

# i-Tree Tools for Colorado and Our Communities



A banner for i-Tree Academy Online Training. On the left is the i-Tree logo (a green tree and grey skyline). To the right of the logo, the text "i-Tree Academy" is written in a large, bold, green, sans-serif font. Below this, the words "Online Training" are written in a smaller, black, sans-serif font. At the bottom, the dates "March 3rd – June 2nd, 2021" are written in a black, sans-serif font. The entire banner is enclosed in a yellow border.

## Learn about i-Tree

More than beauty and shade, trees work hard for us all. Explore how trees improve the environment in communities big and small, urban and rural... even in your own backyard!

What benefits do trees provide? →



# *Today's i-Tree Core Topics*



*I. Design, MyTree, Species, Planting*

*II. Landscape, County*

*III. Canopy*

*IV. Eco, Harvest*

*V. Application (CO FAP, Citizen Science)*

# Core Tools and Utilities



## Core Tools

*These are the flagship tools for i-Tree, listed by ease-of-use.*

- i-Tree MyTree
- i-Tree Landscape
- i-Tree Design
- i-Tree Canopy
- i-Tree Eco

## Powered by i-Tree

*We are lucky to have many partners using i-Tree in their own projects.*

- County Tree Benefits
- GHG Planting Calculator (also know as i-Tree Planting)
- Harvest Carbon Calculator (formerly known as PRESTO)

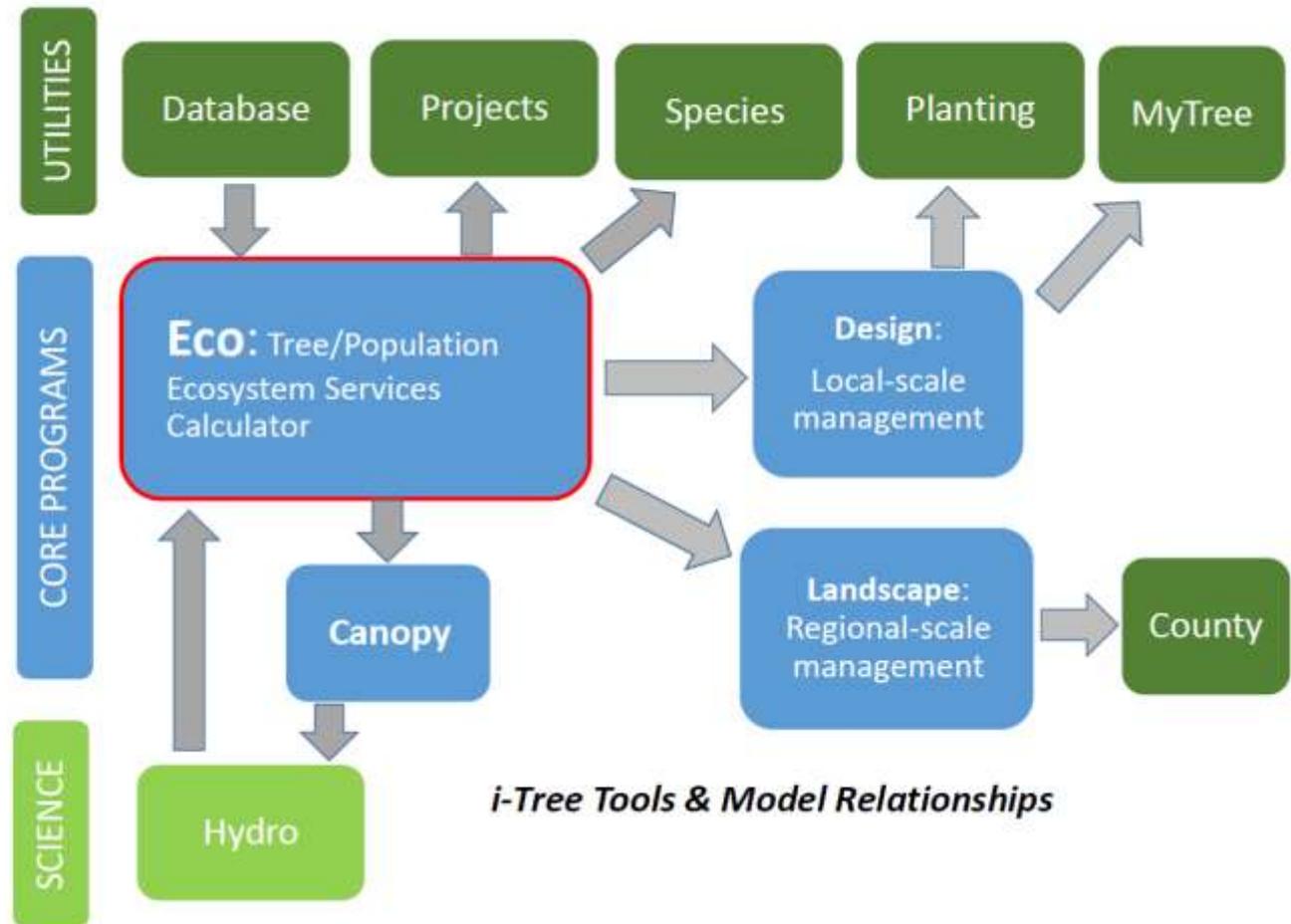
## Utilities

*These smaller tools supplement i-Tree.*

- i-Tree Species

# i-Tree Tool Selection Framework

- *My objectives?*
- *Tool advantages, limitations, and options?*
- *Available resources?*
- *Technical capacity or skillset?*
- *Timeline?*
- *Audience?*
- *What does success look like for me?*





# Which Tool Should I Use?

May 12, 2020

## For forests and many trees:

- *i-Tree Eco (desktop app)* Flagship tool that quantifies the structure of, threats to, benefits, and values provided by forest populations globally.
- *i-Tree Projects (web app)* An online platform for sharing results and data from i-Tree Eco assessments. Currently in beta - additional projects coming soon!
- *i-Tree Landscape (web app)* Rapidly assess human and forest population information; threats to help prioritize areas for tree planting; protection.
- *i-Tree County (web app)* Quickly learn the numerous benefits that trees provide within your county.
- *i-Tree Canopy (web app)* Easily estimate tree canopy and benefits using aerial photographs. *see Canopy report example*

## For individual and small amounts of trees:

- *i-Tree Design (web app)* Parcel level analysis of current and future tree benefits.
- *i-Tree MyTree (web app)* Easily assess the value of one to several trees in a mobile web browser.

## For effects on stream flow & water quality:

- *i-Tree Hydro (desktop app)* Quantify the effects of tree canopy and impervious cover on water quantity and quality.

## For recommendations on what species to plant:

- *i-Tree Species (web app)* Determine the best species that meet your desired benefits.

## For benefits of new tree planting projects:

- *i-Tree Planting (web app)* Estimate the long-term environmental benefits from a tree planting project.

## For carbon stored in harvested wood products:

- *i-Tree Harvest (web app)* Estimate the amount of carbon stored in harvested wood products.

<https://www.itreetools.org/tools/which-tool-should-i-use>

# *Today's i-Tree Core Topics*



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*II. Landscape, County*

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*V. Application (CO FAP, Citizen Science)*



# *I. Design, MyTree, Planting, Species*

## **For individual and small amounts of trees:**

- i-Tree Design (*web app*) Parcel level analysis of current and future tree benefits.
- i-Tree MyTree (*web app*) Easily assess the value of one to several trees in a mobile web browser.

## **For recommendations on what species to plant:**

- i-Tree Species (*web app*) Determine the best species that meet your desired benefits.

## **For benefits of new tree planting projects:**

- i-Tree Planting (*web app*) Estimate the long-term environmental benefits from a tree planting project.



# *I. Design, MyTree, Planting, Species*

## i-Tree Design v7.0\*

i-Tree Design allows anyone to make a simple estimation of the benefits provided by individual trees. With inputs of location, species, tree size, and condition, users will receive an understanding of tree benefits related to greenhouse gas mitigation, air quality improvements, and stormwater interception. With the additional step of drawing a building footprint – and virtually "planting" or placing a tree – tree effects on building energy use can be evaluated.

Tree benefits are estimated for (a) the current year, (b) a user-specified forecast year sometime in the future, (c) the projected total benefits across that future timespan, and (d) the total benefits provided to date (based on estimated tree age). Multiple trees and buildings can be added to compare benefits or to provide a full accounting of a property's trees.

This tool is intended as a simple and accessible starting point for understanding the value of individual trees or a small population of trees to a community. For more detailed information on urban and community forest assessments, please explore more of the [i-Tree](#) website. To learn more about the i-Tree Design model, click [here](#).



Laptop users (mouse)  Tablet users (finger taps)

**Enter a street address below to get started:**

3843 Laporte Ave. Fort Collins, CO 80521

Go!

-or-

Load Previously Saved Project

Use of this tool indicates you accept our [EULA](#).

# Design – Let's get started!



i-Tree Design v7.0

3843 Laporte Ave, Fort Collins, CO 80521, USA

[Start Over](#)  
[Save Progress](#)  
[About](#)

Get started with these easy steps:

## 1. Draw Structures ?

## 2. Place Trees ?

Please break large projects into smaller projects of no more than 25 trees at a time.

### Describe your tree:

- Tree species:

The David Elm

Common

- Tree diameter: 3 Inches  
or circumference: 9.4
- Tree condition: Excellent
- 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:

Model Crown Growth



Map data ©2021 Imagery ©2021, Maxar Technologies Terms of Use Report a map error  
Lat: 40.58797 Bearing: 202 Tree: The David Elm (3 Inches) Energy Savings: \$0.00  
Lng: -105.14586 Distance: 37.3m (122.3ft) Total Savings: \$0.17 kWh: 0.0 Therm: 0.0

Less desirable More desirable

Preferred planting zones to maximize tree benefits are shown around the structure.  
Zone colors are generic for all tree species and sizes. Benefit values will change based on tree and building characteristics and tree placement.

