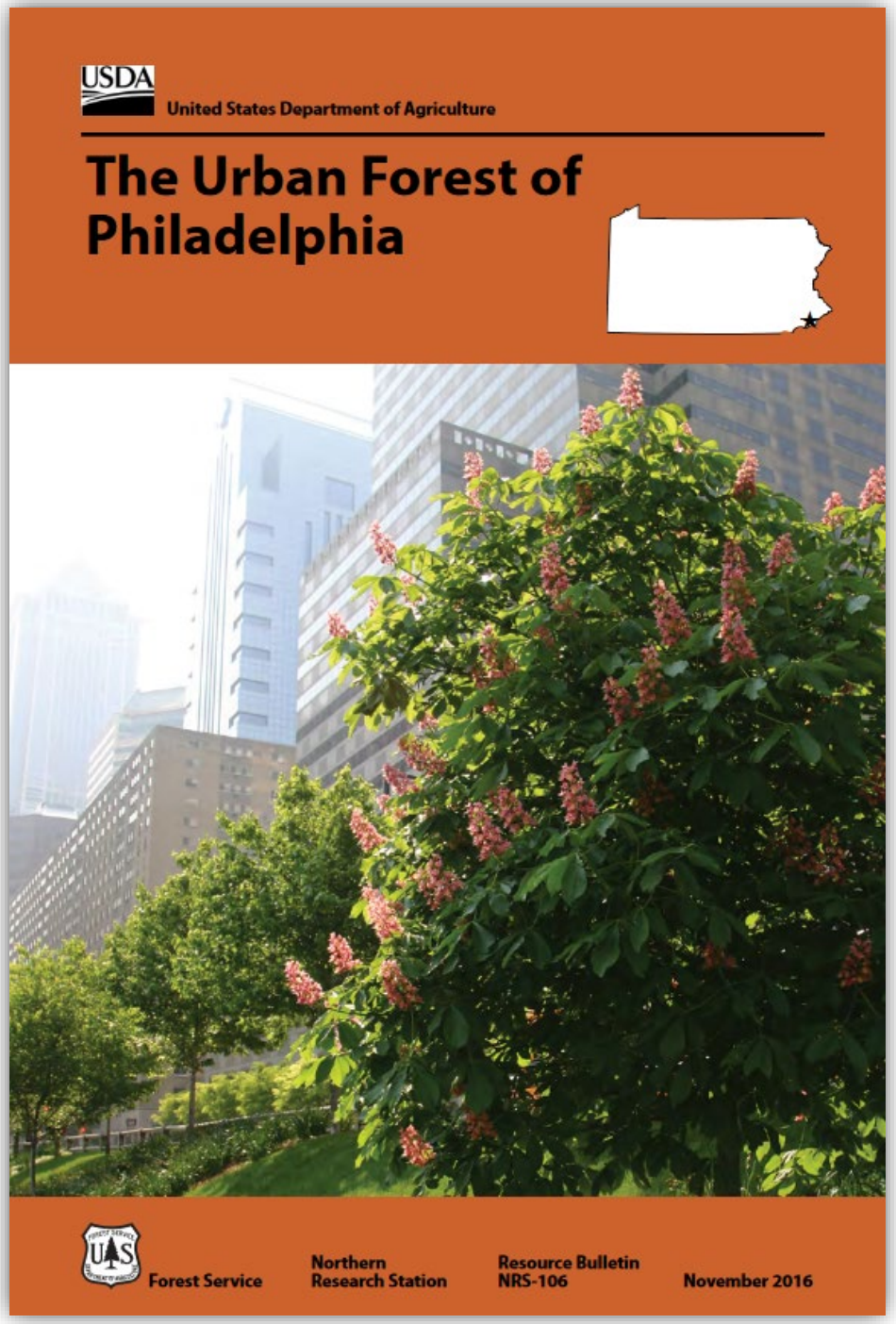
Eligible Activities	• Foster individuals, groups, and organizations in the communities served to become engaged participants in urban forest planning and management, especially those in disadvantaged communities that do not have adequate resources or are underrepresented. • Protect, enhance, and expand 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. • Encourage long-term urban forest planning, assessment, and management. • 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. • Advance the use of tree and forest inventories, monitoring, and assessment tools in priority areas. • Improve preparation for severe storms and the recovery of damaged or deteriorated landscapes to more healthy and resilient conditions. • Protect and enhance watersheds in urban and developing areas with a focus on conserving and managing forest patches, and green stormwater infrastructure. • 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. • Address exotic invasive pest species that adversely impact urban forests. • 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. • Aid in planning, goal setting, and skill sharing with other professions such as urban planners, engineers, and public health officials.

https://www.fs.usda.gov/managing-land/urban-forests

100% fundable activities in Climate and Economic Justice focus communities

i-Tree Eco: The Philly Story





i-Tree Eco: Citywide results

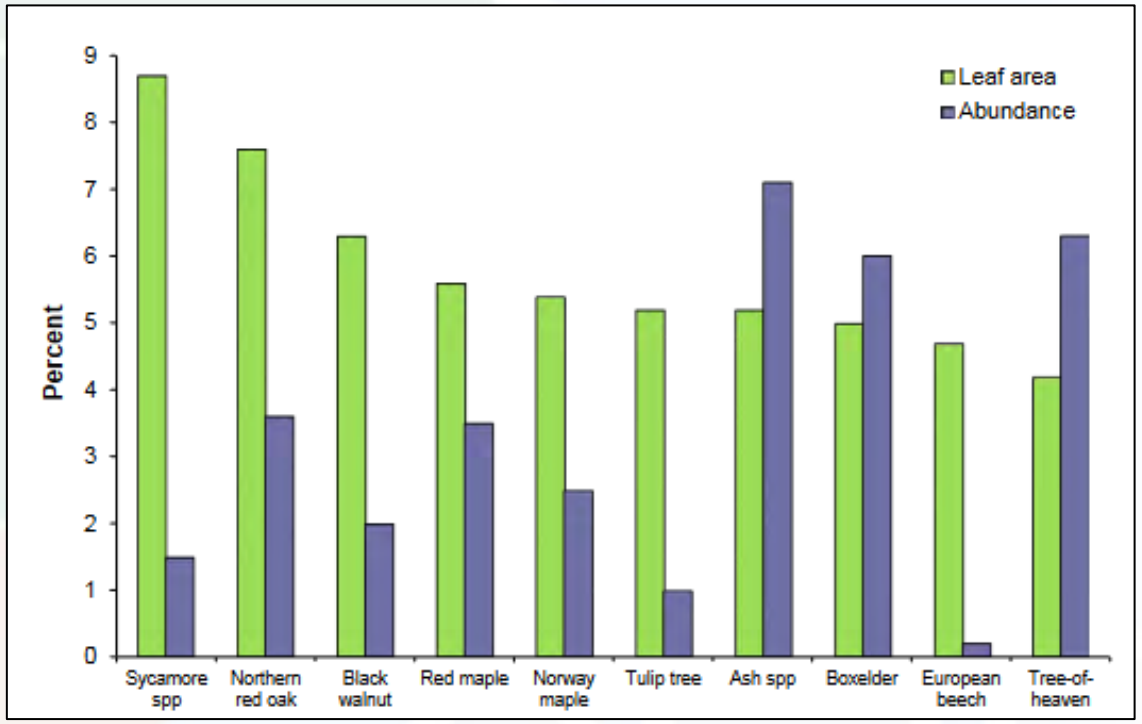


Table 1.—Summary of city-wide urban forest features, Philadelphia, 2012

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)

