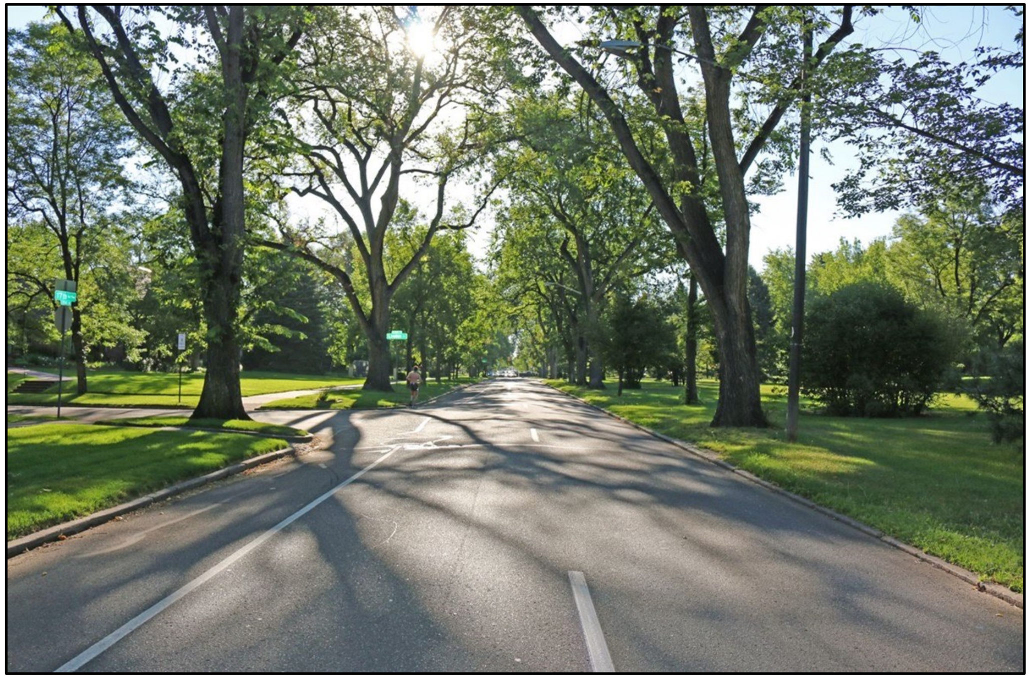
Beyond Beauty: Establishing the Value of Urban and Suburban Trees

David V. Bloniarz, USDA Forest Service
bloniarz@umass.edu



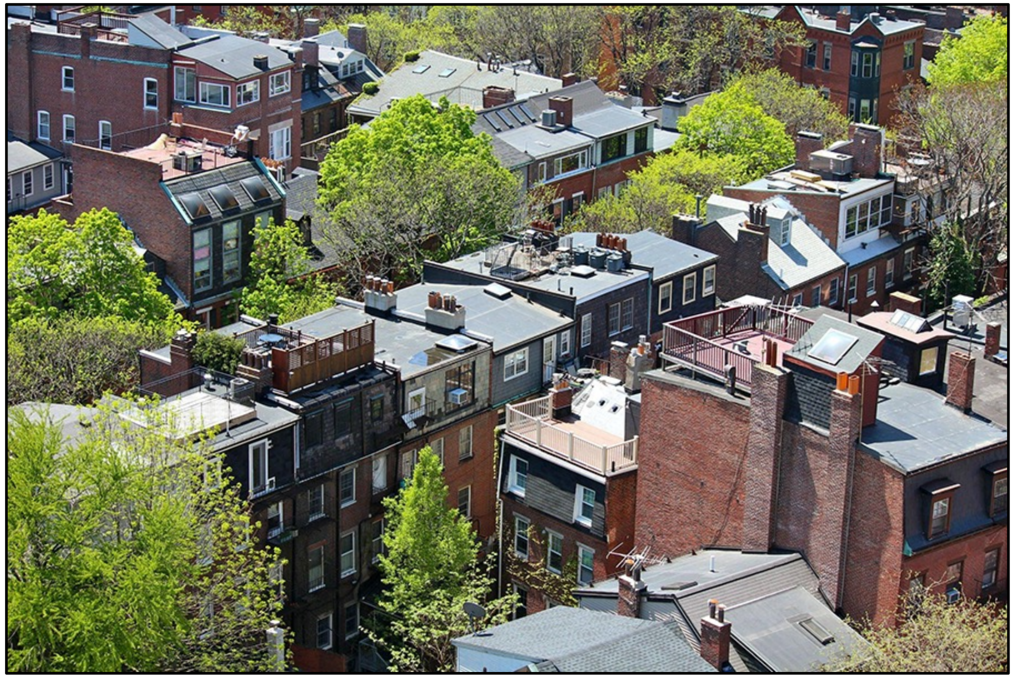
Powerpoint and Resources

www.unri.org/lexington/

Today's Presentation Focus

✓ Using science to establish the benefits and value of trees

✗ Replacement value for an individual tree



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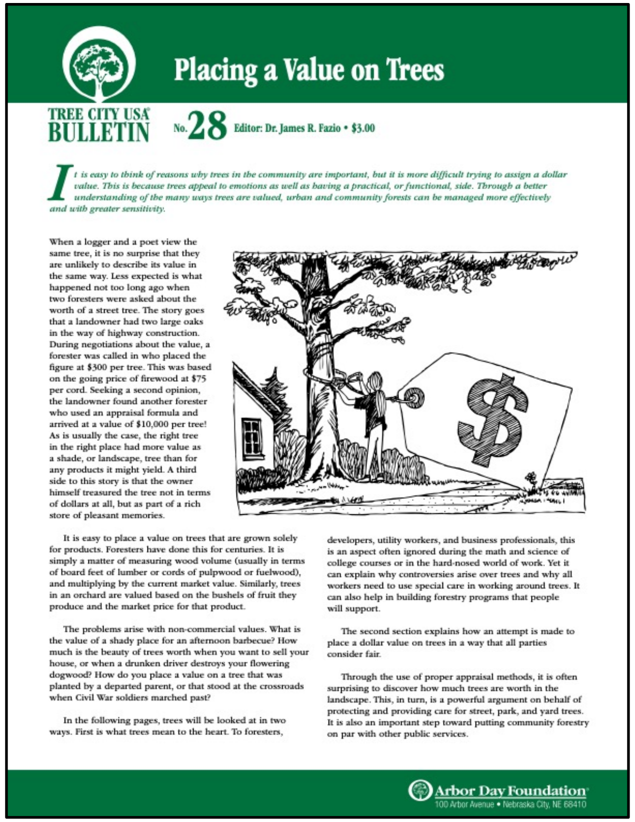

Placing a Value on Trees

TREE CITY USA® BULLETIN No. 28 Editor: Dr. James R. Fazio • $3.00

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When a logger and a poet view the same tree, it is no surprise that they are unlikely to describe its value in the same way. Less expected is what happened not too long ago when two foresters were asked about the worth of a street tree. The story goes that a landowner had two large oaks in the way of highway construction. During negotiations about the value, a forester was called in who placed the figure at $300 per tree. This was based on the going price of firewood at $75 per cord. Seeking a second opinion, the landowner found another forester who used an appraisal formula and arrived at a value of $10,000 per tree! As is usually the case, the right tree in the right place had more value as a shade, or landscape, tree than for any products it might yield. A third side to this story is that the owner himself treasured the tree not in terms of dollars at all, but as part of a rich store of pleasant memories.

It is easy to place a value on trees that are grown solely for products. Foresters have done this for centuries. It is simply a matter of measuring wood volume (usually in terms of board feet of lumber or cords of pulpwood or fuelwood), and multiplying by the current market value. Similarly, trees in an orchard are valued based on the bushels of fruit they produce and the market price for that product.

The problems arise with non-commercial values. What is the value of a shady place for an afternoon barbecue? How much is the beauty of trees worth when you want to sell your house, or when a drunken driver destroys your flowering dogwood? How do you place a value on a tree that was planted by a departed parent, or that stood at the crossroads when Civil War soldiers marched past?

In the following pages, trees will be looked at in two ways. First is what trees mean to the heart. To foresters, developers, utility workers, and business professionals, this is an aspect often ignored during the math and science of college courses or in the hard-nosed world of work. Yet it can explain why controversies arise over trees and why all workers need to use special care in working around trees. It can also help in building forestry programs that people will support.

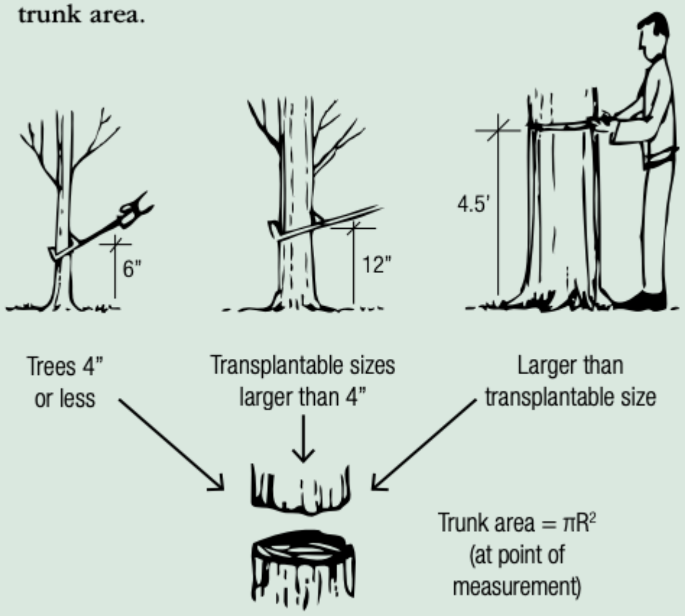
The second section explains how an attempt is made to place a dollar value on trees in a way that all parties consider fair.

Through the use of proper appraisal methods, it is often surprising to discover how much trees are worth in the landscape. This, in turn, is a powerful argument on behalf of protecting and providing care for street, park, and yard trees. It is also an important step toward putting community forestry on par with other public services.

Arbor Day Foundation®
100 Arbor Avenue • Nebraska City, NE 68410

Factors Considered in Determining a Tree's Value

Size: Trunks are measured for diameter. The point of measurement depends on the size of the tree. Diameter is then converted to square inches of trunk area.


6"
12"
4.5'
Trees 4" or less
Transplantable sizes larger than 4"
Larger than transplantable size

Trunk area = πR^2
(at point of measurement)

Location: Location value is the average of the ratings for these three factors.

Species: A rating is assigned to every species within a geographical region. The rating is expressed as a percent of "ideal" (5-100 percent) for that area and is based on the tree's suitability to climate and soils and generally how well it grows there. Aesthetics and functional attributes are also considered. State foresters can usually supply this list.

Condition: A tree in good health is assigned a higher condition rating than one plagued by disease, insects, or physical damage. The range is:

0 percent	dead or dying
5-49 percent	poor
50-69 percent	fair
70-89 percent	good
90-100 percent	excellent

Site: (10-100 percent) This is a highly subjective rating of the general surroundings, with emphasis on quality and design. A well-kept industrial park may be rated 90, whereas a run-down residential area could be 30. But trees in areas of intensive tree care, such as along a residential street, are usually rated higher than trees in industrial zones or those that occur naturally in woods along a roadside.

Contribution: (10-100 percent) The tree's functional attributes (shade, privacy, safety barrier) and aesthetic attributes (flowers, shape, purposeful place in landscape design, wildlife value, etc.) are in this judgment. Historic values can be considered here, but personal sentimental values are not taken into account in any formula method.

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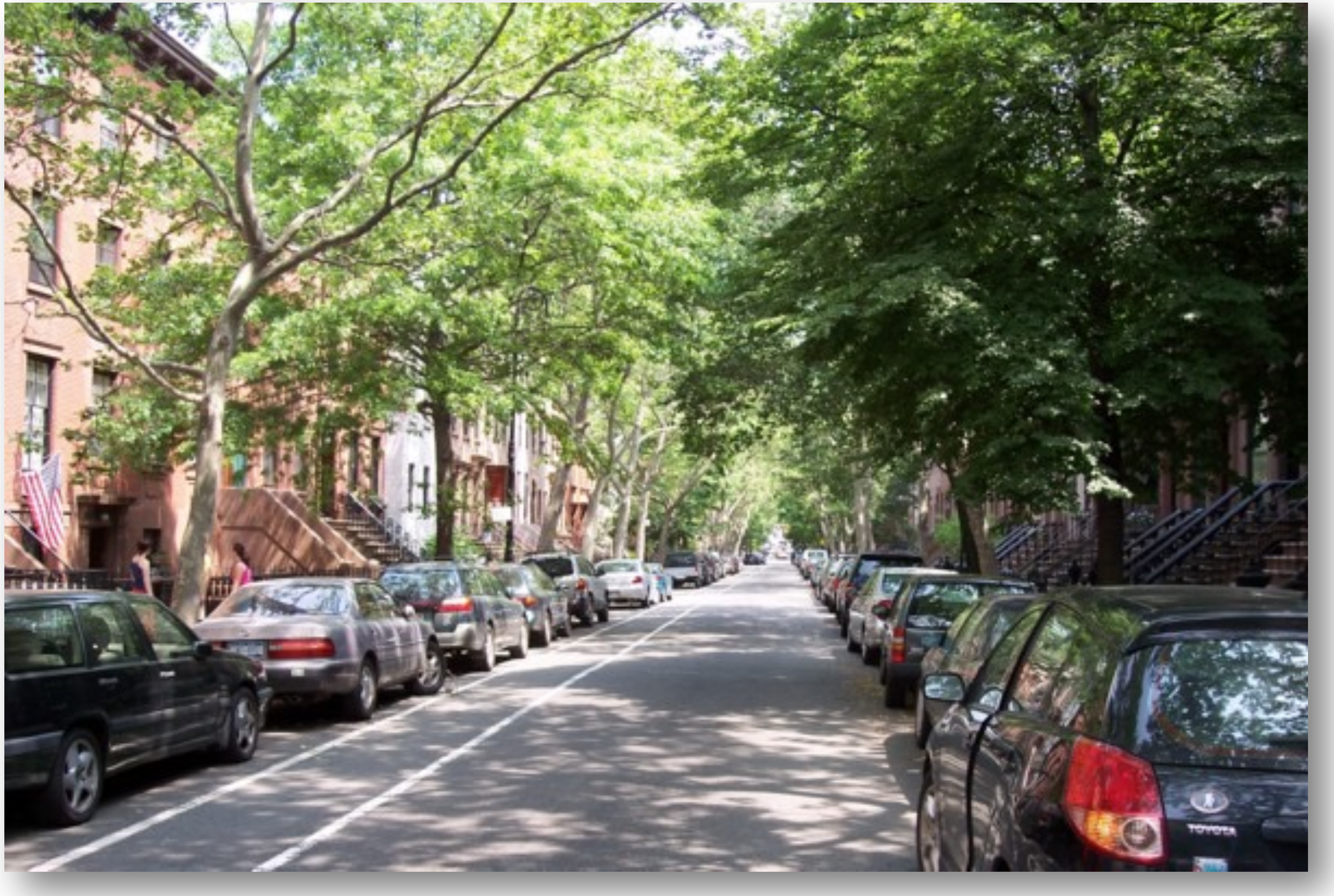
Urban Forests & Tree Canopy

Queens, NY

Urban Forests & Tree Canopy



Brooklyn, NY

Urban Forests & Tree Canopy

Brookline, MA

Urban Forests & Tree Canopy

Back Bay, Boston

Urban Forests & Tree Canopy

Lexington, MA

Urban Forests & Tree Canopy

Lexington, MA

Urban Forests & Tree Canopy

Wellesley College. Wellesley

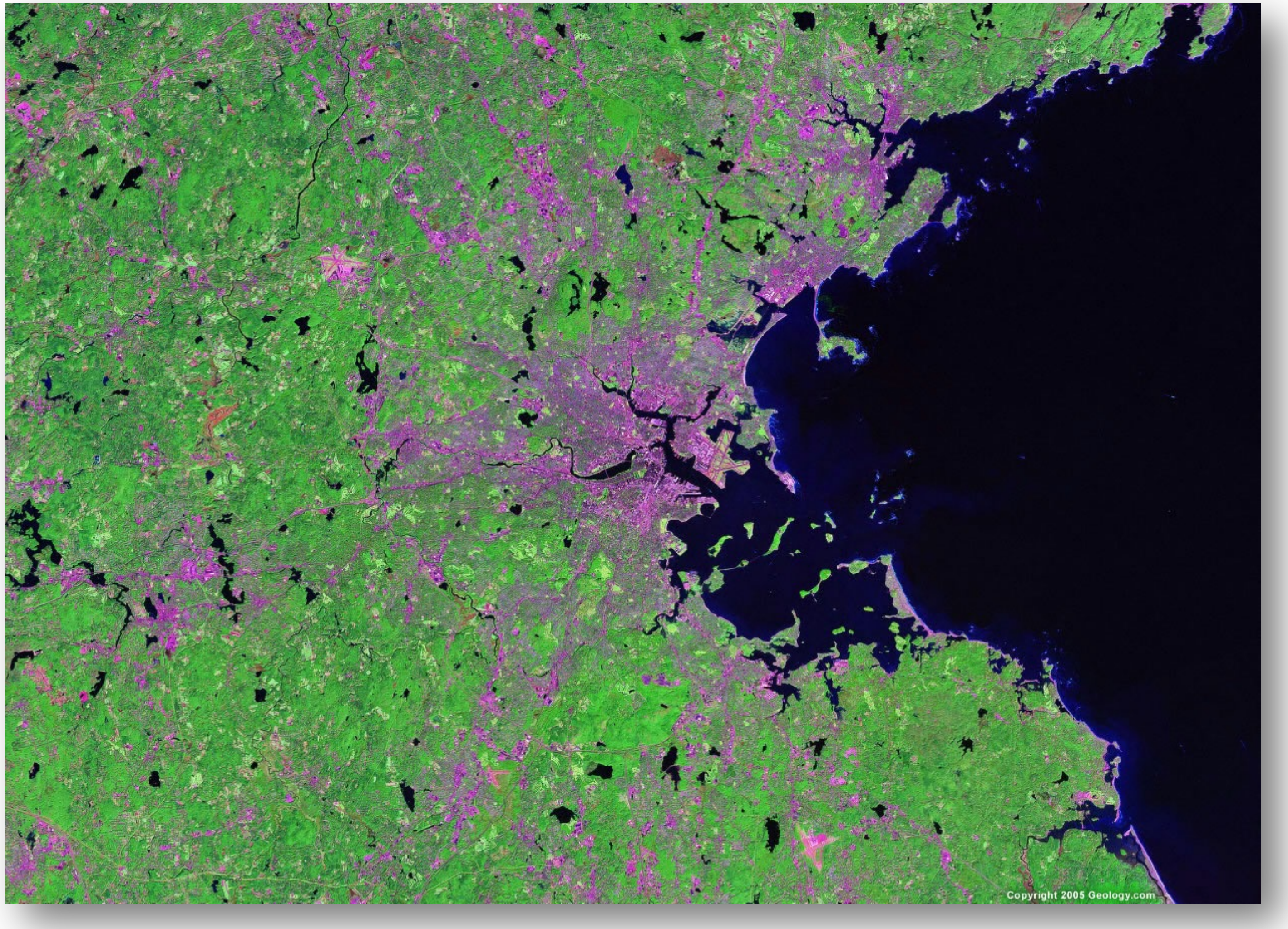
Urban Forests & Tree Canopy

Wellesley College, Wellesley

Urban Forests & Tree Canopy

Bedford, MA

Urban Forests & Tree Canopy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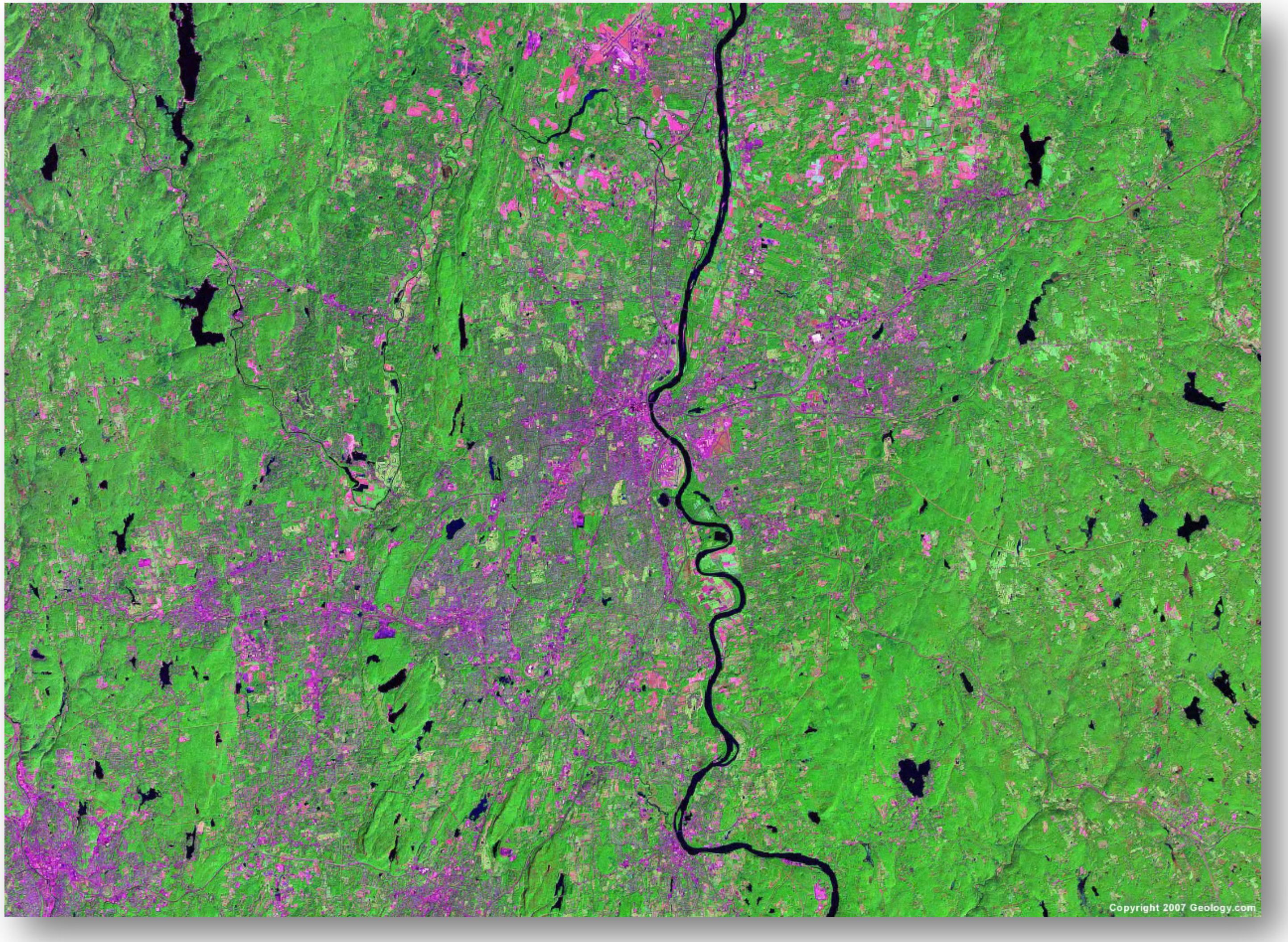
Boston, MA

Urban Forests & Tree Canopy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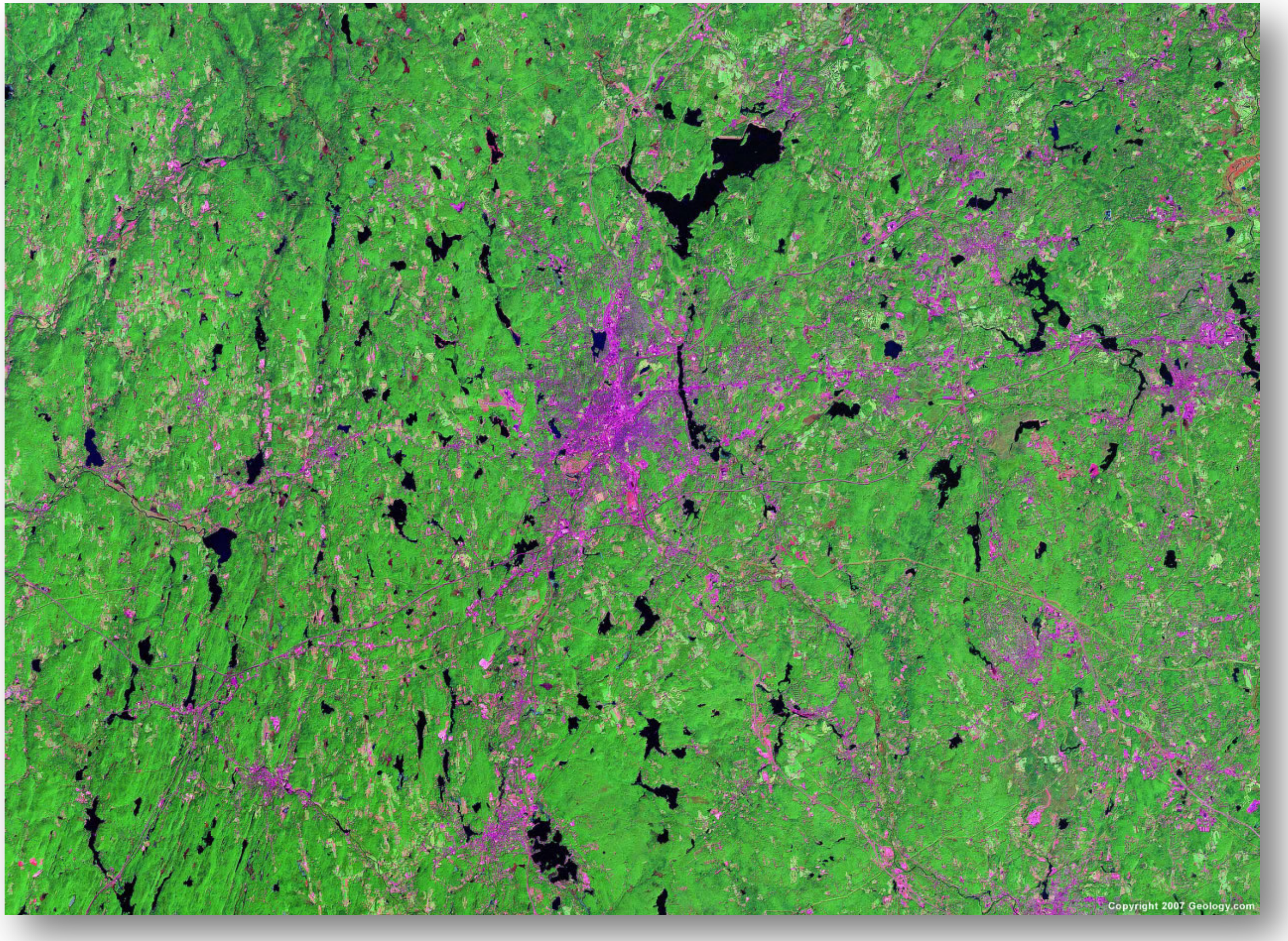
Hartford, CT

Urban Forests & Tree Canopy



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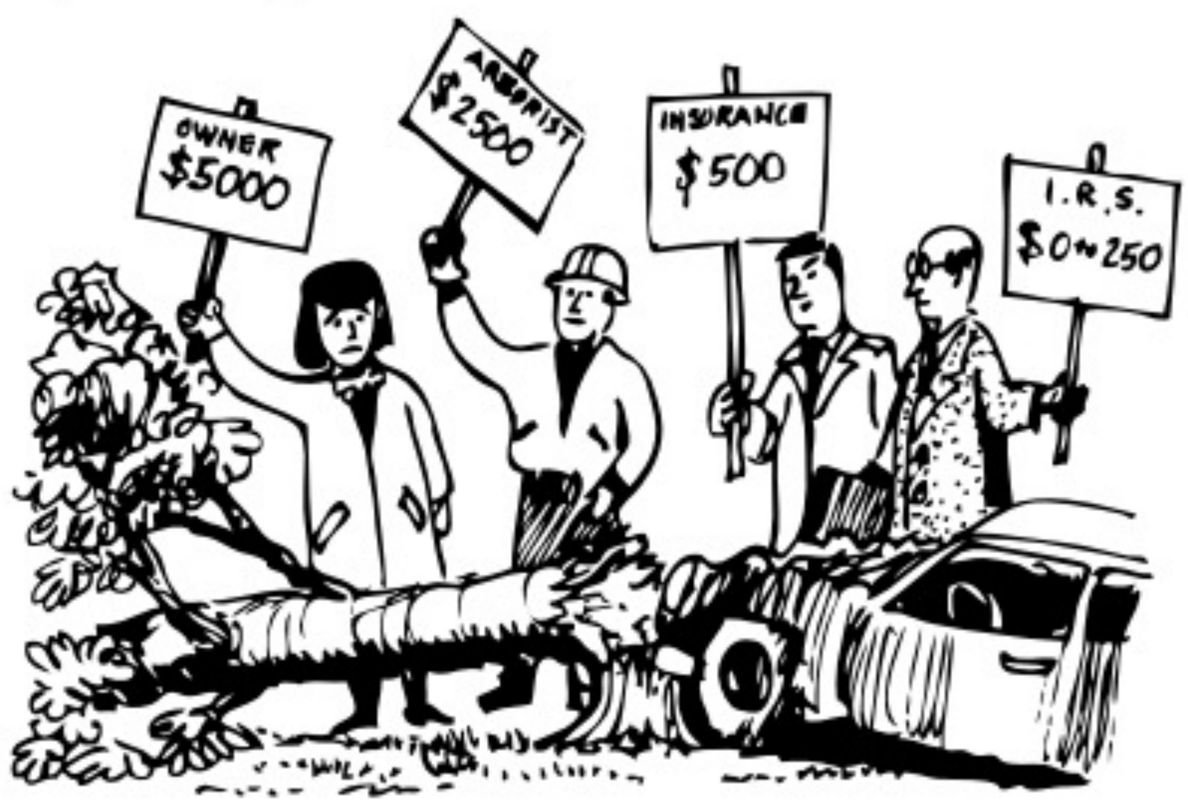
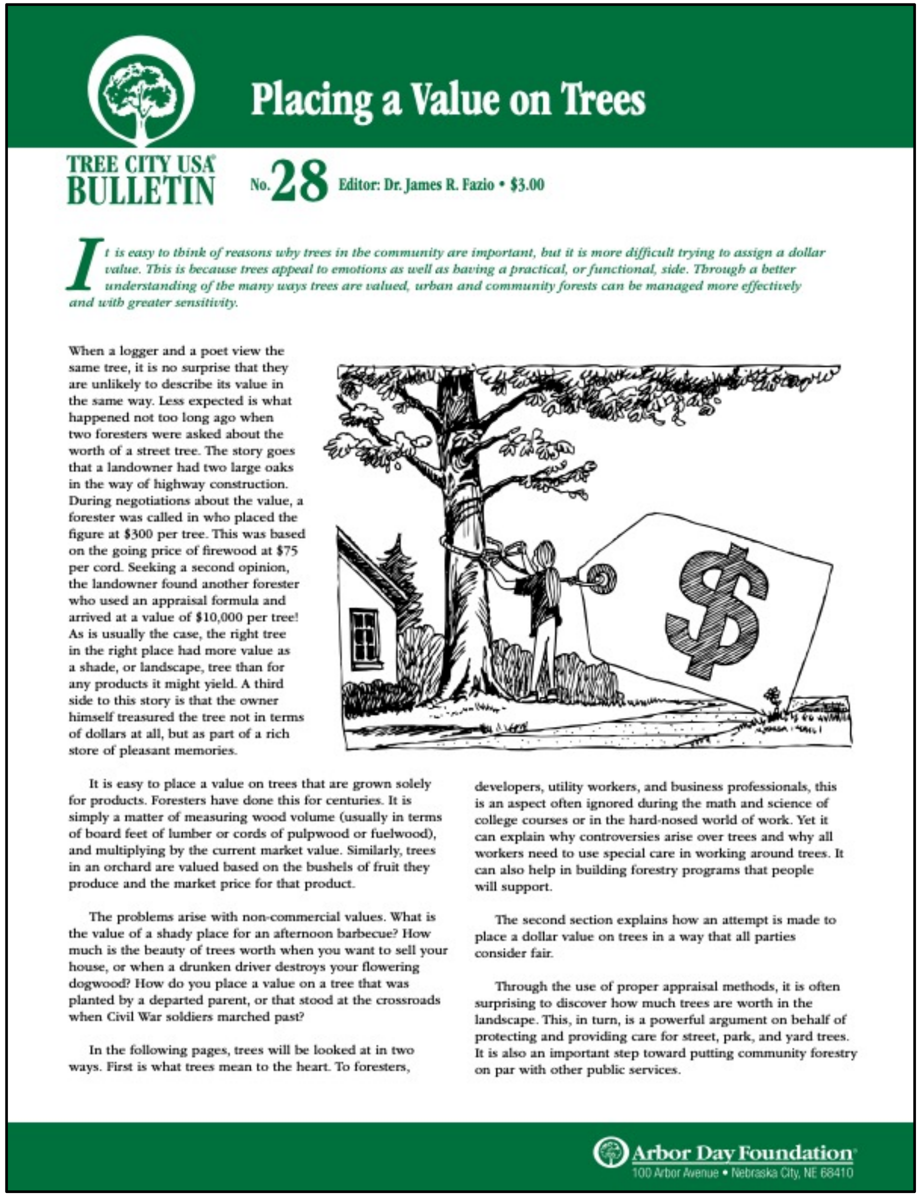
Worcester, MA

Urban Forests & Tree Canopy

Tree City Bulletin #28
Placing a Value on Trees





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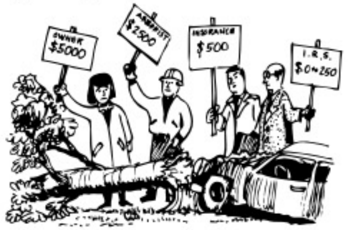
How Much Is A Tree Worth

The Formula Method

It sometimes is necessary to place a specific dollar value on a landscape tree. Typically, this helps settle legal claims for the damage or death of a tree, assists with insurance payments, contributes to real estate assessments, and proves loss for income tax purposes. Placing a dollar value on public trees can also be used to help justify city expenditures for tree care.

There are several ways to establish value, and a key point is to have it done by a professional. Only appraisals that reflect experience and good judgment will be able to stand up in court or before a claims examiner. To obtain the services of an appraiser, contact the American Society of Consulting Arborists referenced on page 8.

The most widely accepted formula method is one developed by the Council of Tree and Landscape Appraisers in its manual *Guide for Plant Appraisal*, published by the International Society of Arboriculture. This guide is regularly updated & available on the ISA's website at isa-arbor.com. Search the Store section for "appraisal." The following is not intended as a do-it-yourself guide, but it should serve to illustrate the components of landscape tree appraisal.



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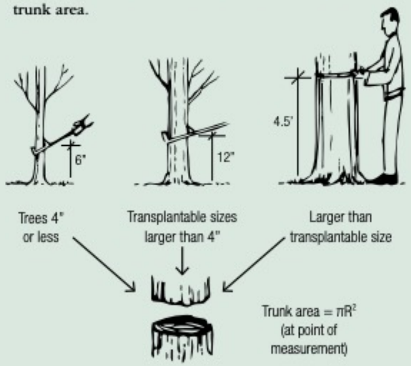
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Appraisal Method #1: Replacement Cost

Trees up to 8 inches in diameter (4 inches in some localities and higher in others) are usually considered transplantable. Value can then be determined by obtaining price quotes from three local nurseries for the same or comparable species of the same size. Transportation and planting costs at the same site should be added.

This formula is then used:

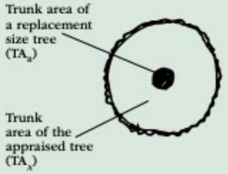
$$\text{Value} = \begin{matrix}\text{Installed}\\ \text{Cost}\end{matrix} \times \begin{matrix}\text{Species}\\ \text{Rating}\end{matrix} \times \text{Condition} \times \frac{\text{Site + Contribution + Placement}}{3}$$

Note: Removal and cleanup cost may be added if appropriate.

Appraisal Method #2: Trunk Formula Method

Trees too large for practical replacement by transplanting are appraised by determining a basic value, then adjusting by condition and location ratings. A two-step process is followed in making the determination.

Step 1. Basic Tree Cost =


Trunk area of a replacement size tree (TA_R)
Trunk area of the appraised tree (TA_A)

Replacement and installation cost of largest normally available tree locally

+

Unit tree cost (i.e., cost per square inch of trunk area of the replacement tree)

x

($TA_A - TA_R$) The difference between the trunk area of the appraised tree and a replacement tree

Step 2.
$$\begin{matrix}\text{Appraised}\\ \text{Value}\end{matrix} = \begin{matrix}\text{Basic}\\ \text{Tree}\\ \text{Cost}\end{matrix} \times \begin{matrix}\text{Species}\\ \text{Rating}\end{matrix} \times \begin{matrix}\text{Condition}\\ \text{Rating}\end{matrix} \times \begin{matrix}\text{Location}\\ \text{Rating}\end{matrix}$$

Note: Increases in trunk diameter on large trees dramatically affect trunk cross sectional area, and therefore basic value. In fact, it becomes unrealistic to say, for example, that a 31-inch tree would be worth $1,300 more than a 30-inch tree when most people could not even visually discern the difference. To account for this, adjusted trunk area values for trees more than 30 inches in diameter are presented in table form in the ninth edition of *Guide for Plant Appraisal* or they can be calculated using the formula: $ATA = -.335d^2 + 69.3d - 1087$.