# Design

i-Tree Design v7.0

3843 Laporte Ave, Fort Collins, CO 80521, USA

[Start Over](#)  
[Save Progress](#)  
[About](#)

Get started with these easy steps:

1. Draw Structures ?
2. Place Trees ?
3. Estimate Benefits ?

**You can calculate the benefits of your tree(s) for current and future years, as well as the total to date.**

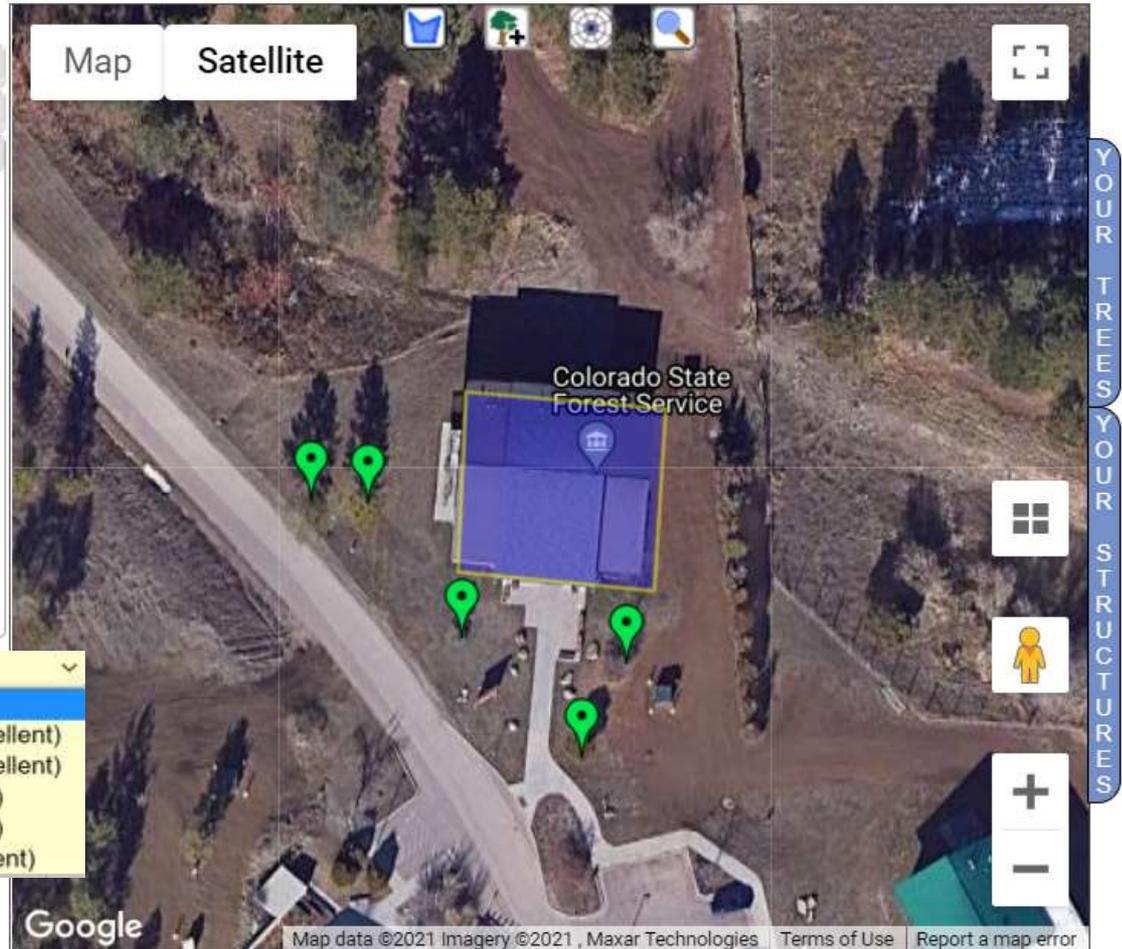
- Enter the number of years (2–99) below to track tree growth and benefits.

Years:

**Get your results!** (Save your project BEFORE calculating. Large projects may fail during times of heavy demand. Saving allows you to try again later!)

[Calculate »](#)

All Trees
All Trees
#1 Ponderosa pine (DBH:10 inches, Condition:Excellent)
#2 Ponderosa pine (DBH:10 inches, Condition:Excellent)
#3 Blue spruce (DBH:5 inches, Condition:Excellent)
#4 Blue spruce (DBH:5 inches, Condition:Excellent)
#5 The David Elm (DBH:3 inches, Condition:Excellent)



Google  
Lat: 40.58820  
Log: 105.14637

Map data ©2021 Imagery ©2021, Maxar Technologies Terms of Use Report a map error

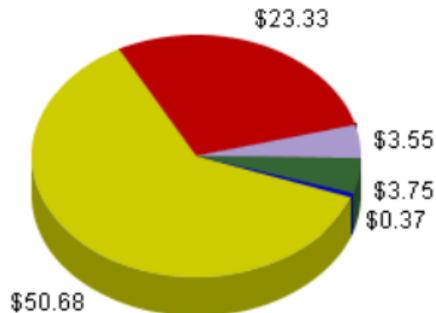


- All Trees
- All Trees
- #1 Ponderosa pine (DBH:10 inches, Condition:Excellent)
- #2 Ponderosa pine (DBH:10 inches, Condition:Excellent)
- #3 Blue spruce (DBH:5 inches, Condition:Excellent)
- #4 Blue spruce (DBH:5 inches, Condition:Excellent)
- #5 The David Elm (DBH:3 inches, Condition:Excellent)

Display results for: All Trees

Overall Benefits Stormwater Energy Air Quality Carbon Dioxide

- Stormwater
- Air Quality
- Winter Savings
- CO2
- Summer Savings



Breakdown of tree benefits

Click on one of the tabs above for more detail

**Your selected trees will provide overall benefits of \$82 in the current year.**

While some functional benefits of trees are well documented, others are difficult to quantify (e.g., human social and communal health). Trees' specific geography, climate, and interactions with humans and infrastructure are highly variable and make precise calculations that much more difficult. Given these complexities, the results presented here should be considered initial approximations to better understand the environmental and economic value associated with trees and their placement.

Benefits of trees do not account for the costs associated with trees' long-term care and maintenance.

**If these trees are cared for and grow, they will provide \$77 worth of annual benefit in 50 years. See 'Future Year (2071)' tab at left for details.**

Current Year (2021)

Future Year (2071)

Total (2021-2071)

Total to Date

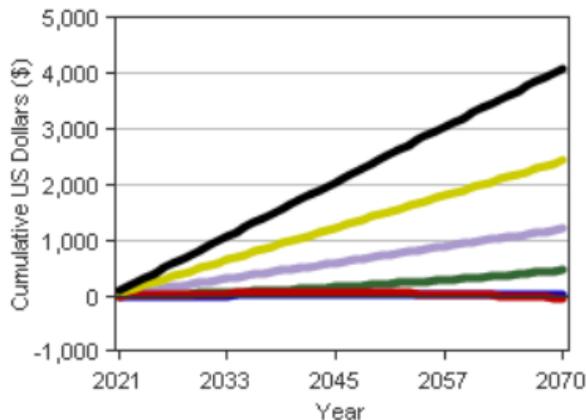


Display results for: All Trees ▼

Overall Benefits
Stormwater
Energy
Air Quality
Carbon Dioxide

Current Year (2021)  
Future Year (2071)  
Total (2021-2071)  
Total to Date

- Stormwater
- Air Quality
- CO2
- Winter Savings
- Summer Savings
- Total



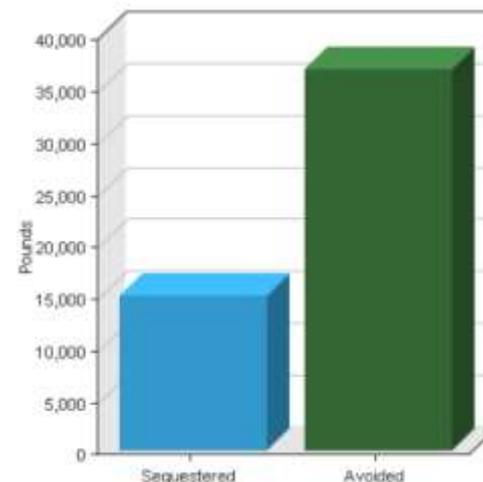
**Breakdown of tree benefits**

Click on one of the tabs above for more detail

**If they are cared for, these trees will provide a total of \$4,089 worth of overall benefits over next 50 years.**

While some functional benefits of trees are well documented, others are difficult to quantify (e.g., human social and communal health). Trees' specific geography, climate, and interactions with humans and infrastructure are highly variable and make precise calculations that much more difficult. Given these complexities, the results presented here should be considered initial approximations to better understand the environmental and economic value associated with trees and their placement.

Benefits of trees do not account for the costs associated with trees' long-term care and maintenance.



**Over the next 50 years, these trees will reduce atmospheric carbon dioxide (CO2) by a total amount of 51,851 pounds.**

# Design, MyTree - Reports



## Total Projected Benefits (2021-2071) - Over the next 50 years, based on forecasted tree growth, i-Tree Design projects total benefits worth \$4,089:

- \$38 of storm runoff savings by avoiding 4,275 gallons of stormwater runoff (intercepting 171,100 gallons of rainfall)
- \$459 of air quality improvement savings by absorbing and intercepting pollutants such as ozone, sulfur dioxide, nitrogen dioxide, and particulate matter; reducing energy production needs; and lowering air temperature
- \$1,206 of savings by reducing 51,851 lbs. of atmospheric carbon dioxide through CO<sub>2</sub> sequestration and decreased energy production needs and emissions
- \$2,430 of summer energy savings by direct shading and air cooling effect through evapotranspiration
- \$-44 of winter energy savings by slowing down winds and reducing home heat loss

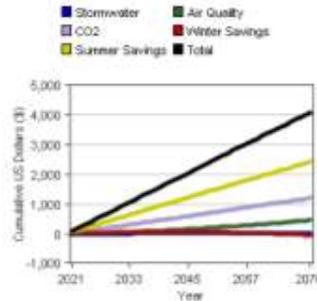


Figure 1. Tree benefit forecast for 50 years

- Stormwater
- Air Quality
- Winter Savings
- CO2
- Summer Savings

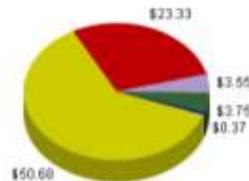


Figure 2. Annual tree benefits for 2021

## Current Year - For 2021, i-Tree Design estimates annual tree benefits of \$81.67:

- \$0.37 of stormwater runoff savings by avoiding 41 gallons of stormwater runoff (intercepting 1,635 gallons of rainfall)
- \$3.75 of air quality improvement savings
- \$23.33 of carbon dioxide reduction savings
- \$50.68 of summer energy savings
- \$3.55 of winter energy savings

[← Return to My Tree List](#)

## MyTree Benefits

David Lim, The David Lim, (Gulfstream)

Sapling Size: 3.00 in. diameter  
 Condition: Good

Total benefits for this year: **\$3.81**

**Carbon Dioxide (CO<sub>2</sub>) Sequestered: \$0.01**

Annual CO<sub>2</sub> equivalent of carbon<sup>1</sup>: 0.26 lbs

**Storm Water (Runoff) Avoided: \$0.10**

Runoff Avoided: 5.28 gal

Runoff Intercepted: 211.01 gal

**Air Pollution Removed Each Year: \$0.11**

Carbon Monoxide: + 0.11 oz

Ozone: 0.98 oz

Nitrogen Dioxide: 0.15 oz

Sulfur Dioxide: + 0.11 oz

PM<sub>2.5</sub>: + 0.11 oz

**Energy Usage Per Year<sup>2</sup>: \$2.54**

Electricity Savings (kWh): 10.91 kWh

Fuel Savings (natural gas, oil): 0.07 MMBtu

**Avoided Energy Emissions: \$1.05**

Carbon Dioxide: 0.43 lbs

Carbon Monoxide: 0.28 oz

Nitrogen Dioxide: 0.21 oz

Sulfur Dioxide: 0.04 oz

PM<sub>2.5</sub>: + 0.11 oz

**CO<sub>2</sub> Stored to Date<sup>3</sup>: \$1.11**

Lifetime CO<sub>2</sub> equivalent of carbon<sup>4</sup>: 17.60 lbs

Benefits are estimated based on USDA Forest Service Research and are meant for guidance only.