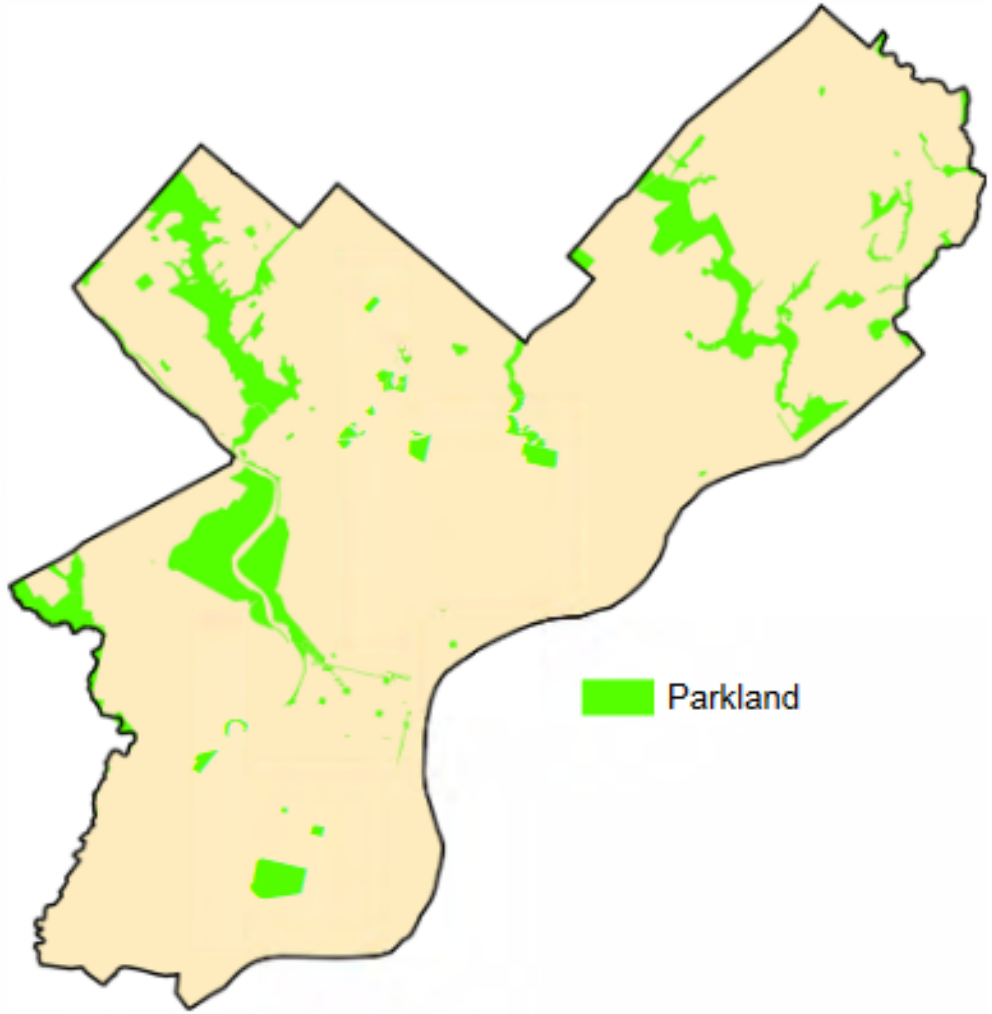
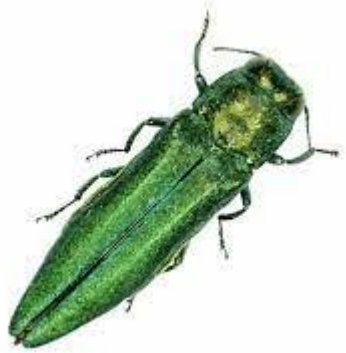


Figure 1.—Philadelphia city boundaries and designated parkland areas, 2012.

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.

+

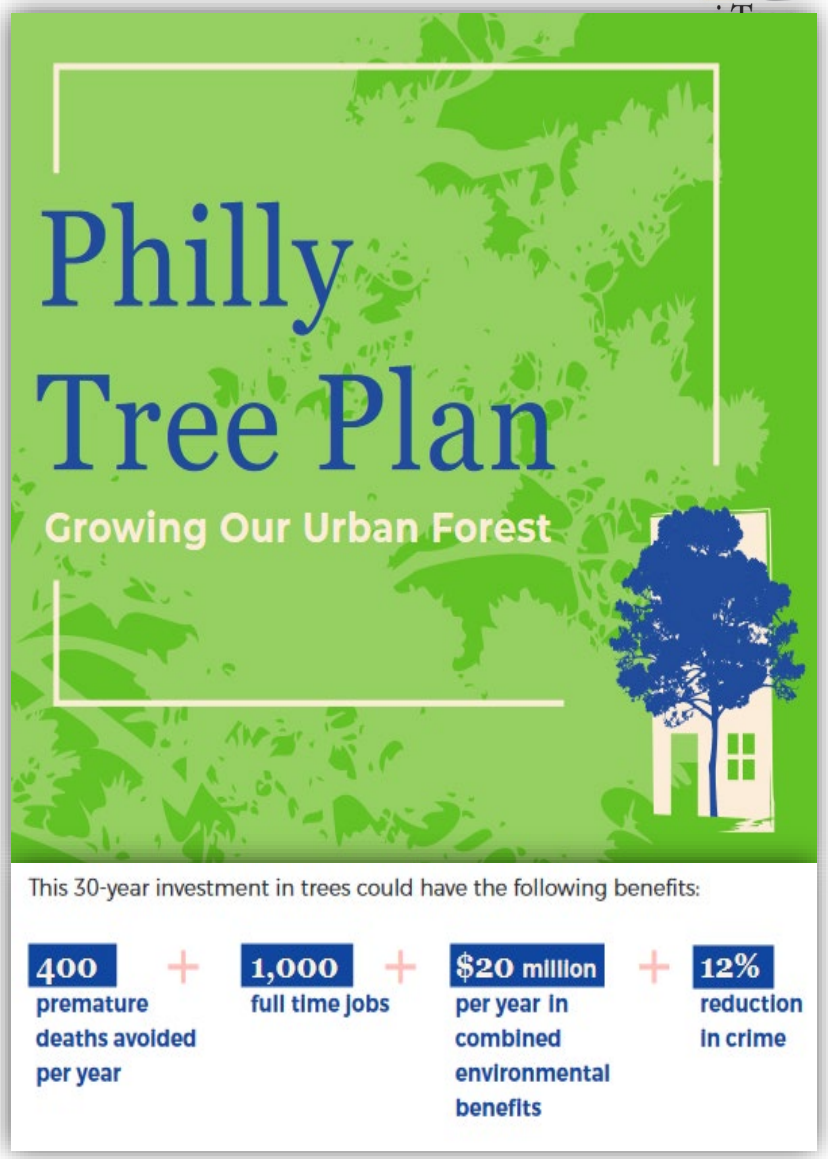
1,000 full time jobs over the course of 30 years.

+

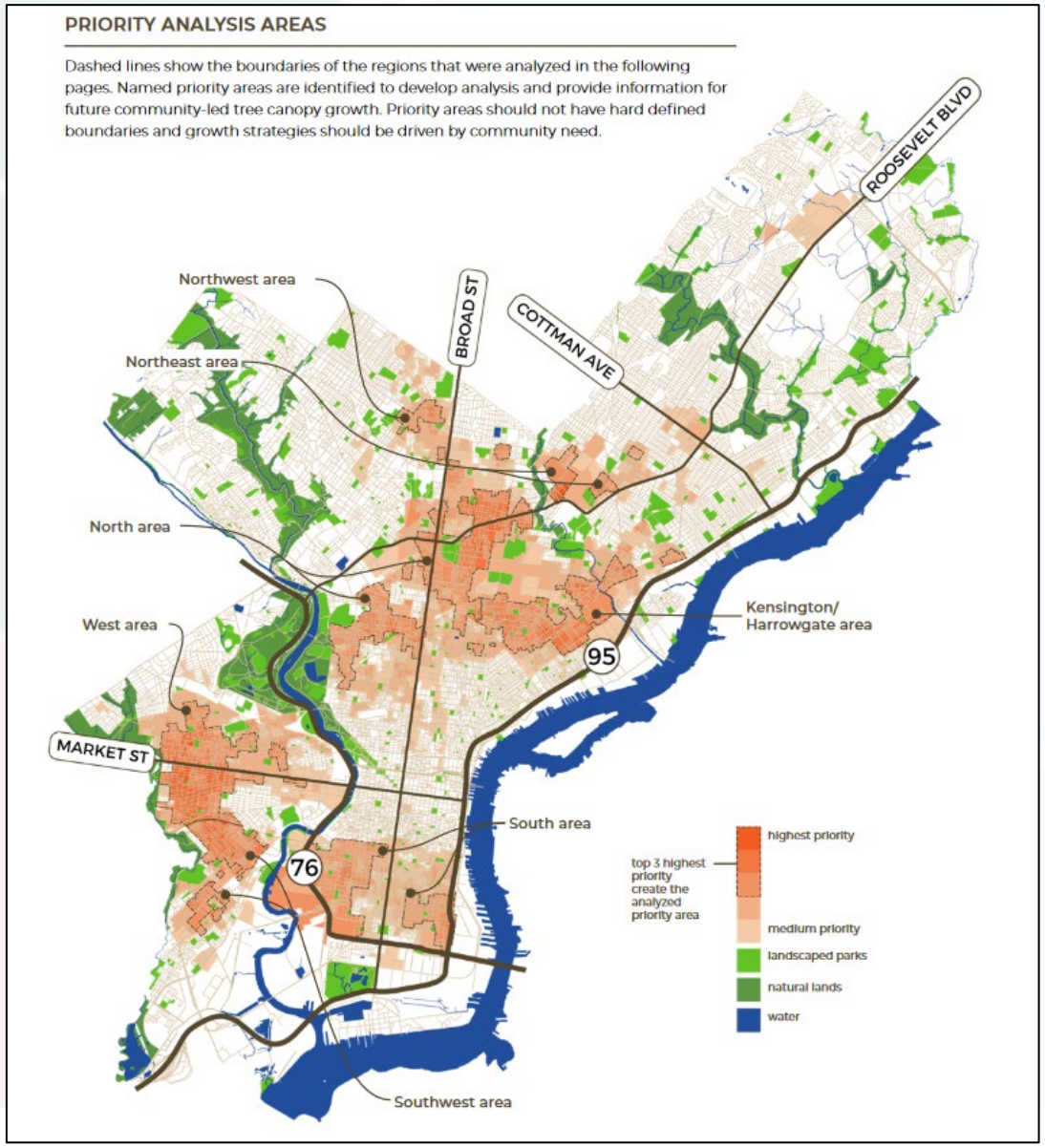
$20 million / year in combined environmental benefits including reduced air pollution, carbon sequestration, reduction in residential energy consumption, and stormwater management.