Government officials in Monroe County, New York, were able to place tree loss at a staggering $97.1 million when a disastrous ice storm struck. Estimating tree values during street and park tree inventories can be useful when trees are subsequently damaged or destroyed.

The Bottom Line — An Example

Using the above Trunk Formula Method, a 15-inch diameter English oak was valued by the Council of Tree & Landscape Appraisers at $4,400. This was based on a $1,785 installed, replacement cost for a 4-inch balled and burlapped tree, and species and condition ratings of 75 percent and 80 percent, respectively. Site, contribution, and placement ratings for location were found to be 90, 80, and 70 percent, respectively.

Urban Forests & Tree Canopy

What is i-Tree?

- A suite of tools to assess urban vegetation and their ecosystem services and values

Eco **Landscape** **Canopy** **Design** **MyTree**

i-Tree is a Cooperative Initiative

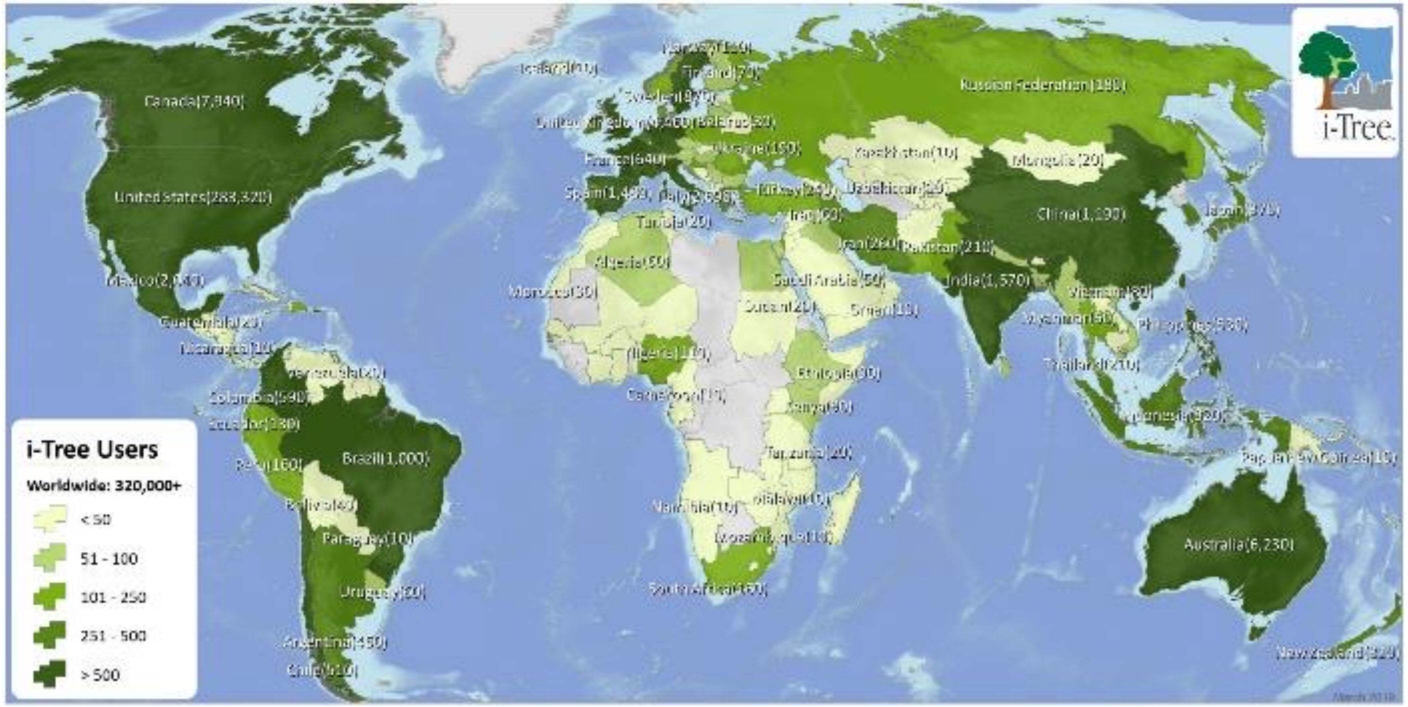
Public-Private Partnership

- USDA Forest Service
- Davey Tree Expert Co.
- National Arbor Day Foundation
- Society of Municipal Arborists
- International Society of Arboriculture
- Casey Trees

What is i-Tree?

"Putting US Forest Service science into the hands of users."

- Benefits-based approach
- Based on peer-reviewed research
- A 15-year collaborative effort
- Technical Support
- www.itreetools.org


i-Tree Users
Worldwide: 320,000+
< 50
51 - 100
101 - 250
251 - 500
> 500
i-Tree
Canada(7,840)
United States(288,320)
Mexico(2,040)
Guatemala(20)
Nicaragua(10)
Venezuela(20)
Colombia(590)
Ecuador(180)
Peru(160)
Brazil(1,000)
Bolivia(40)
Paraguay(10)
Uruguay(20)
Argentina(450)
Chile(510)
Iceland(10)
Norway(150)
Finland(70)
Sweden(870)
United Kingdom(4,400)
Belarus(30)
France(640)
Ukraine(150)
Spain(1,490)
Italy(2,690)
Tunisia(20)
Algeria(50)
Morocco(30)
Nigeria(110)
Cameroon(10)
Sudan(20)
Ethiopia(30)
Kenya(90)
Tanzania(20)
Malawi(10)
Namibia(10)
Mozambique(10)
South Africa(150)
Russian Federation(180)
Kazakhstan(10)
Mongolia(20)
Uzbekistan(20)
Turkey(240)
Iraq(60)
Iran(260)
Pakistan(210)
Saudi Arabia(50)
Oman(10)
India(1,570)
China(1,190)
Japan(370)
Vietnam(20)
Myanmar(50)
Philippines(530)
Thailand(210)
Indonesia(320)
Papua New Guinea(10)
Australia(6,230)
New Zealand(320)
March 2018

DAVEY

Arbor Day Foundation

sma SOCIETY OF MUNICIPAL ARBORISTS

ISA

Casey Trees

ESF
State University of New York
College of Environmental Science and Forestry

NAASF

EPA
United States
Environmental Protection
Agency

Why i-Tree?

Opportunities for communities to…

- Plan and manage urban forest resources more strategically to serve and protect citizens;
- Integrate urban forests in policies: sustainability, climate, resiliency, air quality, public health, stormwater, etc.;
- Support advocacy efforts with data;
- Improve preservation of trees and forests;
- Connect urban and rural forest importance.

Trees and people prioritization
Kearny
Harrison
Livingston

CLIMATE ACTION PROGRAM

MEXICO CITY'S
CLIMATE ACTION
PROGRAM

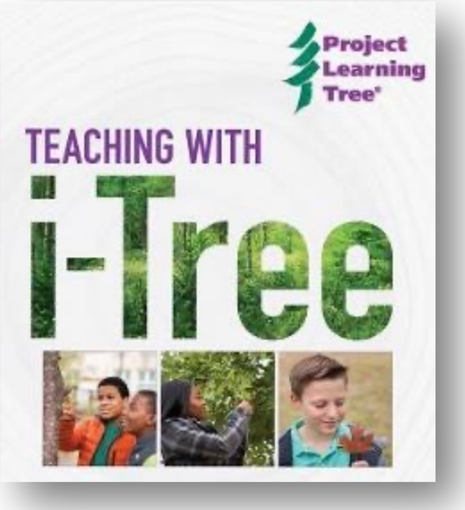
2014-2020

Progress Report 2016

CDMX

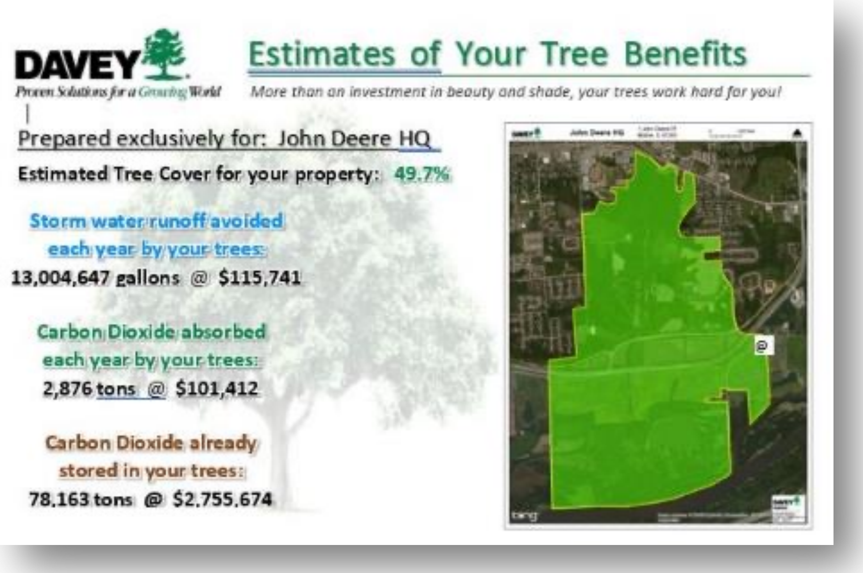
Why i-Tree?

Opportunities for communities to…



- Economic opportunities:

  attract & retain new businesses and residents;
- Promote green tourism and investment;
- Create green industry jobs;
- Sustainable development;
- Youth education & engagement;
- Develop new relationships & partnerships…



DAVEY

Proven Solutions for a Growing World

Estimates of Your Tree Benefits

More than an investment in beauty and shade, your trees work hard for you!

Prepared exclusively for: John Deere HQ

Estimated Tree Cover for your property: 49.7%

Storm water runoff avoided
each year by your trees:
13,004,647 gallons @ $115,741

Carbon Dioxide absorbed
each year by your trees:
2,876 tons @ $101,412

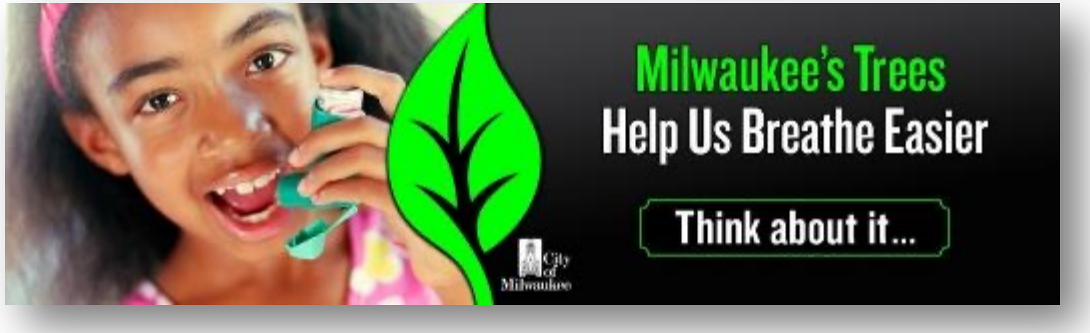
Carbon Dioxide already
stored in your trees:
78,163 tons @ $2,755,674

i-Tree’s Vision

To improve forest and human health, and forest and city resiliency through easy-to-use technology that engages people globally in enhancing forest management.

ENERGY-SAVING TREES
presented by arborday.org
Arbor Day Foundation
About
Get Started
Utility Partners
Register Your Utility Company
FAQ
Online Tutorial
Start Saving »

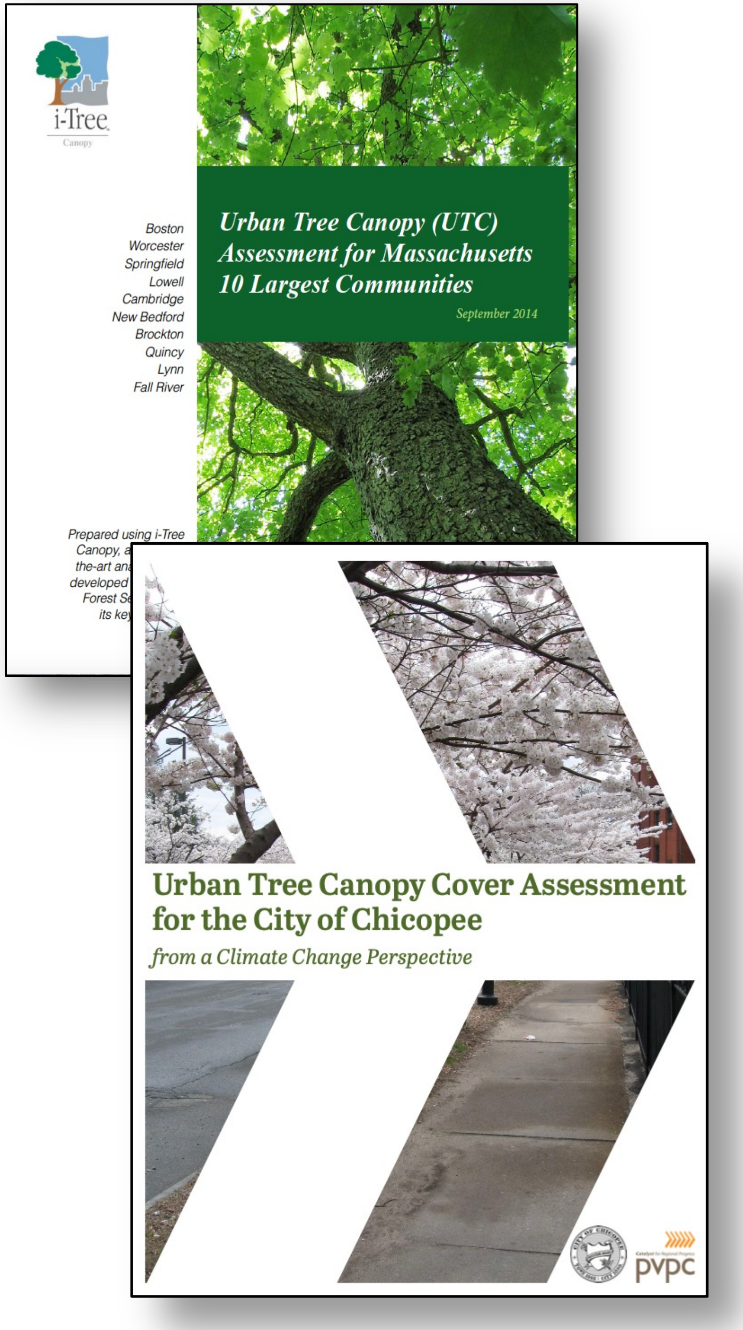
Save on Your Energy Bills by Planting Trees


Milwaukee’s Trees
Help Us Breathe Easier
Think about it...
City of Milwaukee

This tree gives back
$ 89
worth of benefits to our environment over the next year
EVERY TREE COUNTS

Estimating Tree Benefits

- Air pollution removal
- Carbon storage and annual carbon sequestration
- Avoided stormwater run-off *(hydrology effects)*
- Energy effects (*home cooling & heating*)
- Structural assessment
- $ Value for ecosystem services
- Public health impacts related to air quality



i-Tree
Canopy

Boston
Worcester
Springfield
Lowell
Cambridge
New Bedford
Brockton
Quincy
Lynn
Fall River

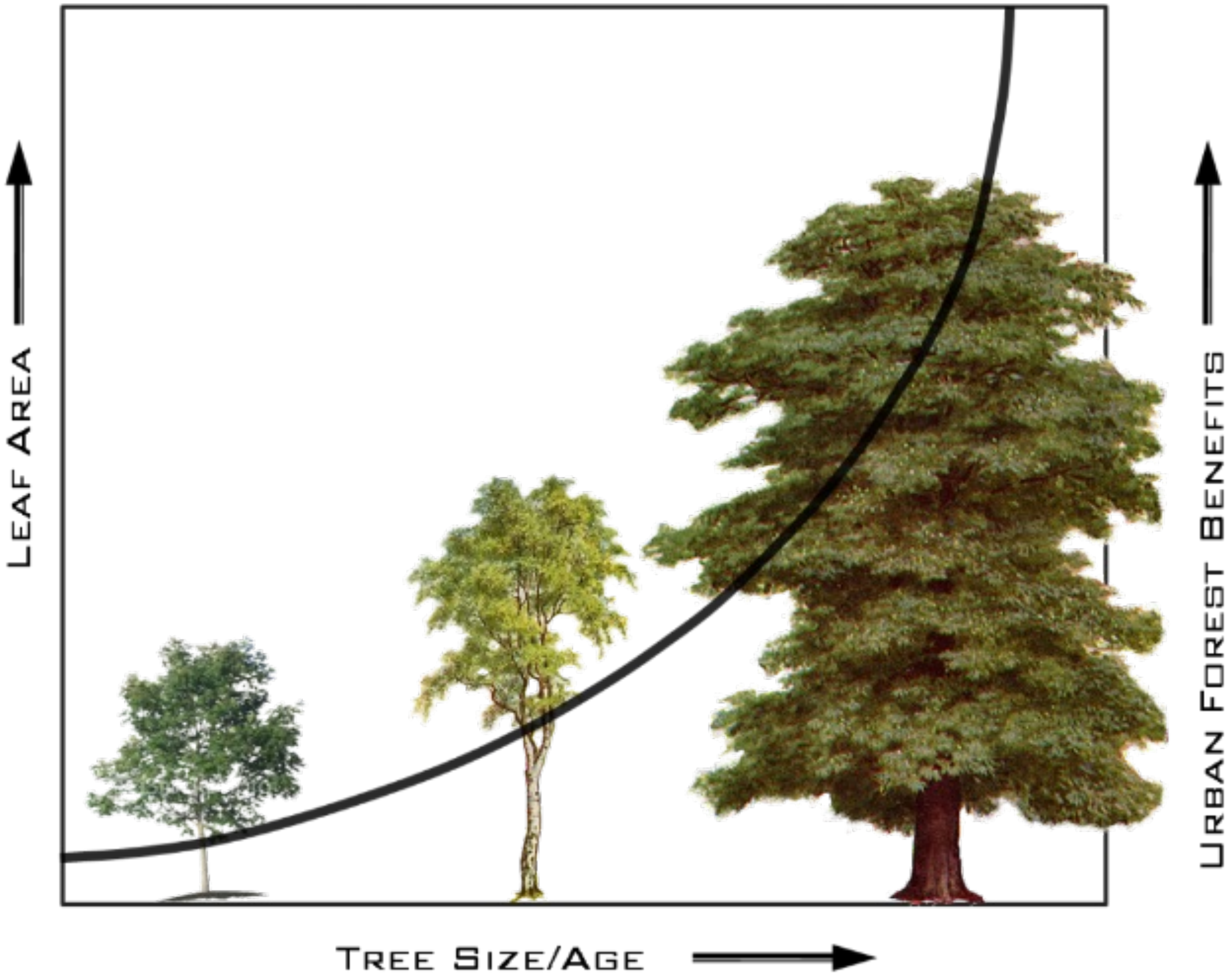
Urban Tree Canopy (UTC)
Assessment for Massachusetts
10 Largest Communities
September 2014

Prepared using i-Tree
Canopy, a
the-art ana
developed
Forest Se
its key

Urban Tree Canopy Cover Assessment for the City of Chicopee
from a Climate Change Perspective

Catalyst for Regional Progress
pvpc

Tree species, size and leaf area area are key to calculating ecosystem services (benefits).


LEAF AREA
TREE SIZE/AGE
URBAN FOREST BENEFITS

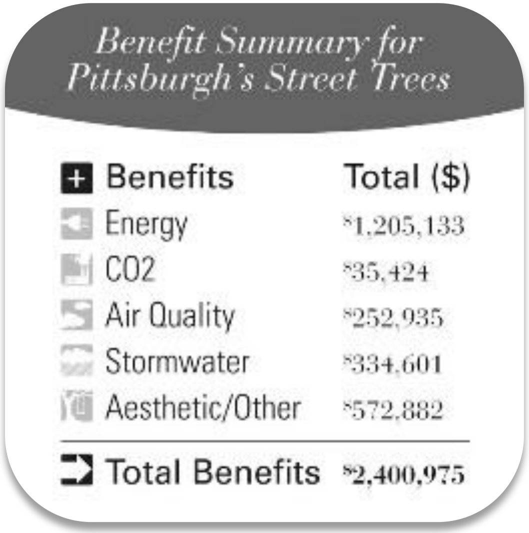
UGA0008378

UGA0008367

Quantify Tree Benefits with Research Science

Carbon dioxide storage and sequestration
Air pollution removal
Storm water reduction

$2.94 in benefits
for every $1.00 spent



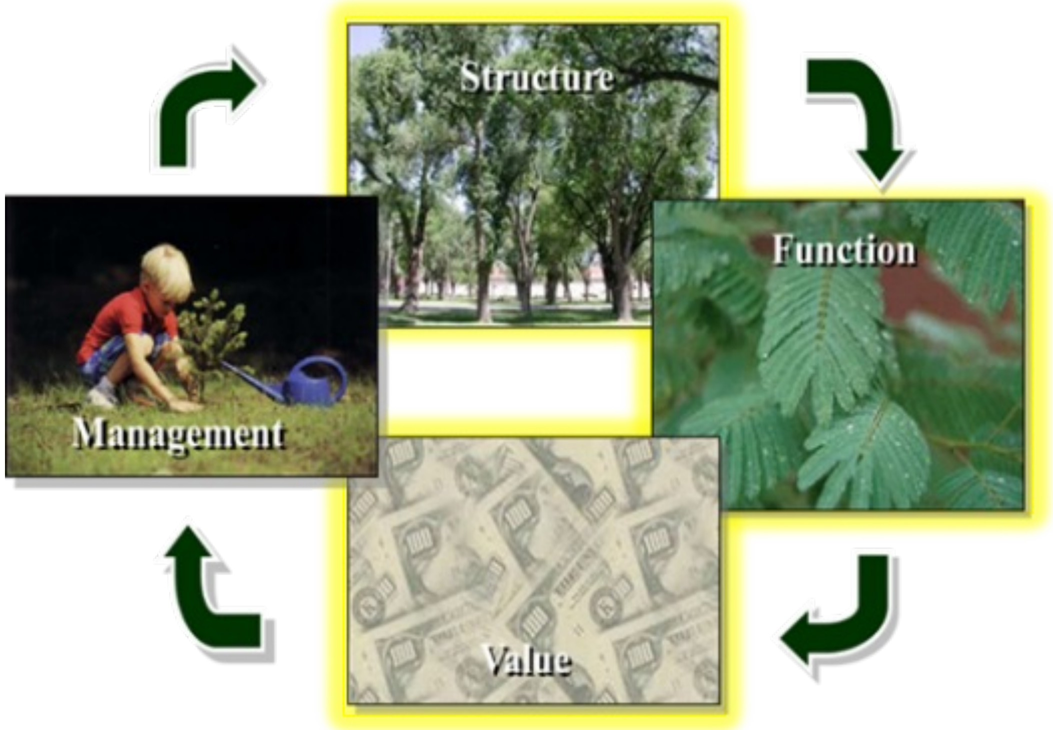
Benefit Summary for Pittsburgh's Street Trees

Benefits	Total ($)
Energy	$1,205,133
CO2	$35,424
Air Quality	$252,935
Stormwater	$334,601
Aesthetic/Other	$572,882
Total Benefits	$2,400,975

This tree gives back
$2,168
worth of environmental benefits over the next 15 years.
EVERY TREE COUNTS

Milwaukee's Trees
A $900,000 Cooling Benefit
Think about it...

The only infrastructure
that increases in value
over time.


Structure
Function
Value
Management

Research Science and Data Development

University Researchers

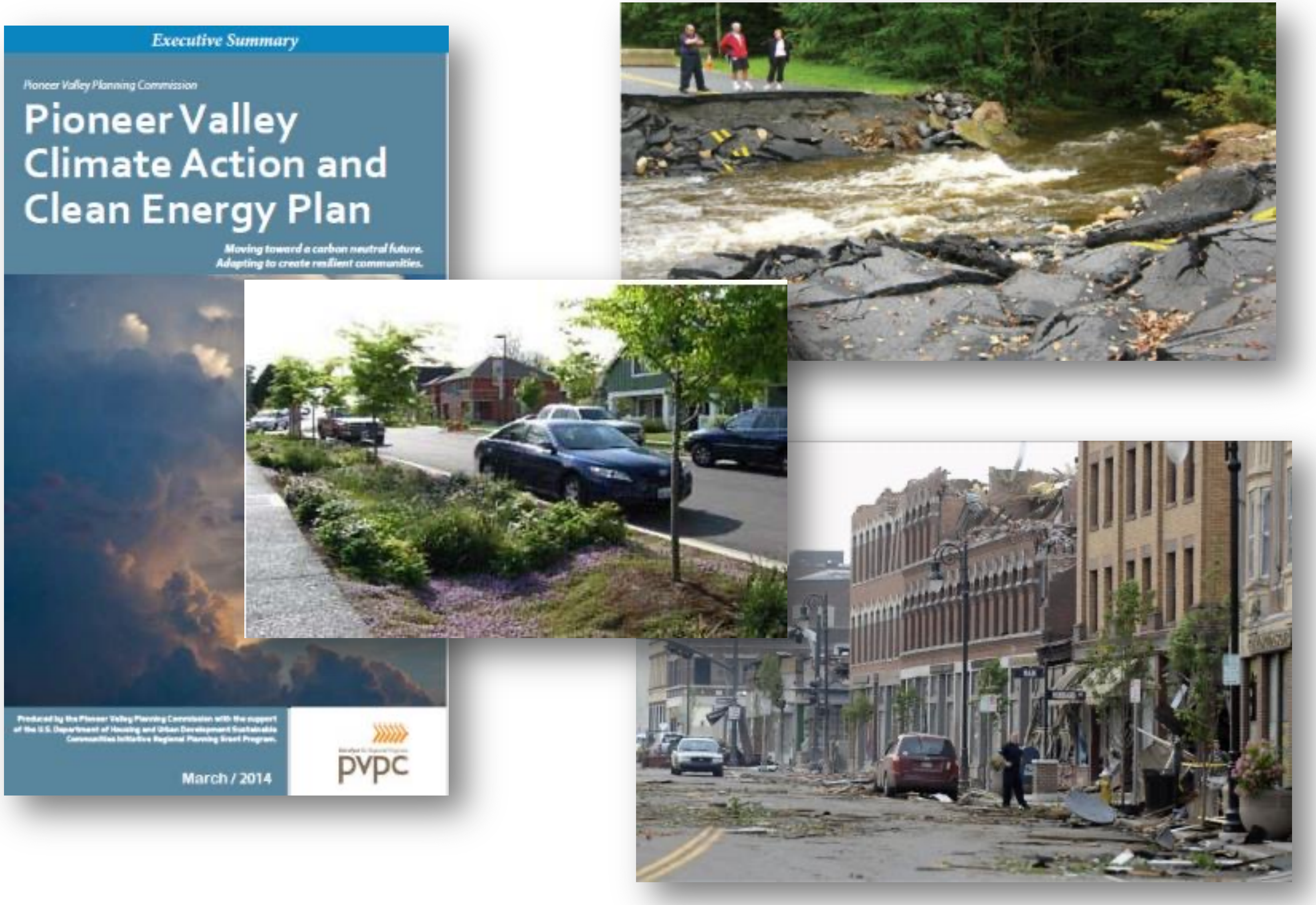
Planners, Engineers & Architects

Commercial Practitioners

Shea Zwerver

Citizen Scientists

What are your urban forestry challenges and opportunities?



Executive Summary

Pioneer Valley Planning Commission

Pioneer Valley Climate Action and Clean Energy Plan

Moving toward a carbon neutral future.
Adapting to create resilient communities.

Produced by the Pioneer Valley Planning Commission with the support of the U.S. Department of Housing and Urban Development Sustainable Communities Initiative Regional Planning Grant Program.

March / 2014

The Foundation: Local Data

- Local Sample or Inventory
- Local information:
    - Weather
    - Pollution
    - Environmental Variables
- Hourly simulations

Tree Benefit: Improve Air Quality

- Absorb pollutants through leaf surfaces
    - O_3 (ozone)
    - NO_2 (nitrogen dioxide)
    - SO_2 (sulfur dioxide)

- Intercept dust and/or particulate matter (PM10 and PM2.5)

- A reduction in energy production needs reduces creation of many air pollutants

- Release oxygen

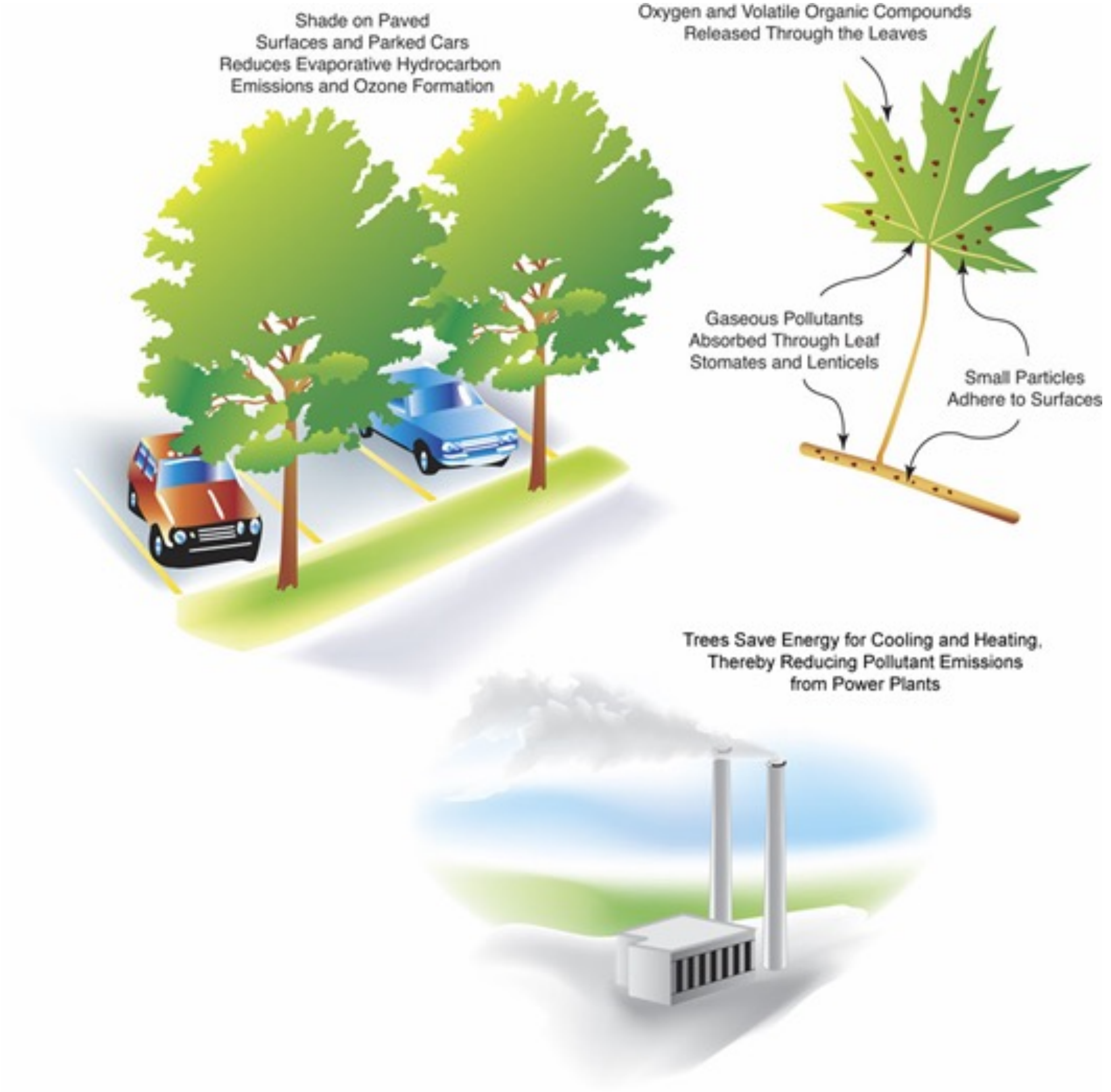
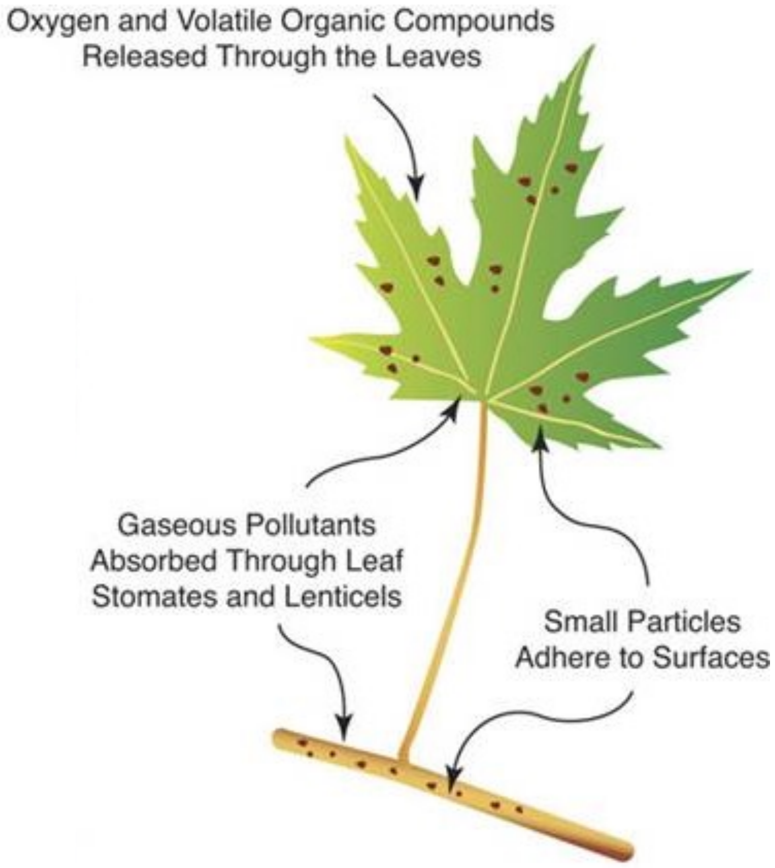

Shade on Paved Surfaces and Parked Cars Reduces Evaporative Hydrocarbon Emissions and Ozone Formation
Oxygen and Volatile Organic Compounds Released Through the Leaves
Gaseous Pollutants Absorbed Through Leaf Stomates and Lenticels
Small Particles Adhere to Surfaces
Trees Save Energy for Cooling and Heating, Thereby Reducing Pollutant Emissions from Power Plants

Image courtesy of the Center for Urban Forest Research

Improving Air Quality

- 15” Oak at 20 years (lbs):
  - NO_2 = 0.98
  - SO_2 = 2.72
  - PM_{10} = 0.52
  - Ozone = 0.84
  - VOCs = 0.21


Oxygen and Volatile Organic Compounds Released Through the Leaves
Gaseous Pollutants Absorbed Through Leaf Stomates and Lenticels
Small Particles Adhere to Surfaces

USDA Forest Service, Springfield, MA i-Tree, 2019

Image courtesy of the Center for Urban Forest Research

Tree Benefit: Reduce Carbon Dioxide CO_2

- Trees are largely made of carbon so they take carbon out of the air and turn it into tissue (bark, leaves, wood, etc.)