<sup>1</sup> For large trees, sequestration is converted by CO<sub>2</sub> loss with decay/loss factors.

<sup>2</sup> Positive energy values indicate savings or reduced emissions. Negative energy values indicate increased usage or emissions.

<sup>3</sup> Not an annual amount or value.

Visit [www.i-treetools.org](http://www.i-treetools.org) to learn more.

MyTree 2.0.0

Powered by the i-Tree Engine



A cooperative initiative between:



# Planting



## Welcome to the i-Tree Planting Calculator! v2.1.2

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



 Get Started

Use of this tool indicates acceptance of the EULA.

# Planting



## Project Report - i-Tree Planting Calculator<sub>v2.1.2</sub>

Location: Fort Collins, Colorado 80525

Electricity Emissions Factor: 1,736.73 pounds CO2 equivalent/MWh

Fuel Emissions Factor: 185.89 pounds CO2 equivalent/MMBtu

Lifetime: 50 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)

Search:

Location		CO <sub>2</sub> Benefits			
Group Identifier	Tree Group Characteristics	CO <sub>2</sub> Avoided (pounds)	CO <sub>2</sub> Avoided (\$)	CO <sub>2</sub> Sequestered (pounds)	CO <sub>2</sub> Sequestered (\$)
1	<ul style="list-style-type: none"> <li>(1.0) Elm (<i>Ulmus</i> species) at 3.0 inches DBH.</li> <li>Planted 20-39 feet and south (180°) of buildings that were built post-1980 with heat and A/C.</li> <li>Trees are in good condition and planted in full sun.</li> </ul>	-6,226.8	\$-144.82	6,815.3	\$158.50

# Species



## Welcome to i-Tree Species!

i-Tree Species is designed to help urban foresters select the most appropriate tree species based on the species potential environmental services and geographic area. Users select and rank the importance (0-10) of each environmental service desired from trees. The program then calculates the best tree species based on the user-provided weighting of environmental benefits of tree species at maturity.

Species are selected based on three types of information:

1. **Hardiness** – as determined by state and city.
2. **Mature height** – user specified minimum and maximum heights.
3. **Environmental factors** – ranked from 0 to 10:
  - o Air pollution removal
  - o Air temperature reduction
  - o Ultraviolet radiation reduction
  - o Carbon storage
  - o Pollen allergenicity
  - o Building energy conservation
  - o Wind reduction
  - o Stream flow reduction (storm water manager



### Air Pollutant Removal (0-10 importance)

Rank each of the following environmental services from 0 to 10 on how important these tree services are to you. 0 = not important; 10 = highly important.

#### Pollutant Removal

Overall  Specific

Overall Rate ?



- Select Overall to consider the overall air pollutant removal impact of any tree (weights five pollutants based on the estimated effect of each pollutant).
- If you wish to rank the pollutants individually, select Specific to see a list of five pollutants.
- Ranking sliders: 10 is most important while choosing 0 means the pollutant will not be considered during species selection.

The combination of hardiness, mature height, and desire suited for local use that maximizes environmental service: as it will need to be whittled down to meet local needs account as well. For more information and to learn about section.



[Get Started](#)

Use of this tool indicates acceptance of the EULA.

### Other Functions (0-10 importance)



- Eight additional environmental functions can be considered here.
- Click the ? button to see a description of any function.
- Ranking sliders: 10 is most important while choosing 0 means the factor will not be considered during species selection.

[Clear Section](#) [Next](#)

# Species Report



Save Report

Print Report

Start Over

## Trees Recommended by i-Tree Species

This is a list of the top 10% of tree species based on the following functions.

Generated: 5/28/2021

Location: Fort Collins, Colorado, United States of America

Hardiness: 5



### Air Pollutant Removal

Rank each of the following = highly important.

- Minimum Height: None
- Maximum Height: None

#### Air Pollutant Removal (0-10 Importance)

- Overall: 10

#### Pollutant Removal

Overall  Specific

#### Other Functions (0-10 Importance)

- Low VOC: 0
- Carbon Storage: 0
- Wind Reduction: 0
- Air Temperature Reduction: 0
- UV Radiation Reduction: 0
- Building Energy Reduction: 0
- Streamflow Reduction: 0
- Low Allergenicity: 0

#### Overall Rate

S = Sensitive I = Intermediate S/I = Indeterminate

- Select Overall to consider pollutant.
- If you wish to rank the pollutant, use the ranking sliders.
- Ranking sliders: 10 is most important.

### Species

Scientific Name	Common Name	Hardiness Zone	Invasive	Sensitivity			Pest Risk Possible Pests
				Ozone (O3)	Nitrogen Dioxide (NO2)	Sulfur Dioxide (SO2)	
TSUGA MERTENSIANA	MOUNTAIN HEMLOCK	5 ~ 7					Fir Engraver, Southern Pine Beetle, Western Spruce Budworm, Douglas-fir Black Stain Root Disease
TSUGA CANADENSIS	EASTERN HEMLOCK	4 ~ 7		I			Hemlock Woolly Adelgid, Southern Pine Beetle
ULMUS AMERICANA	AMERICAN ELM	3 ~ 9			I/S		Asian Longhorned Beetle, Dutch Elm Disease, Winter Moth
LIRIODENDRON TULIPIFERA	TULIP TREE	5 ~ 9		S			

- Eight additional environmental functions are available.
- Click the ? button to see a description of any function.
- Ranking sliders: 10 is most important while choosing 0 means the factor will not be considered during species selection.

Clear Section

Next

# *Today's i-Tree Core Topics*



✓ *I. Design, MyTree, Species, Planting*

*II. Landscape, County*

*III. Canopy*

*IV. Eco, Harvest*

*V. Application (CO FAP, Citizen Science)*



## *II. Landscape, County*

### For forests and many trees:

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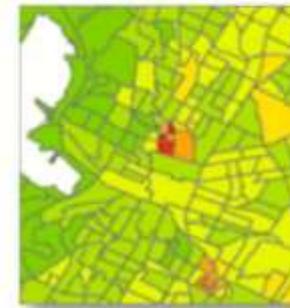
# II. Landscape, County

## Welcome to i-Tree Landscape! v4.3.1

Offering more than just beauty and shade, trees provide intangible benefits, such as removal of atmospheric carbon dioxide and pollution, stormwater reduction, temperature modification, and more. i-Tree Landscape allows you to explore tree canopy, land cover, and basic demographic information in a location of your choosing. With the information provided by i-Tree Landscape, you will learn about the benefits of trees in your selected location, see how planting trees will increase the benefits provided, and map the areas where you decide to prioritize your tree planting efforts.



Ozone	
\$	g/m <sup>2</sup> /yr
90122.16	8.59
PM2.5	
\$	g/m <sup>2</sup> /yr
202948.10	0.42



Find Location

Explore Location Data

See Tree Benefits

Prioritize Tree Planting

Generate Results

# II. Landscape, County

The screenshot shows the i-Tree ACADEMY web application interface. On the left is a map of Broomfield, Colorado, with a blue-shaded boundary area covering parts of the city. The map includes labels for 'Carolyn Holmberg Preserve at Rock...', 'INTERLOCKEN', 'Broomfield', 'NORTH WESTMINSTER', 'NORTH CENTRAL WESTMINSTER', 'Butterfly Pavilion', 'EAST CENTRAL WESTMINSTER', 'WEST WESTMINSTER', 'WEST CENTRAL WESTMINSTER', 'Federal Heights', 'Thornton', 'Northglenn', 'Standley Lake', and 'Colorado Hills Open Space'. Major roads like I-25, I-76, and US-287 are also visible. On the right is a control panel with a 'Main' tab selected. Below the tabs are expandable sections for 'Base Maps', 'Boundaries', and 'Selection Visibility Settings'. A section titled 'Choose a boundary area to analyze:' has a dropdown menu set to 'US Census Block Group'. Below that, a section titled 'Use these tools to work with the map:' contains buttons for 'Navigate', 'Identify', 'Select', 'Box-Select', 'Geo-Swap', 'Clear', 'Process' (with a '20' indicator), and 'Start Over'.

Start on Main, then explore the map layer tabs.

Main Canopy & Land Forest Risk Health Risk Future Climate

Base Maps +

Boundaries +

Selection Visibility Settings +

Choose a boundary area to analyze:

US Census Block Group

Use these tools to work with the map:

Navigate Identify

Select Box-Select

Geo-Swap Clear

Process 20 Start Over

# II. Landscape, County

Progress bar: Find Locations (active) | Explore Location Data | See Tree Benefits | Prioritize Tree Planting | Generate Results

Buttons: Back | Land Cover (dropdown) | Unit: Metric | English | Display: Table | Chart | Next

Land Cover Settings: HiRes | 2011 | 2001

Data Tools: **Area** | Land Cover HiRes | Land Cover 2011 | Census Data | Forest Risk | Health Risk | Future Climate

Canopy & Impervious | Forest Details | Sea Level | Wildlife

Remove	Dataset	Type	Name	ID	Swap	Highlight	Area	Canopy	Impervious	Plantable Space				
							acre	% of all	acre	%	acre	%	acre	%
Selection Total:							11,227.9	100.00	300.1	2.71	3,286.3	29.44	7,525.3	67.84

Data Tools: Area | Land Cover HiRes | **Land Cover 2011** | Census Data | Forest Risk | Health Risk | Future Climate

Developed | Forest | Shrubland | Herbaceous | Planted/Cultivated | Barren | Wetlands | Water

Remove	Dataset	Type	Name	ID	Swap	Highlight	Developed, Open Space	Developed, Low Intensity	Developed, Medium Intensity	Developed, High Intensity				
							acre	%	acre	%	acre	%	acre	%
Selection Total:							2,146.3	19.12	3,131.1	27.89	2,080.8	18.53	816.4	7.27

Data Tools: Area | Land Cover HiRes | Land Cover 2011 | **Census Data** | Forest Risk | Health Risk | Future Climate

Population | Income Overview | Home Overview | Household Type | Home Tenure | Educational Attainment

Remove	Dataset	Type	Name	ID	Swap	Highlight	Population	Under 5	% Under 5	Under 18	% Under 18	Over 64	% Over 64	Median Age	Minority %
									%		%		%		%
Selection Total:							30,388.0	1,774.0	5.84	6,726.0	22.13	2,955.0	9.72	N/A	15.64