+

$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.



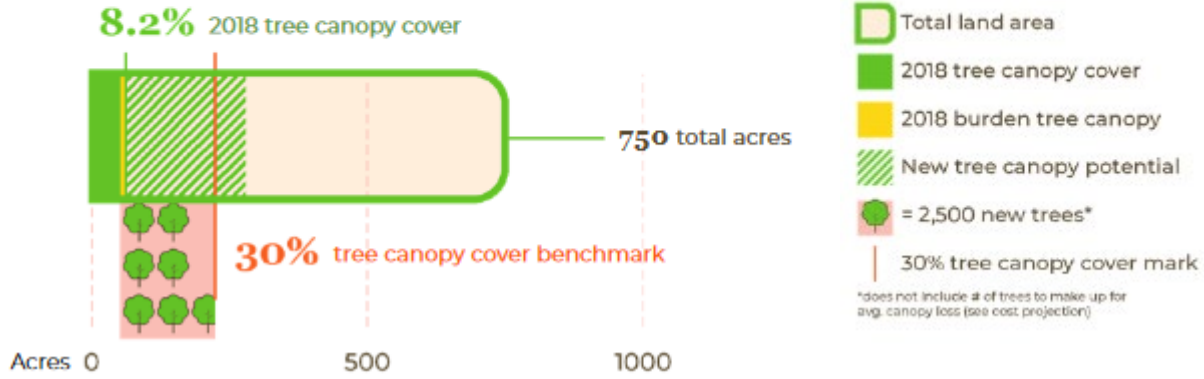
Impactful and realistic goals



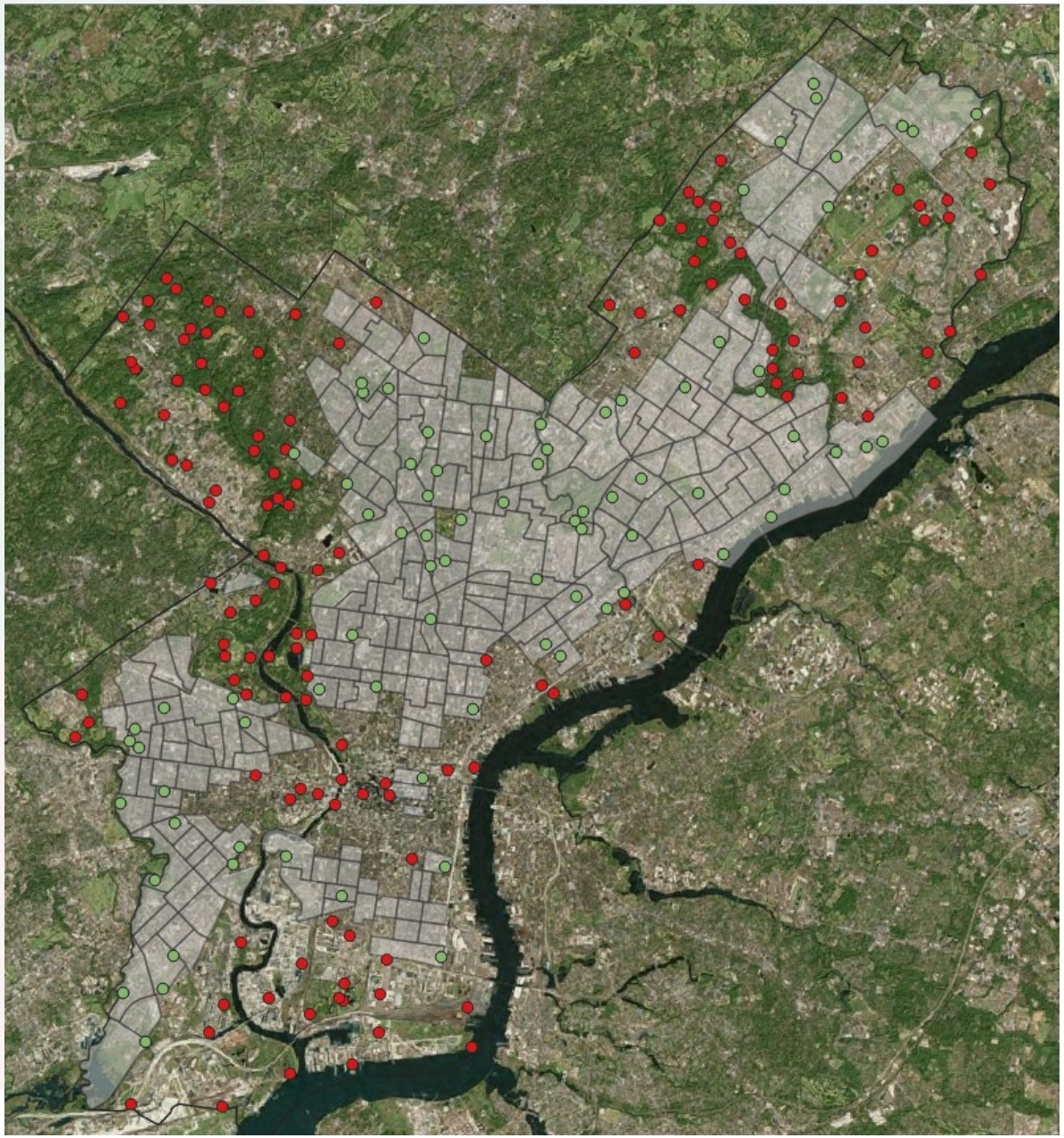
Priority area analysis - SOUTHWEST

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.



Evaluating relative to Climate and Economic Justice



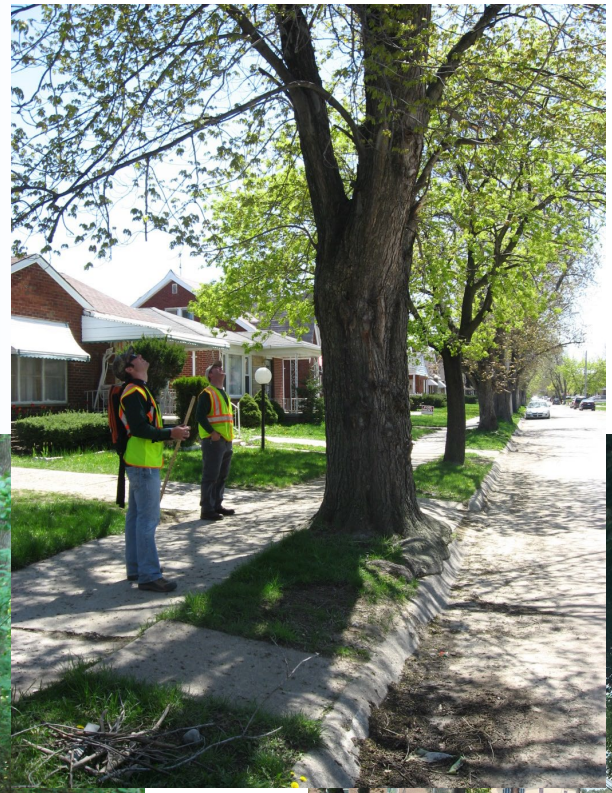
	Non-CEJ	CEJ
Area	58,000 ac	32,600 ac
Trees	88%	12%
Tree per acre	86	21
Carbon	86 tons/ac (96%)	6 tons/ac (4%)
Air pollution	$39.9 million (83%)	$8.15 million (17%)
Energy	$1.71 million (38%)	$2.83 million (62%)