- Tree can help reduce home energy needs, which also reduces additional carbon emissions released from power plants in the first place (*Secondary benefit*)

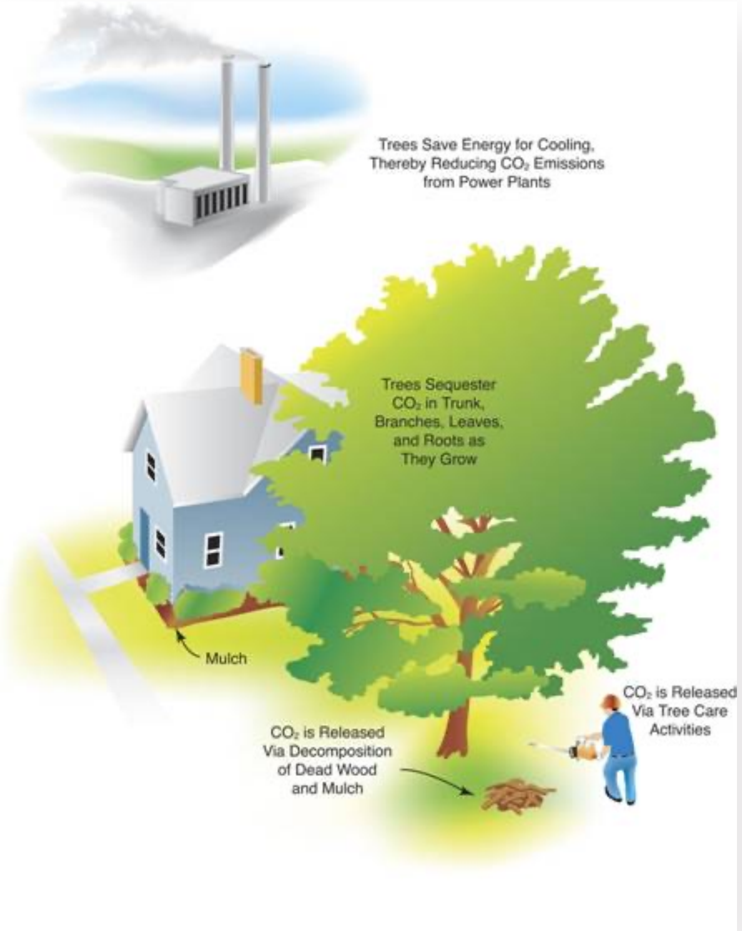
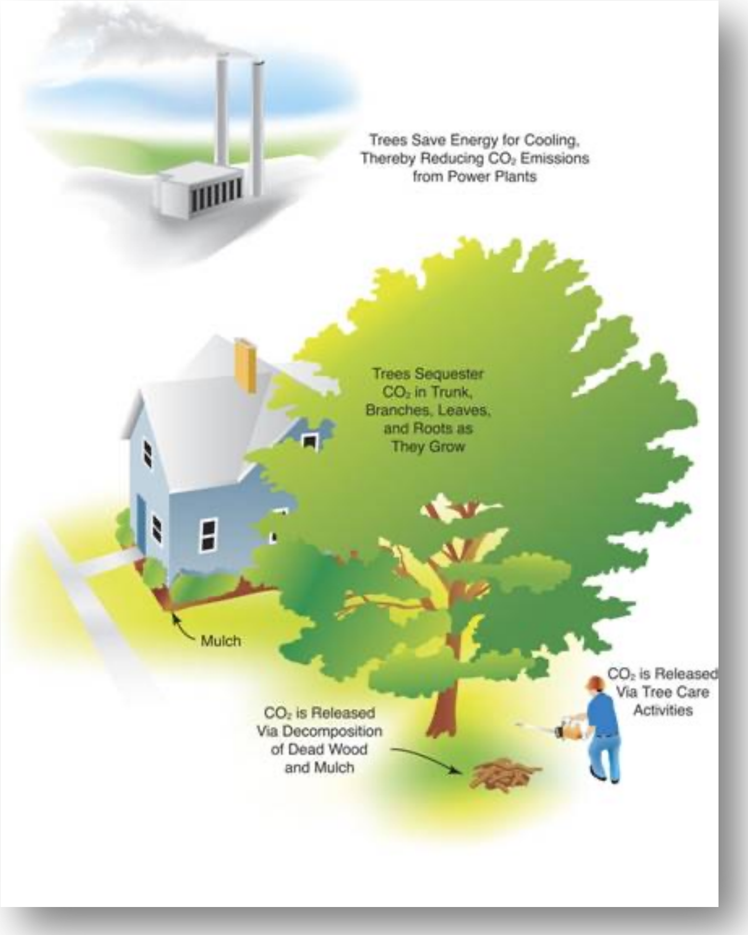

Trees Save Energy for Cooling, Thereby Reducing CO_2 Emissions from Power Plants
Trees Sequester CO_2 in Trunk, Branches, Leaves, and Roots as They Grow
Mulch
CO_2 is Released Via Tree Care Activities
CO_2 is Released Via Decomposition of Dead Wood and Mulch

Image courtesy of the Center for Urban Forest Research

Reducing Atmospheric Carbon Dioxide


Trees Save Energy for Cooling, Thereby Reducing CO_2 Emissions from Power Plants
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Mulch
CO_2 is Released Via Tree Care Activities
CO_2 is Released Via Decomposition of Dead Wood and Mulch

Image courtesy of the Center for Urban Forest Research

10” diameter deciduous shade trees

- 100 trees remove five tons of CO_2/year
- 100 trees remove about 1000 lbs of pollutants per year, including:
    - 400 lbs of ozone
    - 300 lbs of particulates

USDA Forest Service, Brattleboro, VT, i-Tree, 2020

Tree Benefit: Hydrology Effects

- Intercepts and holds rain on leaves, branches, and other surfaces
- Reduces stormwater runoff
- Increases water storage in soil
- Increase infiltration and helps recharge aquifers (underground water)
- Reduces erosion

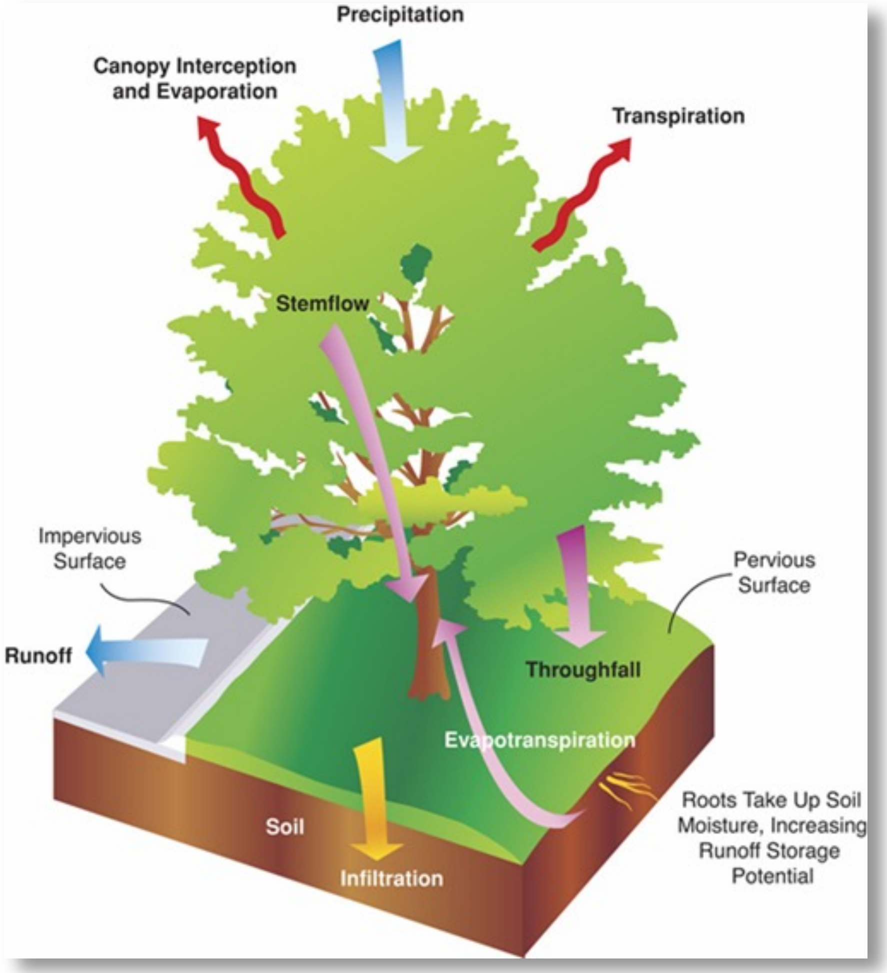

Precipitation
Canopy Interception and Evaporation
Transpiration
Stemflow
Impervious Surface
Pervious Surface
Runoff
Throughfall
Evapotranspiration
Soil
Infiltration
Roots Take Up Soil Moisture, Increasing Runoff Storage Potential

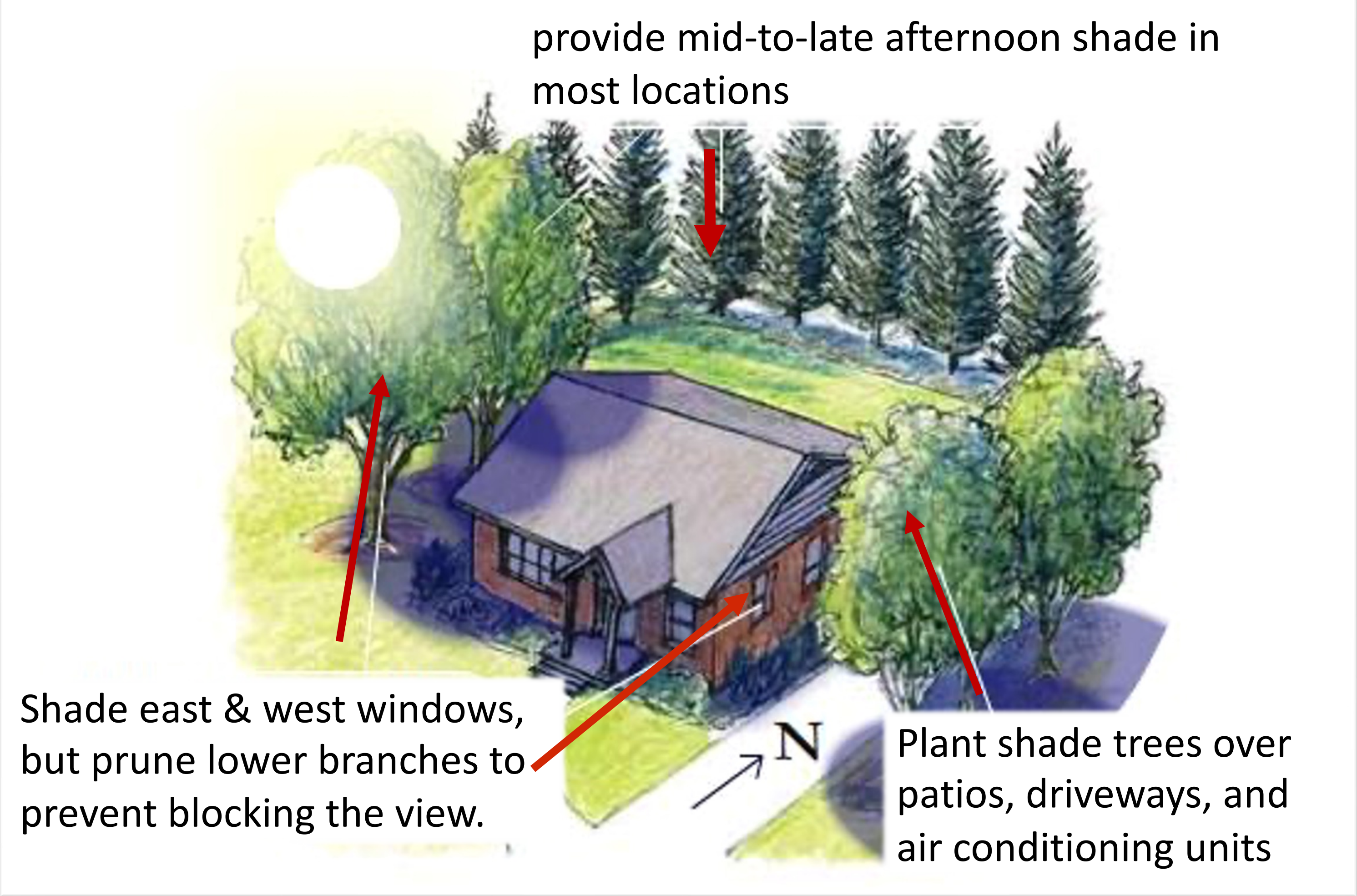
Image courtesy of the Center for Urban Forest Research

Trees & Energy – Summer Effects

Northeast U.S. Average

- Save up to 30% of annual air conditioning costs

- Save 10-25% of winter heating costs



Plant on the west & northwest to provide mid-to-late afternoon shade in most locations

Shade east & west windows, but prune lower branches to prevent blocking the view.

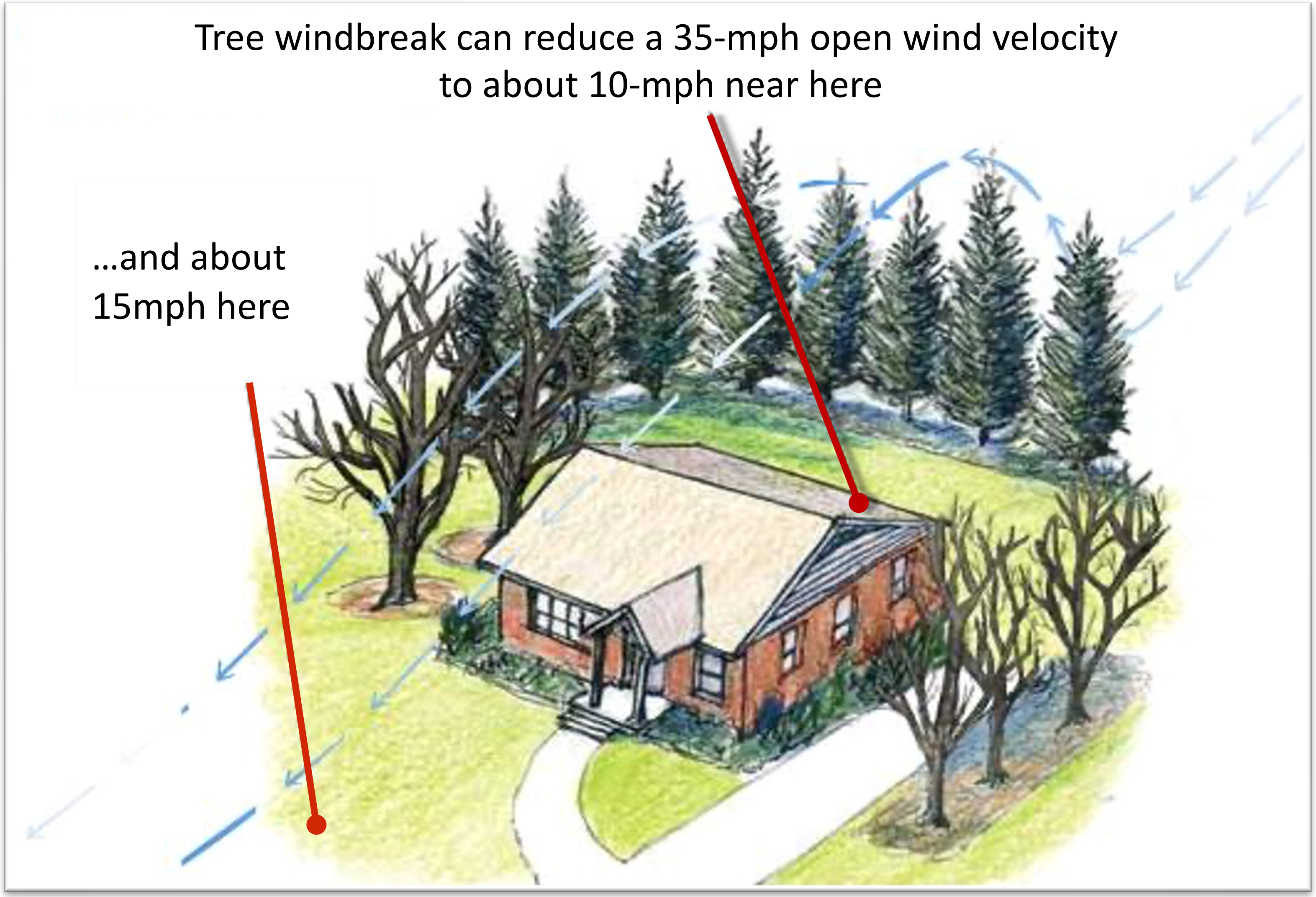
Plant shade trees over patios, driveways, and air conditioning units

Image courtesy of Arbor Day Foundation
https://www.arborday.org/trees/

Trees & Energy – Winter Effects

Northeast U.S. Average

- Save 10-25% of winter heating costs



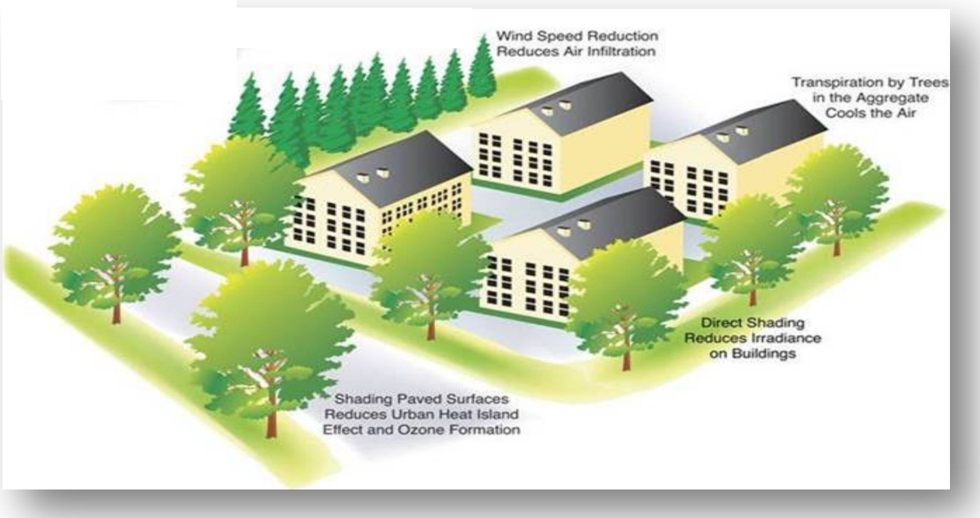
Tree windbreak can reduce a 35-mph open wind velocity to about 10-mph near here

…and about 15mph here

Image courtesy of Arbor Day Foundation
https://www.arborday.org/trees/

Tree Benefit: Energy Effects Summary

- Trees shade buildings and built surfaces (summer)


Wind Speed Reduction
Reduces Air Infiltration
Transpiration by Trees
in the Aggregate
Cools the Air
Direct Shading
Reduces Irradiance
on Buildings
Shading Paved Surfaces
Reduces Urban Heat Island
Effect and Ozone Formation

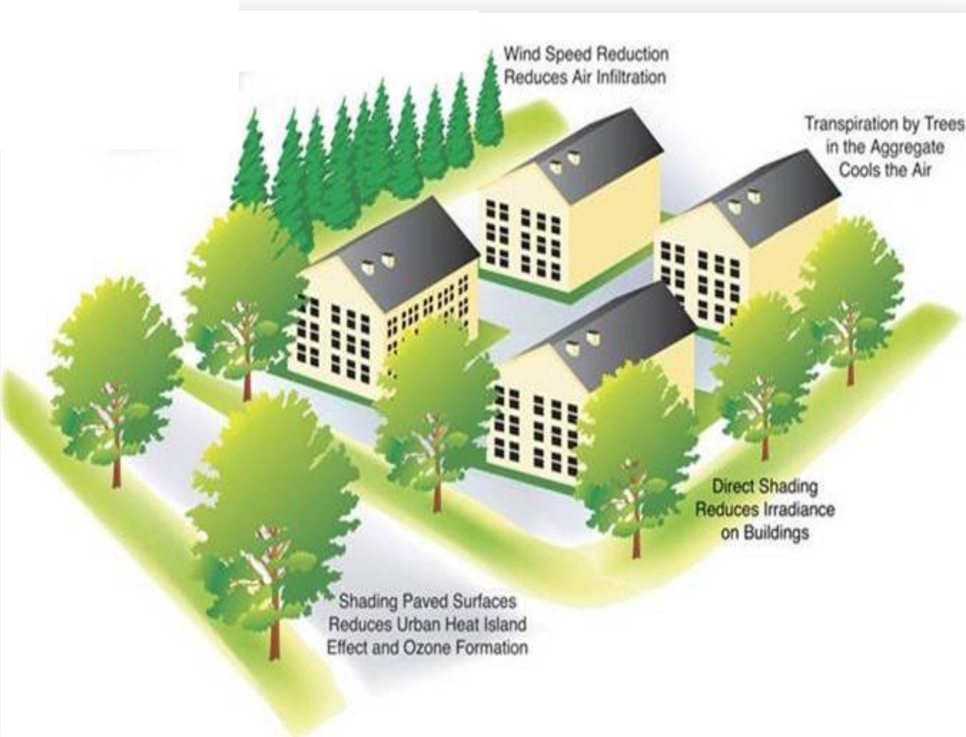
- Act as a wind break reducing heat loss when cold (winter)

- Trees cool the air – (climate effect)

- Reduce energy demand at power generation source (*Secondary benefit*)

Image courtesy of the Center for Urban Forest Research

Conserving Energy

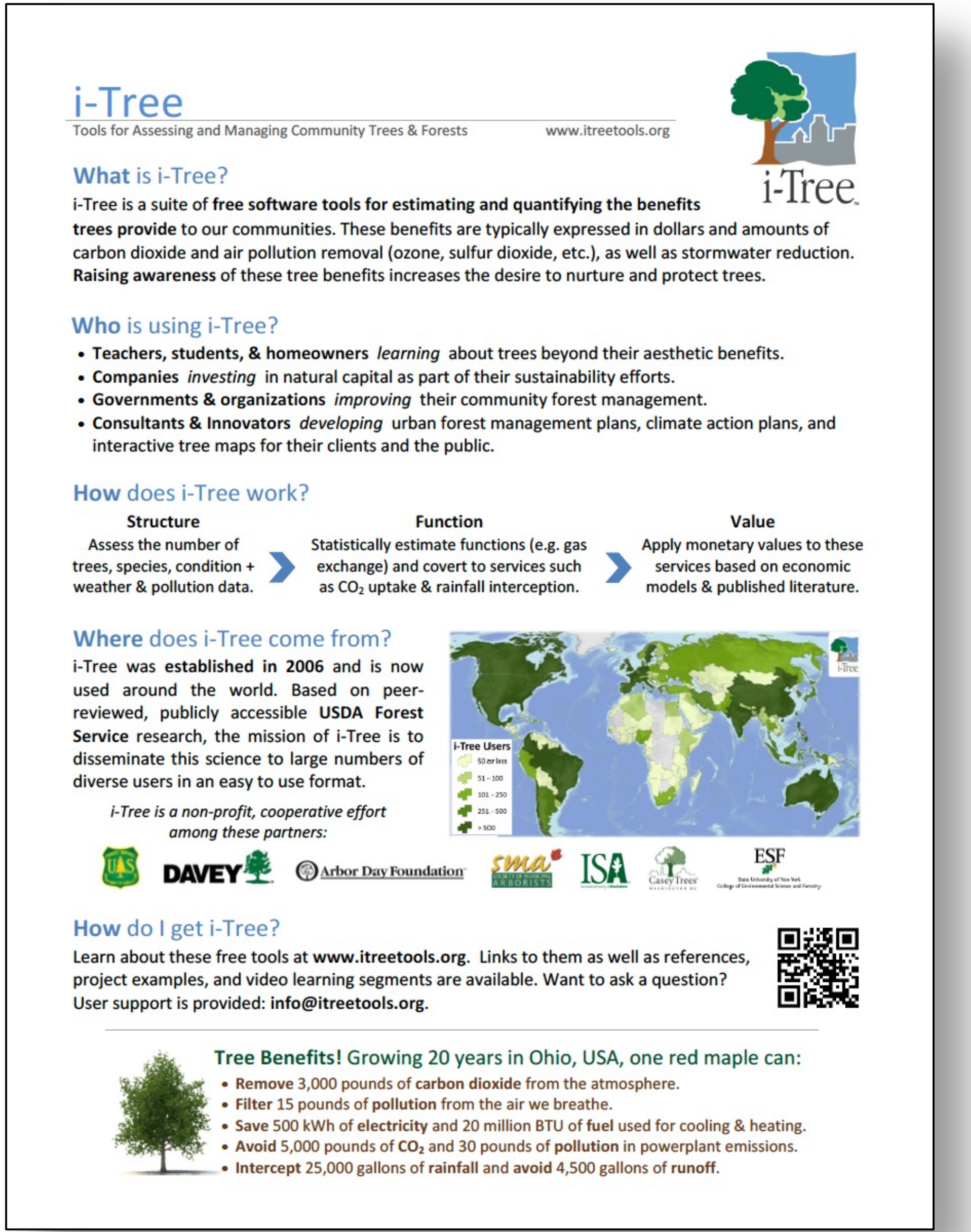

Wind Speed Reduction Reduces Air Infiltration
Transpiration by Trees in the Aggregate Cools the Air
Direct Shading Reduces Irradiance on Buildings
Shading Paved Surfaces Reduces Urban Heat Island Effect and Ozone Formation

Northeast U.S. Average

- Save up to 30% of annual air conditioning costs
- Save 10-25% of winter heating costs

USDA Forest Service, i-Tree, 2021

Image courtesy of the Center for Urban Forest Research



i-Tree

Tools for Assessing and Managing Community Trees & Forests www.itreetools.org

i-Tree

What is i-Tree?

i-Tree is a suite of **free software tools for estimating and quantifying the benefits trees provide** to our communities. These benefits are typically expressed in dollars and amounts of carbon dioxide and air pollution removal (ozone, sulfur dioxide, etc.), as well as stormwater reduction. **Raising awareness** of these tree benefits increases the desire to nurture and protect trees.

Who is using i-Tree?

- **Teachers, students, & homeowners** *learning* about trees beyond their aesthetic benefits.
- **Companies** *investing* in natural capital as part of their sustainability efforts.
- **Governments & organizations** *improving* their community forest management.
- **Consultants & Innovators** *developing* urban forest management plans, climate action plans, and interactive tree maps for their clients and the public.

How does i-Tree work?

Structure	**Function**	**Value**
Assess the number of trees, species, condition + weather & pollution data.	Statistically estimate functions (e.g. gas exchange) and covert to services such as CO_2 uptake & rainfall interception.	Apply monetary values to these services based on economic models & published literature.

Where does i-Tree come from?

i-Tree was **established in 2006** and is now used around the world. Based on peer-reviewed, publicly accessible **USDA Forest Service** research, the mission of i-Tree is to disseminate this science to large numbers of diverse users in an easy to use format.

i-Tree is a non-profit, cooperative effort among these partners:

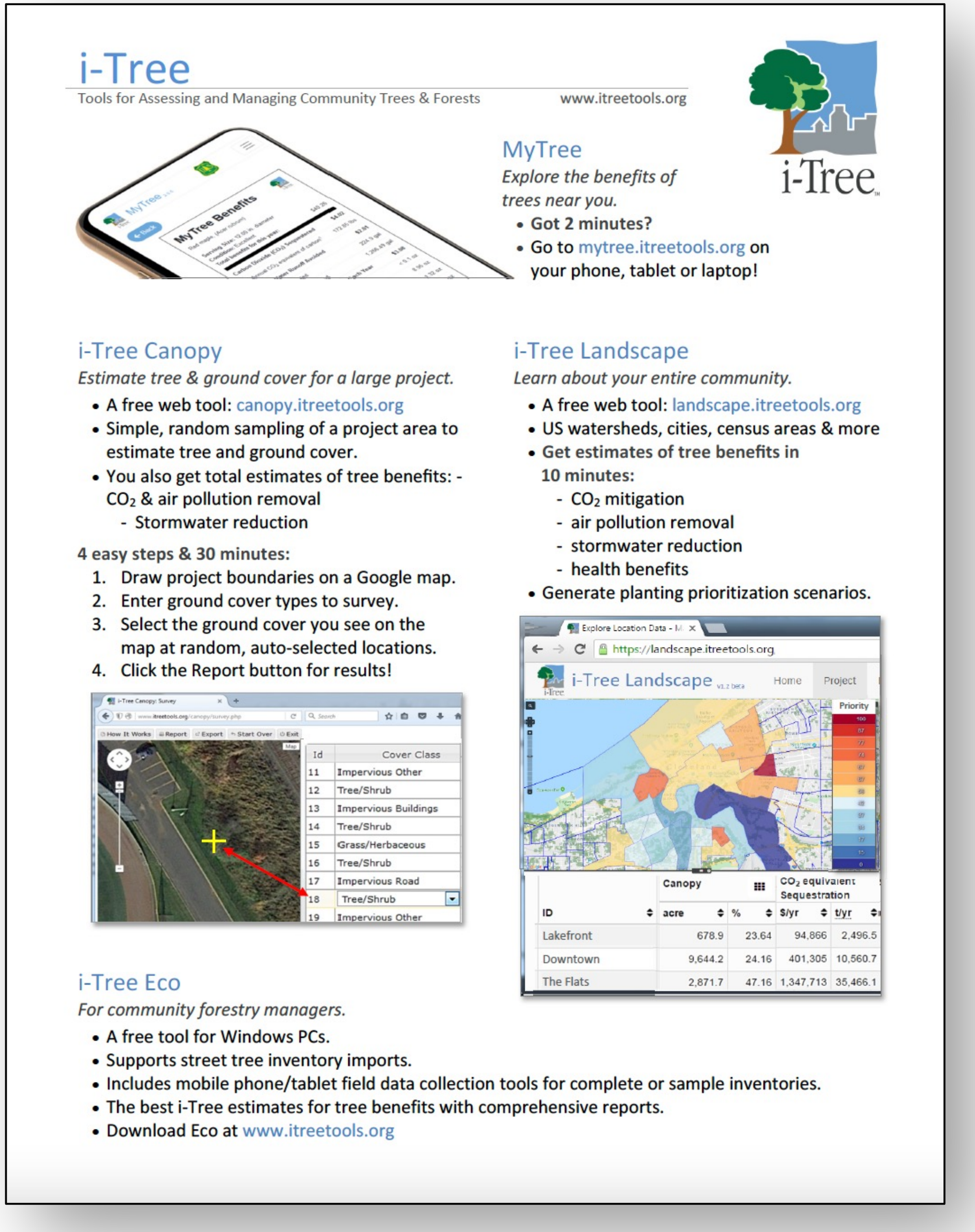
DAVEY · Arbor Day Foundation · sma Society of Municipal Arborists · ISA · Casey Trees · ESF State University of New York College of Environmental Science and Forestry

How do I get i-Tree?

Learn about these free tools at **www.itreetools.org**. Links to them as well as references, project examples, and video learning segments are available. Want to ask a question? User support is provided: **info@itreetools.org**.

Tree Benefits! Growing 20 years in Ohio, USA, one red maple can:

- **Remove** 3,000 pounds of **carbon dioxide** from the atmosphere.
- **Filter** 15 pounds of **pollution** from the air we breathe.
- **Save** 500 kWh of **electricity** and 20 million BTU of **fuel** used for cooling & heating.
- **Avoid** 5,000 pounds of **CO_2** and 30 pounds of **pollution** in powerplant emissions.
- **Intercept** 25,000 gallons of **rainfall** and **avoid** 4,500 gallons of **runoff**.



i-Tree

Tools for Assessing and Managing Community Trees & Forests www.itreetools.org

i-Tree
MyTree
MyTree Benefits

MyTree

Explore the benefits of trees near you.

- Got 2 minutes?
- Go to mytree.itreetools.org on your phone, tablet or laptop!

i-Tree Canopy

Estimate tree & ground cover for a large project.

- A free web tool: canopy.itreetools.org
- Simple, random sampling of a project area to estimate tree and ground cover.
- You also get total estimates of tree benefits: - CO₂ & air pollution removal
  - Stormwater reduction

4 easy steps & 30 minutes:

1. Draw project boundaries on a Google map.
2. Enter ground cover types to survey.
3. Select the ground cover you see on the map at random, auto-selected locations.
4. Click the Report button for results!

i-Tree Canopy: Survey
www.itreetools.org/canopy/survey.php
Search
How It Works
Report
Export
Start Over
Exit
Map

Id	Cover Class
11	Impervious Other
12	Tree/Shrub
13	Impervious Buildings
14	Tree/Shrub
15	Grass/Herbaceous
16	Tree/Shrub
17	Impervious Road
18	Tree/Shrub
19	Impervious Other

i-Tree Landscape

Learn about your entire community.

- A free web tool: landscape.itreetools.org
- US watersheds, cities, census areas & more
- Get estimates of tree benefits in 10 minutes:
  - CO₂ mitigation
  - air pollution removal
  - stormwater reduction
  - health benefits
- Generate planting prioritization scenarios.

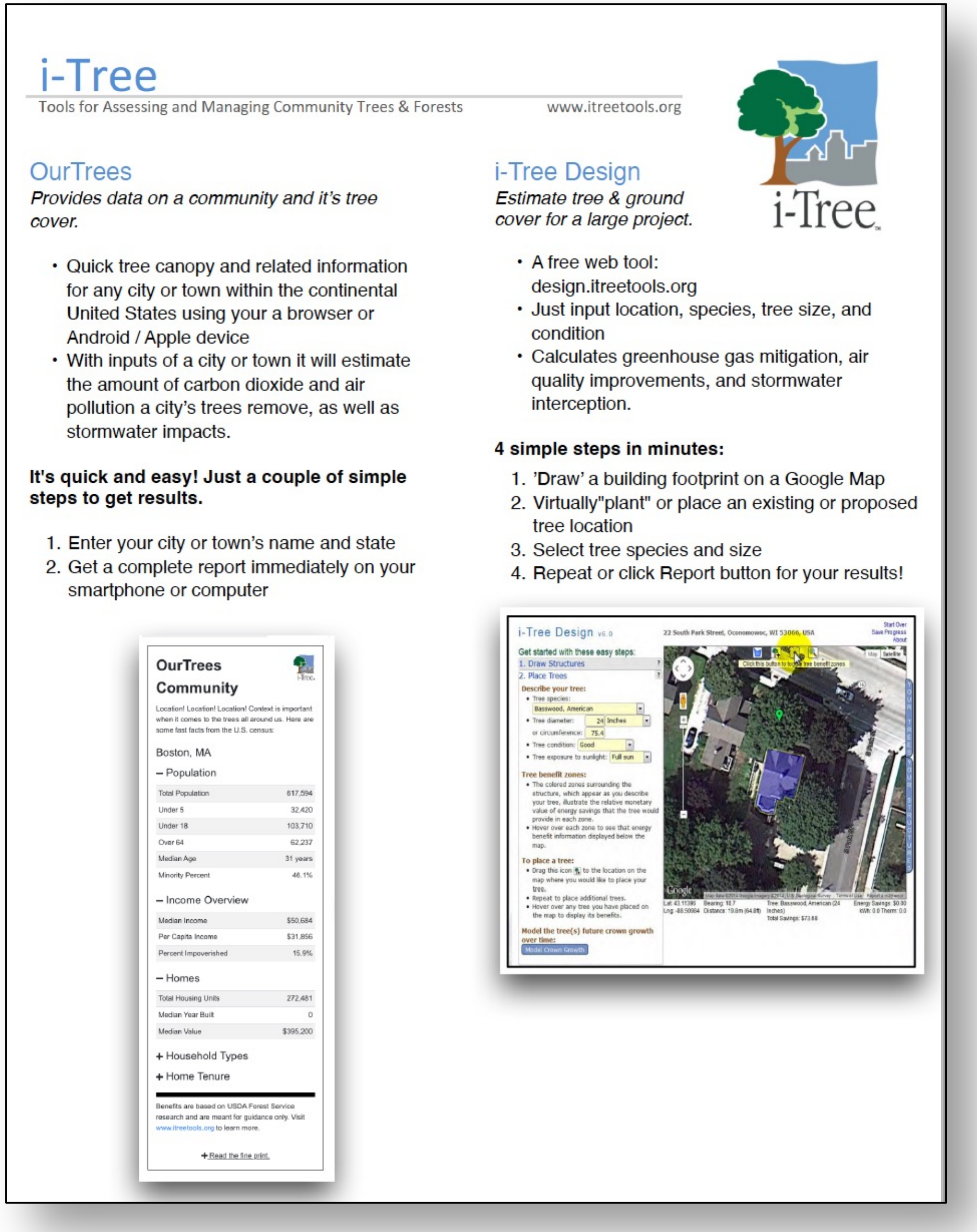
Explore Location Data - M.
https://landscape.itreetools.org
i-Tree Landscape v1.2 beta
Home
Project
Priority
100
0

	Canopy		CO_2 equivalent Sequestration	
ID	acre	%	$/yr	t/yr
Lakefront	678.9	23.64	94,866	2,496.5
Downtown	9,644.2	24.16	401,305	10,560.7
The Flats	2,871.7	47.16	1,347,713	35,466.1

i-Tree Eco

For community forestry managers.

- A free tool for Windows PCs.
- Supports street tree inventory imports.
- Includes mobile phone/tablet field data collection tools for complete or sample inventories.
- The best i-Tree estimates for tree benefits with comprehensive reports.
- Download Eco at www.itreetools.org



i-Tree

Tools for Assessing and Managing Community Trees & Forests www.itreetools.org

OurTrees

Provides data on a community and it's tree cover.

- Quick tree canopy and related information for any city or town within the continental United States using your a browser or Android / Apple device
- With inputs of a city or town it will estimate the amount of carbon dioxide and air pollution a city's trees remove, as well as stormwater impacts.

It's quick and easy! Just a couple of simple steps to get results.

1. Enter your city or town's name and state
2. Get a complete report immediately on your smartphone or computer

OurTrees Community

Location! Location! Location! Context is important when it comes to the trees all around us. Here are some fast facts from the U.S. census:

Boston, MA

– Population

Total Population	617,594
Under 5	32,420
Under 18	103,710
Over 64	62,237
Median Age	31 years
Minority Percent	46.1%

– Income Overview

Median Income	$50,684
Per Capita Income	$31,856
Percent Impoverished	15.9%

– Homes

Total Housing Units	272,481
Median Year Built	0
Median Value	$395,200

+ Household Types

+ Home Tenure

Benefits are based on USDA Forest Service research and are meant for guidance only. Visit www.itreetools.org to learn more.