# II. Landscape, County

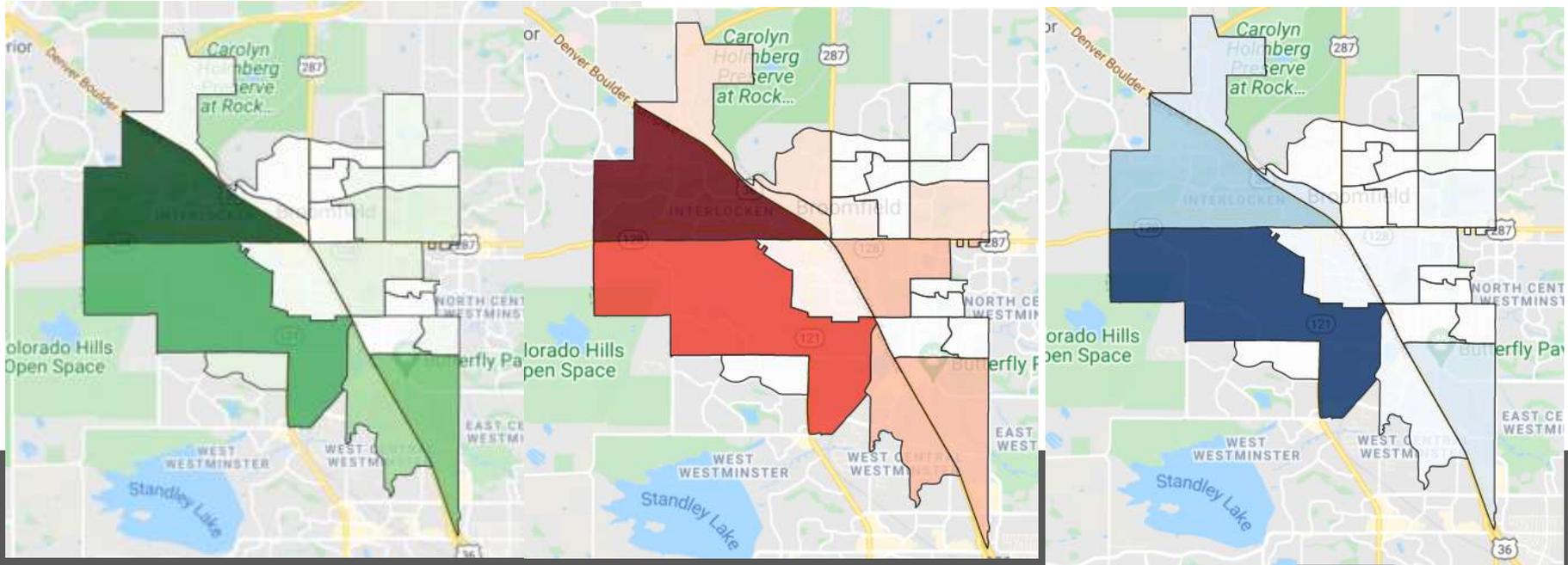
Progress bar: Find Locations (active), Explore Location Data, See Tree Benefits, Prioritize Tree Planting, Generate Results

[← Back](#)
Land Cover: HiRes | 2011 | 2001
Unit: Metric | English
Display: Table | Chart
[Next →](#)

Data Tools: Carbon | Air Pollution Removal | Hydrology

Remove	Dataset	Type	Name	ID	Swap	Highlight	Carbon Storage		Carbon Sequestration		CO <sub>2</sub> Equivalent Storage		CO <sub>2</sub> Equivalent Sequestration	
							\$	Short Ton	\$/yr	t/yr	\$	Short Ton	\$/yr	t/yr
Selection Total:							\$ 1,755,664	10,294.0	\$/yr 44,825	t/yr 262.8	\$ 1,755,664	37,745.0	\$/yr 44,825	t/yr 963.6

# II. Landscape, County



**Canopy Legend** ✕

Minimum: 4.0  
Maximum: 48.8

min  max

Lighter colors represent lower values, while darker colors represent higher values.

**Impervious Legend** ✕

Minimum: 32.8  
Maximum: 636.2

min  max

Lighter colors represent lower values, while darker colors represent higher values.

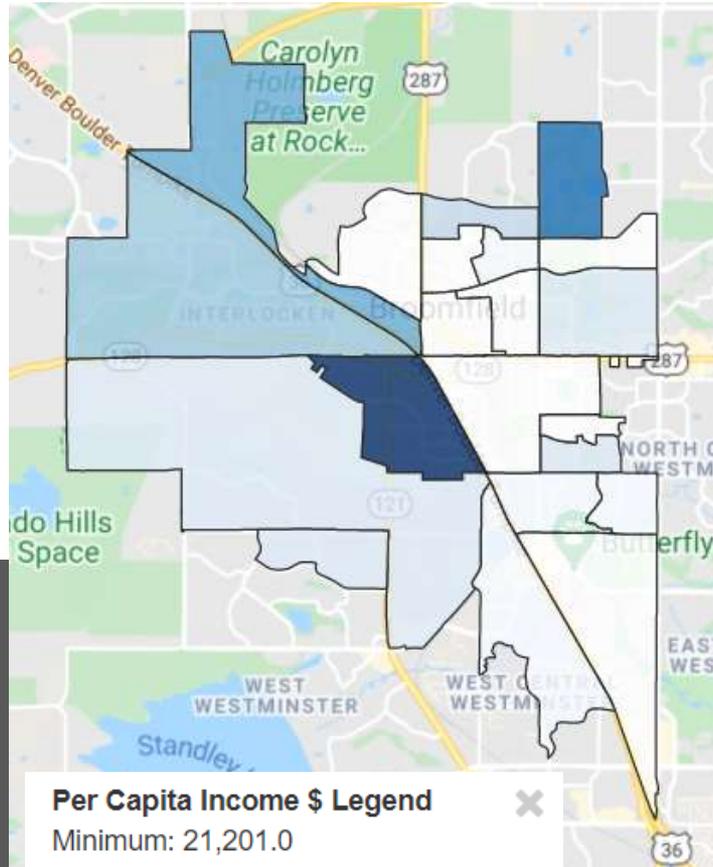
**Plantable Space Legend** ✕

Minimum: 50.7  
Maximum: 2,221.7

min  max

Lighter colors represent lower values, while darker colors represent higher values.

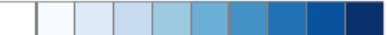
# II. Landscape, County



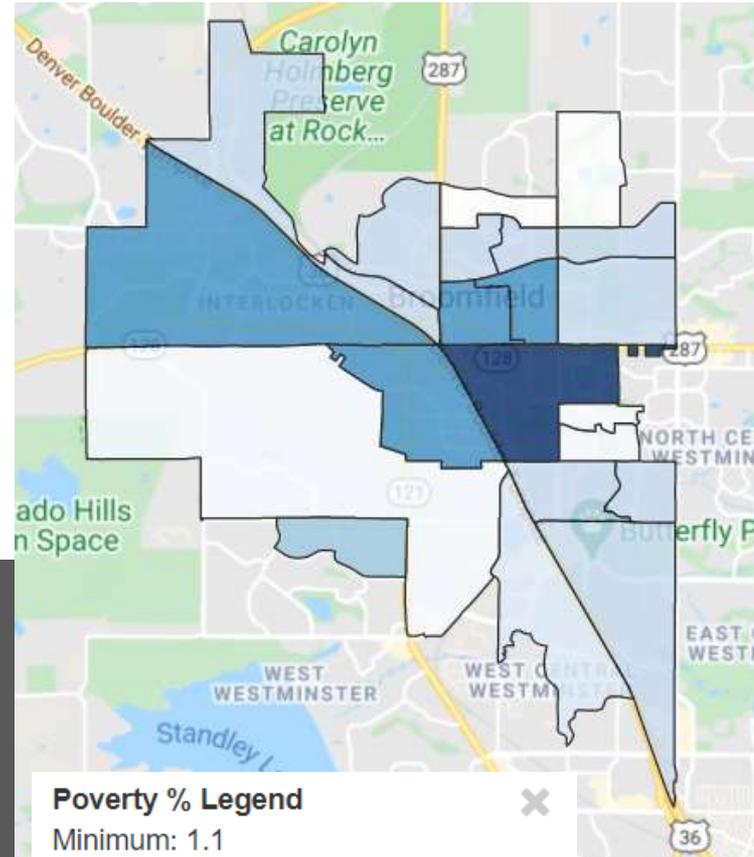
### Per Capita Income \$ Legend

Minimum: 21,201.0

Maximum: 87,371.0

min  max

Lighter colors represent lower values, while darker colors represent higher values.