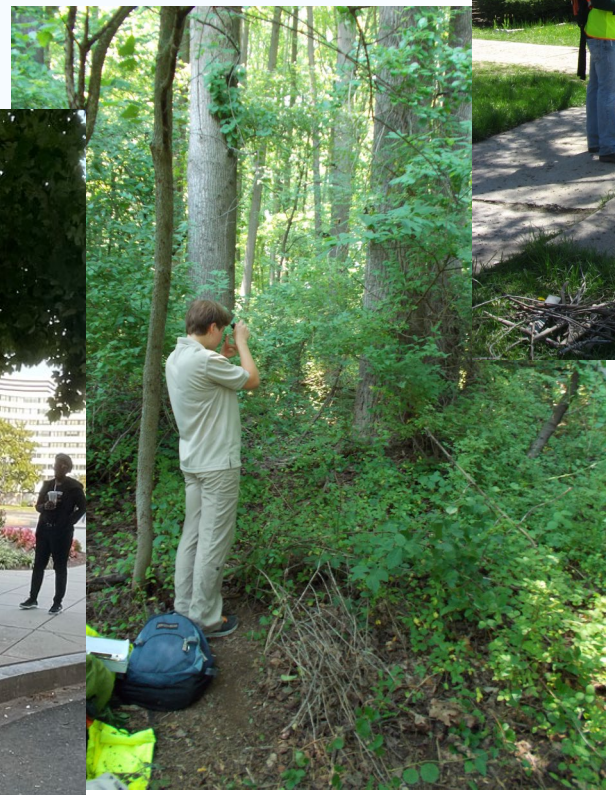
- **Non-CEJ has 3 times the species richness**
- **Non-CEJ has 3.5 times the leaf area per acre**
- **Trees decrease UV radiation by 45% in non-CEJ, only 16% in CEJ areas**
- **CEJ 5 most important species Boxelder, Tree of heaven, red maple, arborvitae, mulberry**

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





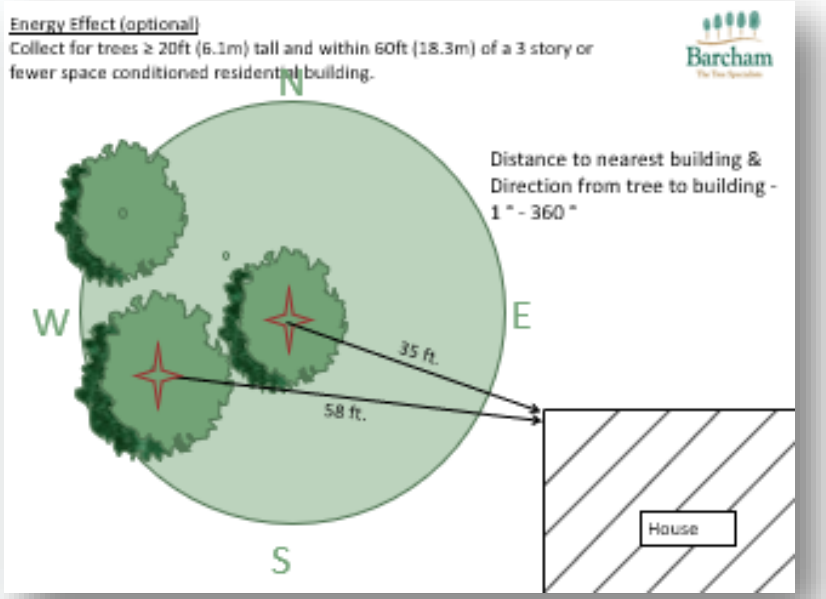
Eco flexible tree data variables

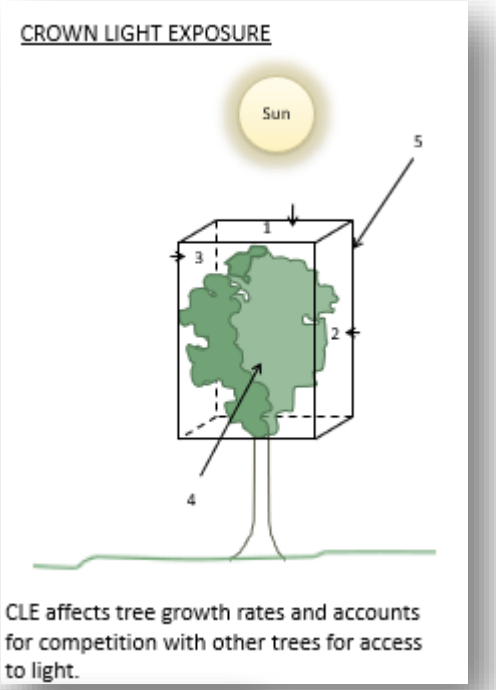
Minimum Required Tree Data

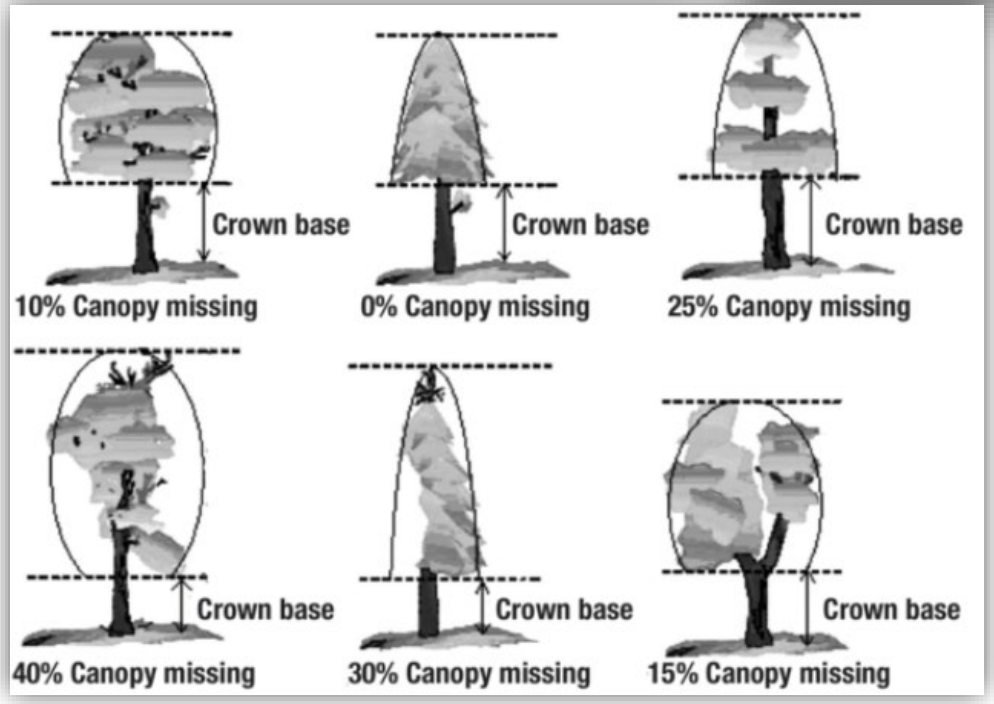
1. Tree species
2. Diameter at breast height (DBH)