+ Read the fine print.

i-Tree Design

Estimate tree & ground cover for a large project.

- A free web tool: design.itreetools.org
- Just input location, species, tree size, and condition
- Calculates greenhouse gas mitigation, air quality improvements, and stormwater interception.

4 simple steps in minutes:

1. 'Draw' a building footprint on a Google Map
2. Virtually"plant" or place an existing or proposed tree location
3. Select tree species and size
4. Repeat or click Report button for your results!

i-Tree Design v6.0
22 South Park Street, Oconomowoc, WI 53066, USA
Start Over
Save Progress
About
Click this button to toggle tree benefit zones
Map
Satellite
YOUR TREES
YOUR STRUCTURES
Google
Model Crown Growth

Get started with these easy steps:

1. Draw Structures
2. Place Trees

Describe your tree:

- Tree species: Basswood, American
- Tree diameter: 24 Inches
  or circumference: 75.4
- Tree condition: Good
- Tree exposure to sunlight: Full sun

Tree benefit zones:

- The colored zones surrounding the structure, which appear as you describe your tree, illustrate the relative monetary value of energy savings that the tree would provide in each zone.
- Hover over each zone to see that energy benefit information displayed below the map.

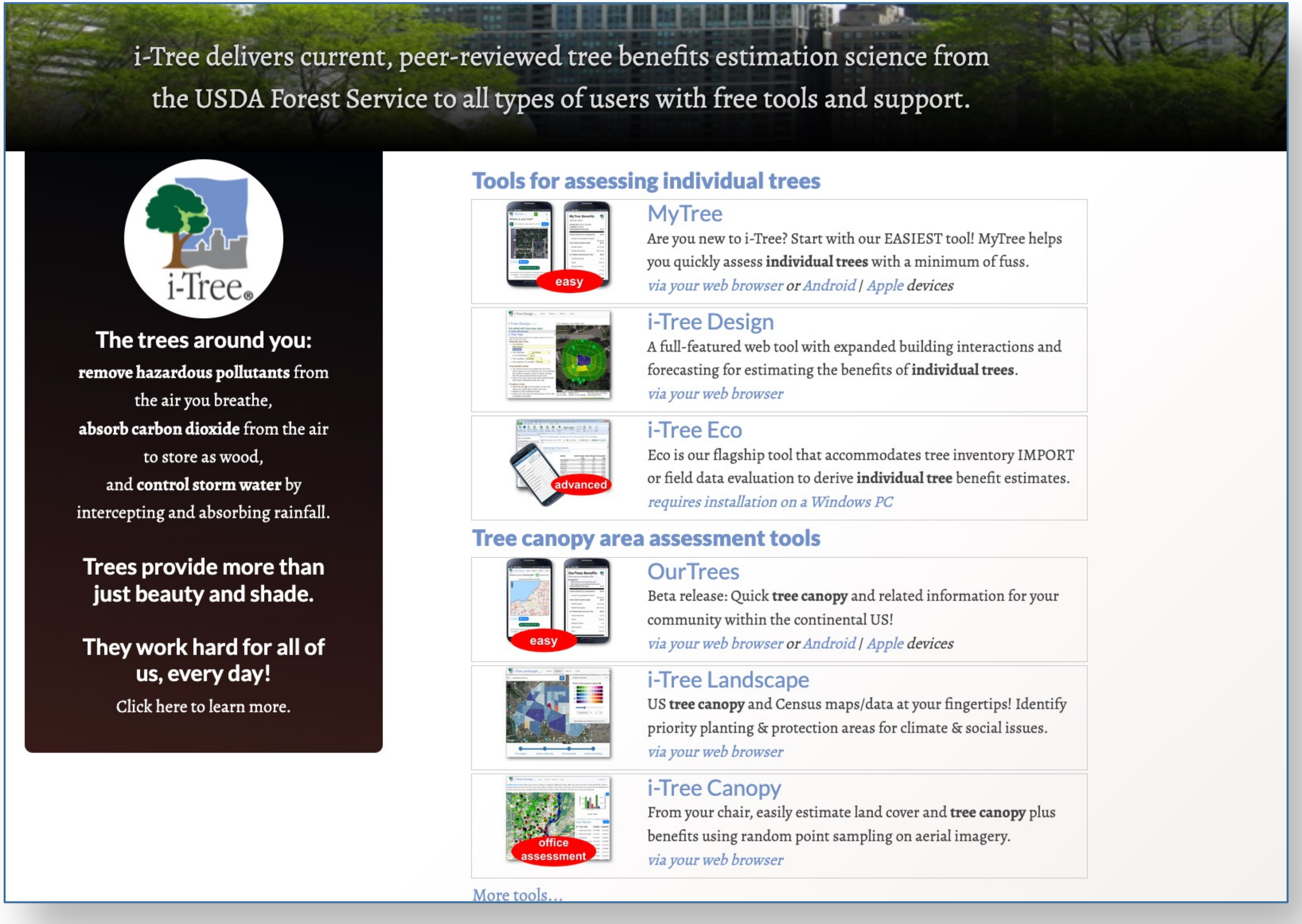
To place a tree:

- Drag this icon to the location on the map where you would like to place your tree.
- Repeat to place additional trees.
- Hover over any tree you have placed on the map to display its benefits.

Model the tree(s) future crown growth over time:

Lat: 43.11396 Lng: -88.50984 Bearing: 10.7 Distance: 19.8m (64.8ft) Tree: Basswood, American (24 inches) Total Savings: $73.68 Energy Savings: $0.00 kWh: 0.0 Therm: 0.0

www.itreetools.org Resources



i-Tree delivers current, peer-reviewed tree benefits estimation science from the USDA Forest Service to all types of users with free tools and support.

The trees around you:

remove hazardous pollutants from the air you breathe,
absorb carbon dioxide from the air to store as wood,
and **control storm water** by intercepting and absorbing rainfall.

Trees provide more than just beauty and shade.

They work hard for all of us, every day!

Click here to learn more.

Tools for assessing individual trees

MyTree

Are you new to i-Tree? Start with our EASIEST tool! MyTree helps you quickly assess **individual trees** with a minimum of fuss.

via your web browser or Android / Apple devices

i-Tree Design

A full-featured web tool with expanded building interactions and forecasting for estimating the benefits of **individual trees**.

via your web browser

i-Tree Eco

Eco is our flagship tool that accommodates tree inventory IMPORT or field data evaluation to derive **individual tree** benefit estimates.

requires installation on a Windows PC

Tree canopy area assessment tools

OurTrees

Beta release: Quick **tree canopy** and related information for your community within the continental US!

via your web browser or Android / Apple devices

i-Tree Landscape

US **tree canopy** and Census maps/data at your fingertips! Identify priority planting & protection areas for climate & social issues.

via your web browser

i-Tree Canopy

From your chair, easily estimate land cover and **tree canopy** plus benefits using random point sampling on aerial imagery.

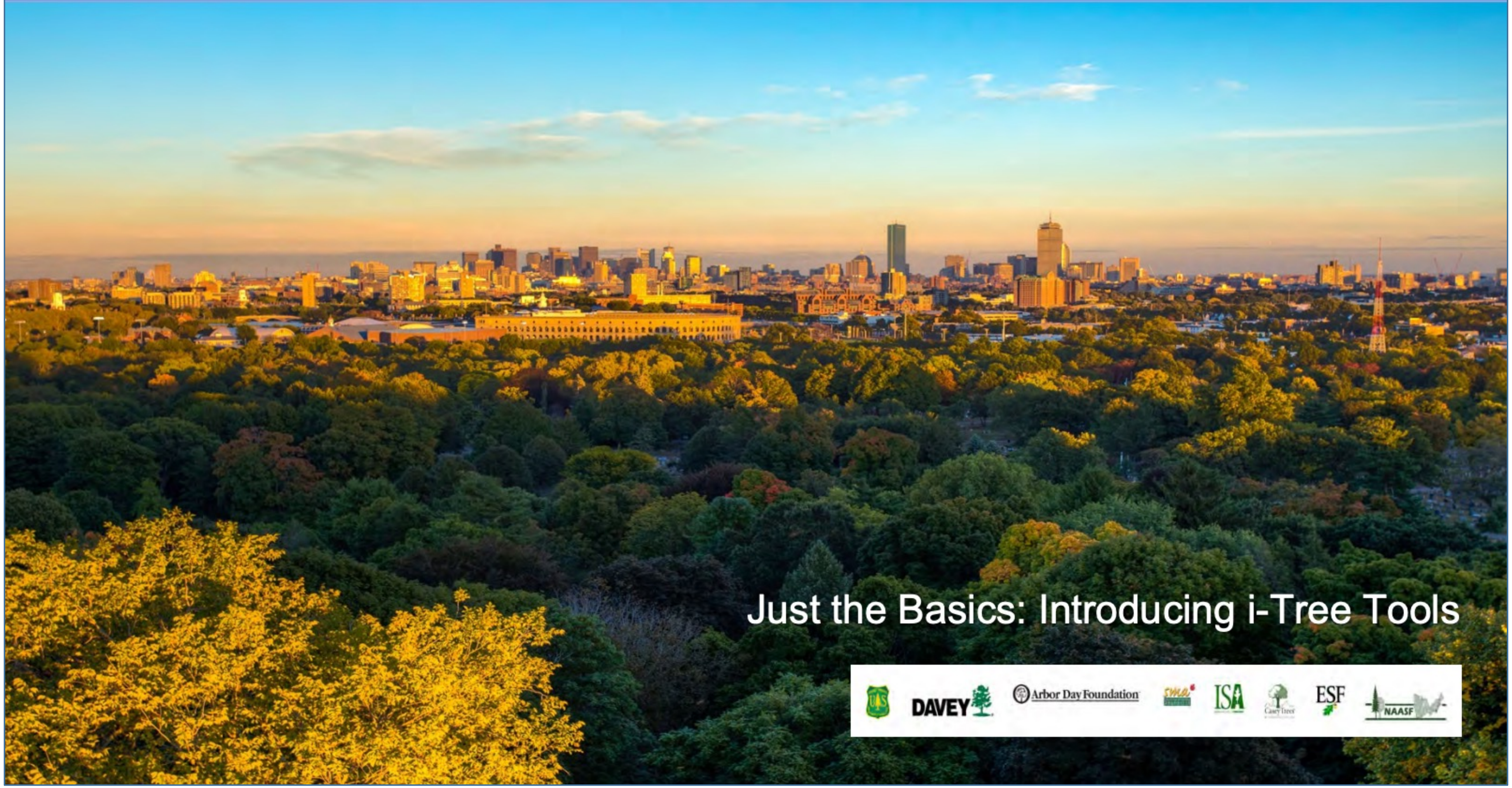
via your web browser

More tools...

www.itreetools.org

i-Tree Quick Guide

ver. 09012020

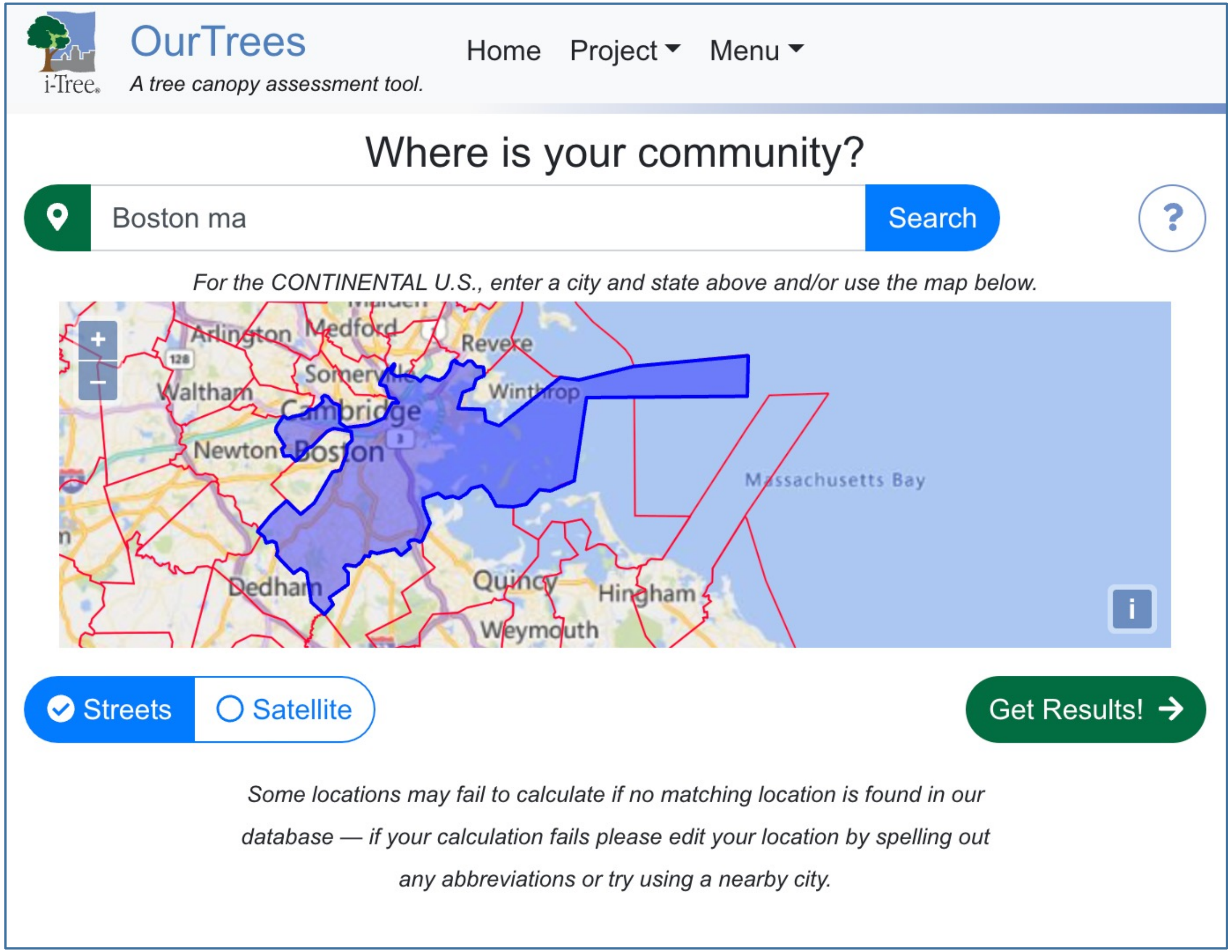


Just the Basics: Introducing i-Tree Tools

OurTrees

i-Tree
OurTrees

i-Tree quick summary data for any community


i-Tree
OurTrees
A tree canopy assessment tool.
Home
Project
Menu
Search
?
Arlington
Medford
Malden
Revere
Somerville
Waltham
Winthrop
Cambridge
Newton
Boston
Massachusetts Bay
Quincy
Hingham
Dedham
Weymouth
+
–
i
Streets
Satellite
Get Results!

Where is your community?

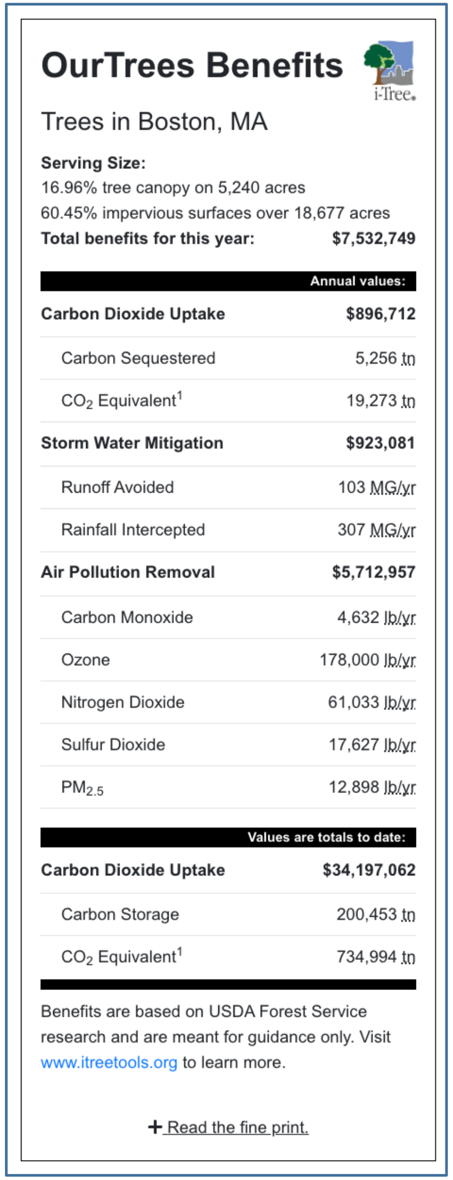
Boston ma

For the CONTINENTAL U.S., enter a city and state above and/or use the map below.

○ Streets ○ Satellite

Some locations may fail to calculate if no matching location is found in our database — if your calculation fails please edit your location by spelling out any abbreviations or try using a nearby city.

i-Tree quick summary data Boston, MA



OurTrees Benefits

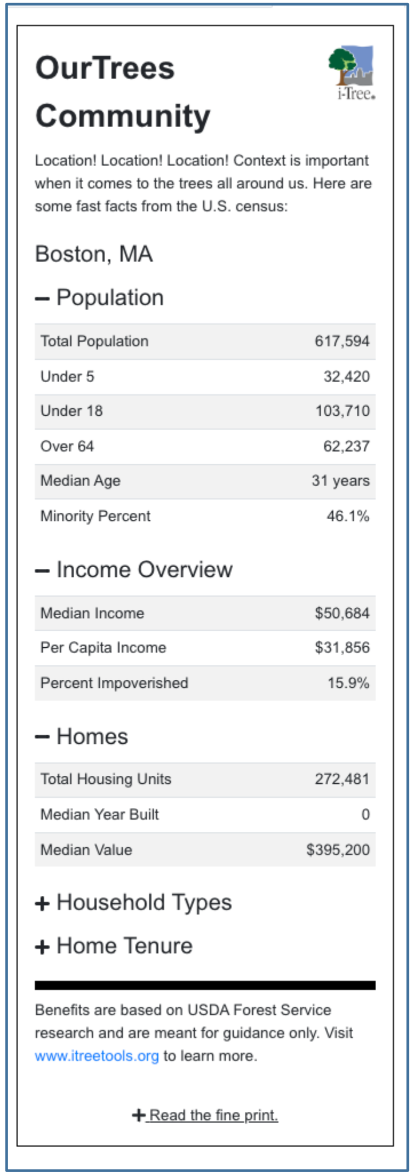
Trees in Boston, MA

Serving Size:
16.96% tree canopy on 5,240 acres
60.45% impervious surfaces over 18,677 acres

Total benefits for this year:	**$7,532,749**
	Annual values:
Carbon Dioxide Uptake	**$896,712**
Carbon Sequestered	5,256 tn
CO_2 Equivalent[1]	19,273 tn
Storm Water Mitigation	**$923,081**
Runoff Avoided	103 MG/yr
Rainfall Intercepted	307 MG/yr
Air Pollution Removal	**$5,712,957**
Carbon Monoxide	4,632 lb/yr
Ozone	178,000 lb/yr
Nitrogen Dioxide	61,033 lb/yr
Sulfur Dioxide	17,627 lb/yr
$PM_{2.5}$	12,898 lb/yr
	Values are totals to date:
Carbon Dioxide Uptake	**$34,197,062**
Carbon Storage	200,453 tn
CO_2 Equivalent[1]	734,994 tn

Benefits are based on USDA Forest Service research and are meant for guidance only. Visit www.itreetools.org to learn more.

+ Read the fine print.



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Minority Percent	46.1%

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Per Capita Income	$31,856
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– Homes

Total Housing Units	272,481
Median Year Built	0
Median Value	$395,200

+ Household Types

+ Home Tenure

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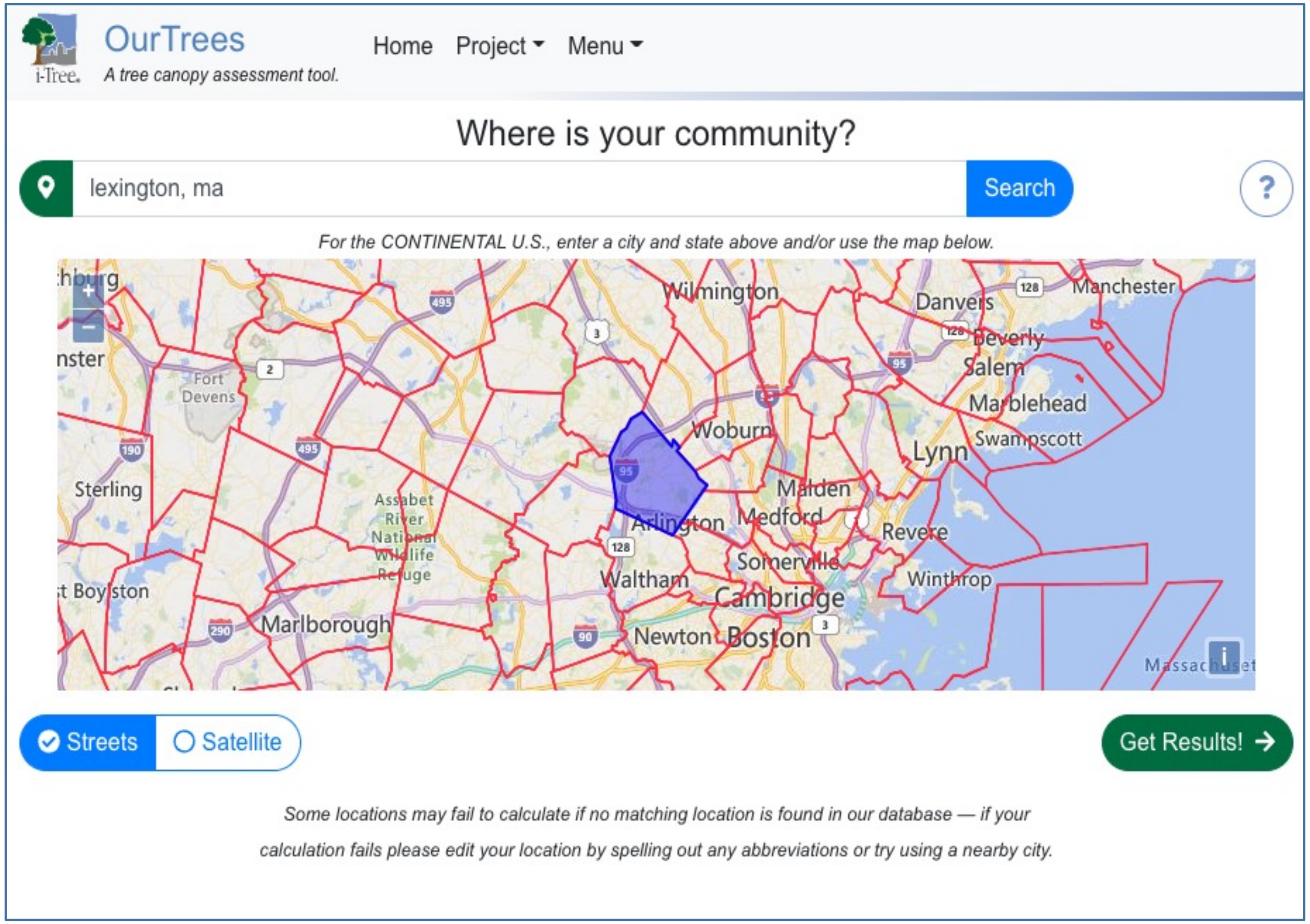
+ Read the fine print.

i-Tree
OurTrees

i-Tree quick summary data for any community


OurTrees
A tree canopy assessment tool.
Home
Project
Menu
Search
?
Wilmington
Danvers
Manchester
Beverly
Salem
Marblehead
Swampscott
Lynn
Woburn
Malden
Medford
Revere
Arlington
Somerville
Winthrop
Waltham
Cambridge
Newton
Boston
Fort Devens
Sterling
Assabet River National Wildlife Refuge
Marlborough
Boylston
Massachusetts
Streets
Satellite
Get Results!

Where is your community?

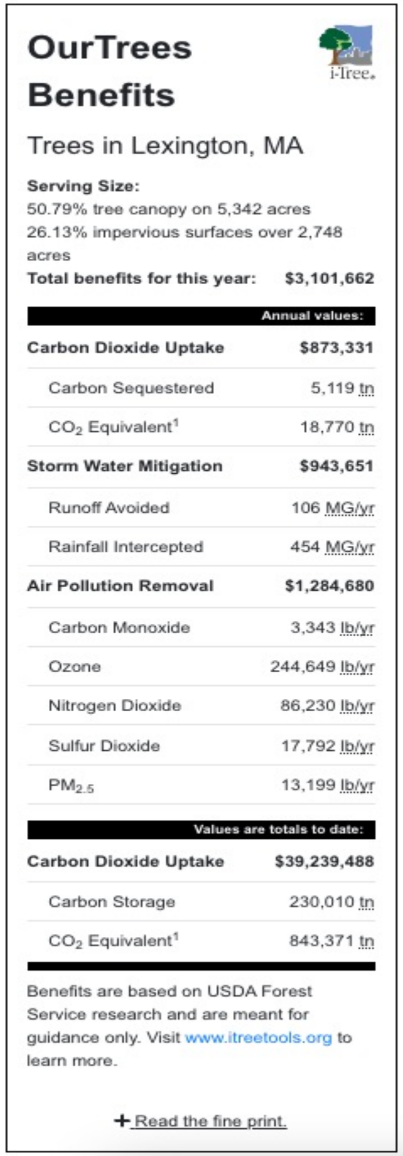
lexington, ma

For the CONTINENTAL U.S., enter a city and state above and/or use the map below.

● Streets ○ Satellite

Some locations may fail to calculate if no matching location is found in our database — if your calculation fails please edit your location by spelling out any abbreviations or try using a nearby city.

i-Tree quick summary data Lexington, MA



OurTrees Benefits

Trees in Lexington, MA

Serving Size:
50.79% tree canopy on 5,342 acres
26.13% impervious surfaces over 2,748 acres

Total benefits for this year:	**$3,101,662**
	Annual values:
Carbon Dioxide Uptake	**$873,331**
Carbon Sequestered	5,119 tn
CO_2 Equivalent[1]	18,770 tn
Storm Water Mitigation	**$943,651**
Runoff Avoided	106 MG/yr
Rainfall Intercepted	454 MG/yr
Air Pollution Removal	**$1,284,680**
Carbon Monoxide	3,343 lb/yr
Ozone	244,649 lb/yr
Nitrogen Dioxide	86,230 lb/yr
Sulfur Dioxide	17,792 lb/yr
$PM_{2.5}$	13,199 lb/yr
	Values are totals to date:
Carbon Dioxide Uptake	**$39,239,488**
Carbon Storage	230,010 tn
CO_2 Equivalent[1]	843,371 tn

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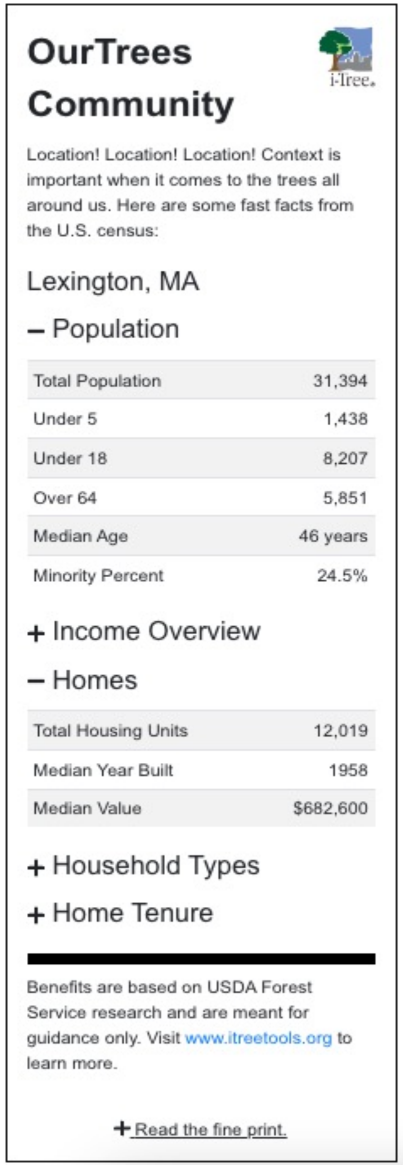
+ Read the fine print.



OurTrees Community

Location! Location! Location! Context is important when it comes to the trees all around us. Here are some fast facts from the U.S. census:

Lexington, MA

– Population

Total Population	31,394
Under 5	1,438
Under 18	8,207
Over 64	5,851
Median Age	46 years
Minority Percent	24.5%

+ Income Overview

– Homes

Total Housing Units	12,019
Median Year Built	1958
Median Value	$682,600

+ Household Types

+ Home Tenure

Benefits are based on USDA Forest Service research and are meant for guidance only. Visit www.itreetools.org to learn more.

+ Read the fine print.

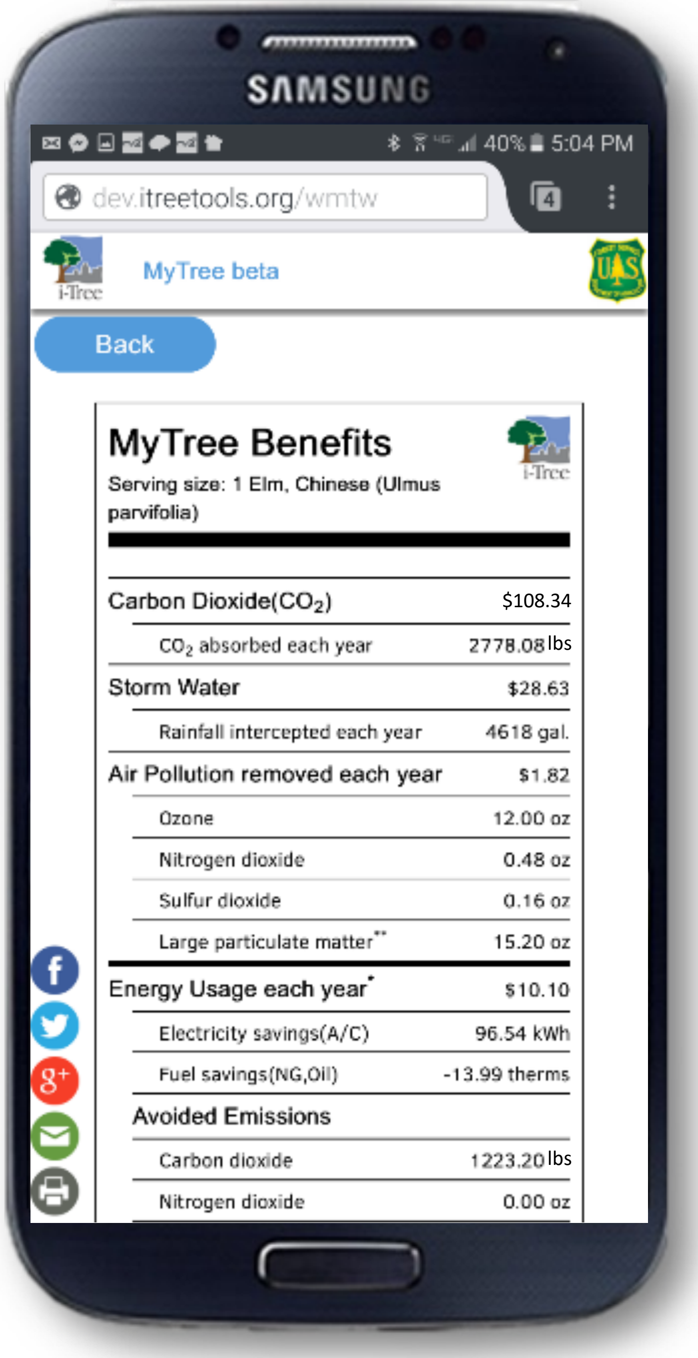
MyTree

i-Tree™

i-Tree

MyTree

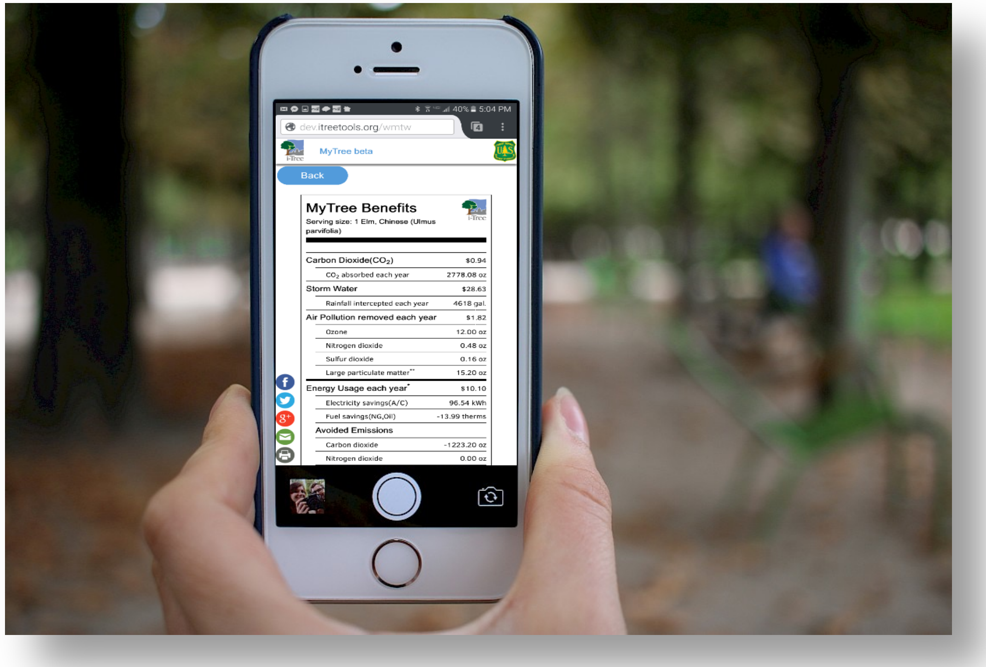
i-Tree on the go…
for individual or multiple trees!



MyTree Benefits

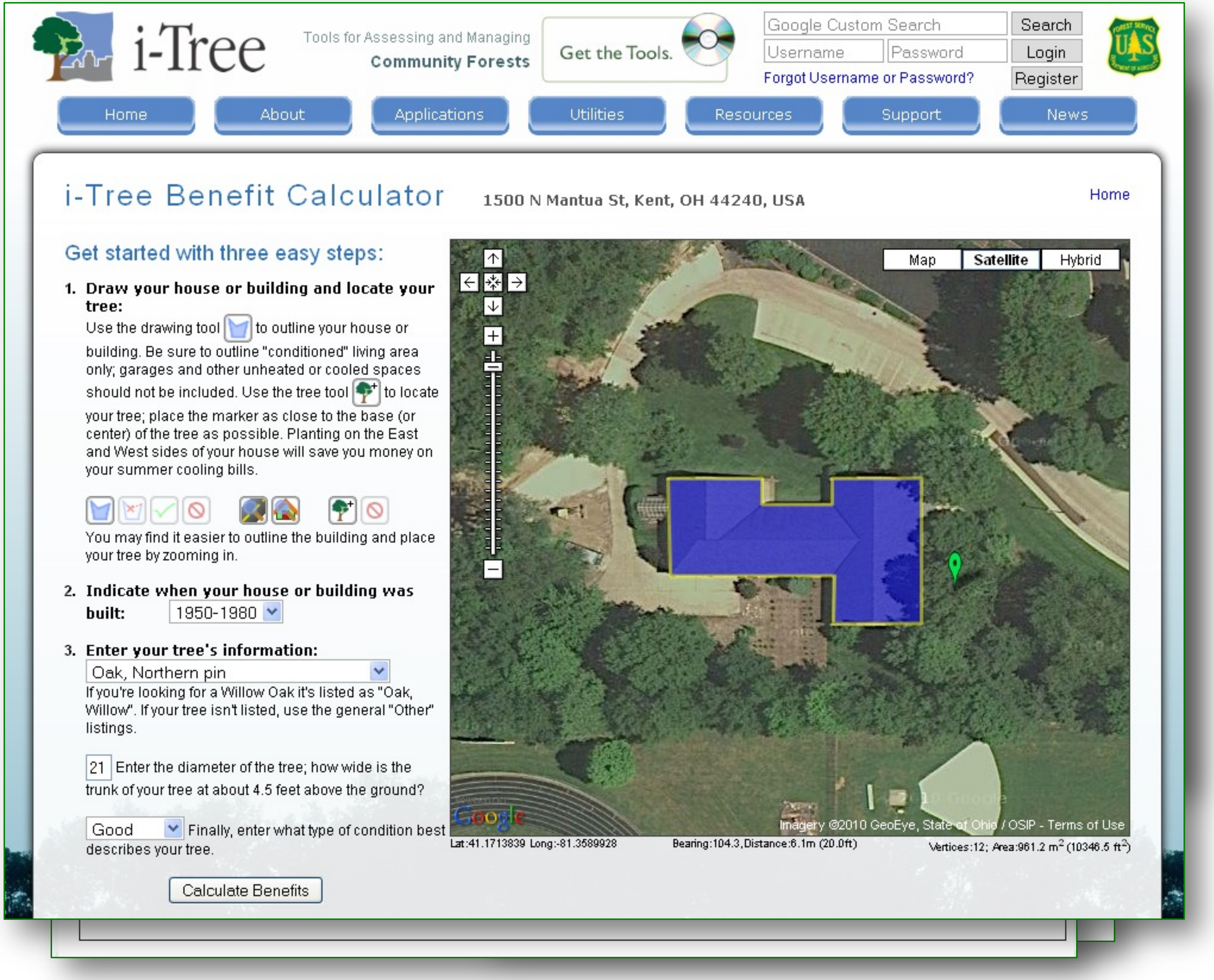
Serving size: 1 Elm, Chinese (Ulmus parvifolia)

Carbon Dioxide(CO_2)	\$108.34
CO_2 absorbed each year	2778.08 lbs
Storm Water	\$28.63
Rainfall intercepted each year	4618 gal.
Air Pollution removed each year	\$1.82
Ozone	12.00 oz
Nitrogen dioxide	0.48 oz
Sulfur dioxide	0.16 oz
Large particulate matter**	15.20 oz
Energy Usage each year*	\$10.10
Electricity savings(A/C)	96.54 kWh
Fuel savings(NG,Oil)	-13.99 therms
Avoided Emissions	
Carbon dioxide	1223.20 lbs
Nitrogen dioxide	0.00 oz



i-Tree Design

i-Tree Design


i-Tree
Tools for Assessing and Managing
Community Forests
Get the Tools.
Google Custom Search
Search
Username
Password
Login
Forgot Username or Password?
Register
Home
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Applications
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Map
Satellite
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Google
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Calculate Benefits

i-Tree Benefit Calculator

1500 N Mantua St, Kent, OH 44240, USA

Home

Get started with three easy steps:

1. **Draw your house or building and locate your tree:** Use the drawing tool to outline your house or building. Be sure to outline "conditioned" living area only; garages and other unheated or cooled spaces should not be included. Use the tree tool to locate your tree; place the marker as close to the base (or center) of the tree as possible. Planting on the East and West sides of your house will save you money on your summer cooling bills.