### Poverty % Legend

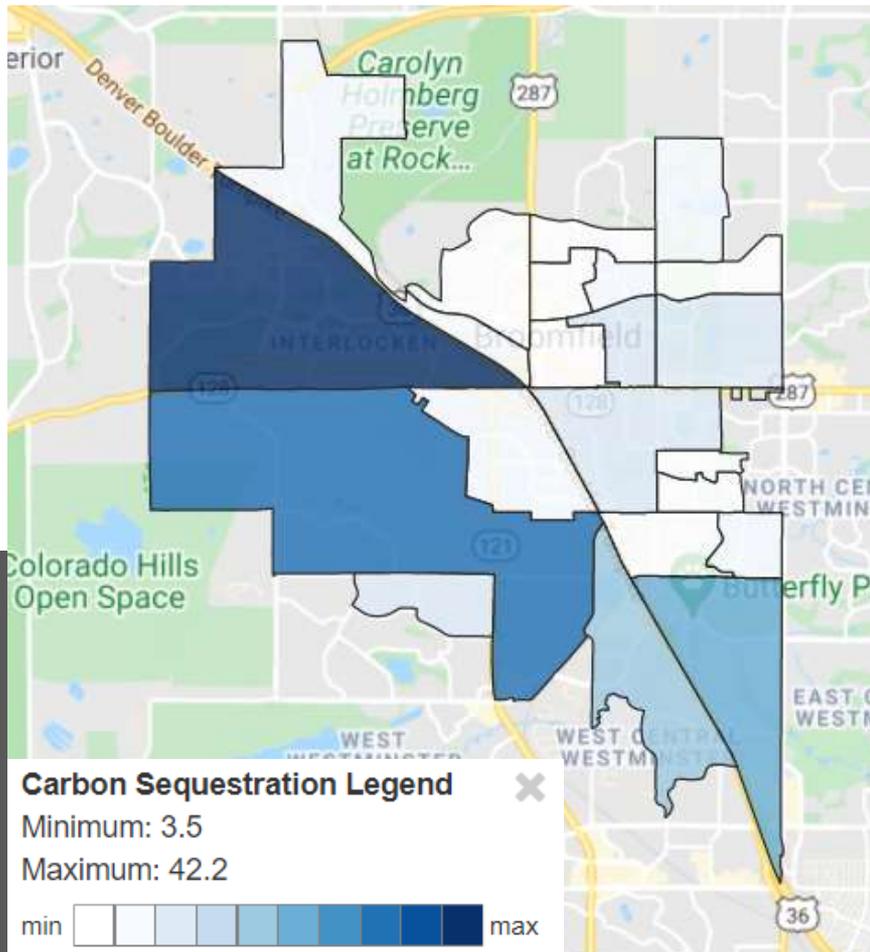
Minimum: 1.1

Maximum: 19.6

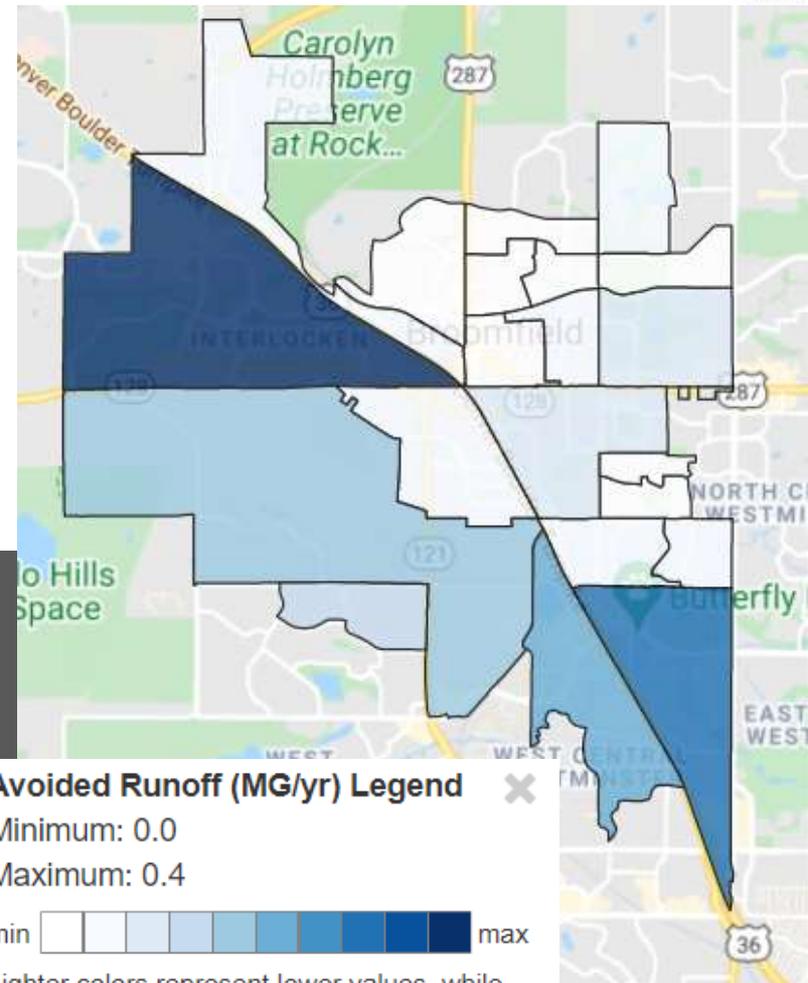
min  max

Lighter colors represent lower values, while darker colors represent higher values.

# II. Landscape, County

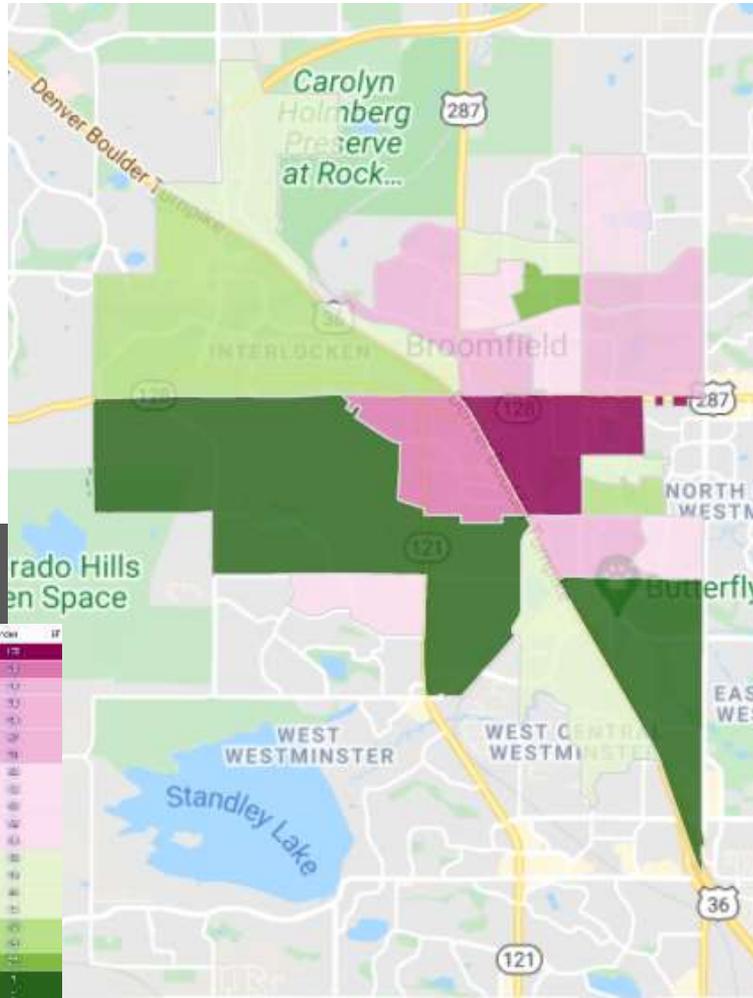


Lighter colors represent lower values, while darker colors represent higher values.



Lighter colors represent lower values, while darker colors represent higher values.

# II. Landscape, County



High Low **Tree Stocking Level** v

Importance (weight) 25 %

High Low **Tree Cover per Capita** x

Importance (weight) 25 %

High Low **Population Below Poverty Line** v

Importance (weight) 25 %

High Low **Plantable Space** v

Importance (weight) 25 %

# II. Landscape, County



i-Tree Landscape

## Executive Summary

Broomfield Area

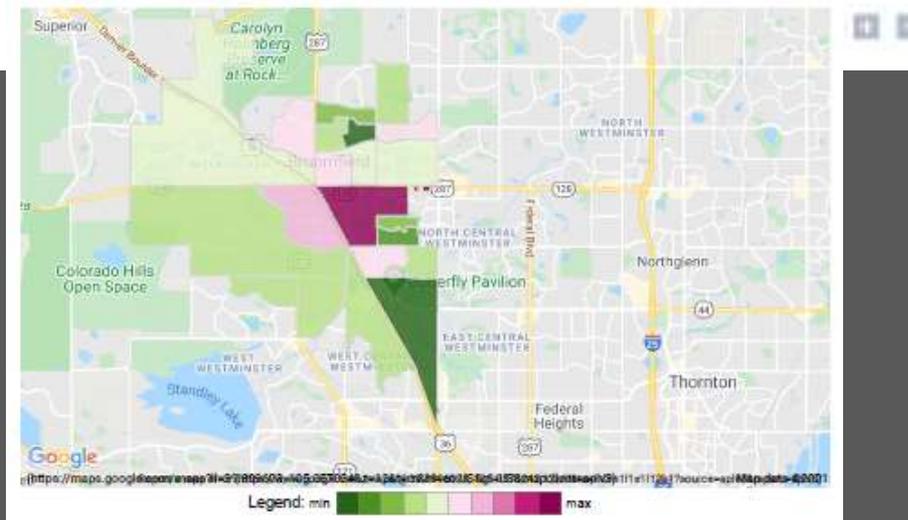
Date: 06/01/2021

landscape.itreetools.org

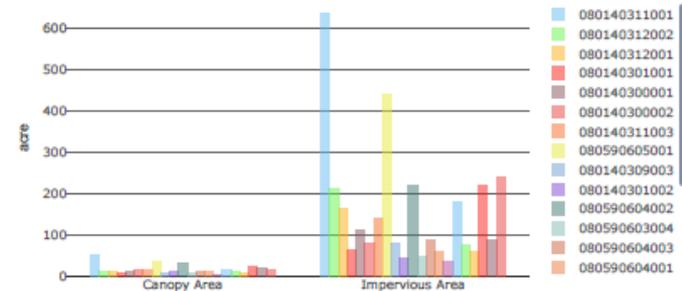
Version: 4.3.1

### Prioritization

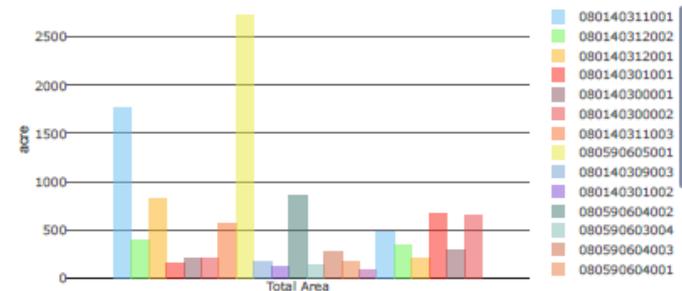
Poverty (High Resolution UTC)



Canopy & Impervious Area



Total Area



Canopy & Impervious (2011 NLCD)

	Area		Canopy		Impervious		Plantable Space	
	acre	% of all	acre	%	acre	%	acre	%
<b>Selection Total:</b>	11,227.9	100.00	300.1	2.71	3,266.3	29.44	7,525.3	67.84

# *Today's i-Tree Core Topics*



✓ *I. Design, MyTree, Species, Planting*

✓ *II. Landscape, County*

*III. Canopy*

*IV. Eco, Harvest*

*V. Application (CO FAP, Citizen Science)*

# II. Canopy

## For forests and many trees:

- i-Tree Canopy (*web app*) Easily estimate tree canopy and benefits using aerial photographs. *see Canopy report example*