Optional but Recommended Tree Data

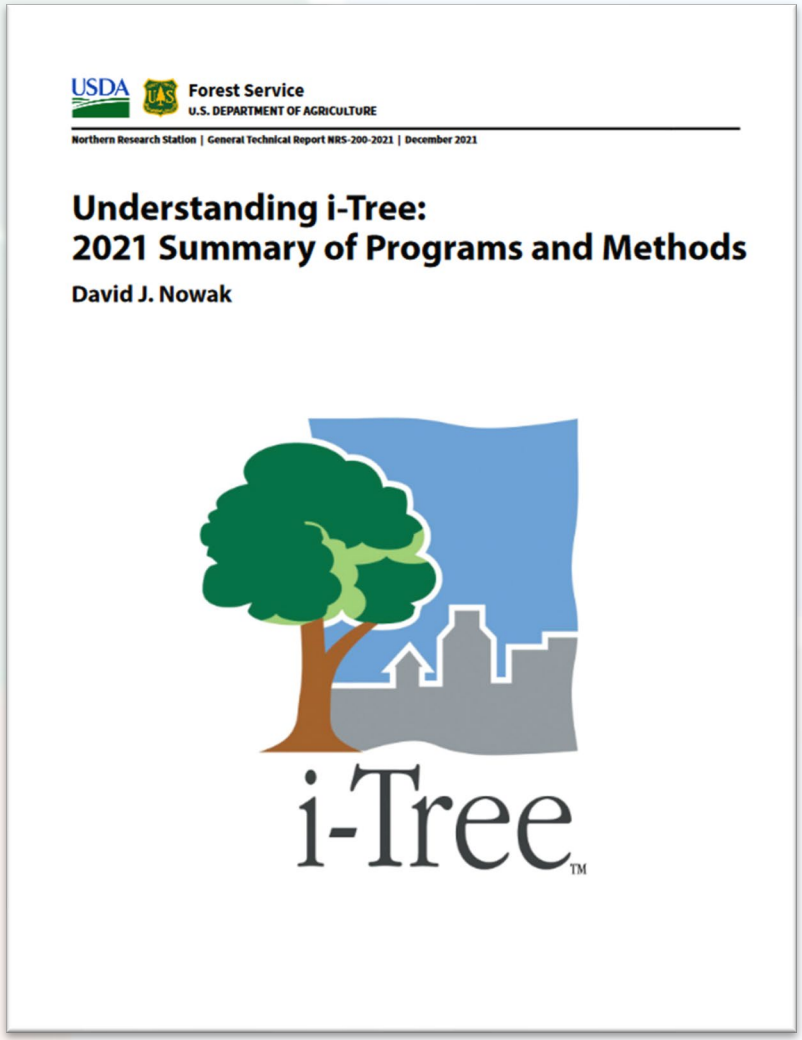
3. Total tree height
4. Height to live top
5. Height to crown base
6. Crown width (N-S)
7. Crown width (E-W)
8. % Crown missing
9. % dieback (condition)
10. Crown light exposure (CLE)
11. Land use







From field data to results



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https://www.fs.usda.gov/research/treesearch/63636

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										
DIRECT MEASURES	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
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	

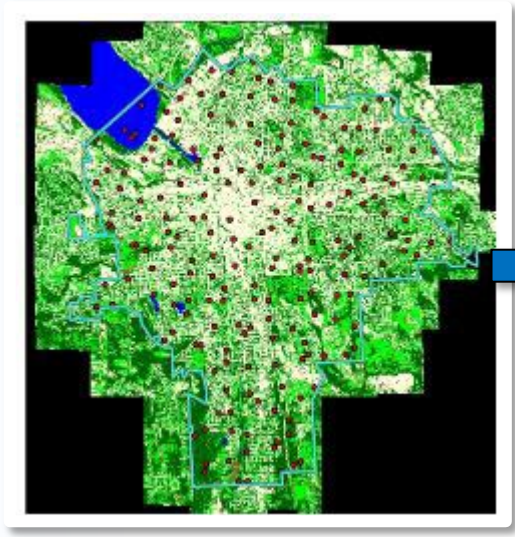
Tree Data

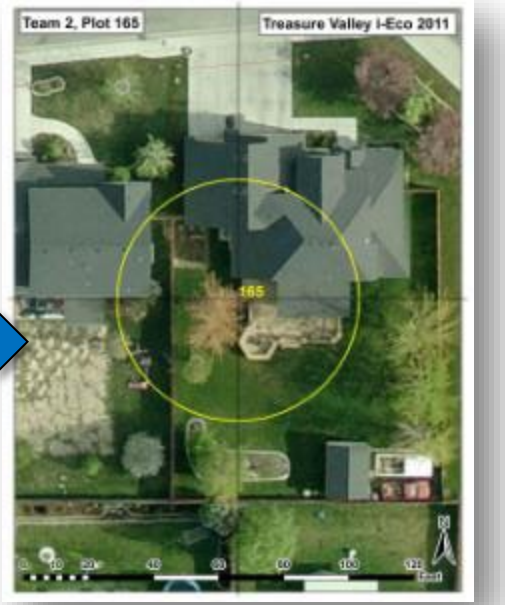
Plot Data

Sample or complete inventory

Sample plots

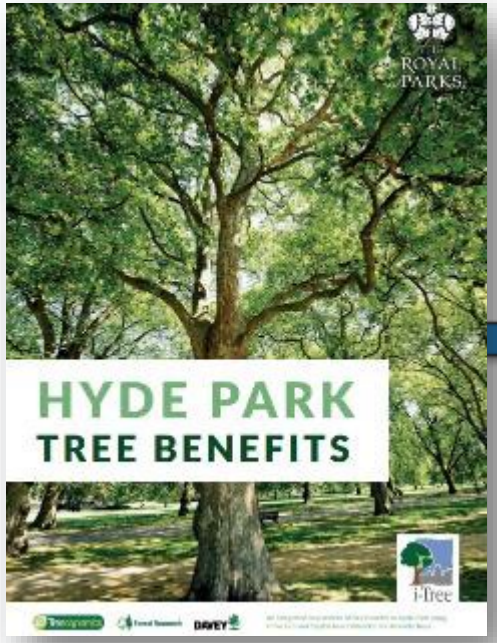
- Regional or watershed
- County
- City
- Where measuring every tree is impractical





Complete inventory

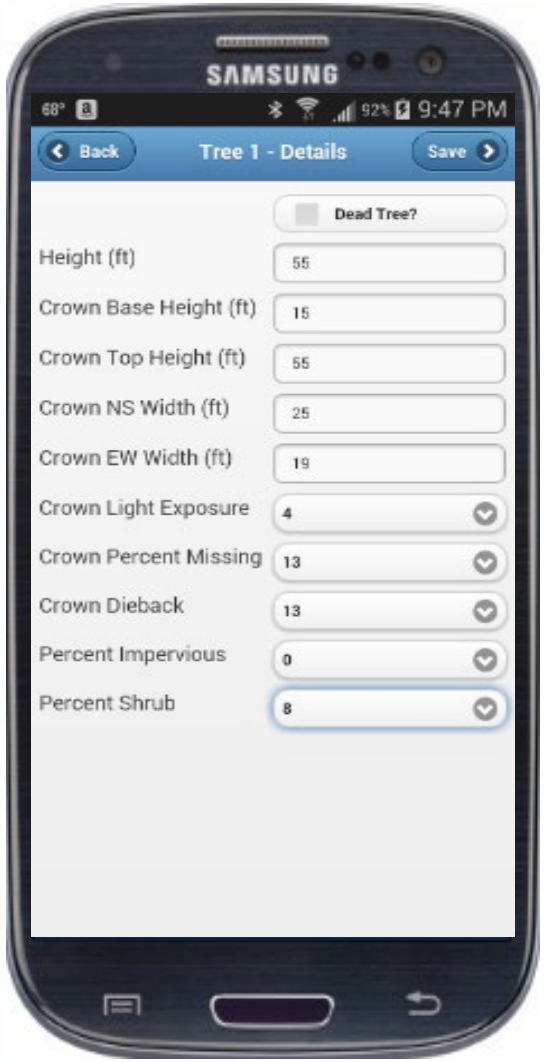
- Residential properties
- Neighborhoods/blocks
- Street tree inventory
- Parks
- Campuses
- Existing data