   You may find it easier to outline the building and place your tree by zooming in.

2. **Indicate when your house or building was built:** 1950-1980

3. **Enter your tree's information:** Oak, Northern pin

   If you're looking for a Willow Oak it's listed as "Oak, Willow". If your tree isn't listed, use the general "Other" listings.

   21 Enter the diameter of the tree; how wide is the trunk of your tree at about 4.5 feet above the ground?

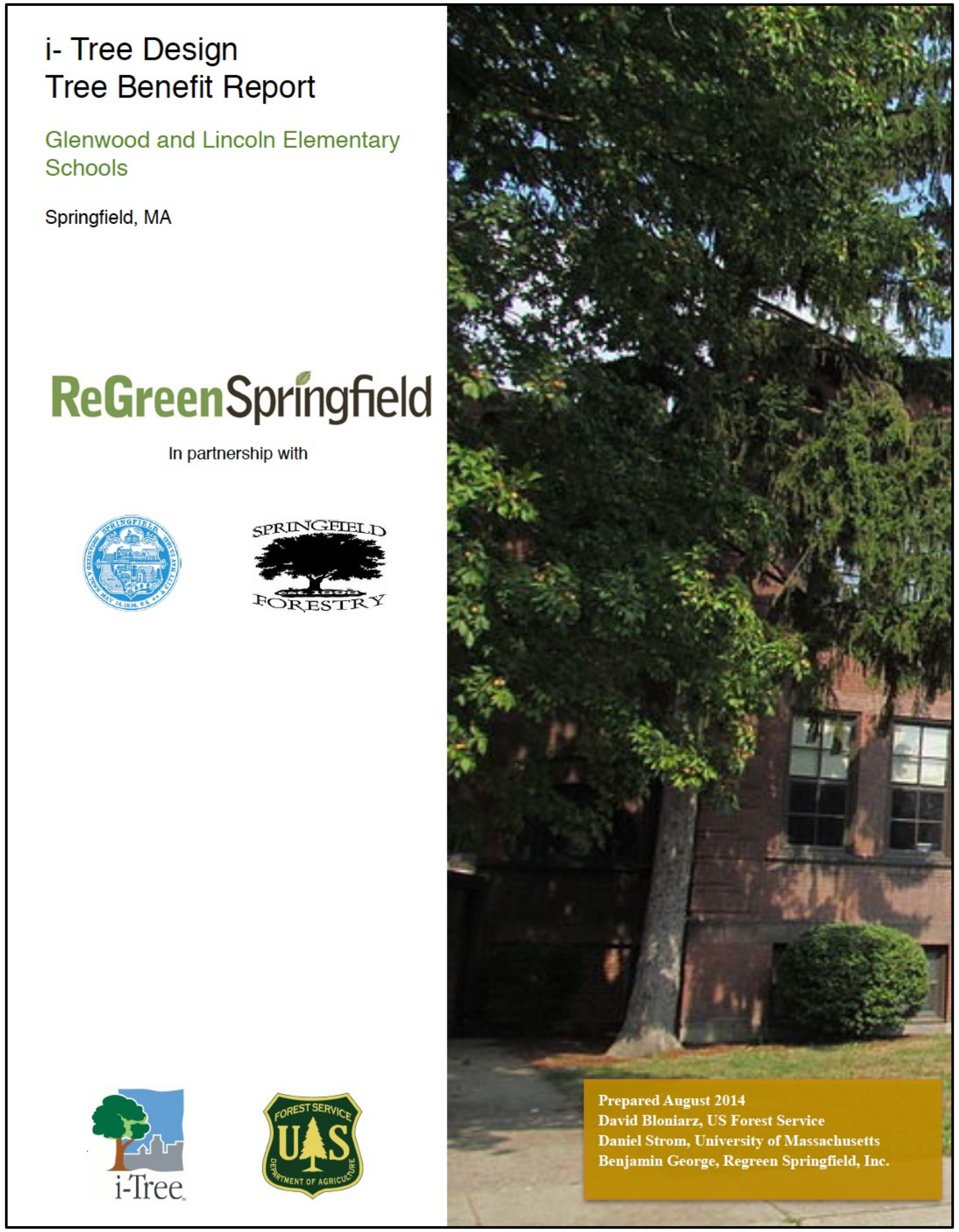
   Good Finally, enter what type of condition best describes your tree.

Lat:41.1713839 Long:-81.3589928

Bearing:104.3, Distance:6.1m (20.0ft)

Vertices:12; Area:961.2 m^2 (10346.5 ft^2)

i-Tree Design



i- Tree Design
Tree Benefit Report

Glenwood and Lincoln Elementary Schools

Springfield, MA

ReGreenSpringfield

In partnership with

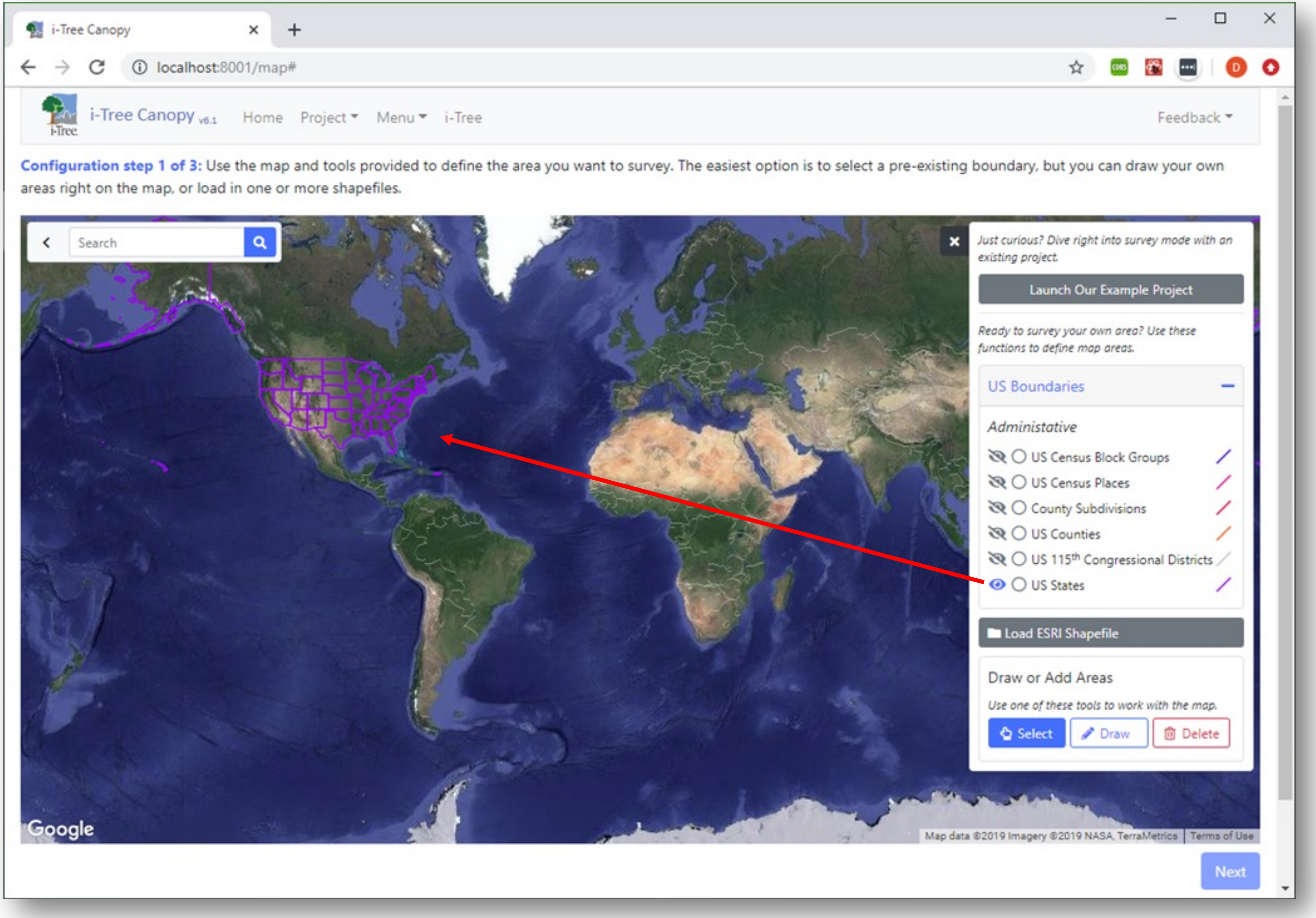
SPRINGFIELD FORESTRY

i-Tree

Prepared August 2014
David Bloniarz, US Forest Service
Daniel Strom, University of Massachusetts
Benjamin George, Regreen Springfield, Inc.

i-Tree Canopy

i-Tree Canopy



Configuration step 1 of 3: Use the map and tools provided to define the area you want to survey. The easiest option is to select a pre-existing boundary, but you can draw your own areas right on the map, or load in one or more shapefiles.

Just curious? Dive right into survey mode with an existing project.

Ready to survey your own area? Use these functions to define map areas.

US Boundaries

Administative

- ○ US Census Block Groups
- ○ US Census Places
- ○ County Subdivisions
- ○ US Counties
- ○ US 115th Congressional Districts
- ○ US States

Draw or Add Areas

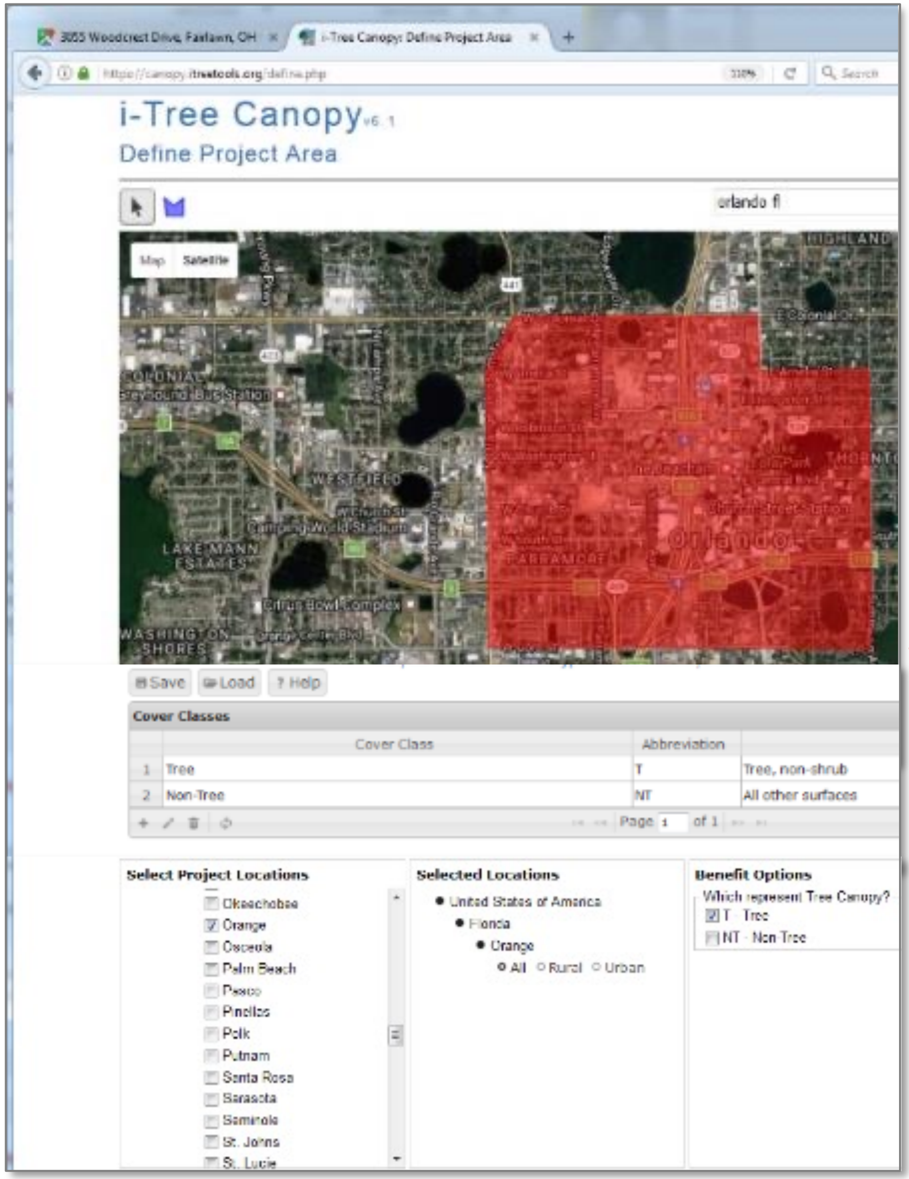
Use one of these tools to work with the map.

i-Tree Canopy
localhost:8001/map#
i-Tree Canopy v6.1
Home
Project
Menu
i-Tree
Feedback
Search
Launch Our Example Project
Load ESRI Shapefile
Select
Draw
Delete
Google
Map data ©2019 Imagery ©2019 NASA, TerraMetrics
Terms of Use
Next

i-Tree Canopy

Quick, statistical estimate of Canopy cover and associated benefits.

- Create custom cover classes
- Random point locations
- Does not automatically assign cover class at point


3055 Woodcrest Drive, Fairlawn, OH
i-Tree Canopy: Define Project Area
https://canopy.itreetools.org/define.php
orlando fl
Map
Satellite
Save
Load
? Help

i-Tree Canopy v6.1

Define Project Area

Cover Classes

	Cover Class	Abbreviation	
1	Tree	T	Tree, non-shrub
2	Non-Tree	NT	All other surfaces

Page 1 of 1

Select Project Locations

☐ Okeechobee
☑ Orange
☐ Osceola
☐ Palm Beach
☐ Pasco
☐ Pinellas
☐ Polk
☐ Putnam
☐ Santa Rosa
☐ Sarasota
☐ Seminole
☐ St. Johns
☐ St. Lucie

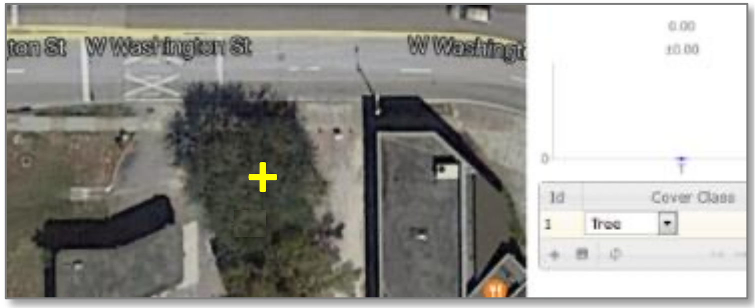
Selected Locations

- United States of America
  - Florida
    - Orange
      - ● All ○ Rural ○ Urban

Benefit Options

Which represent Tree Canopy?

☑ T - Tree
☐ NT - Non Tree


ton St
W Washington St
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0
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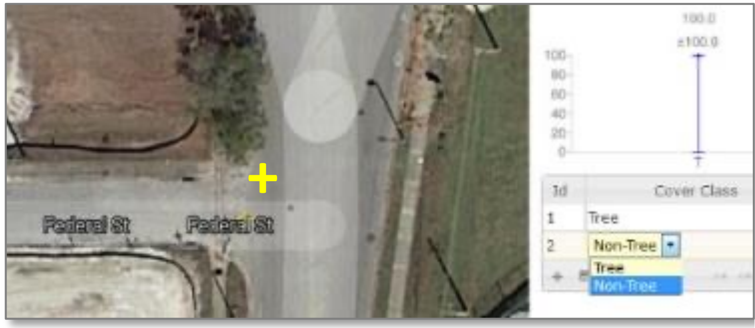
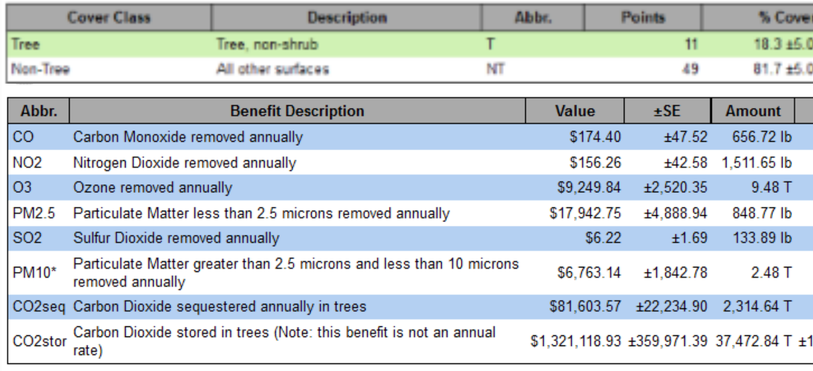
Cover Class
1
Tree

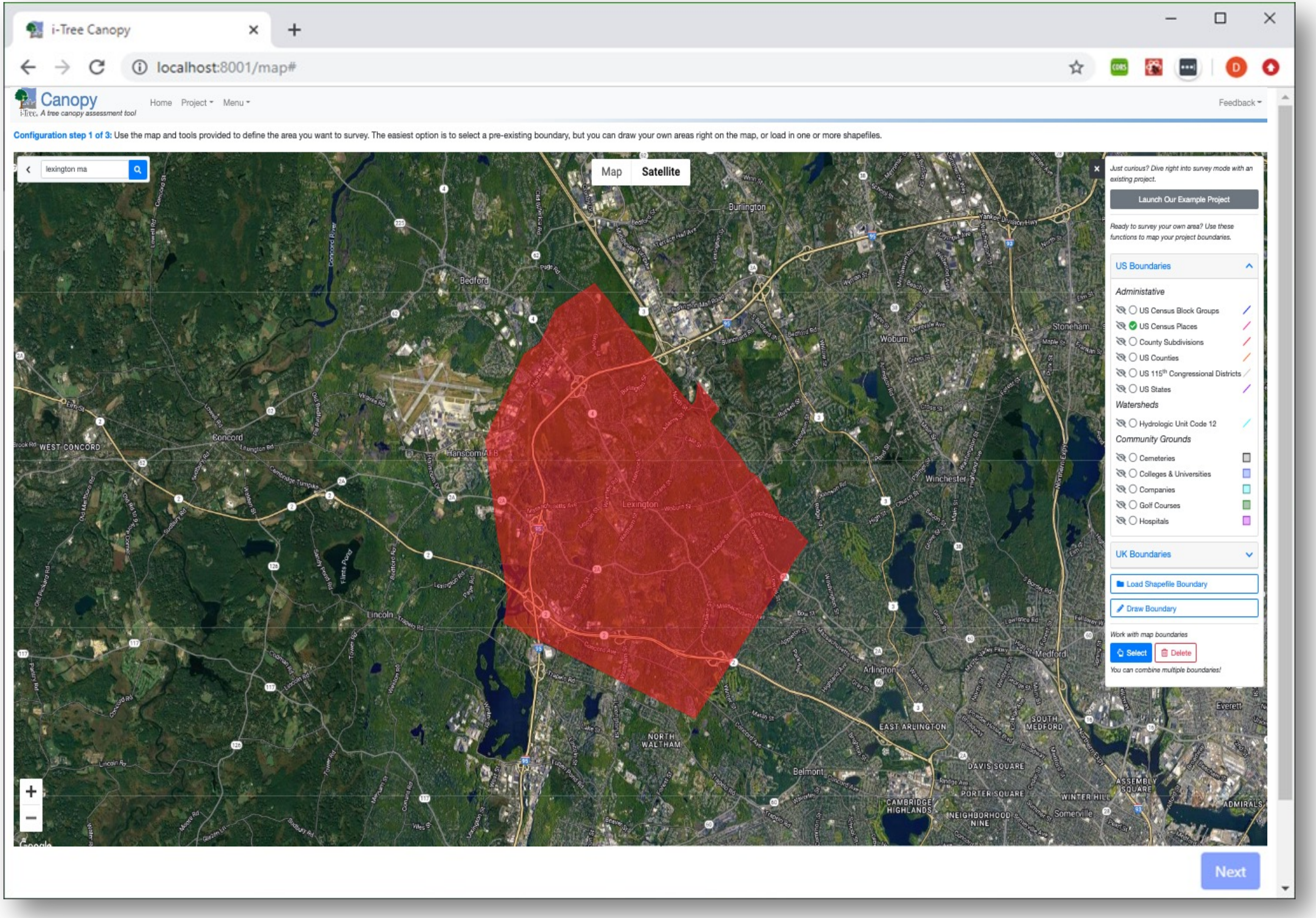

Federal St
Federal St
100.0
±100.0
100
80
60
40
20
0
Id
Cover Class
1
Tree
2
Non-Tree
Tree
Non-Tree



Cover Class	Description	Abbr.	Points	% Cover
Tree	Tree, non-shrub	T	11	18.3 ±5.0
Non-Tree	All other surfaces	NT	49	81.7 ±5.0

Abbr.	Benefit Description	Value	±SE	Amount
CO	Carbon Monoxide removed annually	$174.40	±47.52	656.72 lb
NO2	Nitrogen Dioxide removed annually	$156.26	±42.58	1,511.65 lb
O3	Ozone removed annually	$9,249.84	±2,520.35	9.48 T
PM2.5	Particulate Matter less than 2.5 microns removed annually	$17,942.75	±4,888.94	848.77 lb
SO2	Sulfur Dioxide removed annually	$6.22	±1.69	133.89 lb
PM10*	Particulate Matter greater than 2.5 microns and less than 10 microns removed annually	$6,763.14	±1,842.78	2.48 T
CO2seq	Carbon Dioxide sequestered annually in trees	$81,603.57	±22,234.90	2,314.64 T
CO2stor	Carbon Dioxide stored in trees (Note: this benefit is not an annual rate)	$1,321,118.93	±359,971.39	37,472.84 T

i-Tree Canopy



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- ○ US 115th Congressional Districts
- ○ US States

Watersheds

- ○ Hydrologic Unit Code 12

Community Grounds

- ○ Cemeteries
- ○ Colleges & Universities
- ○ Companies
- ○ Golf Courses
- ○ Hospitals

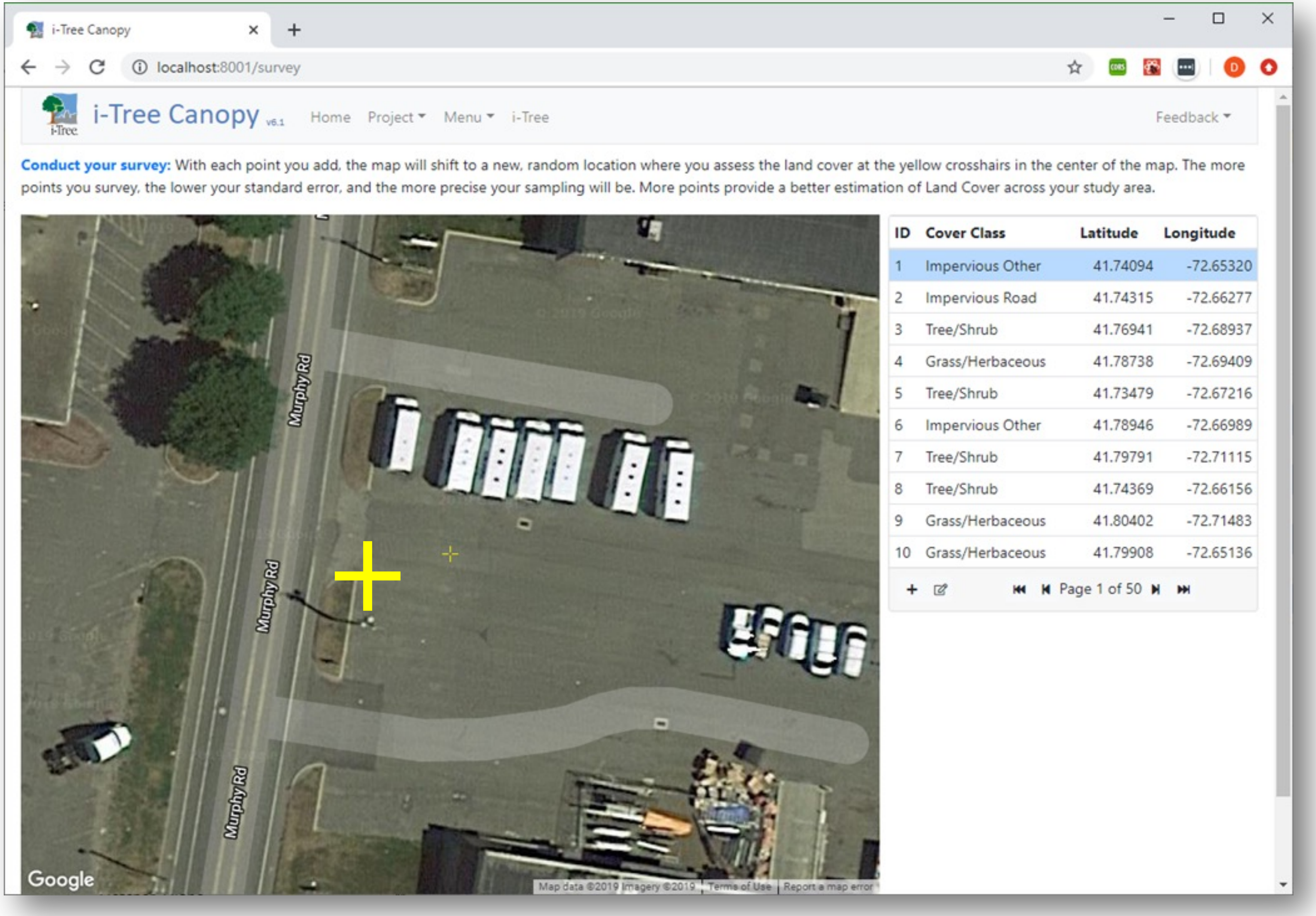
UK Boundaries

Work with map boundaries

You can combine multiple boundaries!

i-Tree Canopy
localhost:8001/map#
Canopy
i-Tree. A tree canopy assessment tool
Home
Project
Menu
Feedback
lexington ma
Map
Satellite
Launch Our Example Project
Load Shapefile Boundary
Draw Boundary
Select
Delete
Next
Bedford
Burlington
Concord
WEST CONCORD
Hanscom AFB
Lexington
Woburn
Winchester
Stoneham
Lincoln
Arlington
EAST ARLINGTON
NORTH WALTHAM
Belmont
Medford
SOUTH MEDFORD
DAVIS SQUARE
PORTER SQUARE
Somerville
Everett
CAMBRIDGE HIGHLANDS
NEIGHBORHOOD NINE
WINTER HILL
ASSEMBLY SQUARE
Google

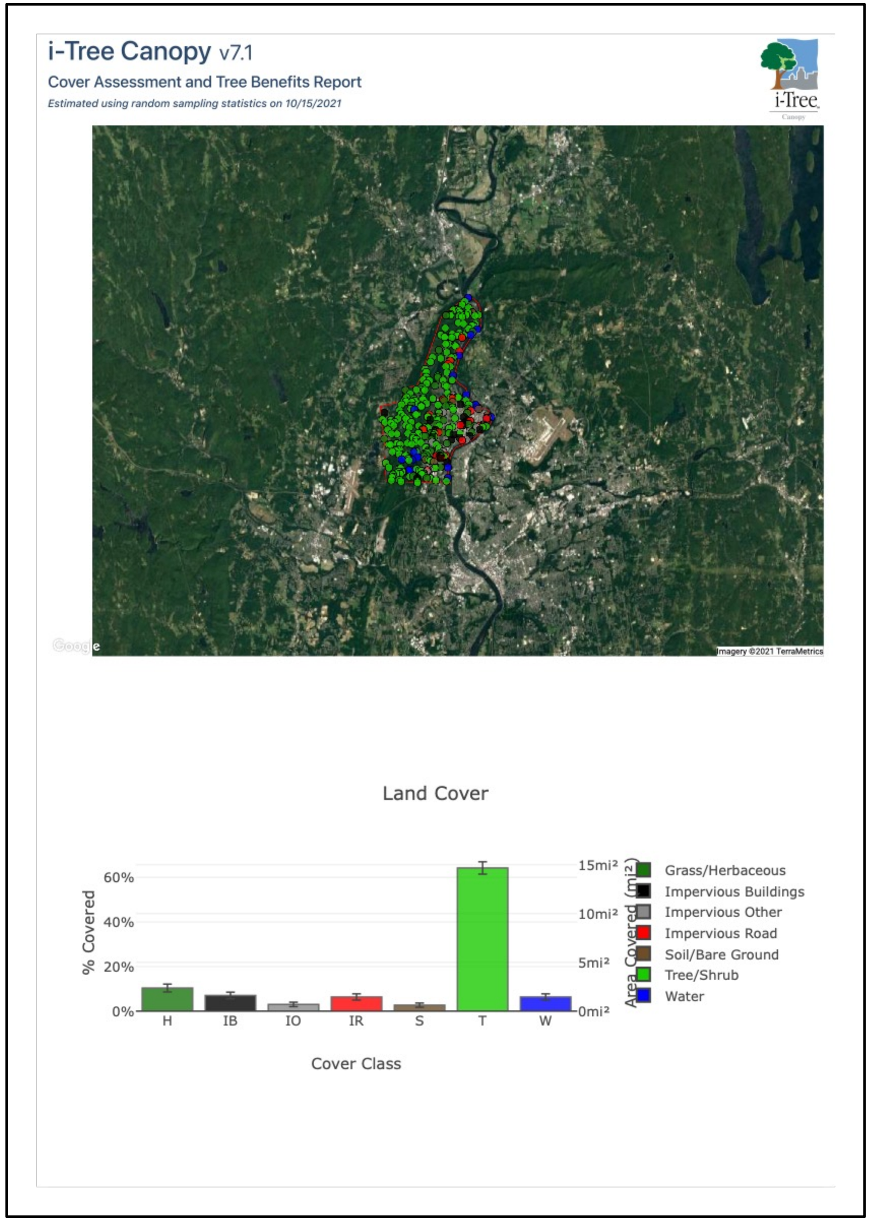
i-Tree Canopy


i-Tree Canopy
localhost:8001/survey
i-Tree Canopy v6.1
Home
Project
Menu
i-Tree
Feedback
Murphy Rd
Murphy Rd
Murphy Rd
Google
Map data ©2019 Imagery ©2019
Terms of Use
Report a map error
Page 1 of 50

Conduct your survey: With each point you add, the map will shift to a new, random location where you assess the land cover at the yellow crosshairs in the center of the map. The more points you survey, the lower your standard error, and the more precise your sampling will be. More points provide a better estimation of Land Cover across your study area.