## Welcome to i-Tree Canopy! v7.1

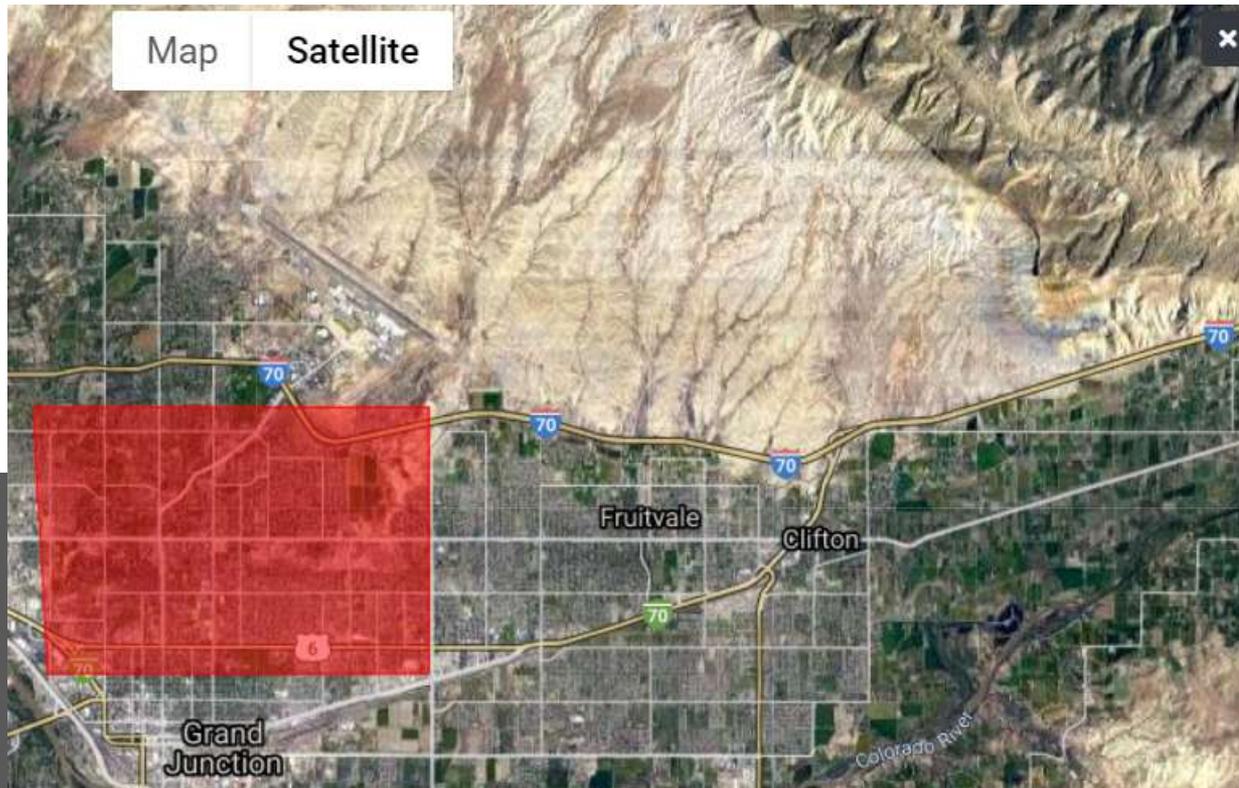
Estimate tree cover and tree benefits for a given area with a random sampling process that lets you easily classify ground cover types.

- Select from existing geographic boundaries, draw your own project area boundaries onto Google Maps, or load an ESRI shapefile.
- You can use multiple, non-overlapping boundaries at the same time.
- i-Tree Canopy randomly generates sample points and zooms to each one so you can choose from your pre-defined list of cover types for that spot.
- With i-Tree Canopy, you review Google Maps aerial photography at random points to conduct a cover assessment within a defined project area.
- 500-1000 survey points are suggested; the more points you complete, the better your cover estimate for your study area.
- If estimating tree cover, tree benefits can also be estimated.
- [Learn how i-Tree Canopy works.](#)
- [Video Learning Resources](#)

<https://www.itreetools.org/tools/which-tool-should-i-use>



# II. Canopy



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

[Launch Our Example Project](#)

Ready to survey your own area? Use these functions to map your project boundaries.

[US Boundaries](#) ▾

[UK Boundaries](#) ▾

[Load Shapefile Boundary](#)

[Draw Boundary](#)

Work with map boundaries

[Select](#)

[Delete](#)

You can combine multiple boundaries!

# II. Canopy



Cover Class

incl: 0.0%±0.00 Tree/Shrub: 0.0%±0.00 Water

[View Results](#) [Report](#)

[Add New Point](#)

ID

1

Cover Class

Impervious Road

Latitude 39.0919022370017

Longitude -108.58001249574

[Save](#) [Save & Create New](#)

Page 1 of 1

[Save your Project](#)

[Save](#) Save often - don't lose your data!

# II. Canopy



Cover Class

Other: 10.0%±10.00 Impervious Road: 20.0%±

**View Results** [Report](#)

**Add New Point**

ID:

Cover Class:

Latitude:

Longitude:

[Save](#) [Save & Create New](#)

[+](#) [-](#) [Page 2 of 2](#)

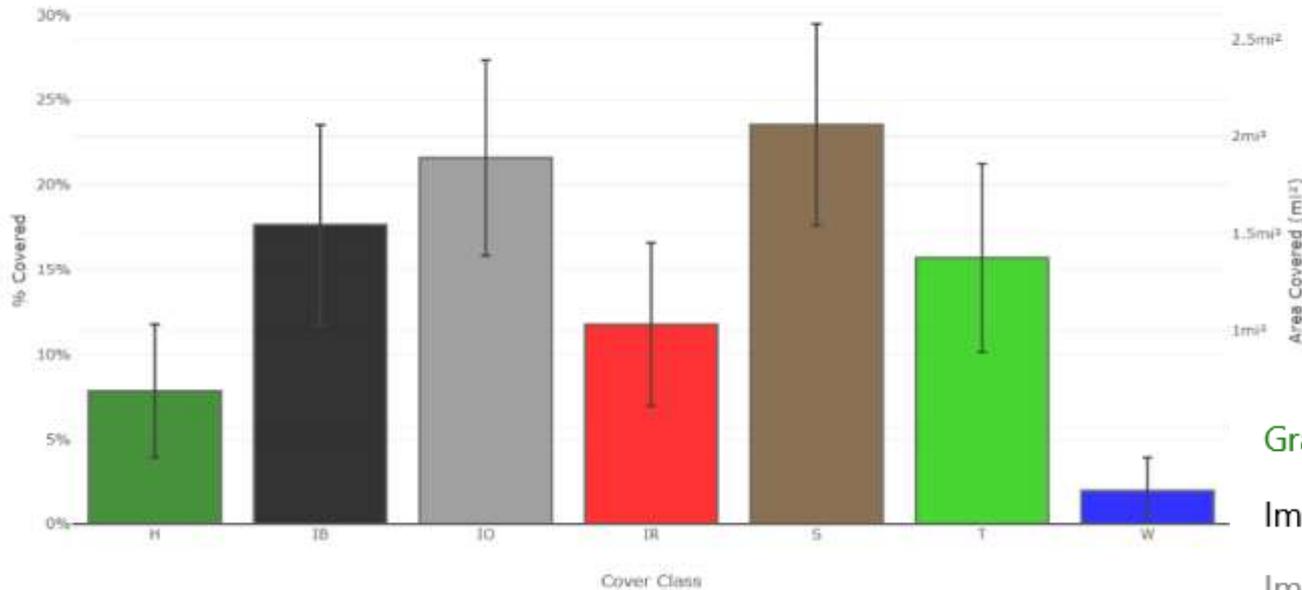
**Save your Project**

[Save](#) Save often - don't lose your data!

# II. Canopy



Cover Chart



Grass/Herbaceous: 7.8%±3.92

Impervious Buildings: 17.6%±5.88

Impervious Other: 21.6%±5.76

Impervious Road: 11.8%±4.80

Soil/Bare Ground: 23.5%±5.94

Tree/Shrub: 15.7%±5.55

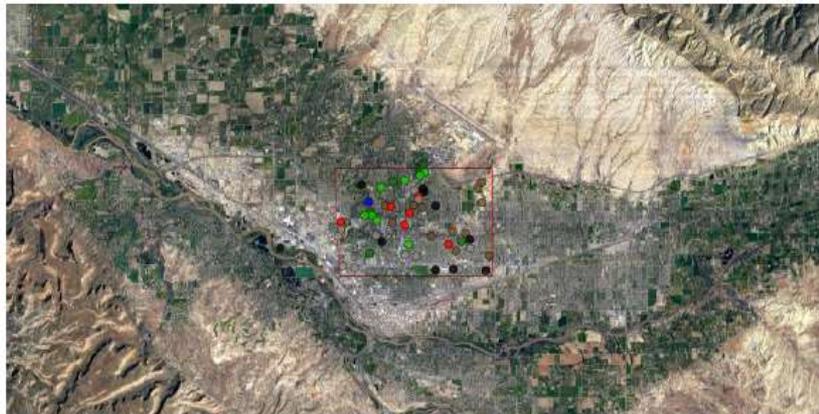
Water: 2.0%±1.96

# II. Canopy

i-Tree Canopy v7.1

Cover Assessment and Tree Benefits Report

Estimated using random sampling statistics on 6/1/2021



Tree Benefit Estimates: Air Pollution (English units)

Abbr.	Description	Amount (oz)	±SE	Value (USD)	±SE
CO	Carbon Monoxide removed annually	0.00	±0.00	\$0	±0
NO2	Nitrogen Dioxide removed annually	0.00	±0.00	\$0	±0
O3	Ozone removed annually	0.00	±0.00	\$0	±0
SO2	Sulfur Dioxide removed annually	0.00	±0.00	\$0	±0
PM2.5	Particulate Matter less than 2.5 microns removed annually	0.00	±0.00	\$0	±0
PM10*	Particulate Matter greater than 2.5 microns and less than 10 microns removed annually	0.00	±0.00	\$0	±0
<b>Total</b>		<b>0.00</b>	<b>±0.00</b>	<b>\$0</b>	<b>±0</b>

Currency is in USD and rounded. Standard errors of removal and benefit amounts are based on standard errors of sampled and classified points. Air Pollution Estimates are based on these values in oz/m<sup>2</sup>/yr @ \$/oz/yr and rounded: CO 0.000 @ \$0.00 | NO2 0.000 @ \$0.00 | O3 0.000 @ \$0.00 | SO2 0.000 @ \$0.00 | PM2.5 0.000 @ \$0.00 | PM10\* 0.000 @ \$0.00 (English units: oz = ounces, m<sup>2</sup> = square miles)

Tree Benefit Estimates: Hydrological (English units)

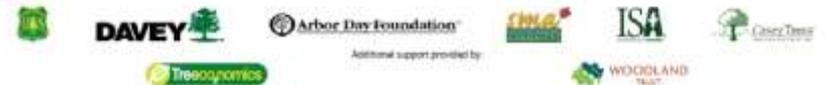
Abbr.	Benefit	Amount (oz)	±SE	Value (USD)	±SE
AVRD	Avoided Runoff	0.00	±0.00	\$0	±0
E	Evaporation	0.00	±0.00	N/A	N/A
I	Interception	0.00	±0.00	N/A	N/A
T	Transpiration	0.00	±0.00	N/A	N/A
PE	Potential Evaporation	0.00	±0.00	N/A	N/A
PET	Potential Evapotranspiration	0.00	±0.00	N/A	N/A

Currency is in USD and rounded. Standard errors of removal and benefit amounts are based on standard errors of sampled and classified points. Hydrological Estimates are based on these values in oz/m<sup>2</sup>/yr @ \$/oz/yr and rounded: AVRD 0.000 @ \$0.00 | E 0.000 @ N/A | I 0.000 @ N/A | T 0.000 @ N/A | PE 0.000 @ N/A | PET 0.000 @ N/A (English units: oz = ounces, m<sup>2</sup> = square miles)

About i-Tree Canopy  
The concept and prototype of this program were developed by David J. Nowak, Jeffrey T. Watson, and Eric J. Greenfield (USDA Forest Service). The current version of this program was developed and adapted to i-Tree by David Ellsworth, Mike Stokke, and Scott Macz (The Davey Tree Expert Company).