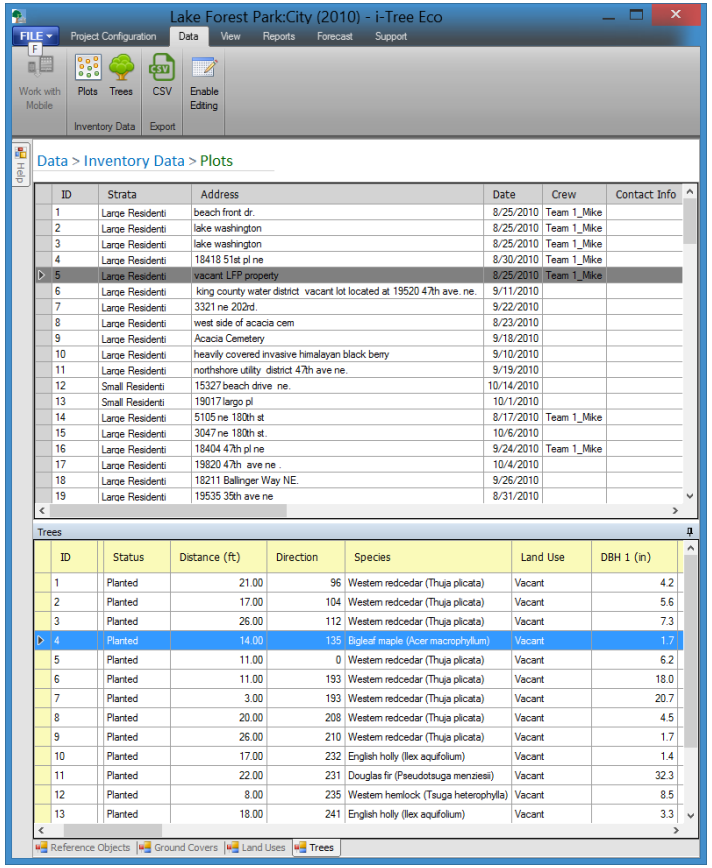


Example 1: i-Tree Eco can be easy

Mobile data entry

https://bit.ly/3KMHVSr





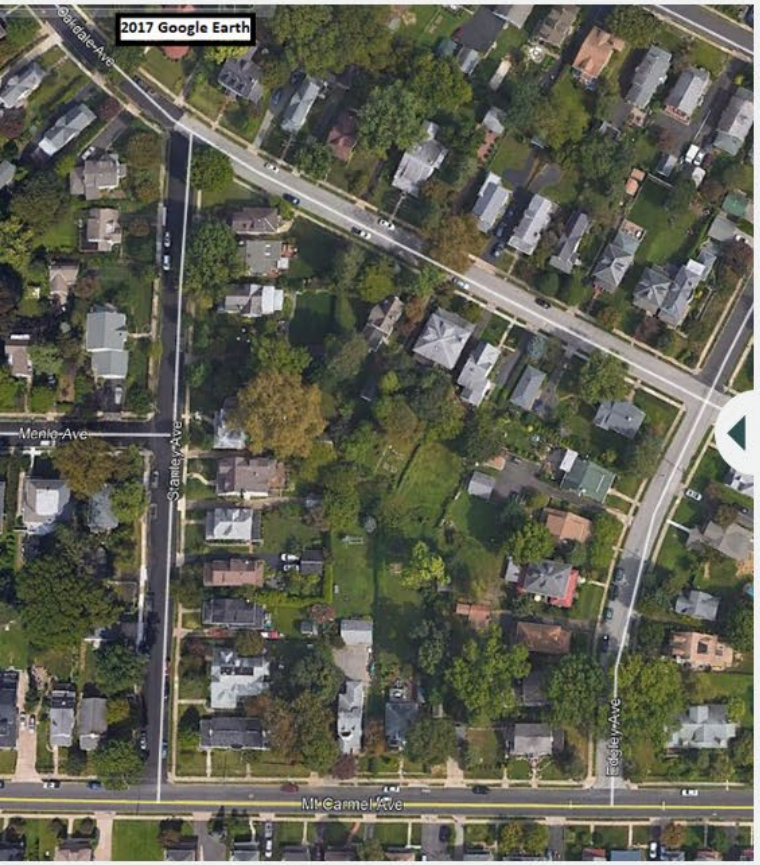
Example 1: i-Tree Eco can be easy

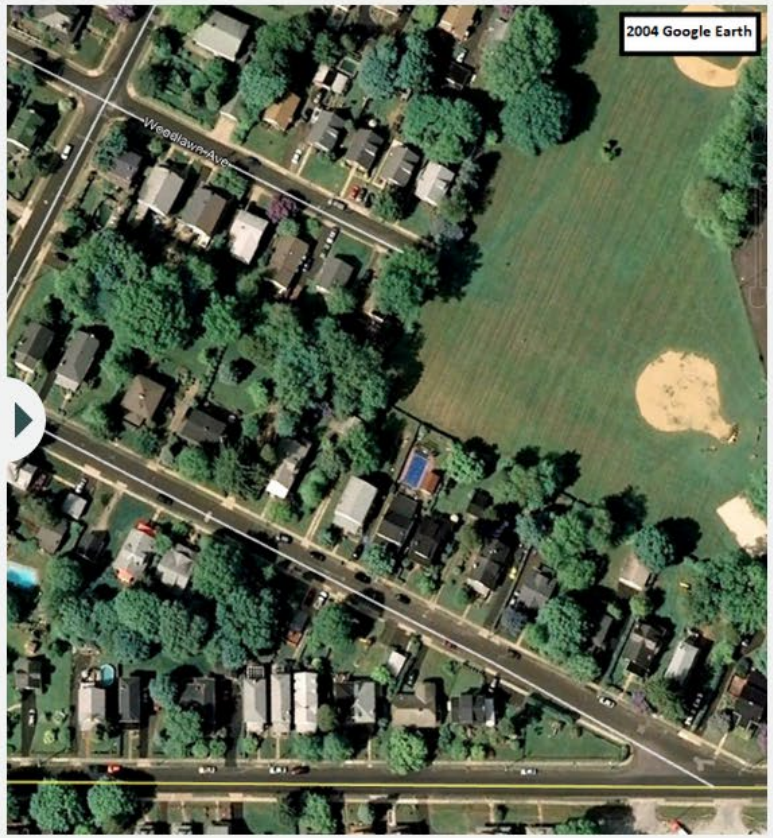
- Citizen science
- Engagement/Outreach
- Monitoring
- Diverse audiences
- Connect people to *their* trees

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.

08 / 09

https://storymaps.arcgis.com/stories/ed7e547aeaed454ea5dd44c4b1be08c0

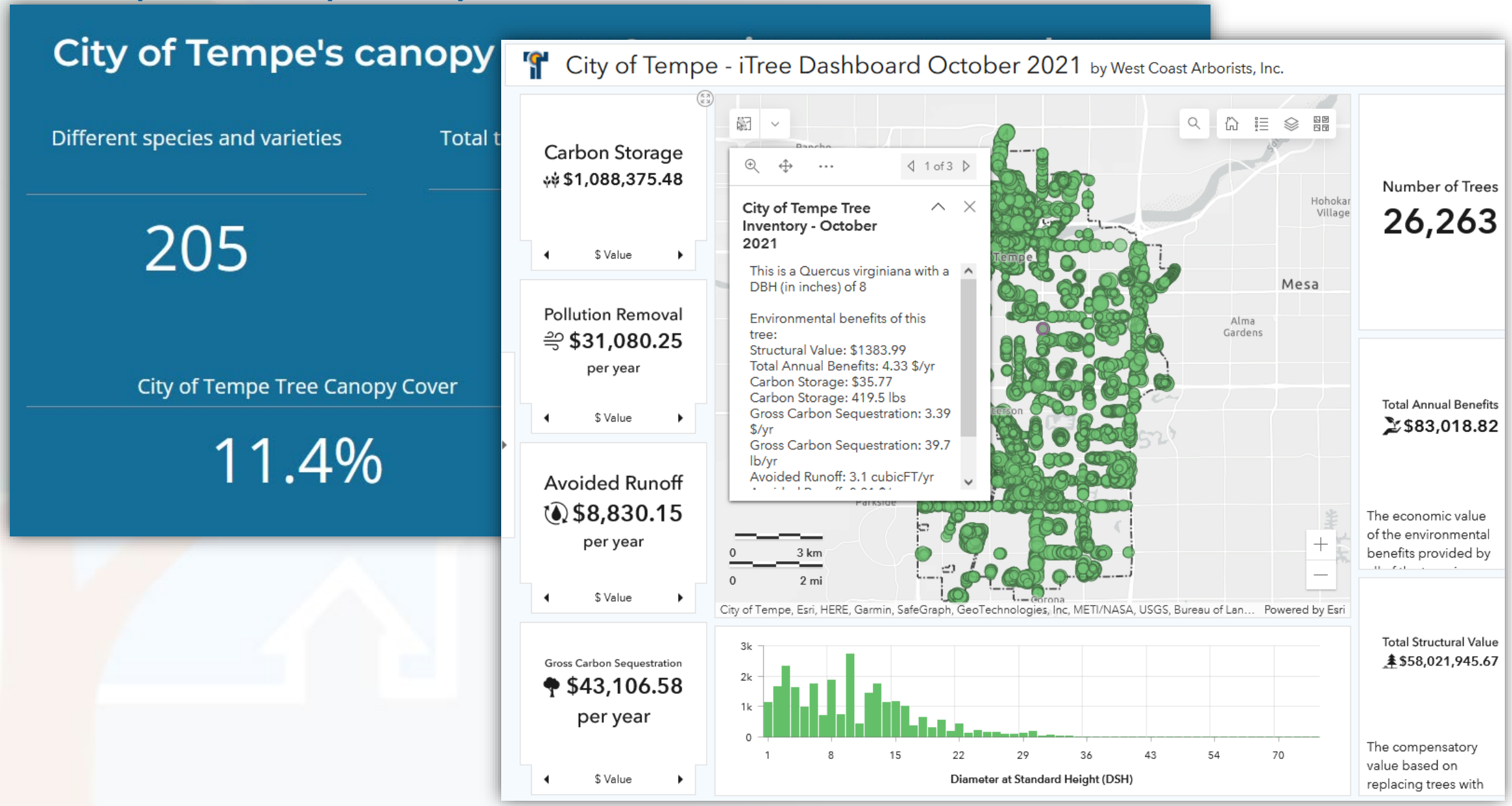
"These six trees store 14,291 lbs of carbon and continue to sequester 470 lbs of carbon each year. For comparison, the 1,316 small trees between 1-4 inches DBH in this study store a combined total of 16,567 lbs of carbon"