ID	Cover Class	Latitude	Longitude
1	Impervious Other	41.74094	-72.65320
2	Impervious Road	41.74315	-72.66277
3	Tree/Shrub	41.76941	-72.68937
4	Grass/Herbaceous	41.78738	-72.69409
5	Tree/Shrub	41.73479	-72.67216
6	Impervious Other	41.78946	-72.66989
7	Tree/Shrub	41.79791	-72.71115
8	Tree/Shrub	41.74369	-72.66156
9	Grass/Herbaceous	41.80402	-72.71483
10	Grass/Herbaceous	41.79908	-72.65136

i-Tree Canopy

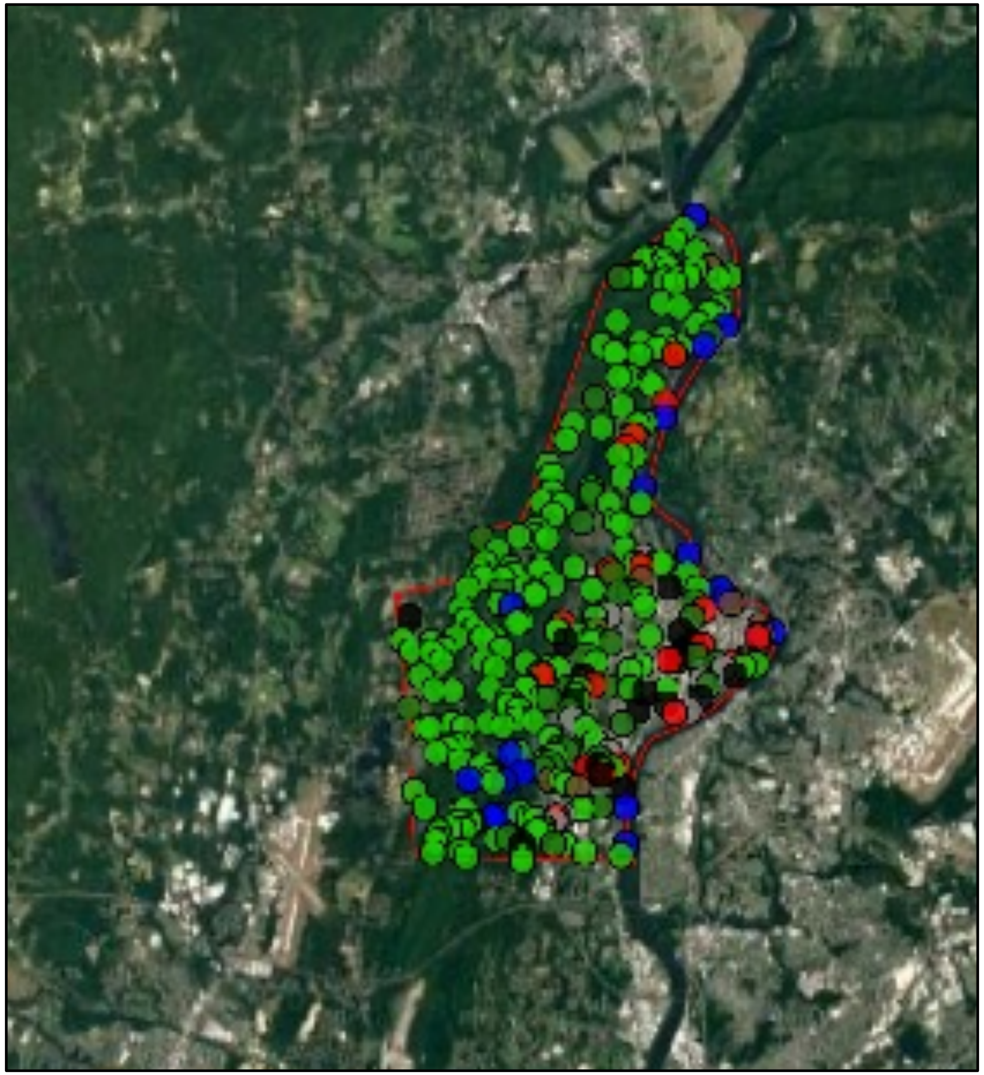


i-Tree Canopy v7.1

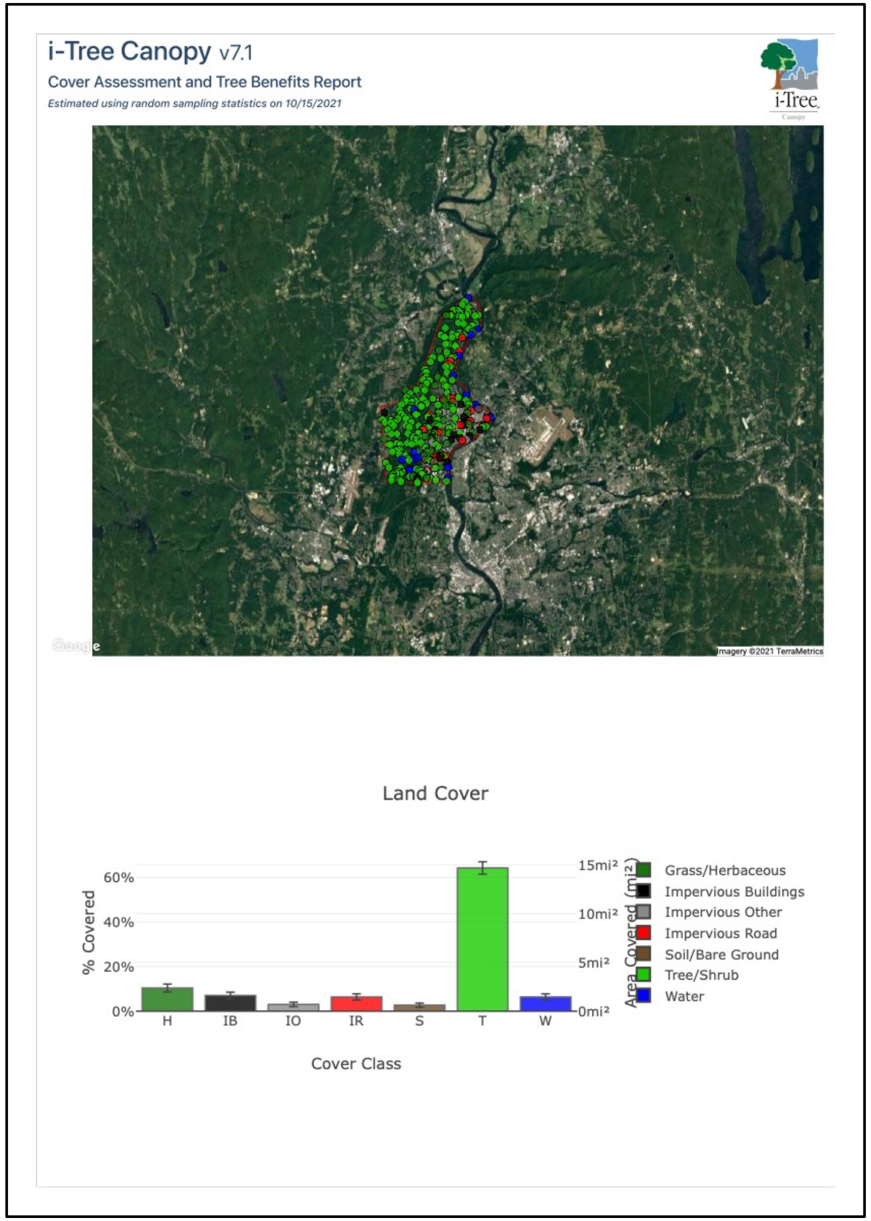
Cover Assessment and Tree Benefits Report

Estimated using random sampling statistics on 10/15/2021

i-Tree
Canopy
Google
Imagery ©2021 TerraMetrics
Land Cover
60%
40%
20%
0%
% Covered
15mi²
10mi²
5mi²
0mi²
Area Covered (mi2)
H
IB
IO
IR
S
T
W
Cover Class
Grass/Herbaceous
Impervious Buildings
Impervious Other
Impervious Road
Soil/Bare Ground
Tree/Shrub
Water



i-Tree Canopy

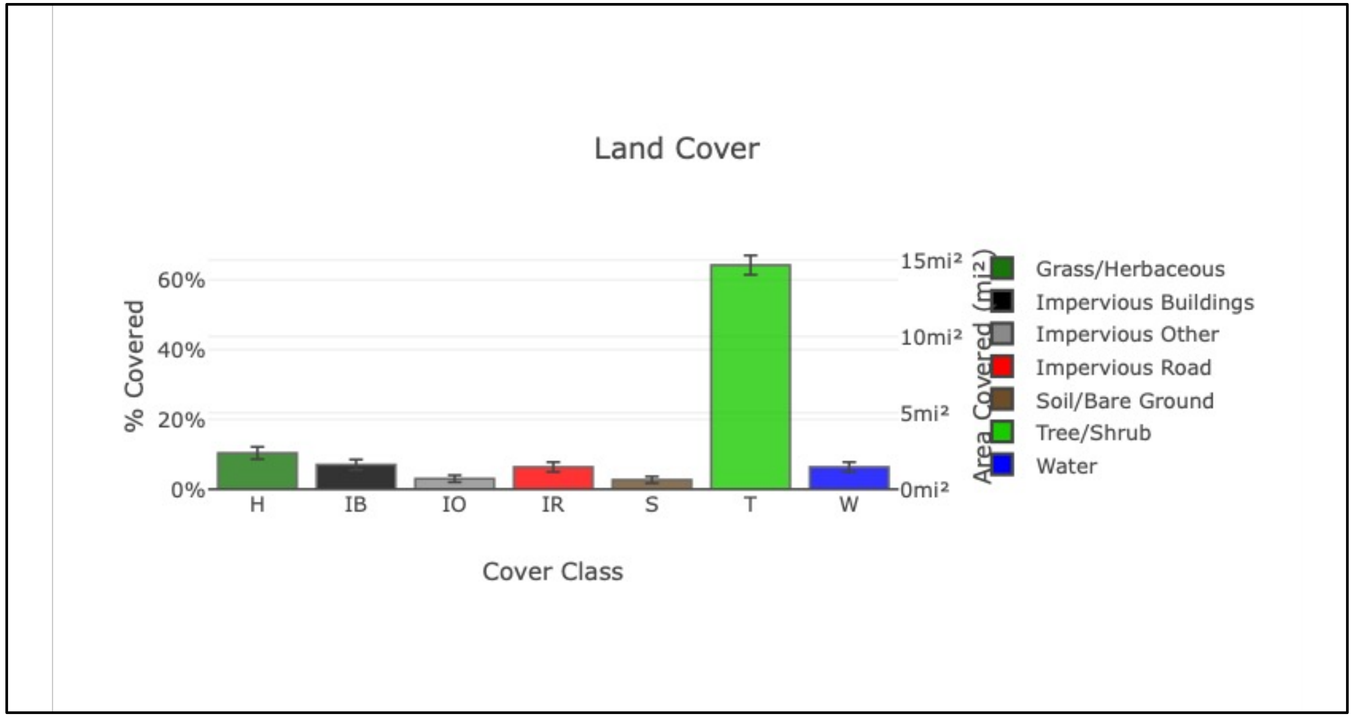


i-Tree Canopy v7.1

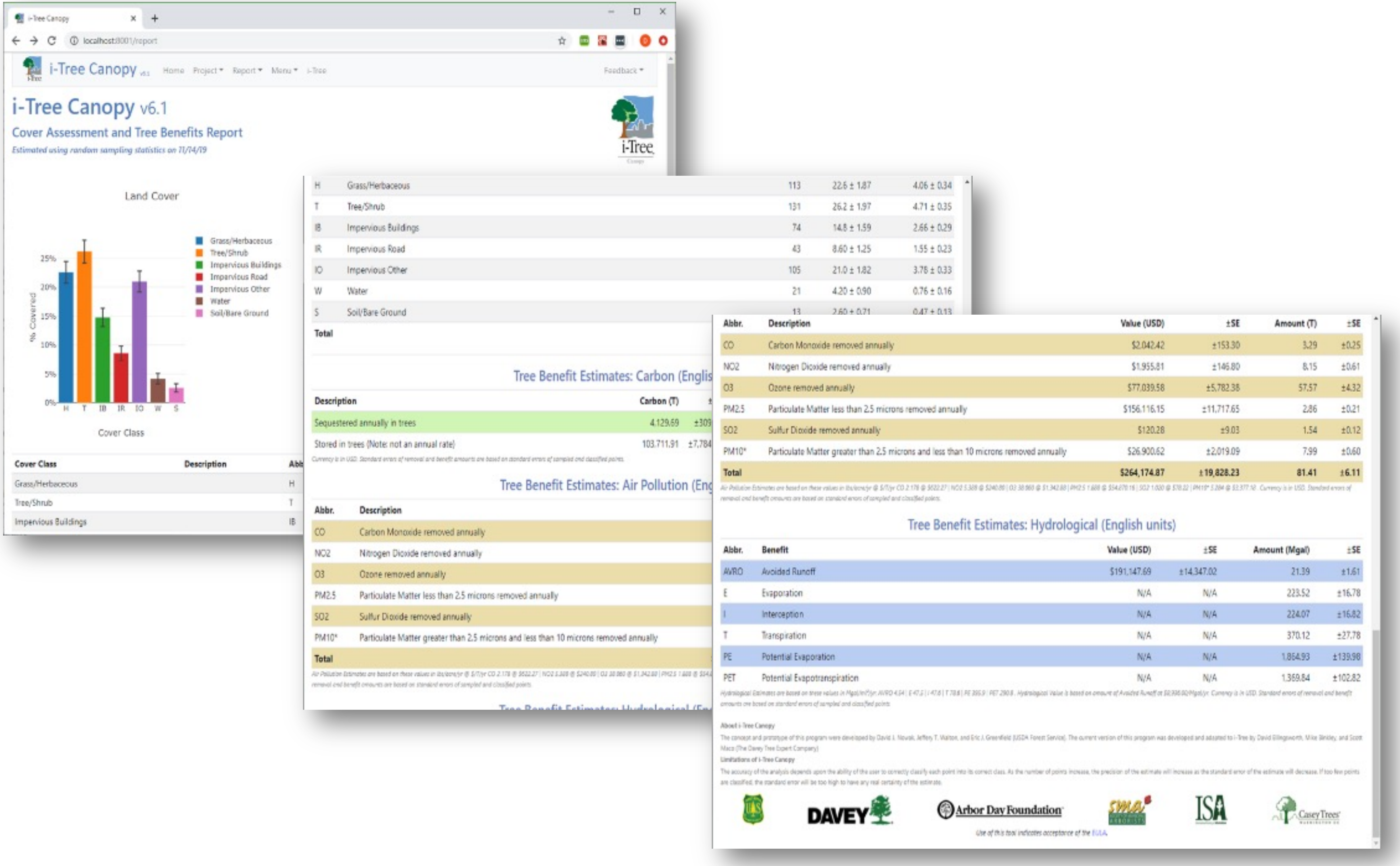
Cover Assessment and Tree Benefits Report

Estimated using random sampling statistics on 10/15/2021

i-Tree
Google
Imagery ©2021 TerraMetrics
Land Cover
% Covered
60%
40%
20%
0%
15mi²
10mi²
5mi²
0mi²
Area Covered (mi2)
H
IB
IO
IR
S
T
W
Cover Class
Grass/Herbaceous
Impervious Buildings
Impervious Other
Impervious Road
Soil/Bare Ground
Tree/Shrub
Water



i-Tree Canopy


i-Tree Canopy
localhost:8001/report
i-Tree Canopy v6.1
Home
Project
Report
Menu
i-Tree
Feedback
i-Tree
Land Cover
25%
20%
15%
10%
5%
0%
% Covered
H
T
IB
IR
IO
W
S
Cover Class
Grass/Herbaceous
Tree/Shrub
Impervious Buildings
Impervious Road
Impervious Other
Water
Soil/Bare Ground
DAVEY
Arbor Day Foundation
SMA
ISA
Casey Trees

i-Tree Canopy v6.1

Cover Assessment and Tree Benefits Report

Estimated using random sampling statistics on 11/14/19

Cover Class	Description	Abb
Grass/Herbaceous		H
Tree/Shrub		T
Impervious Buildings		IB

H	Grass/Herbaceous	113	22.6 ± 1.87	4.06 ± 0.34
T	Tree/Shrub	131	26.2 ± 1.97	4.71 ± 0.35
IB	Impervious Buildings	74	14.8 ± 1.59	2.66 ± 0.29
IR	Impervious Road	43	8.60 ± 1.25	1.55 ± 0.23
IO	Impervious Other	105	21.0 ± 1.82	3.78 ± 0.33
W	Water	21	4.20 ± 0.90	0.76 ± 0.16
S	Soil/Bare Ground	13	2.60 ± 0.71	0.47 ± 0.13
Total				

Tree Benefit Estimates: Carbon (Englis

Description	Carbon (T)	±
Sequestered annually in trees	4,129.69	±309
Stored in trees (Note: not an annual rate)	103,711.91	±7,784

Tree Benefit Estimates: Air Pollution (Eng

Abbr.	Description
CO	Carbon Monoxide removed annually
NO2	Nitrogen Dioxide removed annually
O3	Ozone removed annually
PM2.5	Particulate Matter less than 2.5 microns removed annually
SO2	Sulfur Dioxide removed annually
PM10*	Particulate Matter greater than 2.5 microns and less than 10 microns removed annually
Total	

Abbr.	Description	Value (USD)	±SE	Amount (T)	±SE
CO	Carbon Monoxide removed annually	$2,042.42	±153.30	3.29	±0.25
NO2	Nitrogen Dioxide removed annually	$1,955.81	±146.80	8.15	±0.61
O3	Ozone removed annually	$77,039.58	±5,782.38	57.57	±4.32
PM2.5	Particulate Matter less than 2.5 microns removed annually	$156,116.15	±11,717.65	2.86	±0.21
SO2	Sulfur Dioxide removed annually	$120.28	±9.03	1.54	±0.12
PM10*	Particulate Matter greater than 2.5 microns and less than 10 microns removed annually	$26,900.62	±2,019.09	7.99	±0.60
Total		**$264,174.87**	**±19,828.23**	**81.41**	**±6.11**

Tree Benefit Estimates: Hydrological (English units)

Abbr.	Benefit	Value (USD)	±SE	Amount (Mgal)	±SE
AVRO	Avoided Runoff	$191,147.69	±14,347.02	21.39	±1.61
E	Evaporation	N/A	N/A	223.52	±16.78
I	Interception	N/A	N/A	224.07	±16.82
T	Transpiration	N/A	N/A	370.12	±27.78
PE	Potential Evaporation	N/A	N/A	1,864.93	±139.98
PET	Potential Evapotranspiration	N/A	N/A	1,369.84	±102.82

About i-Tree Canopy

The concept and prototype of this program were developed by David J. Nowak, Jeffery T. Walton, and Eric J. Greenfield (USDA Forest Service). The current version of this program was developed and adapted to i-Tree by David Ellingsworth, Mike Binkley, and Scott Maco (The Davey Tree Expert Company)

Limitations of i-Tree Canopy

The accuracy of the analysis depends upon the ability of the user to correctly classify each point into its correct class. As the number of points increase, the precision of the estimate will increase as the standard error of the estimate will decrease. If too few points are classified, the standard error will be too high to have any real certainty of the estimate.

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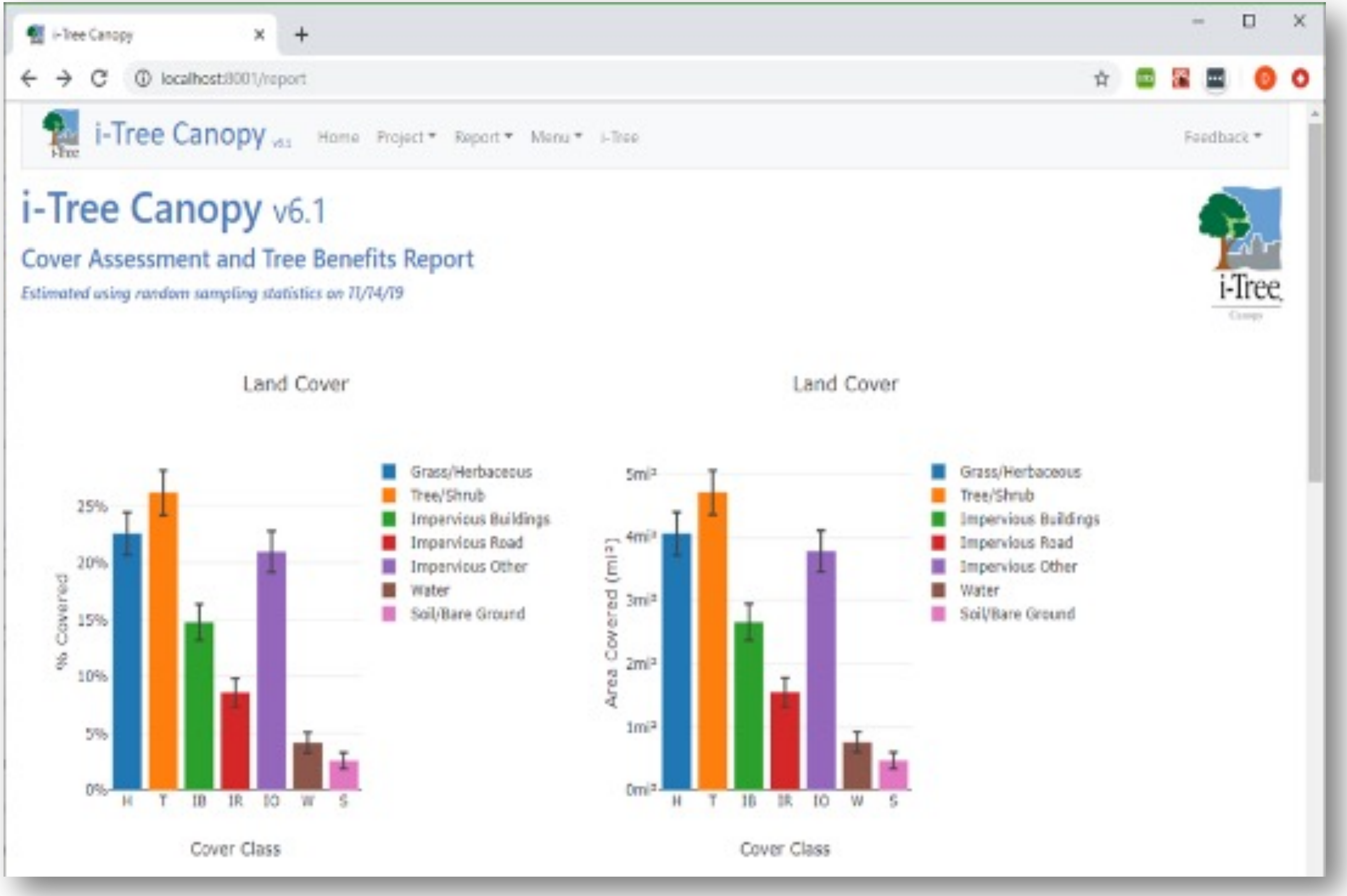
i-Tree Canopy



i-Tree Canopy
localhost:8001/report
i-Tree Canopy v6.1
Home
Project
Report
Menu
i-Tree
Feedback
i-Tree

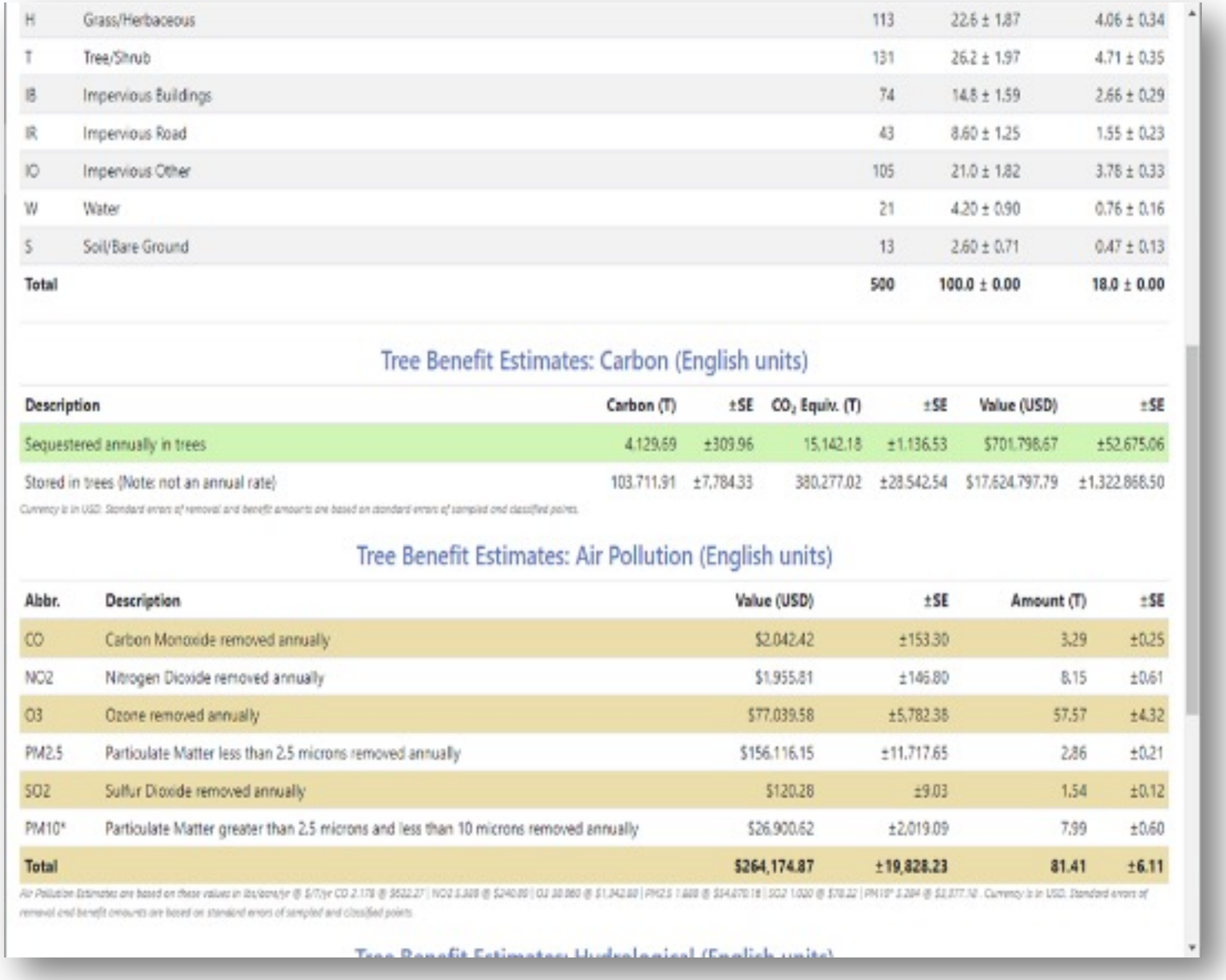
i-Tree Canopy v6.1

Cover Assessment and Tree Benefits Report

Estimated using random sampling statistics on 11/14/19

Land Cover
% Covered
25%
20%
15%
10%
5%
0%
H
T
IB
IR
IO
W
S
Cover Class
🟦 Grass/Herbaceous
🟧 Tree/Shrub
🟩 Impervious Buildings
🟥 Impervious Road
🟪 Impervious Other
🟫 Water
Soil/Bare Ground
Land Cover
Area Covered (mi²)
5mi²
4mi²
3mi²
2mi²
1mi²
0mi²
H
T
IB
IR
IO
W
S
Cover Class
🟦 Grass/Herbaceous
🟧 Tree/Shrub
🟩 Impervious Buildings
🟥 Impervious Road
🟪 Impervious Other
🟫 Water
Soil/Bare Ground

i-Tree Canopy



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W	Water	21	4.20 ± 0.90	0.76 ± 0.16
S	Soil/Bare Ground	13	2.60 ± 0.71	0.47 ± 0.13
Total		**500**	**100.0 ± 0.00**	**18.0 ± 0.00**

Tree Benefit Estimates: Carbon (English units)

Description	**Carbon (T)**	**±SE**	**CO_2 Equiv. (T)**	**±SE**	**Value (USD)**	**±SE**
Sequestered annually in trees	4,129.69	±309.96	15,142.18	±1,136.53	$701,798.67	±52,675.06
Stored in trees (Note: not an annual rate)	103,711.91	±7,784.33	380,277.02	±28,542.54	$17,624,797.79	±1,322,868.50

Currency is in USD. Standard errors of removal and benefit amounts are based on standard errors of sampled and classified points.

Tree Benefit Estimates: Air Pollution (English units)

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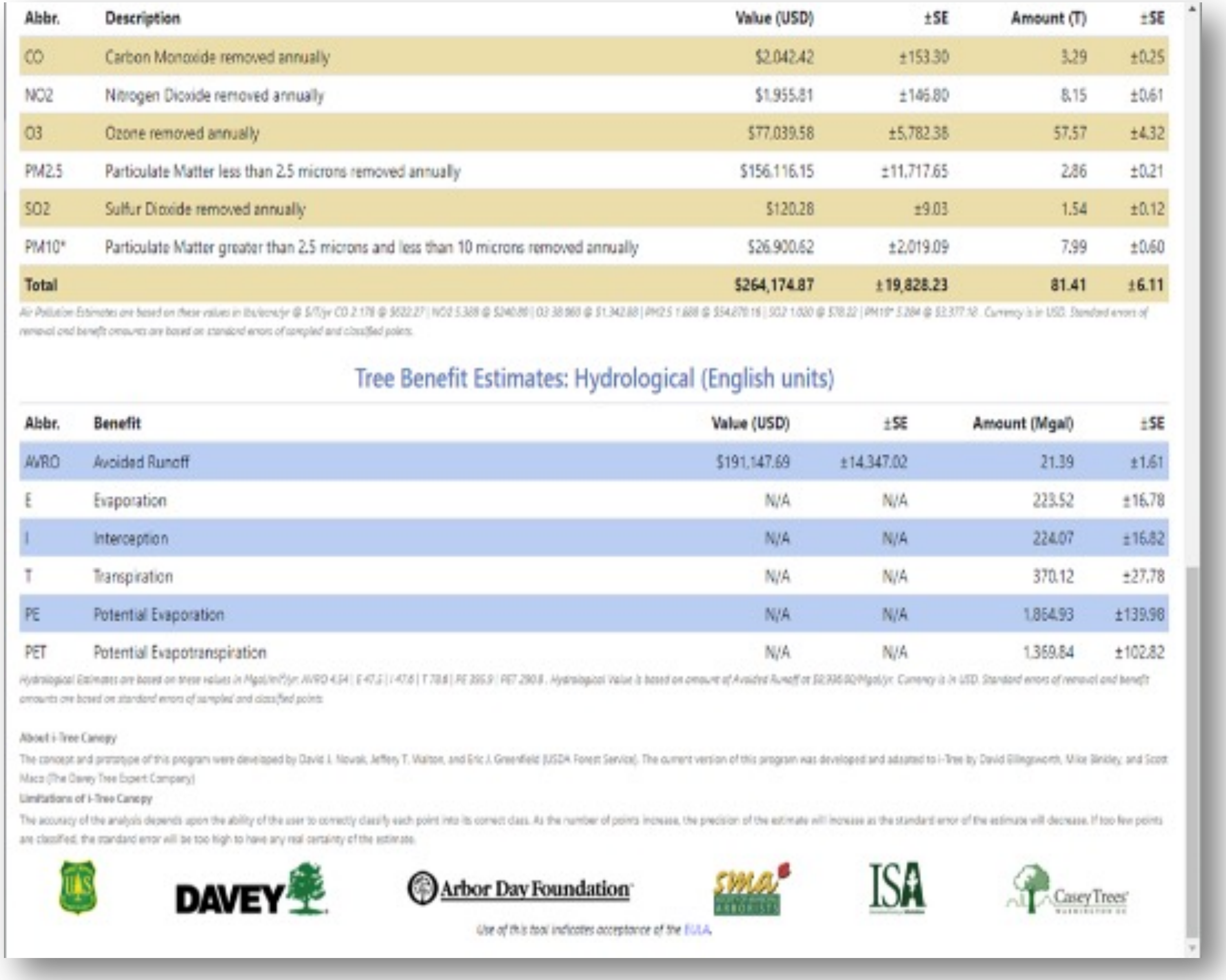
Total		**$264,174.87**	**±19,828.23**	**81.41**	**±6.11**

Air Pollution Estimates are based on these values in lbs/acre/yr @ $/T/yr CO 2.178 @ $622.27 | NO2 5.388 @ $240.80 | O3 38.060 @ $1,342.80 | PM2.5 1.888 @ $54,670.18 | SO2 1.020 @ $78.22 | PM10 5.284 @ $3,377.10 . Currency is in USD. Standard errors of removal and benefit amounts are based on standard errors of sampled and classified points.*

Tree Benefit Estimates: Hydrological (English units)

i-Tree Canopy



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Hydrological Estimates are based on these values in Mgal/mi²/yr: AVRO 4.54 | E 47.5 | I 47.6 | T 78.8 | PE 395.9 | PET 290.8 . Hydrological Value is based on amount of Avoided Runoff at $8,936.80/Mgal/yr. Currency is in USD. Standard errors of removal and benefit amounts are based on standard errors of sampled and classified points.

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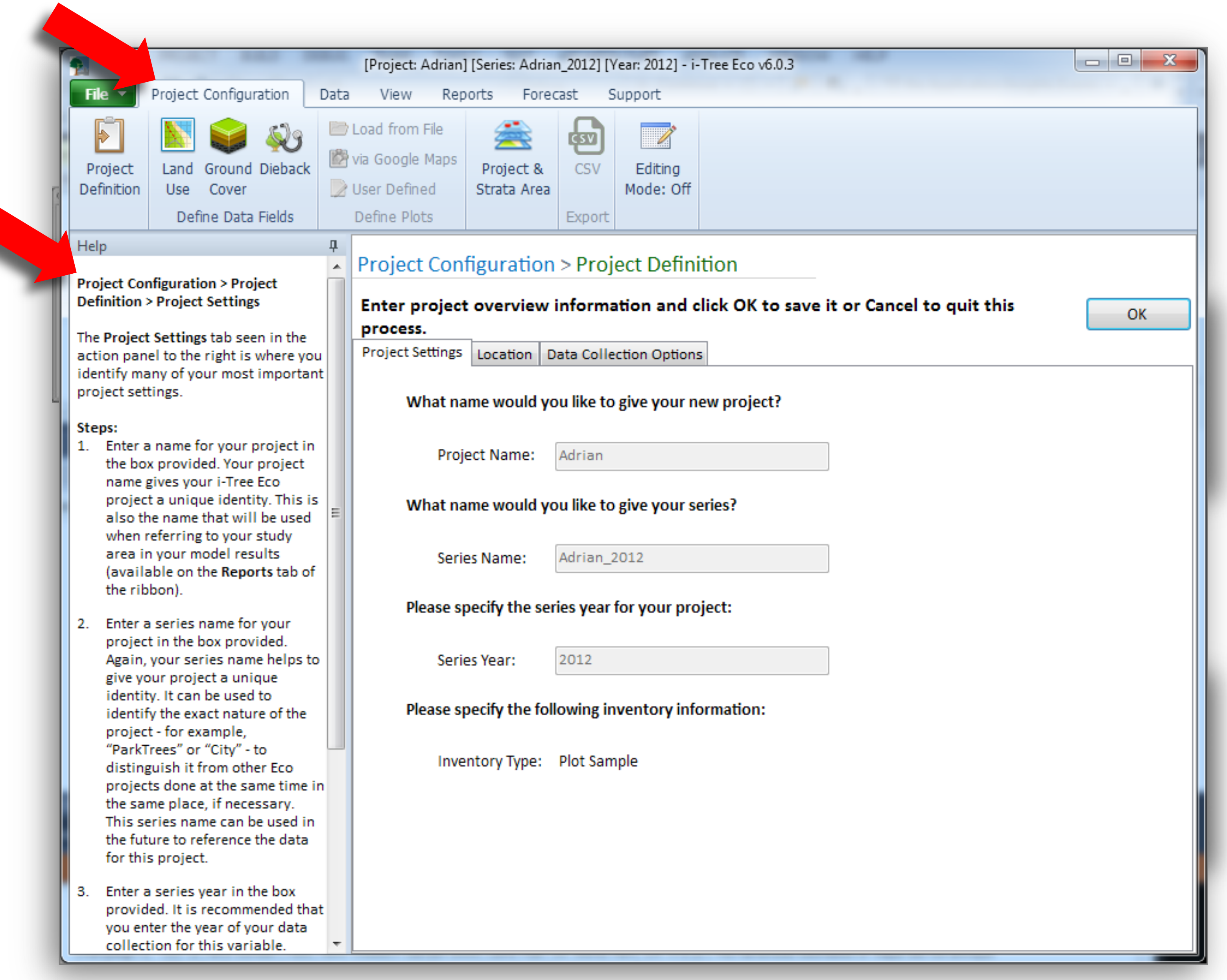
i-Tree Eco


[Project: Adrian] [Series: Adrian_2012] [Year: 2012] - i-Tree Eco v6.0.3
File
Project Configuration
Data
View
Reports
Forecast
Support
Project Definition
Land Use
Ground Cover
Dieback
Define Data Fields
Load from File
via Google Maps
User Defined
Define Plots
Project & Strata Area
CSV
Export
Editing Mode: Off
Help
OK
Project Settings
Location
Data Collection Options

Project Configuration > Project Definition > Project Settings

The **Project Settings** tab seen in the action panel to the right is where you identify many of your most important project settings.

Steps:

1. Enter a name for your project in the box provided. Your project name gives your i-Tree Eco project a unique identity. This is also the name that will be used when referring to your study area in your model results (available on the **Reports** tab of the ribbon).
2. Enter a series name for your project in the box provided. Again, your series name helps to give your project a unique identity. It can be used to identify the exact nature of the project - for example, "ParkTrees" or "City" - to distinguish it from other Eco projects done at the same time in the same place, if necessary. This series name can be used in the future to reference the data for this project.
3. Enter a series year in the box provided. It is recommended that you enter the year of your data collection for this variable.

Project Configuration > Project Definition

Enter project overview information and click OK to save it or Cancel to quit this process.

What name would you like to give your new project?

Project Name: Adrian

What name would you like to give your series?

Series Name: Adrian_2012

Please specify the series year for your project:

Series Year: 2012

Please specify the following inventory information:

Inventory Type: Plot Sample

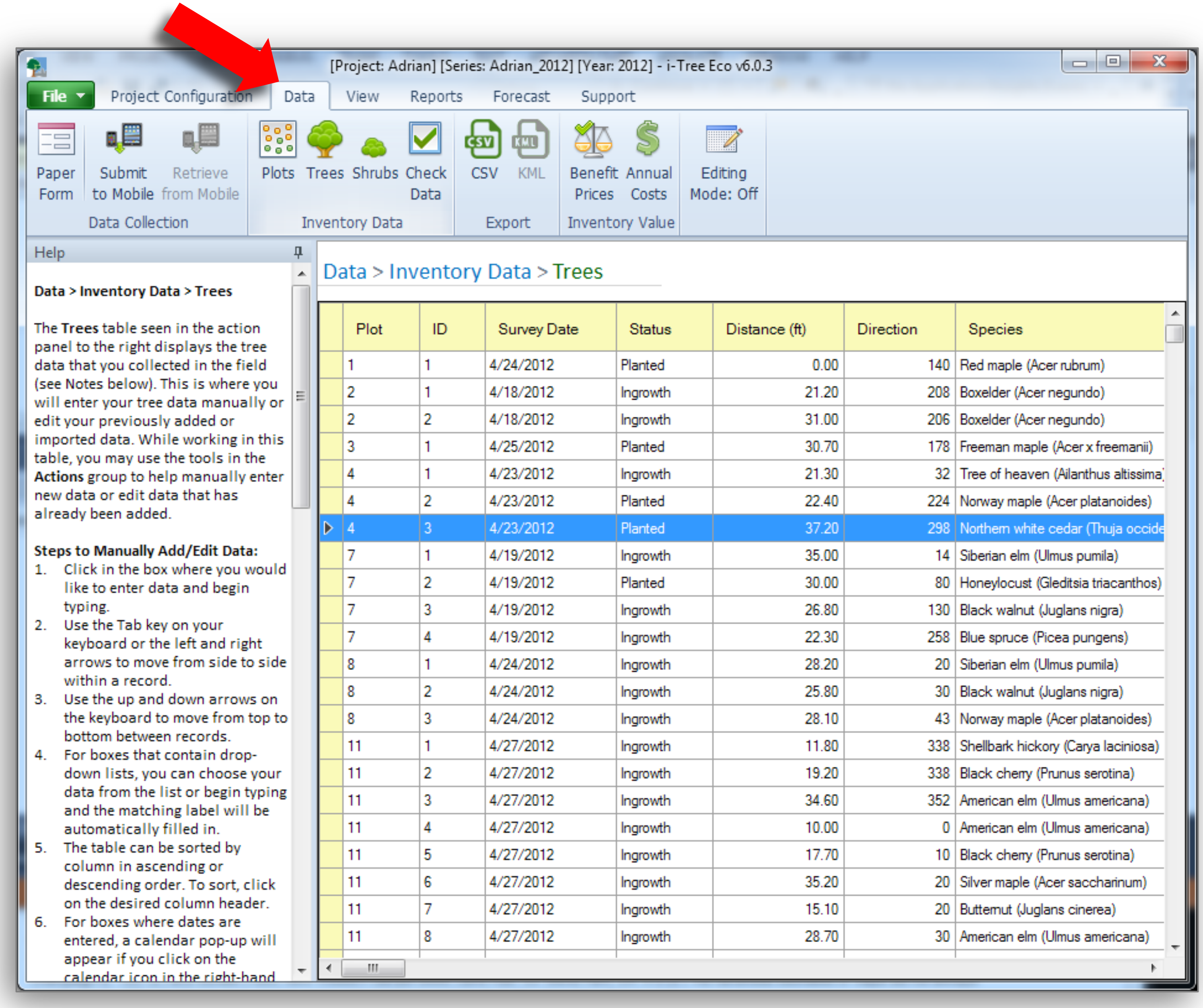
i-Tree Eco v6

Flagship tool with best estimates for Composition and Benefits.