Limitations of i-Tree Canopy

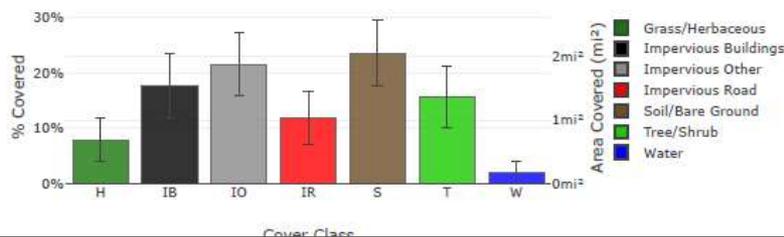
The accuracy of the analysis depends upon the ability of the user to correctly classify each point into its correct class. As the number of points increase, the precision of the estimate will increase as the standard error of the estimate will decrease. If too few points are classified, the standard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



Google

Imagery ©2021 TerraMetrics

Land Cover



Cover Class

# *Today's i-Tree Core Topics*



✓ *I. Design, MyTree, Species, Planting*

✓ *II. Landscape, County*

✓ *III. Canopy*

*IV. Eco, Harvest*

*V. Application (CO FAP, Citizen Science)*

# II. Eco

## For forests and many trees:

- *i-Tree Eco (desktop app)* Flagship tool that quantifies the structure of, threats to, benefits, and values provided by forest populations globally.



# i-Tree Eco Complete Inventories

*June 26, 2019*

The Eco complete inventory option is a flexible and scalable choice that can be used to assess ecosystem services for a single tree in your yard or for assessing thousands of trees in a street or park tree inventory.

Examples of projects that are suited for the Eco complete inventory option include parks, corporate or college campuses, apartment complexes, cemeteries or other individual properties.

<https://www.itreetools.org/tools/which-tool-should-i-use>

A promotional banner for i-Tree Academy. On the left is the i-Tree logo, which includes a stylized tree and a city skyline. To the right of the logo, the text 'i-Tree Academy' is written in a large, bold, green font. Below this, 'Online Training' is written in a smaller, black font, and 'March 3rd – June 2nd, 2021' is written in a bold, black font. The entire banner is enclosed in a yellow border.



# *II. Eco, Harvest*

## What does Eco provide?

i-Tree Eco provides extensive forest and individual tree analyses including the following:

### Functional Analyses:

- Pollution removal and human health impacts
- Carbon sequestration and storage
- Hydrology effects (avoided run-off, interception, transpiration)
- Building energy effects
- Tree bio-emissions
- Avian habitat suitability (plot-based projects; limited to 9 bird species) [Avian Habitat Suitability Report Example](#)
- Ultraviolet radiation (UV) tree effects [UV Report Example](#)

### Structure and composition analyses:

- Species condition and distribution
- Leaf area and biomass
- Species importance values
- Diversity indices and relative performance



## *II. Eco, Harvest*

### Forecasting modeling options including:

- Tree planting inputs
- Extreme event impacts for weather and pests
- Annual mortality adjustments

### Management information including:

- Pest risk analysis
- User defined optional fields
- Cost benefit analysis

### Eco Report Examples - Springfield MA Squares

These are examples of exported structural, benefit analyses, individual level PDF reports from a demonstration project applying Eco to (2) small public squares. You will not need Eco installed to view examples of these reports.

- Springfield Square report examples: [Springfield Eco zip file package \(6.3mb\)](#)

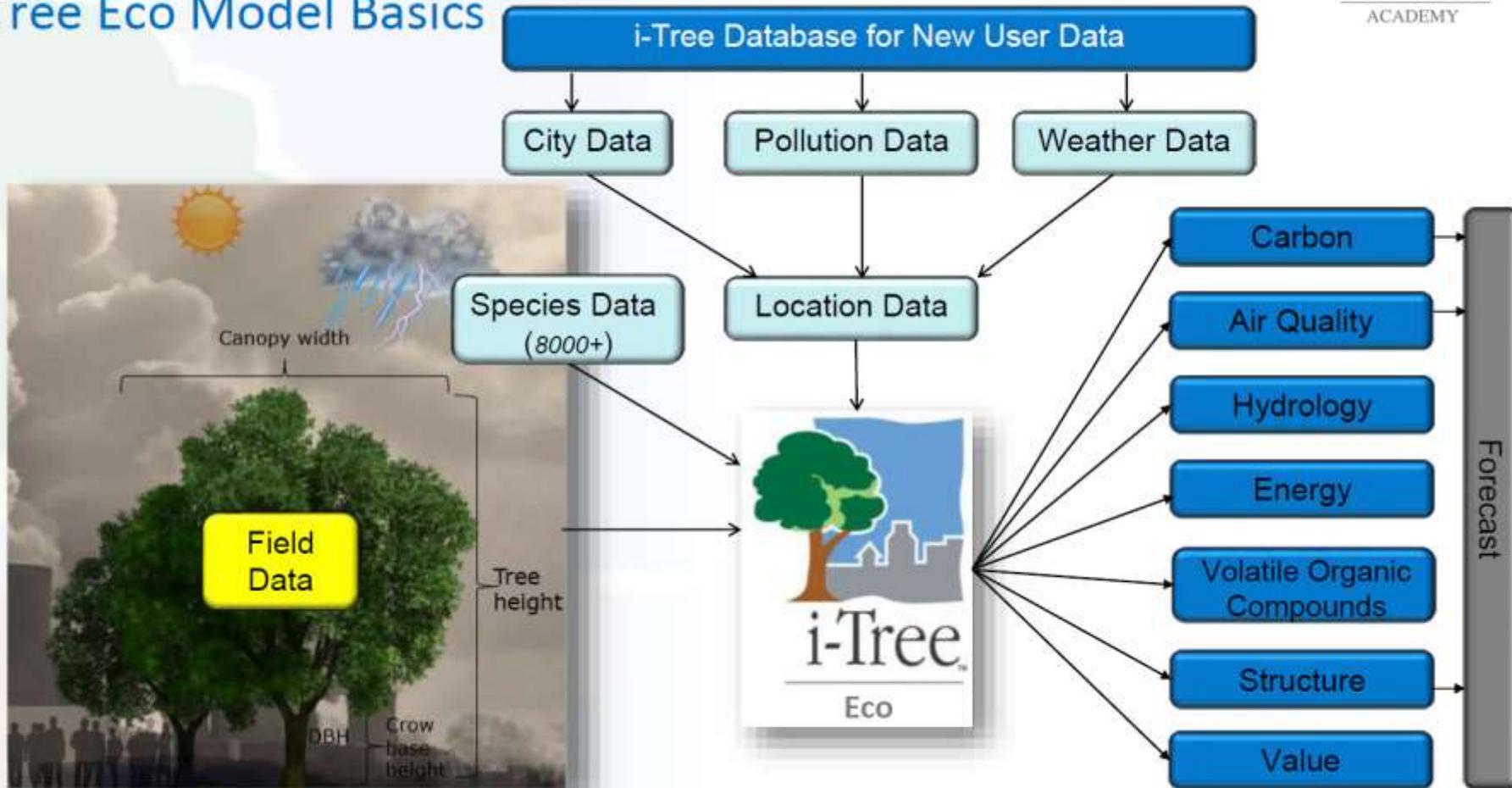
### Who is using Eco?

Thousands of people in the United States and internationally have used Eco for projects ranging from small tree inventories to regional scale assessments. Eco users include government agencies, consultants, nonprofits, universities, researchers, volunteers, educators, advocates and more.

# II. Eco, Harvest



## i-Tree Eco Model Basics



<https://www.itreetools.org/support/resources-overview/i-tree-methods-and-files>

# II. Eco, Harvest



## Eco tree data variables

### Minimum Required Tree Data

- Tree species
- Diameter at breast height (DBH)

### Optional but Recommended Tree Data

- Total tree height
- Height to live top
- Height to crown base
- Crown width (N-S & E-W)
- % Crown missing
- Crown health % dieback (condition)
- Crown light exposure (CLE)
- Land use

### Energy Effects Data

*(optional but not available for all international locations)*

- Direction to a building from the tree
- Distance to a building from a tree

## Understanding i-Tree: Summary of Programs and Methods

David J. Nowak

# II. Eco, Harvest

Eco tree data  
variable  
relationships

Page 22:  
[Understanding i-Tree](#)

Tree  
Variables

Plot  
Variables

	DERIVED VARIABLES		ECOSYSTEM SERVICES										
	Leaf Area	Leaf Biomass	Carbon Storage	Gross Carbon Sequestration	Net Carbon Sequestration	Energy Effects	Air Pollution Removal	Avoided Runoff	Transpiration	VOC Emissions	Compensatory Value	Wildlife Suitability	UV Effects
<b>DIRECT MEASURES</b>													
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	

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.

# II. Eco, Harvest



i-Tree

Search the site



EN ES KO IT

ABOUT TOOLS SUPPORT & RESOURCES NEWS DOWNLOAD

## Download

Feb. 24, 2021

Thank you for your interest in i-Tree! Use one of the links below to download the latest installer for the i-Tree suite of tools.

Select the appropriate link below to access the download form and receive your download link by email. **Note to previous i-Tree users: i-Tree accounts are no longer needed for this process!** The file you are downloading will automatically launch a Windows Installer for the i-Tree Desktop tools. The web-based i-Tree tools (i-Tree Canopy, etc.) do not need to be downloaded and installed.

- [i-Tree\\_2021\\_6.1.36.exe](#) (use this to install directly on a Windows-based PC)
  - *If you have trouble actually saving the download **after clicking on the link emailed to you**, you may need to temporarily disable *Controlled Folders Access* in Windows.*
- [i-Tree\\_2021\\_6.1.36.iso](#) (use this if you need to create a CD or DVD that can be used to install i-Tree onto Windows-based PCs)

i-Tree is supported through a cooperative agreement among the U.S. Forest Service and other organizations. By filling out the download form **you will help us assess interest in the i-Tree Tools and inform future funding allocations**. Once you complete the form you will receive a download link by email from itreetools.org. Please make sure your spam filters allow email from this address and please check your junk mail folder if the email is late in arriving.