From Corey Bassett, https://www.itreetools.org/documents/352/UPenn_iTreeEcoInventory.pdf

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

Example 3: Expand your view



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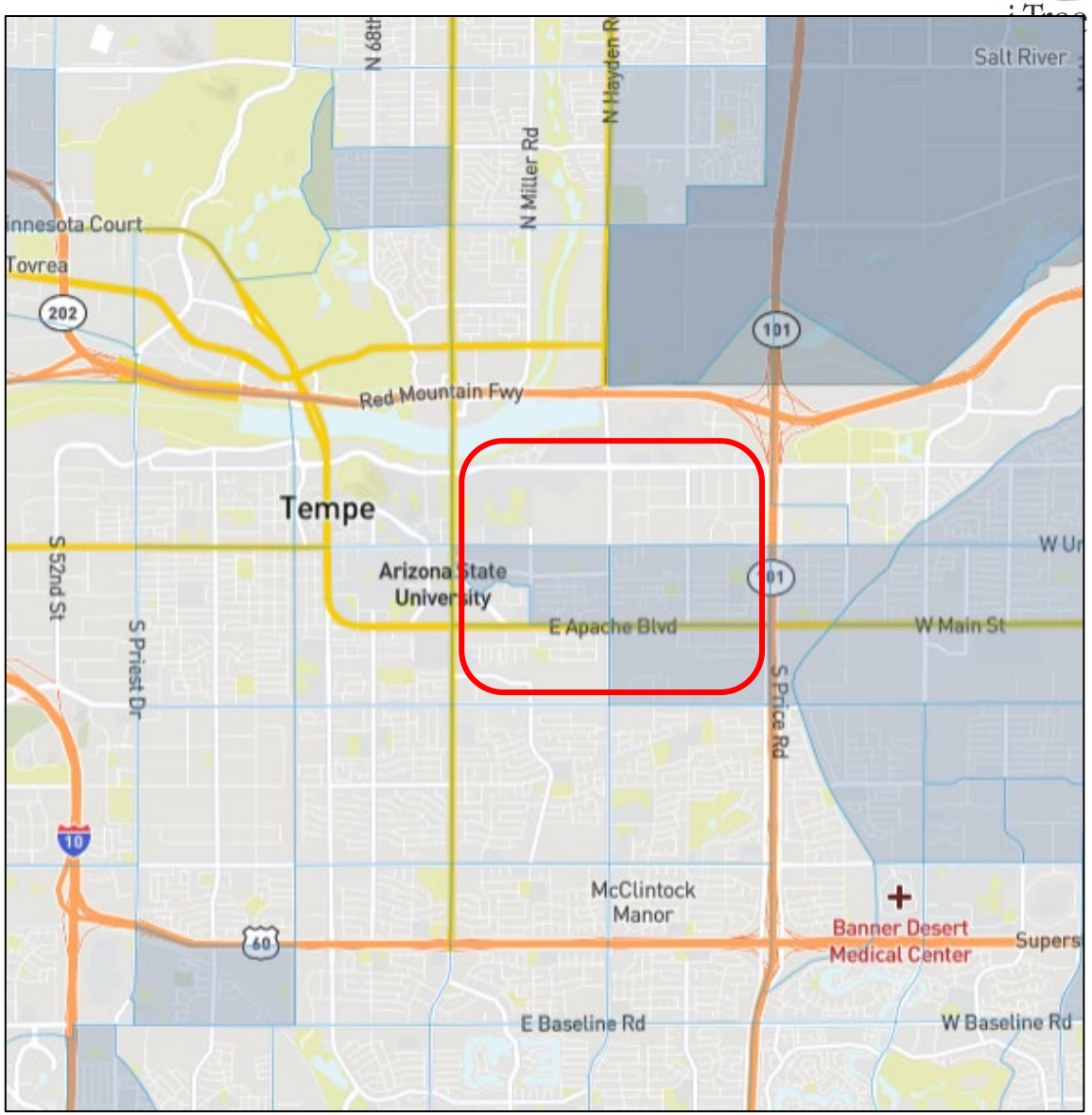
Example 3: Expand your view



https://screeningtool.geoplatform.gov/en/#3/33.47/-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.