- User interface & Help text
- Reporting
- Tree inventory import
- Mobile data collector
- Help text

Plot Sampling & Complete Inventories

i-Tree Eco v6


[Project: Adrian] [Series: Adrian_2012] [Year: 2012] - i-Tree Eco v6.0.3
File
Project Configuration
Data
View
Reports
Forecast
Support
Paper Form
Submit to Mobile
Retrieve from Mobile
Data Collection
Plots
Trees
Shrubs
Check Data
Inventory Data
CSV
KML
Export
Benefit Prices
Annual Costs
Inventory Value
Editing Mode: Off
Help

Data > Inventory Data > Trees

The **Trees** table seen in the action panel to the right displays the tree data that you collected in the field (see Notes below). This is where you will enter your tree data manually or edit your previously added or imported data. While working in this table, you may use the tools in the **Actions** group to help manually enter new data or edit data that has already been added.

Steps to Manually Add/Edit Data:

1. Click in the box where you would like to enter data and begin typing.
2. Use the Tab key on your keyboard or the left and right arrows to move from side to side within a record.
3. Use the up and down arrows on the keyboard to move from top to bottom between records.
4. For boxes that contain drop-down lists, you can choose your data from the list or begin typing and the matching label will be automatically filled in.
5. The table can be sorted by column in ascending or descending order. To sort, click on the desired column header.
6. For boxes where dates are entered, a calendar pop-up will appear if you click on the calendar icon in the right-hand

Data > Inventory Data > Trees

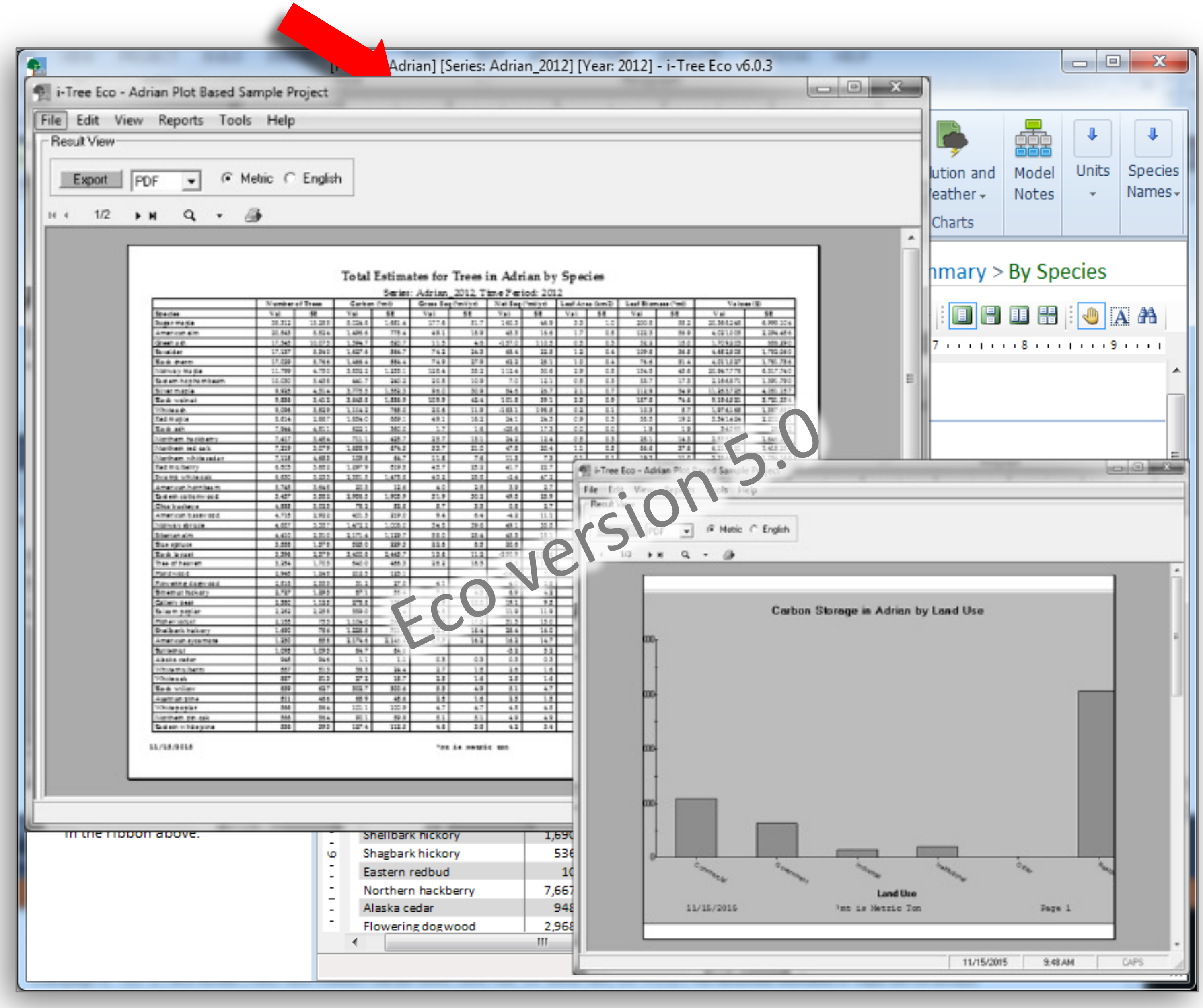
Plot	ID	Survey Date	Status	Distance (ft)	Direction	Species
1	1	4/24/2012	Planted	0.00	140	Red maple (Acer rubrum)
2	1	4/18/2012	Ingrowth	21.20	208	Boxelder (Acer negundo)
2	2	4/18/2012	Ingrowth	31.00	206	Boxelder (Acer negundo)
3	1	4/25/2012	Planted	30.70	178	Freeman maple (Acer x freemanii)
4	1	4/23/2012	Ingrowth	21.30	32	Tree of heaven (Ailanthus altissima
4	2	4/23/2012	Planted	22.40	224	Norway maple (Acer platanoides)
4	3	4/23/2012	Planted	37.20	298	Northern white cedar (Thuja occide
7	1	4/19/2012	Ingrowth	35.00	14	Siberian elm (Ulmus pumila)
7	2	4/19/2012	Planted	30.00	80	Honeylocust (Gleditsia triacanthos)
7	3	4/19/2012	Ingrowth	26.80	130	Black walnut (Juglans nigra)
7	4	4/19/2012	Ingrowth	22.30	258	Blue spruce (Picea pungens)
8	1	4/24/2012	Ingrowth	28.20	20	Siberian elm (Ulmus pumila)
8	2	4/24/2012	Ingrowth	25.80	30	Black walnut (Juglans nigra)
8	3	4/24/2012	Ingrowth	28.10	43	Norway maple (Acer platanoides)
11	1	4/27/2012	Ingrowth	11.80	338	Shellbark hickory (Carya laciniosa)
11	2	4/27/2012	Ingrowth	19.20	338	Black cherry (Prunus serotina)
11	3	4/27/2012	Ingrowth	34.60	352	American elm (Ulmus americana)
11	4	4/27/2012	Ingrowth	10.00	0	American elm (Ulmus americana)
11	5	4/27/2012	Ingrowth	17.70	10	Black cherry (Prunus serotina)
11	6	4/27/2012	Ingrowth	35.20	20	Silver maple (Acer saccharinum)
11	7	4/27/2012	Ingrowth	15.10	20	Butternut (Juglans cinerea)
11	8	4/27/2012	Ingrowth	28.70	30	American elm (Ulmus americana)

Flagship tool with best estimates for Composition and Benefits.

- User interface & Help Text
- Reporting
- Tree inventory import
- Mobile data collector
- Help text

Plot Sampling & Complete Inventories.

i-Tree Eco v6


[Adrian] [Series: Adrian_2012] [Year: 2012] - i-Tree Eco v6.0.3
i-Tree Eco - Adrian Plot Based Sample Project
File
Edit
View
Reports
Tools
Help
Result View
Export
PDF
Metric
English
1/2
lution and
eather
Charts
Model
Notes
Units
Species
Names
mary > By Species
Eco version 5.0
Land Use
in the ribbon above.

Total Estimates for Trees in Adrian by Species

Series: Adrian_2012 Time Period: 2012

Carbon Storage in Adrian by Land Use

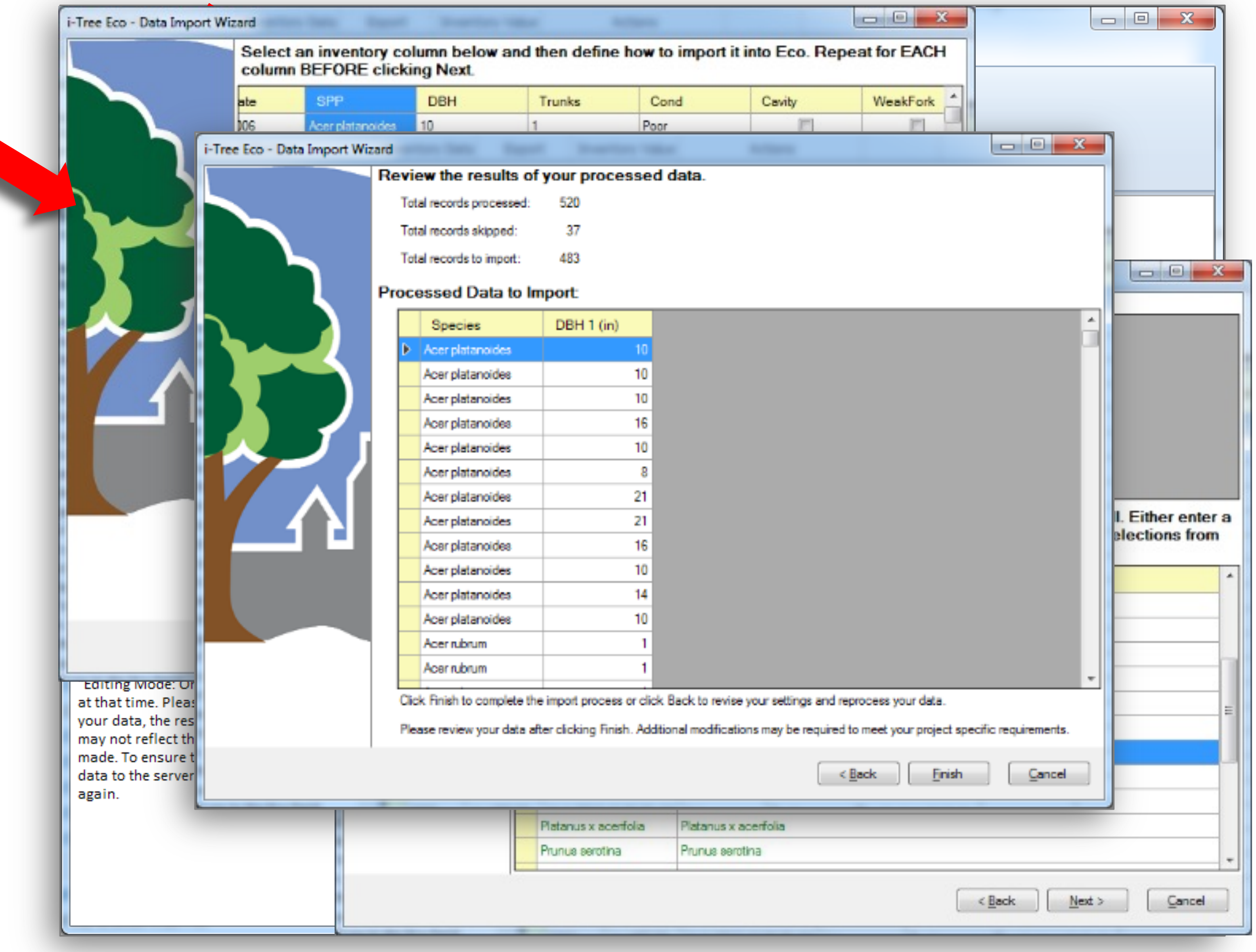
Shellbark hickory	1,69
Shagbark hickory	536
Eastern redbud	10
Northern hackberry	7,667
Alaska cedar	948
Flowering dogwood	2,968

Flagship tool with best estimates for Composition and Benefits.

- User interface & Help text
- Reporting
- Tree inventory import
- Mobile data collector
- Basic mapping

Plot Sampling & Complete Inventories.

i-Tree Eco v6



i-Tree Eco - Data Import Wizard

Select an inventory column below and then define how to import it into Eco. Repeat for EACH column BEFORE clicking Next.

ate	SPP	DBH	Trunks	Cond	Cavity	WeakFork
06	Acer platanoides	10	1	Poor	☐	☐

Editing Mode: Or
at that time. Pleas
your data, the res
may not reflect th
made. To ensure t
data to the server
again.

i-Tree Eco - Data Import Wizard

Review the results of your processed data.

Total records processed:	520
Total records skipped:	37
Total records to import:	483

Processed Data to Import:

Species	DBH 1 (in)
Acer platanoides	10
Acer platanoides	10
Acer platanoides	10
Acer platanoides	16
Acer platanoides	10
Acer platanoides	8
Acer platanoides	21
Acer platanoides	21
Acer platanoides	16
Acer platanoides	10
Acer platanoides	14
Acer platanoides	10
Acer rubrum	1
Acer rubrum	1

Click Finish to complete the import process or click Back to revise your settings and reprocess your data.

Please review your data after clicking Finish. Additional modifications may be required to meet your project specific requirements.

l. Either enter a
elections from

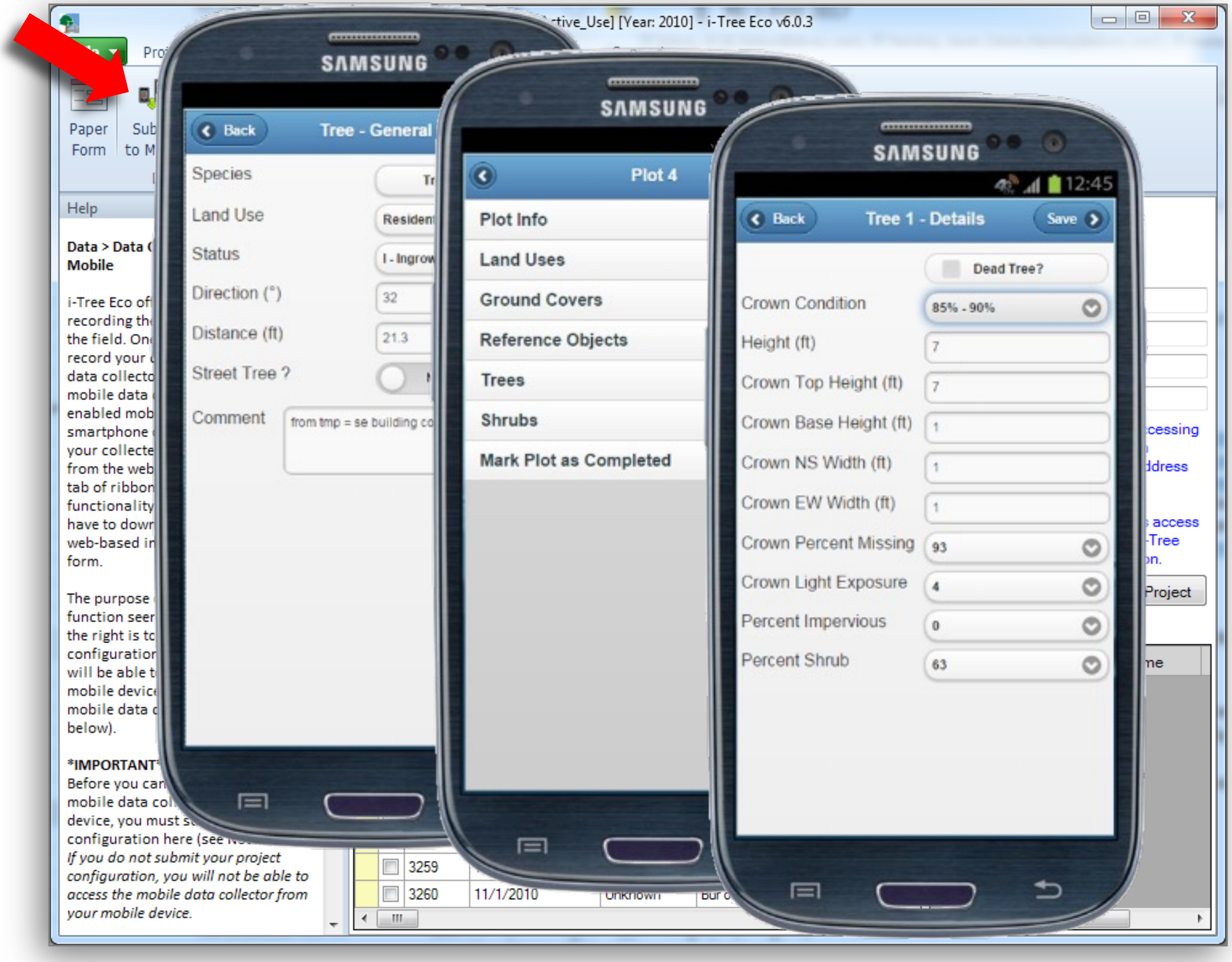
Platanus x acerfolia	Platanus x acerfolia
Prunus serotina	Prunus serotina

Flagship tool with best estimates for Composition and Benefits.

- User interface & Help text
- Reporting
- **Tree inventory import**
- Mobile data collector
- Basic mapping

Plot Sampling & Complete Inventories.

i-Tree Eco v6


...tive_Use] [Year: 2010] - i-Tree Eco v6.0.3
Pro
Paper Form
Sub to M
Help
Project
SAMSUNG
12:45

Data > Data (Mobile

i-Tree Eco of recording th the field. On record your data collecto mobile data enabled mob smartphone your collecte from the web tab of ribbon functionality have to down web-based in form.

The purpose function seer the right is to configuration will be able t mobile device mobile data c below).

IMPORTANT Before you can mobile data col device, you must s configuration here (see

If you do not submit your project configuration, you will not be able to access the mobile data collector from your mobile device.

...cessing ...ddress ...access ...-Tree ...on.

☐	3259			
☐	3260	11/1/2010	Unknown	Bur

Tree - General

Species	Tr
Land Use	Residen
Status	I - Ingrow
Direction (°)	32
Distance (ft)	21.3
Street Tree ?	N
Comment	from tmp = se building co

Plot 4

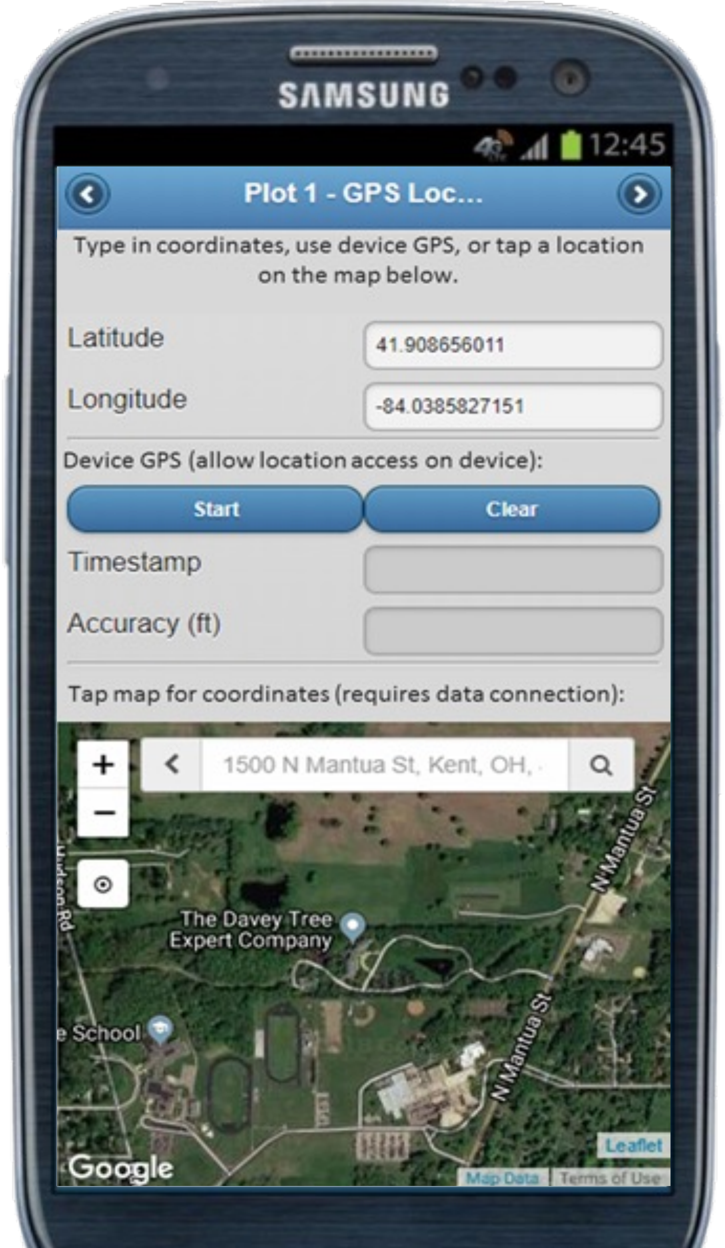
- Plot Info
- Land Uses
- Ground Covers
- Reference Objects
- Trees
- Shrubs
- Mark Plot as Completed

Tree 1 - Details

☐ Dead Tree?

Crown Condition	85% - 90%
Height (ft)	7
Crown Top Height (ft)	7
Crown Base Height (ft)	1
Crown NS Width (ft)	1
Crown EW Width (ft)	1
Crown Percent Missing	93
Crown Light Exposure	4
Percent Impervious	0
Percent Shrub	63

Back
Save


SAMSUNG
12:45
Start
Clear
+
−
The Davey Tree Expert Company
School
N Mantua St
Hudson Rd
Leaflet
Google
Map Data
Terms of Use

Plot 1 - GPS Loc...

Type in coordinates, use device GPS, or tap a location on the map below.

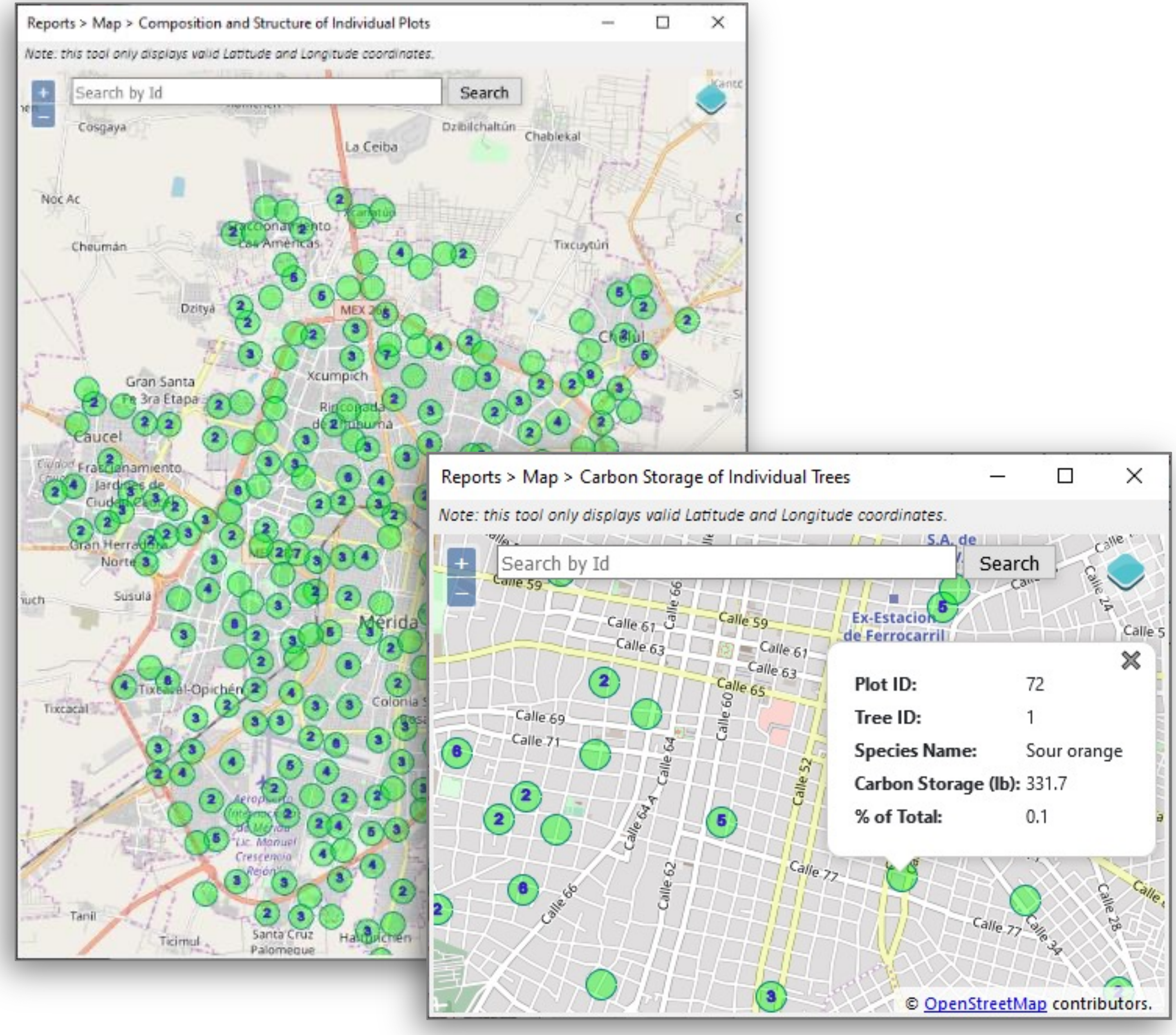
Latitude	41.908656011
Longitude	-84.0385827151

Device GPS (allow location access on device):

Timestamp	
Accuracy (ft)	

Tap map for coordinates (requires data connection):

1500 N Mantua St, Kent, OH,



Reports > Map > Composition and Structure of Individual Plots

Note: this tool only displays valid Latitude and Longitude coordinates.

Reports > Map > Carbon Storage of Individual Trees

Note: this tool only displays valid Latitude and Longitude coordinates.

Plot ID:	72
Tree ID:	1
Species Name:	Sour orange
Carbon Storage (lb):	331.7
% of Total:	0.1

Search by Id
Search
Cosgaya
La Ceiba
Dzibilchaltún
Chablekal
Noc Ac
Cheumán
Tixcuytún
Dzityá
MEX 261
Xcumpich
Gran Santa Fe 3ra Etapa
Caucel
Mérida
Tixcacal
Tanil
Ticimul
Santa Cruz Palomeque
Calle 59
Calle 61
Calle 63
Calle 65
Calle 69
Calle 71
Calle 77
Ex-Estacion de Ferrocarril
© OpenStreetMap contributors.

i-Tree Eco v6

Flagship tool with best estimates for Composition and Benefits.

- User interface & Help text
- Reporting
- Tree inventory import
- Mobile data collector
- Basic mapping

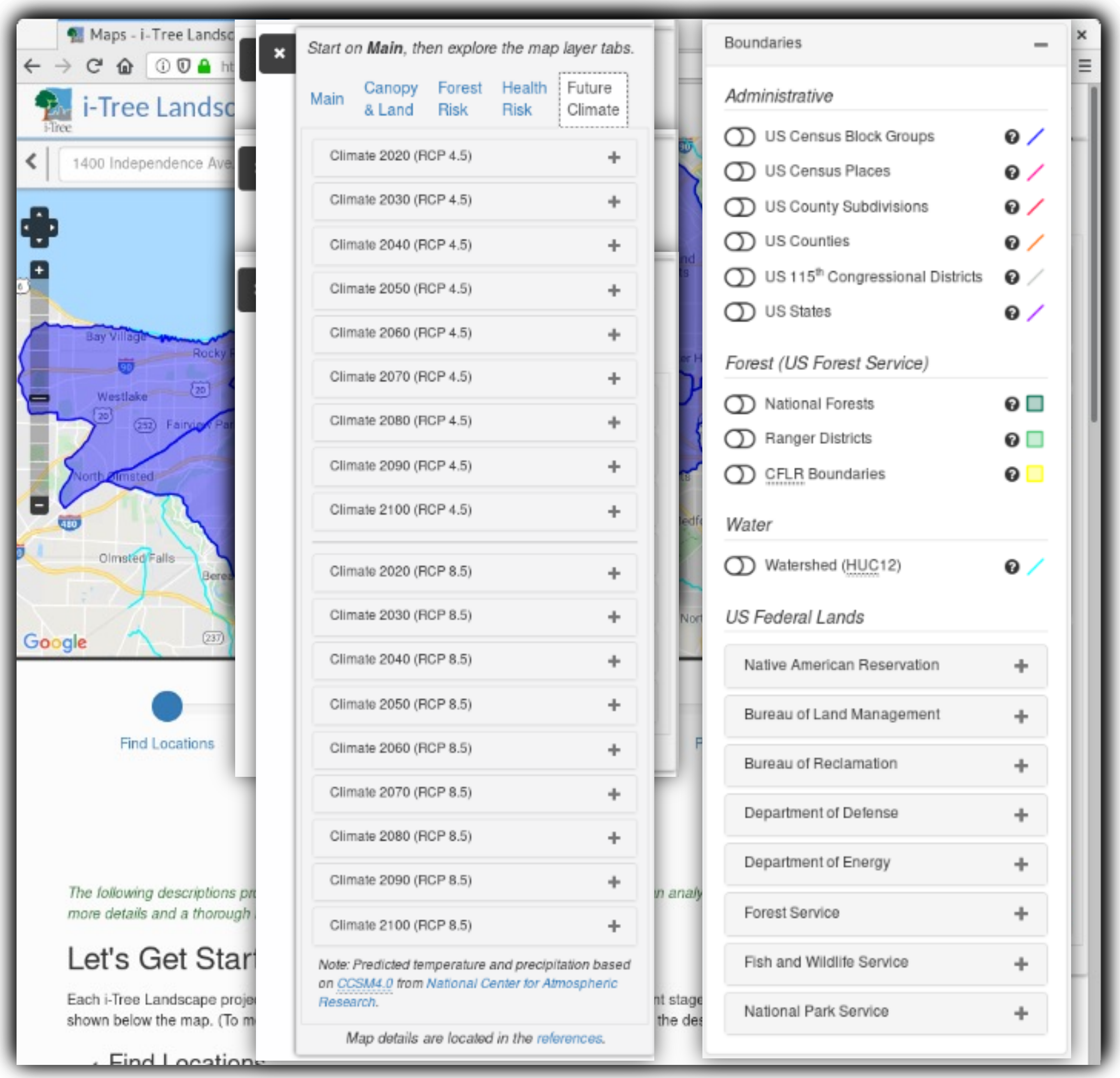
Plot Sampling & Complete Inventories

i-Tree Landscape

i-Tree Landscape

Gateway to tree benefits – available to anyone and everyone in the US.

- Uses existing boundaries.
- Canopy, Land, and Impervious Cover across the US.
  - UTC – send us yours!
    - High Resolution Urban Tree Canopy Assessments
- 250+ map layers
  - 7 base maps
  - 10 boundaries, plus 26 federal types
  - 7 canopy and land
  - 6 forest risk, plus 47 pests
  - 17 health risk
  - 144 future climate
  - Up to 18 new ones coming with v5.0
- 1,000's of data attributes and tree benefits organized for easy exploration.
- Planting prioritization tool


Maps - i-Tree Landsc
i-Tree Landsc
1400 Independence Ave
Bay Village
Rocky
Westlake
Fairview Par
North Olmsted
Olmsted Falls
Bere
Google
Find Locations
Main
Canopy & Land
Forest Risk
Health Risk
Future Climate
Climate 2020 (RCP 4.5)
Climate 2030 (RCP 4.5)
Climate 2040 (RCP 4.5)
Climate 2050 (RCP 4.5)
Climate 2060 (RCP 4.5)
Climate 2070 (RCP 4.5)
Climate 2080 (RCP 4.5)
Climate 2090 (RCP 4.5)
Climate 2100 (RCP 4.5)
Climate 2020 (RCP 8.5)
Climate 2030 (RCP 8.5)
Climate 2040 (RCP 8.5)
Climate 2050 (RCP 8.5)
Climate 2060 (RCP 8.5)
Climate 2070 (RCP 8.5)
Climate 2080 (RCP 8.5)
Climate 2090 (RCP 8.5)
Climate 2100 (RCP 8.5)
Boundaries
Administrative
US Census Block Groups
US Census Places
US County Subdivisions
US Counties
US 115th Congressional Districts
US States
Forest (US Forest Service)
National Forests
Ranger Districts
CFLR Boundaries
Water
Watershed (HUC12)
US Federal Lands
Native American Reservation
Bureau of Land Management
Bureau of Reclamation
Department of Defense
Department of Energy
Forest Service
Fish and Wildlife Service
National Park Service

*Start on **Main**, then explore the map layer tabs.*

Note: Predicted temperature and precipitation based on CCSM4.0 from National Center for Atmospheric Research.

Map details are located in the references.

The following descriptions pr… more details and a thorough…

Let's Get Start…

Each i-Tree Landscape proje… shown below the map. (To m…

Find Location…

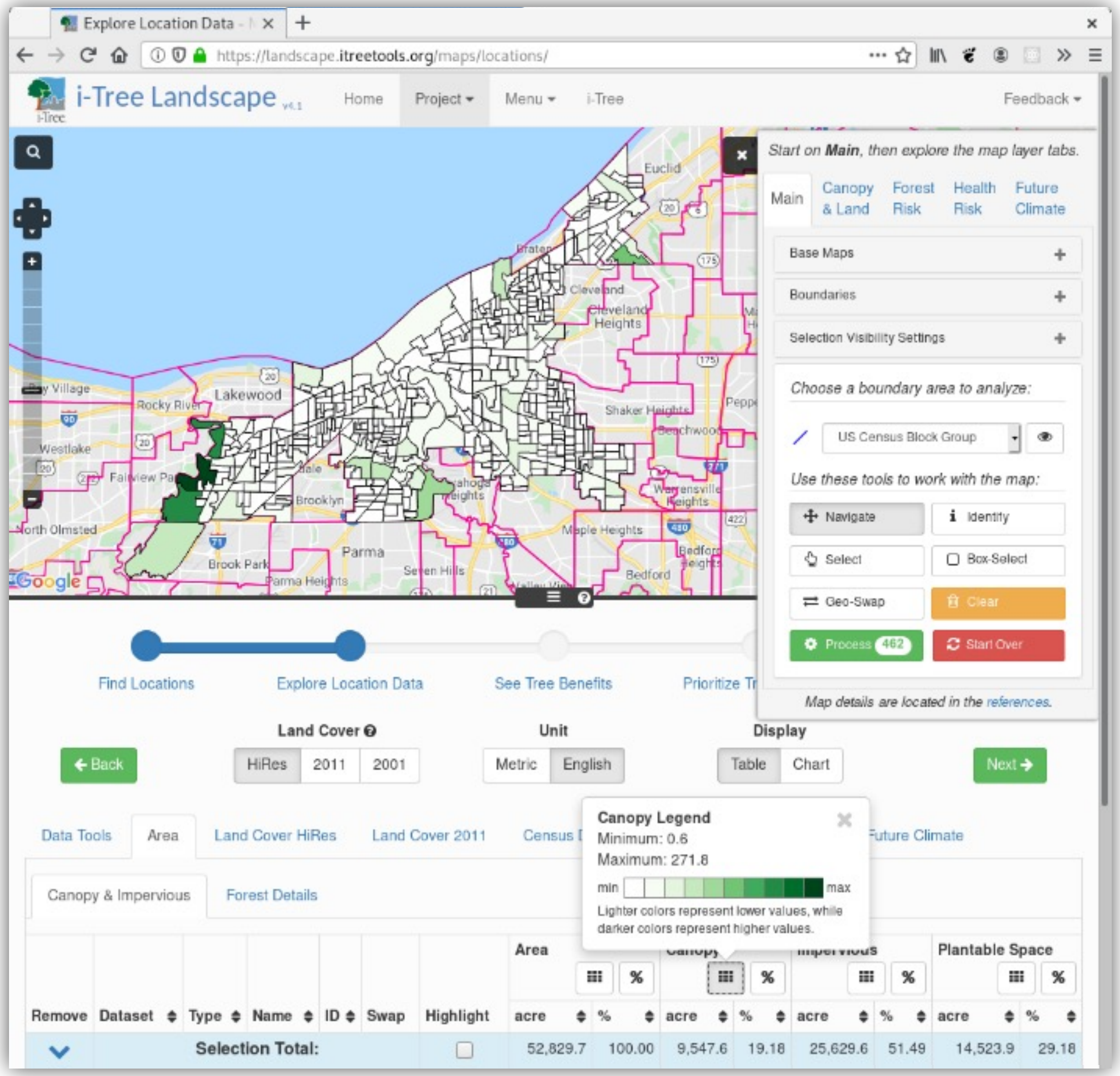
i-Tree Landscape

Gateway to tree benefits – available to anyone and everyone in the US.

A good place to get people started in i-Tree.

A quick tour of…

- Location Data
  - Making a selection
  - Land Cover classifications
    - and tree canopy
  - Thematic mapping


Explore Location Data
i-Tree Landscape
Home
Project
Menu
i-Tree
Feedback
Main
Canopy & Land
Forest Risk
Health Risk
Future Climate
Base Maps
Boundaries
Selection Visibility Settings
Navigate
Identify
Select
Box-Select
Geo-Swap
Clear
Process 462
Start Over
Euclid
Cleveland
Cleveland Heights
Lakewood
Rocky River
Westlake
Fairview Park
North Olmsted
Brooklyn
Parma
Brook Park
Parma Heights
Seven Hills
Shaker Heights
Beachwood
Warrensville Heights
Maple Heights
Bedford Heights
Bedford
Google
Find Locations
Explore Location Data
See Tree Benefits
Prioritize Tr
Land Cover
HiRes
2011
2001
Unit
Metric
English
Display
Table
Chart
Back
Next
Data Tools
Area
Land Cover HiRes
Land Cover 2011
Census
Future Climate
Canopy & Impervious
Forest Details
min
max

https://landscape.itreetools.org/maps/locations/

*Start on **Main**, then explore the map layer tabs.*

Choose a boundary area to analyze:

US Census Block Group

Use these tools to work with the map:

Map details are located in the references.

Canopy Legend
Minimum: 0.6
Maximum: 271.8
Lighter colors represent lower values, while darker colors represent higher values.

Remove	Dataset	Type	Name	ID	Swap	Highlight	Area acre	Area %	Canopy acre	Canopy %	Impervious acre	Impervious %	Plantable Space acre	Plantable Space %
		Selection Total:				☐	52,829.7	100.00	9,547.6	19.18	25,629.6	51.49	14,523.9	29.18

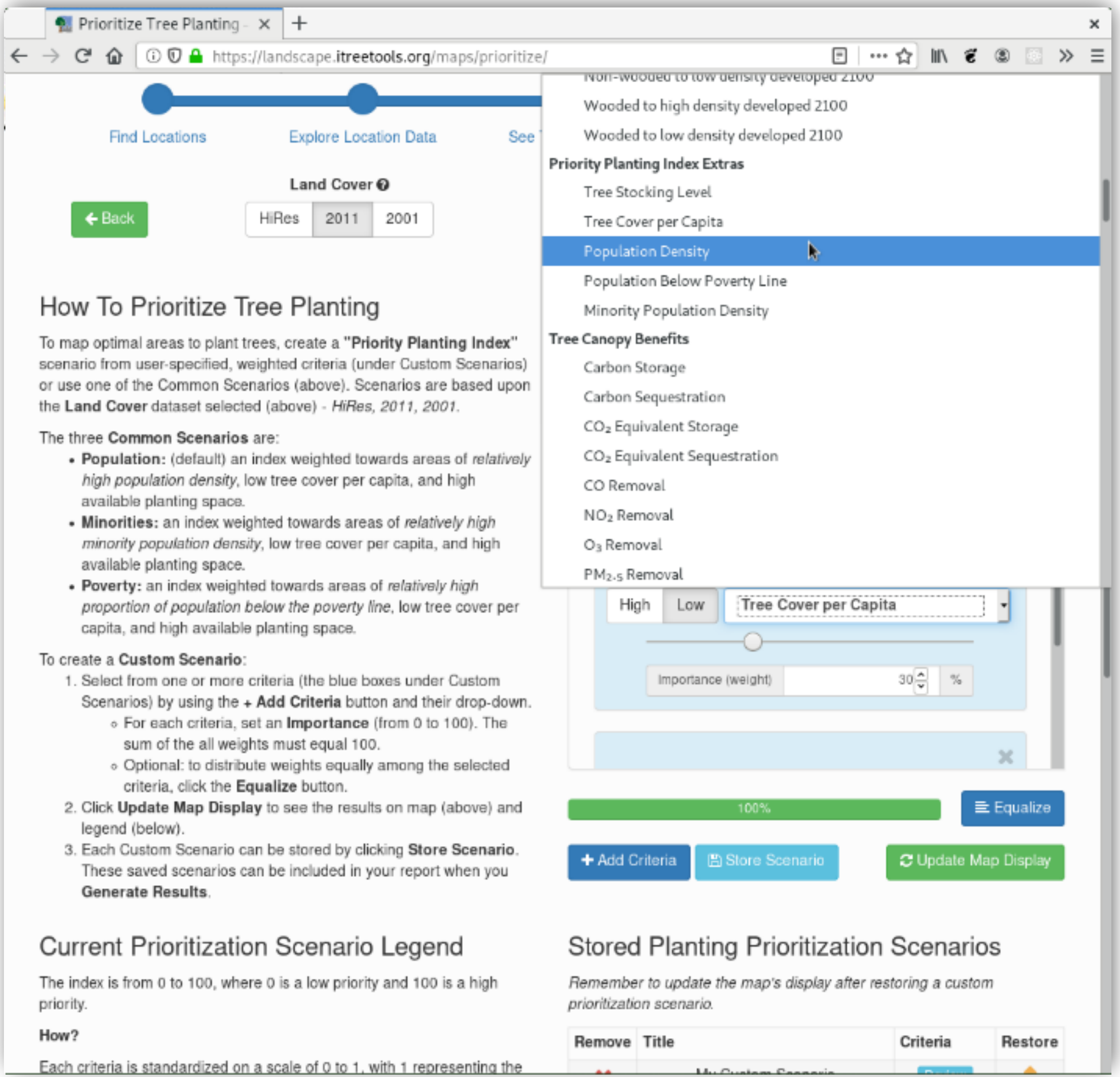
i-Tree Landscape

Gateway to tree benefits – available to anyone and everyone in the US.

A good place to get people started in i-Tree.

A quick tour of…

- Tree Benefits
  - Carbon (CO^2), air pollution, hydrology
- Planting Prioritization
  - Weighted prioritizations
    - Custom scenarios
  - Maintenance vs new planting
    - (vs highest priority; i.e. both)


Prioritize Tree Planting -
https://landscape.itreetools.org/maps/prioritize/
Find Locations
Explore Location Data
See
Back
Land Cover
HiRes
2011
2001
Wooded to high density developed 2100
Wooded to low density developed 2100
Priority Planting Index Extras
Tree Stocking Level
Tree Cover per Capita
Population Density
Population Below Poverty Line
Minority Population Density
Tree Canopy Benefits
Carbon Storage
Carbon Sequestration
CO₂ Equivalent Storage
CO₂ Equivalent Sequestration
CO Removal
NO₂ Removal
O₃ Removal
PM₂.₅ Removal
High
Low
Tree Cover per Capita
Importance (weight)
30
%
100%
Equalize
Add Criteria
Store Scenario
Update Map Display

How To Prioritize Tree Planting

To map optimal areas to plant trees, create a **"Priority Planting Index"** scenario from user-specified, weighted criteria (under Custom Scenarios) or use one of the Common Scenarios (above). Scenarios are based upon the **Land Cover** dataset selected (above) - *HiRes, 2011, 2001*.

The three **Common Scenarios** are:

- **Population:** (default) an index weighted towards areas of *relatively high population density*, low tree cover per capita, and high available planting space.
- **Minorities:** an index weighted towards areas of *relatively high minority population density*, low tree cover per capita, and high available planting space.
- **Poverty:** an index weighted towards areas of *relatively high proportion of population below the poverty line*, low tree cover per capita, and high available planting space.

To create a **Custom Scenario**:

1. Select from one or more criteria (the blue boxes under Custom Scenarios) by using the **+ Add Criteria** button and their drop-down.
   - For each criteria, set an **Importance** (from 0 to 100). The sum of the all weights must equal 100.
   - Optional: to distribute weights equally among the selected criteria, click the **Equalize** button.
2. Click **Update Map Display** to see the results on map (above) and legend (below).
3. Each Custom Scenario can be stored by clicking **Store Scenario**. These saved scenarios can be included in your report when you **Generate Results**.

Current Prioritization Scenario Legend

The index is from 0 to 100, where 0 is a low priority and 100 is a high priority.

How?

Each criteria is standardized on a scale of 0 to 1, with 1 representing the

Stored Planting Prioritization Scenarios

Remember to update the map's display after restoring a custom prioritization scenario.

Remove	Title	Criteria	Restore

i-Tree Landscape

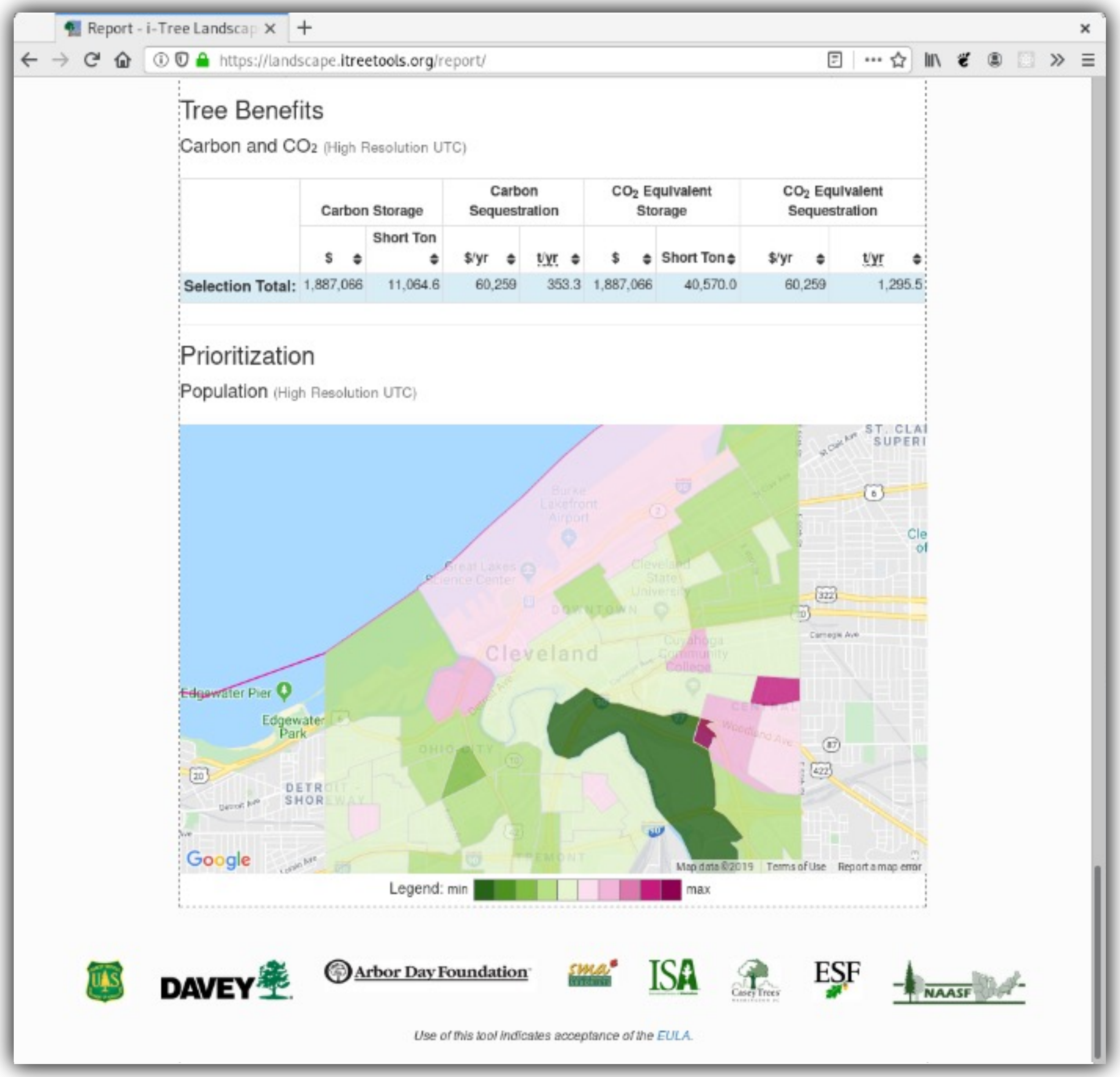
Gateway to tree benefits – available to anyone and everyone in the US.

A good place to get people started in i-Tree.

A quick tour of…

- Reporting
  - Title and description
  - Example tables
  - Example thematic map
  - Example prioritization map

landscape.itreetools.org


Report - i-Tree Landscap
https://landscape.itreetools.org/report/

Tree Benefits

Carbon and CO2 (High Resolution UTC)

	Carbon Storage		Carbon Sequestration		CO_2 Equivalent Storage		CO_2 Equivalent Sequestration	
	$ ⬍	Short Ton ⬍	$/yr ⬍	t/yr ⬍	$ ⬍	Short Ton ⬍	$/yr ⬍	t/yr ⬍
Selection Total:	1,887,066	11,064.6	60,259	353.3	1,887,066	40,570.0	60,259	1,295.5

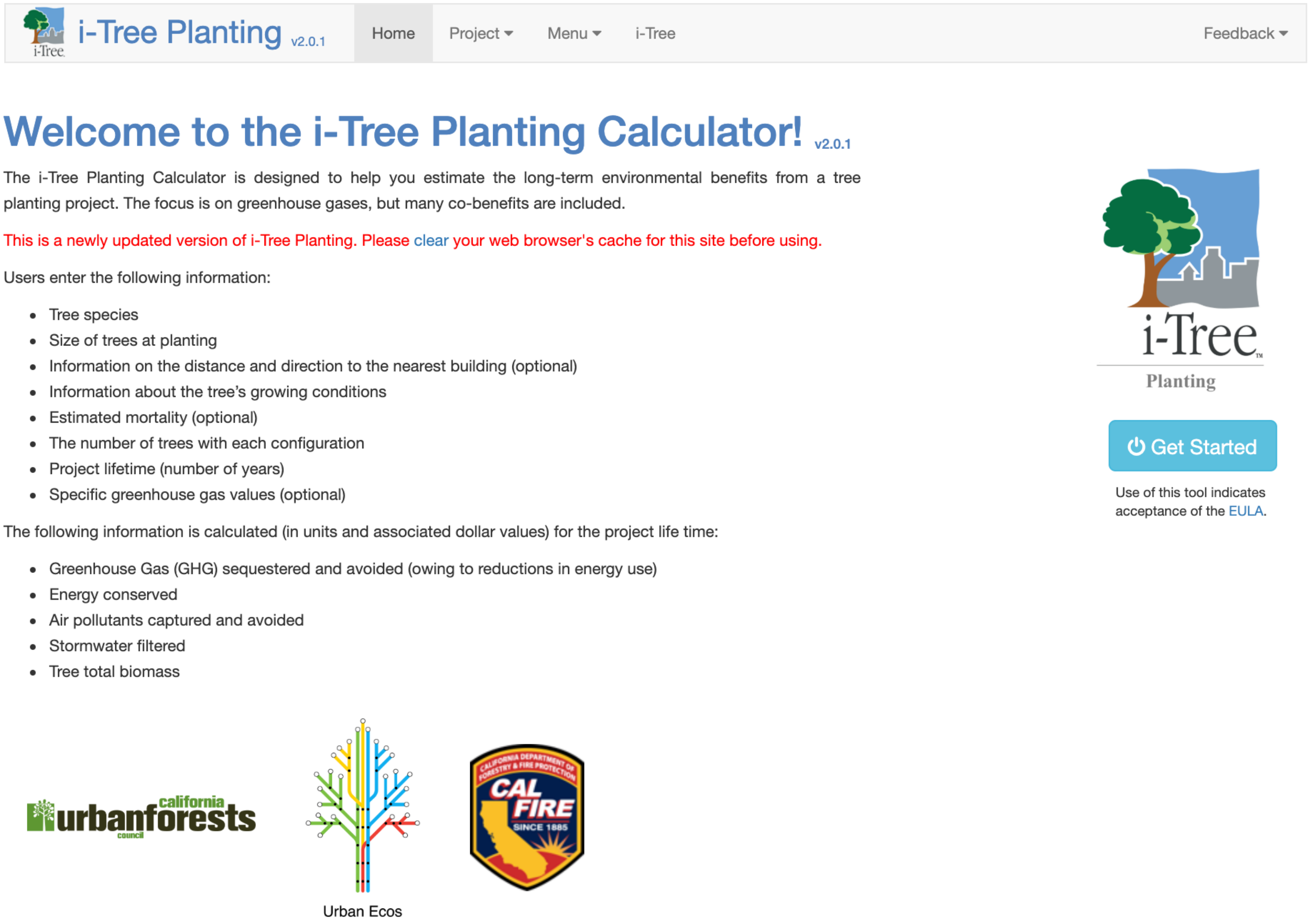
Prioritization

Population (High Resolution UTC)

Burke Lakefront Airport
Great Lakes Science Center
Cleveland State University
Downtown
Cleveland
Cuyahoga Community College
Edgewater Pier
Edgewater Park
Ohio City
Detroit Shoreway
Central
Woodland Ave
Tremont
Google
Map data ©2019
Terms of Use
Report a map error
Legend: min
max
DAVEY
Arbor Day Foundation
ISA
Casey Trees
ESF
NAASF

Use of this tool indicates acceptance of the EULA.

i-Tree Planting


i-Tree Planting v2.0.1
Home
Project
Menu
i-Tree
Feedback
i-Tree Planting
Get Started
california urbanforests council
Urban Ecos
CAL FIRE

Welcome to the i-Tree Planting Calculator! v2.0.1

The i-Tree Planting Calculator is designed to help you estimate the long-term environmental benefits from a tree planting project. The focus is on greenhouse gases, but many co-benefits are included.

This is a newly updated version of i-Tree Planting. Please clear your web browser's cache for this site before using.

Users enter the following information:

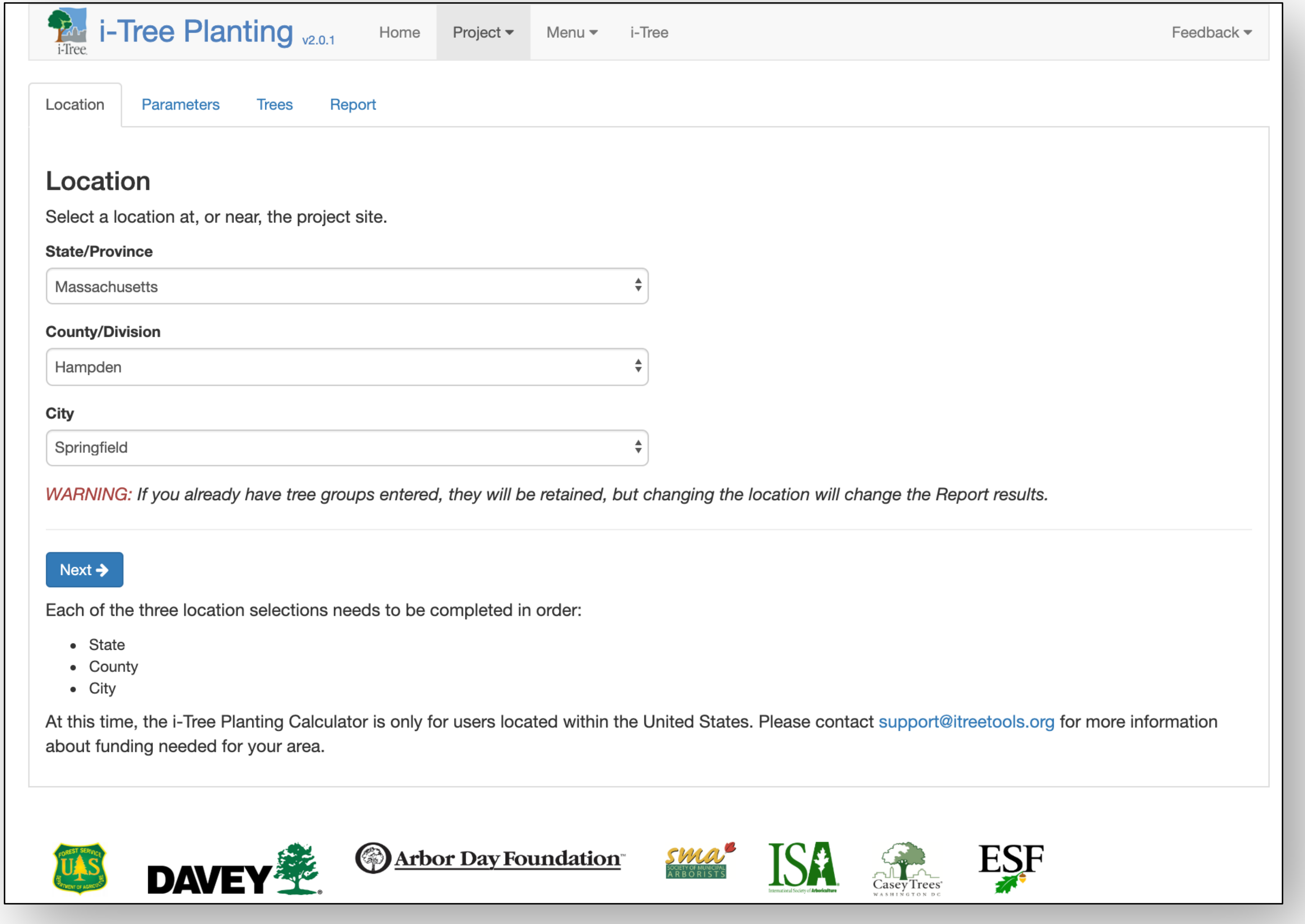
- Tree species
- Size of trees at planting
- Information on the distance and direction to the nearest building (optional)
- Information about the tree's growing conditions
- Estimated mortality (optional)
- The number of trees with each configuration
- Project lifetime (number of years)
- Specific greenhouse gas values (optional)

The following information is calculated (in units and associated dollar values) for the project life time:

- Greenhouse Gas (GHG) sequestered and avoided (owing to reductions in energy use)
- Energy conserved
- Air pollutants captured and avoided
- Stormwater filtered
- Tree total biomass

Use of this tool indicates acceptance of the EULA.

A collaborative initiative with


i-Tree Planting v2.0.1
Home
Project
Menu
i-Tree
Feedback
Location
Parameters
Trees
Report
Next
DAVEY
Arbor Day Foundation
ISA
Casey Trees
ESF

Location

Select a location at, or near, the project site.

State/Province
Massachusetts

County/Division
Hampden

City
Springfield

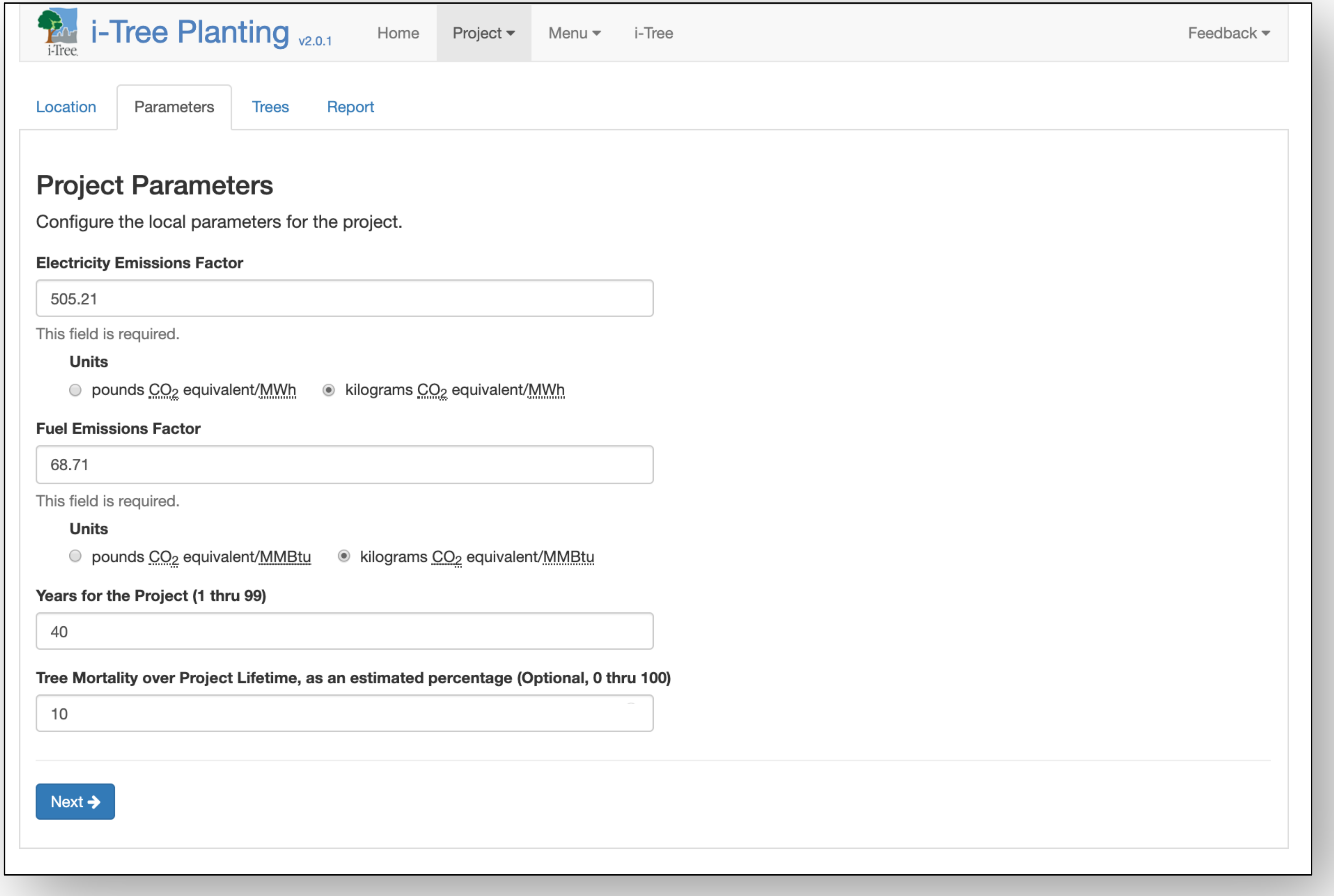
WARNING: *If you already have tree groups entered, they will be retained, but changing the location will change the Report results.*

Each of the three location selections needs to be completed in order:

- State
- County
- City

At this time, the i-Tree Planting Calculator is only for users located within the United States. Please contact support@itreetools.org for more information about funding needed for your area.

A collaborative initiative with


i-Tree
i-Tree Planting v2.0.1
Home
Project
Menu
i-Tree
Feedback
Location
Parameters
Trees
Report

Project Parameters

Configure the local parameters for the project.

Electricity Emissions Factor

505.21

This field is required.

Units

○ pounds CO_2 equivalent/MWh ● kilograms CO_2 equivalent/MWh

Fuel Emissions Factor

68.71

This field is required.

Units

○ pounds CO_2 equivalent/MMBtu ● kilograms CO_2 equivalent/MMBtu

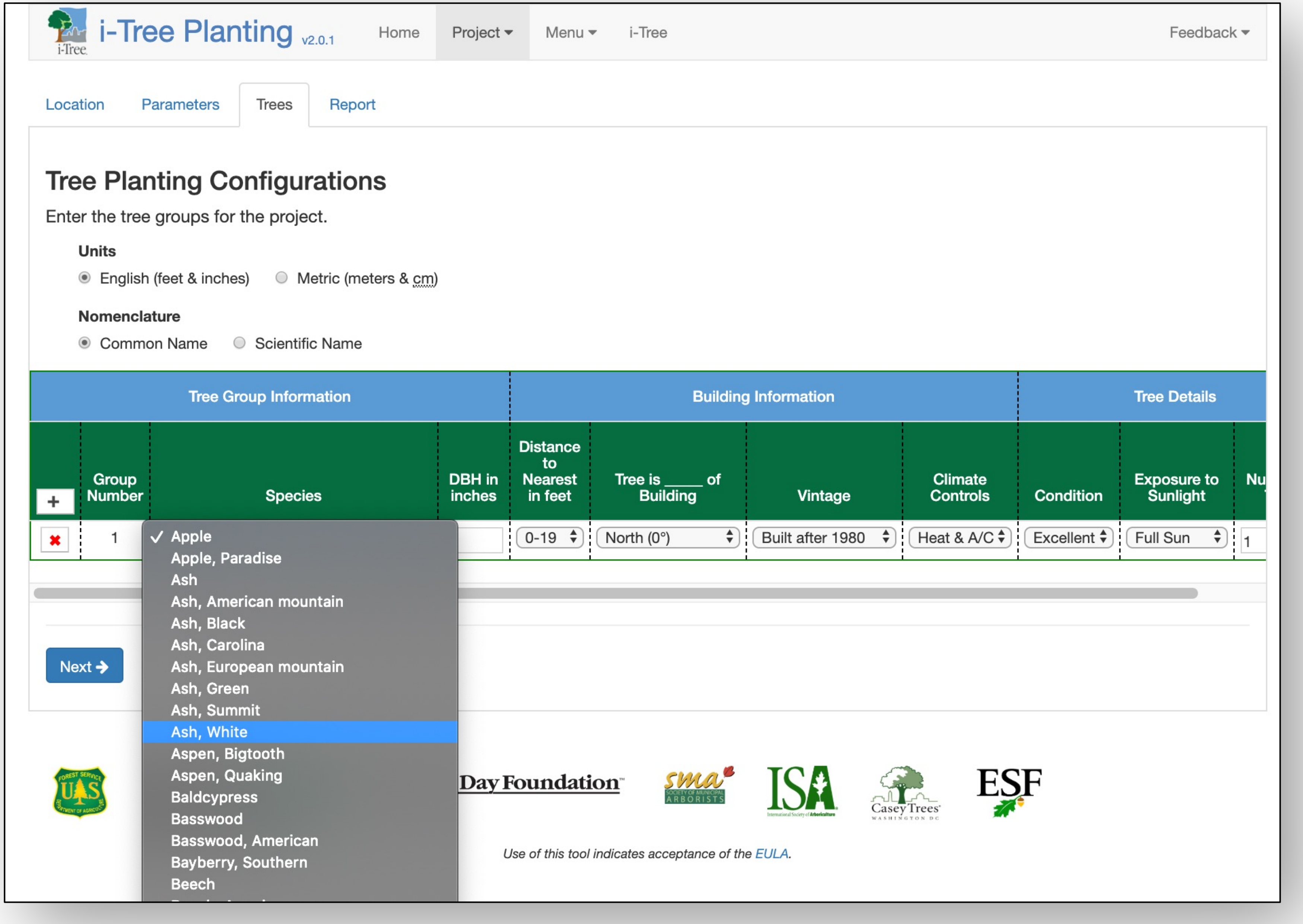
Years for the Project (1 thru 99)

40

Tree Mortality over Project Lifetime, as an estimated percentage (Optional, 0 thru 100)

10

A collaborative initiative with


i-Tree Planting v2.0.1
Home
Project
Menu
i-Tree
Feedback
Location
Parameters
Trees
Report

Tree Planting Configurations

Enter the tree groups for the project.

Units

● English (feet & inches) ○ Metric (meters & cm)

Nomenclature

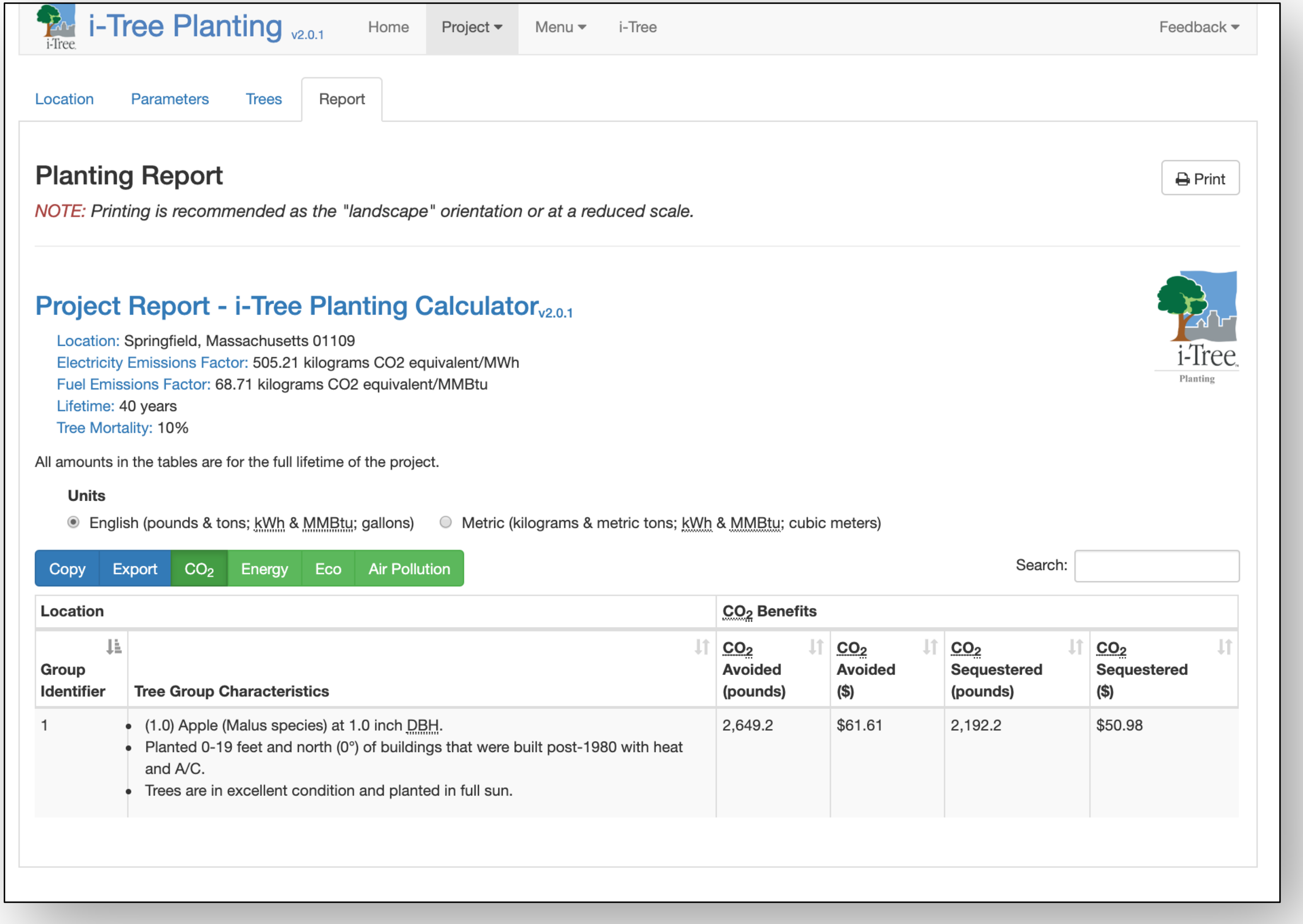
● Common Name ○ Scientific Name

Tree Group Information				Building Information				Tree Details		
+	Group Number	Species	DBH in inches	Distance to Nearest in feet	Tree is ____ of Building	Vintage	Climate Controls	Condition	Exposure to Sunlight	Nu
✖	1	Apple		0-19	North (0°)	Built after 1980	Heat & A/C	Excellent	Full Sun	1

✓ Apple
Apple, Paradise
Ash
Ash, American mountain
Ash, Black
Ash, Carolina
Ash, European mountain
Ash, Green
Ash, Summit
Ash, White
Aspen, Bigtooth
Aspen, Quaking
Baldcypress
Basswood
Basswood, American
Bayberry, Southern
Beech
Next

Use of this tool indicates acceptance of the EULA.

A collaborative initiative with


i-Tree Planting v2.0.1
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Planting Report

NOTE: Printing is recommended as the "landscape" orientation or at a reduced scale.

Project Report - i-Tree Planting Calculator v2.0.1

Location: Springfield, Massachusetts 01109
Electricity Emissions Factor: 505.21 kilograms CO2 equivalent/MWh
Fuel Emissions Factor: 68.71 kilograms CO2 equivalent/MMBtu
Lifetime: 40 years
Tree Mortality: 10%

All amounts in the tables are for the full lifetime of the project.

Units

● English (pounds & tons; kWh & MMBtu; gallons) ○ Metric (kilograms & metric tons; kWh & MMBtu; cubic meters)

Location		**CO_2 Benefits**			
Group Identifier	**Tree Group Characteristics**	**CO_2 Avoided (pounds)**	**CO_2 Avoided ($)**	**CO_2 Sequestered (pounds)**	**CO_2 Sequestered ($)**
1	• (1.0) Apple (Malus species) at 1.0 inch DBH. • Planted 0-19 feet and north (0°) of buildings that were built post-1980 with heat and A/C. • Trees are in excellent condition and planted in full sun.	2,649.2	$61.61	2,192.2	$50.98

Powerpoint and Resources
www.unri.org/lexington/

www.itreetools.org

www.unri.org

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Powerpoint and Resources

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