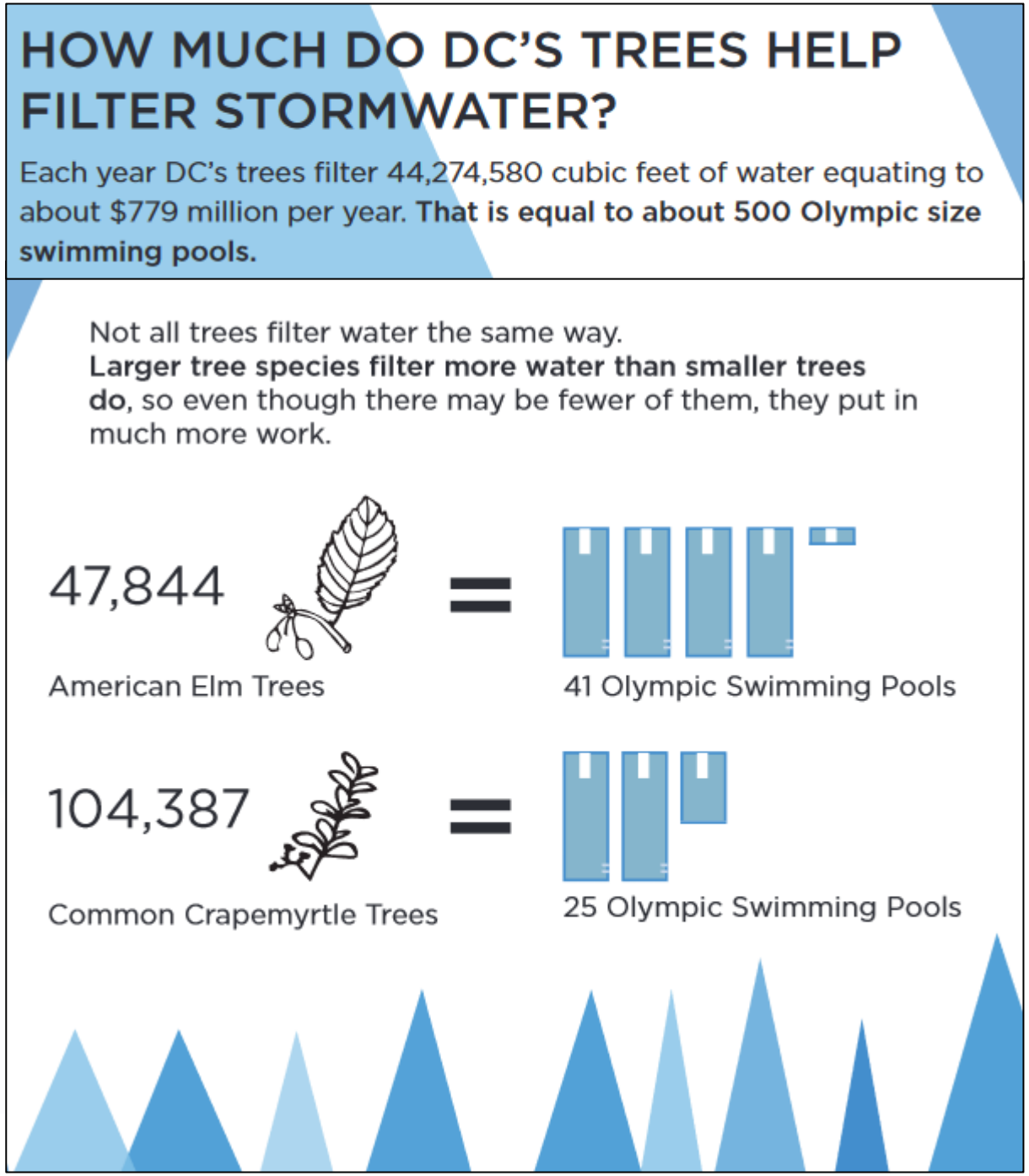
Project Management

- 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

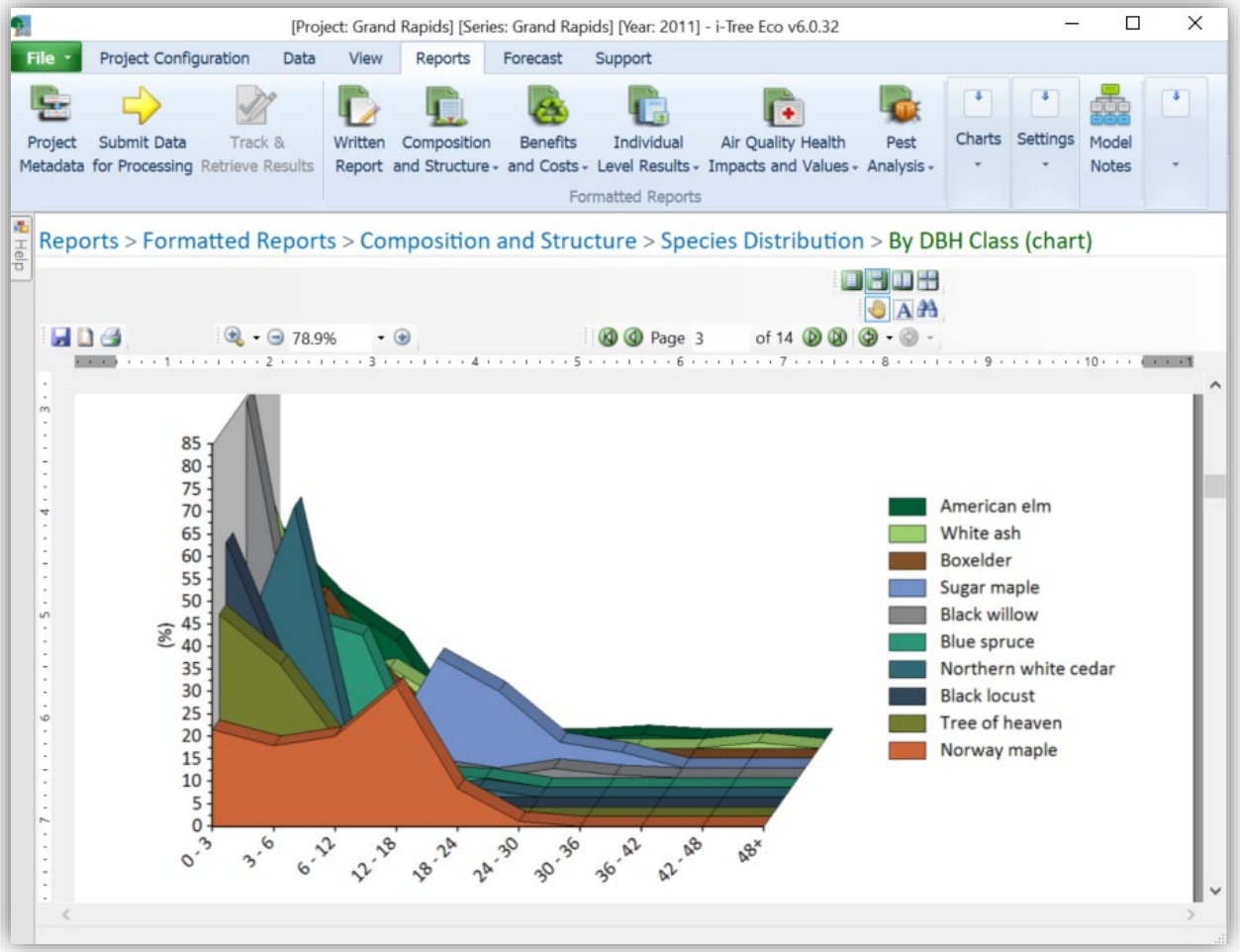
- Import your existing data in an hour or less
- Majority of trees are on private property
- Your existing data makes the case for larger projects
- Broader data and more results support better management and future funding



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



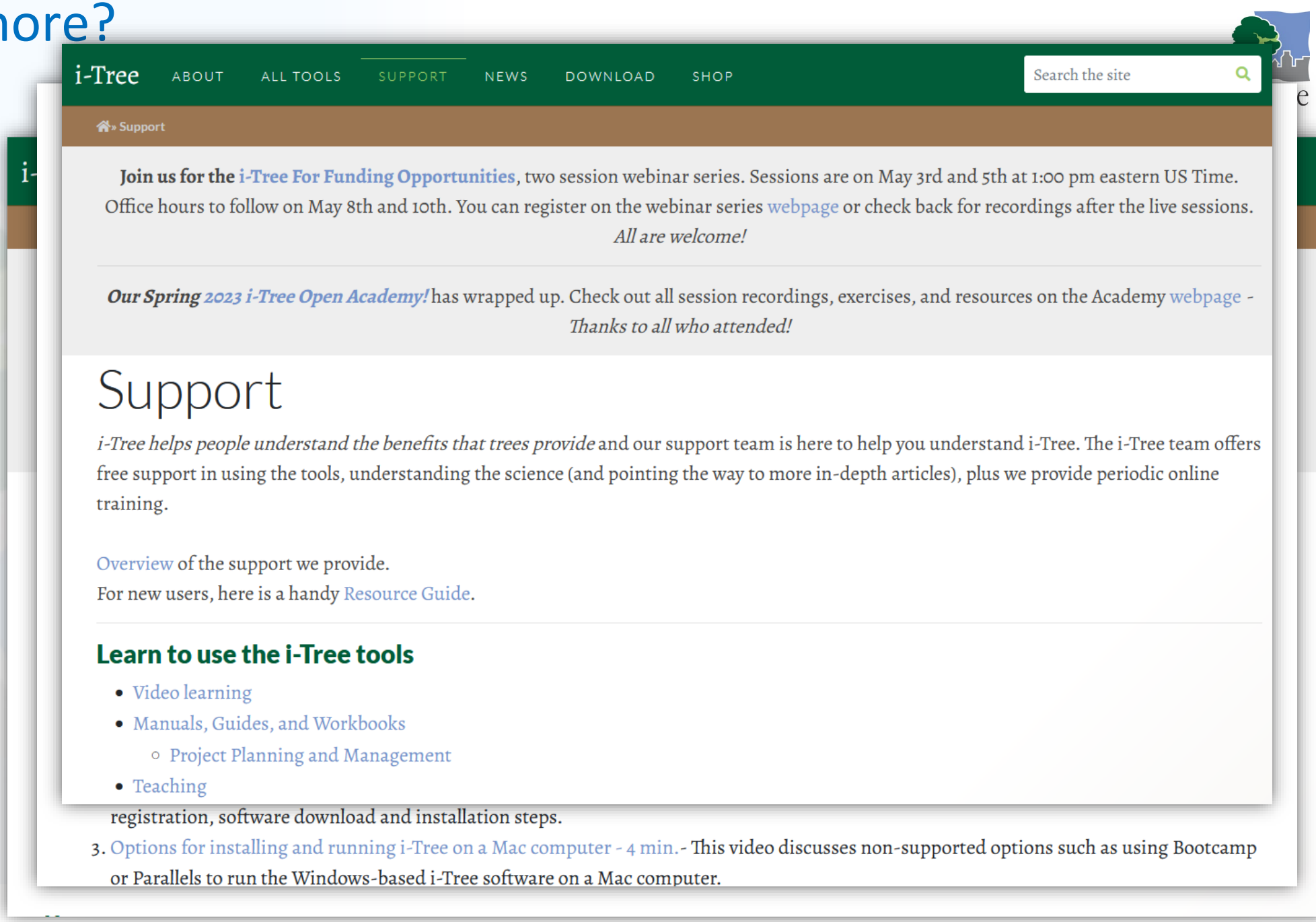
Why i-Tree Eco?

- 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



Thanks from the team

Supported by:
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Jason Henning
Krista Heinlin
Jay Heppler
Scott Maco
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Success stories?
Questions?
Suggestions?
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