**Video i-Tree desktop software download and installation – Al Zelaya, i-Tree Academy**

[https://www.youtube.com/watch?v=B\\_EUQ\\_4i198](https://www.youtube.com/watch?v=B_EUQ_4i198)

# II. Eco, Harvest



The screenshot shows the i-Tree software interface. At the top, a green title bar reads "[Project: UGA Campus Arboretum] [Series: Campus Inventory] [Year: 2011] - i-Tree Eco v6.0.22". Below this is a ribbon menu with tabs for "File", "Project Configuration", "Data", "View", "Reports", "Forecast", and "Support". The "Reports" tab is active, showing a ribbon with various report options: "Project Metadata", "Submit Data for Processing", "Track &amp; Retrieve Results", "Written Report", "Composition and Structure", "Benefits and Costs", "Individual Level Results", "Air Quality Health Impacts and Values", "Pest Analysis", "Pollution and Weather", "Charts", "Settings", "Coordinates", "Comments", "Model Notes", "Map Active Report (beta)", "CSV (beta)", and "KML (beta)". The "Written Report" option is selected. On the left, a "Help" pane is open, displaying "Reports &gt; Formatted Reports &gt; Written Report". The main content area shows a preview of the report cover page, which includes the i-Tree logo, the title "Ecosystem Analysis", the subtitle "UGA Campus Arboretum", a photograph of a forest, and the text "Urban Forest Effects and Values June 2021". The interface also shows a toolbar with navigation and zoom controls, and a page indicator showing "Page 1 of 36".



## Summary

Understanding an urban forest's structure, function and value can promote management decisions that will improve human health and environmental quality. An assessment of the vegetation structure, function, and value of the UGA Campus Arboretum urban forest was conducted during 2011. Data from 8056 trees at the UGA Campus Arboretum were analyzed using the i-Tree Eco model developed by the U.S. Forest Service. For more information, see the Station.

- Number of trees: 8,056
- Tree Cover: 16.9 %
- Most common species of trees: Lagerstroemia spp, Red maple, Loblolly pine
- Percentage of trees less than 6" (15.2 cm) diameter: 50.9 %
- Pollution Removal: 2.635 tons/year (\$4.53 thousand/year)
- Carbon Storage: 2.724 thousand tons (\$362 thousand)
- Carbon Sequestration: 85.22 tons (\$11.3 thousand/year)
- Oxygen Production: 227.3 tons/year
- Avoided Runoff: 197.4 thousand cubic feet/year (\$13.2 thousand/year)
- Building energy savings: N/A – data not collected
- Avoided carbon emissions: N/A – data not collected
- Structural values: \$10.6 million

Ton: short ton (U.S.) (2,000 lbs)

Monetary values \$ are reported in US Dollars throughout the report except where noted.

Ecosystem service estimates are reported for trees.

For an overview of i-Tree Eco methodology, see Appendix I. Data collection quality varies by collector, over which i-Tree has no control.

### Reports > Formatted Reports > Written Report

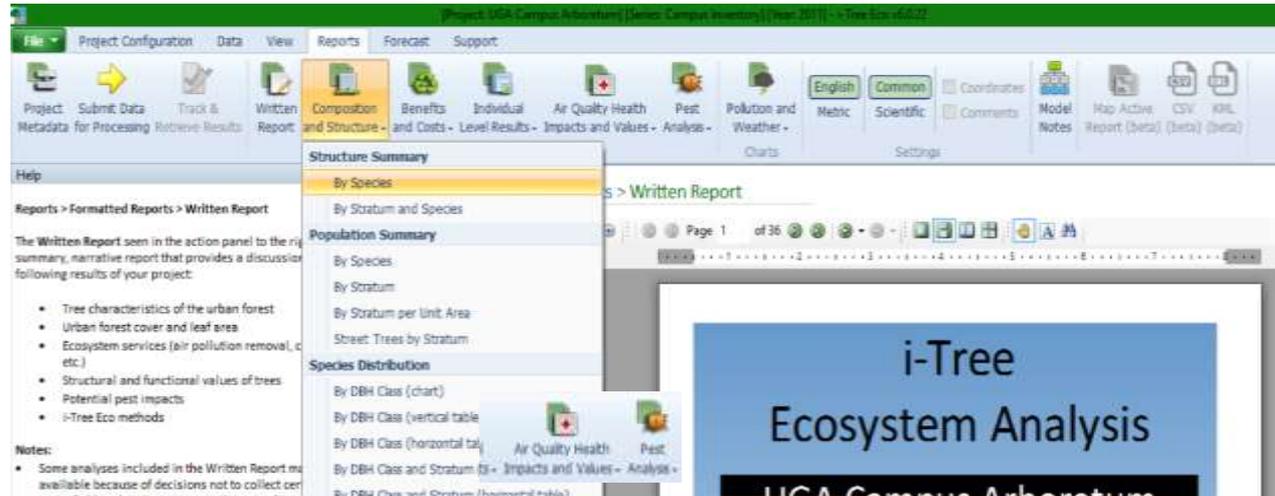
The **Written Report** seen in the action panel to the right is a summary, narrative report that provides a discussion of the following results of your project:

- Tree characteristics of the urban forest
- Urban forest cover and leaf area
- Ecosystem services (air pollution removal, carbon storage, etc.)
- Structural and functional values of trees
- Potential pest impacts
- i-Tree Eco methods

#### Notes:

- Some analyses included in the Written Report may not be available because of decisions not to collect certain variables in the field or data limitations in the case of international studies.
- If you make changes to your project settings or add or edit your field data, you will need to send your data to the server and load your results again to ensure that your changes are reflected in your reports.
- Use the toolbar at the top of the action panel to zoom in and out and save or print the report you have open.
- You can change how units (English or metric) and species names (common or scientific) are displayed in your reports by clicking on the appropriate button in the ribbon above.

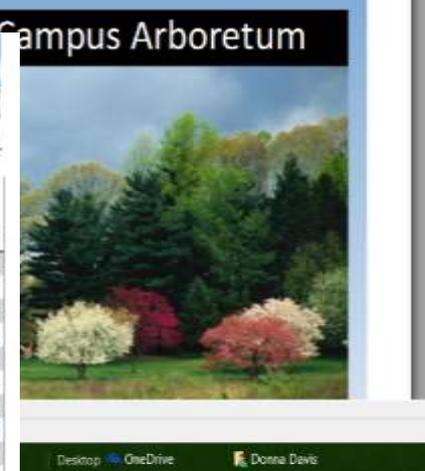
# II. Eco, Harvest



## Structure Summary by Species

Location: Athens-Clarke County (balance), Clarke, Georgia, United States of America  
 Project: UGA Campus Arboretum, Series: Campus Inventory, Year: 2011  
 Generated: 6/1/2021

Species	Trees		Leaf Area		Leaf Biomass		Tree Dry Weight Biomass		Average Condition (%)
	Number	SE	(ac)	SE	(ton)	SE	(ton)	SE	
lagerstroemia spp	581	±0	6.574	±0.000	3.796	±0.000	97.237	±0.000	94.05
Red maple	435	±0	19.749	±0.000	5.933	±0.000	126.666	±0.000	94.17
Loblolly pine	416	±0	34.003	±0.000	12.304	±0.000	229.639	±0.000	89.63
Flowering dogwood	406	±0	3.774	±0.000	1.308	±0.000	33.812	±0.000	92.26
River birch	379	±0	16.095	±0.000	5.565	±0.000	85.035	±0.000	90.10
Willow oak	367	±0	38.716	±0.000	15.322	±0.000	368.928	±0.000	97.02
Southern magnolia	327	±0	23.760	±0.000	14.315	±0.000	271.548	±0.000	95.03
Tulip tree	315	±0	14.056	±0.000	3.696	±0.000	66.952	±0.000	93.76
Water oak	314	±0	70.973	±0.000	29.939	±0.000	1,096.491	±0.000	91.72
Eastern red cedar	224	±0	4.576	±0.000	5.672	±0.000	42.303	±0.000	93.58
Texas red oak	152	±0	3.534	±0.000	1.549	±0.000	31.339	±0.000	96.62
Overcup oak	146	±0	17.081	±0.000	7.487	±0.000	150.924	±0.000	94.12
Eastern redbud	140	±0	1.598	±0.000	0.457	±0.000	9.205	±0.000	90.87
Sweetbay	125	±0	0.676	±0.000	0.431	±0.000	4.360	±0.000	93.89
Total holly	123	±0	1.535	±0.000	0.915	±0.000	32.035	±0.000	93.65



Project: USA Campus Adventure | Device: Campus Inventory | Year: 2011 | i-Tree Eco v6.0.22

File Project Configuration Data View Reports Forecast Support

Submit to Mobile Retrieve from Mobile Paper Form Import Trees Check Data Benefit Prices Annual Costs DBH Crown Health CSV KML Editing Mode: Off

Data Collection Inventory Data Inventory Value Report Classes Export

Help Work with Tree data

To get started, go to the File menu and select one of the following options:

- **New Project** – to create a new Eco project.
- **Open Project** – to open an existing Eco project.
- **Open Example Project** – to open and explore an example project provided by Eco.

Choose from the available tabs at the top of the ribbon bar to access the different phases of an Eco project. Within each tab, you can click on one of the functions or buttons in the ribbon above. The feature that you choose will become available in the action panel to the right.



On this tab, you can enter the data that you collected in the field and recorded using either paper forms or a mobile device. You can also edit or view data that has already been entered. On the ribbon above, there are six groups of available functions, including:

**Data Collection** – to view and print forms if you are using paper forms for recording data collected in the field. To submit your project settings to the web or retrieve your data from the web if you are using a mobile device for recording field data. To activate the import function, click on the Trees button.

**Inventory Data** – to manually add the data that you collected in the field or edit/view data that has already been added.

**Inventory Value** – to adjust benefit prices and add annual cost data.

**Report Classes** – to view DBH and Crown Health classes that will be displayed in reports.

**Export** – to export an open data table to a “comma separated values” (csv) or “keyhole markup language” (kml) file.

**Editing Mode** – to turn Editing mode on.

**\*IMPORTANT\***  
After you send data and retrieve results on the Reports tab, the **Editing Mode** function will become available on the Data tab (i.e., it will no longer be greyed out and the function will read “Editing Mode: OFF”). This indicates that, with the exception of the **Benefit Prices** and **Annual Costs** functions, the tab is in View-only mode so each function may be viewed, but not edited. The **Benefit Prices** and **Annual Costs** functions may be edited at all times.

In order to edit data in the rest of the tab, you will need to switch to Editing mode by clicking on the **Editing Mode** function once it has become available. After clicking on it, the function will be greyed out and read “Editing Mode: On.” Edits may be made at that time. Please note that if you edit your data,

## Data > Inventory Data > Trees

ID	Stratum	Crew	Survey Date	Status	Species	Address	Land Use	Photo ID	DBH 1 (in)	DBH 1: Height (ft)
332	Campus		11/11/2012 12:00:00 AM	Planted	Flowering dogwood (Cornus florida)		Institutional			4.0
335	Campus		11/11/2012 12:00:00 AM	Planted	Flowering dogwood (Cornus florida)		Institutional			3.0
349	Campus		11/11/2012 12:00:00 AM	Planted	Tulip tree (Liriodendron tulipifera)		Institutional			3.0
351	Campus		11/11/2012 12:00:00 AM	Planted	Tulip tree (Liriodendron tulipifera)		Institutional			4.0
361	Campus		11/11/2012 12:00:00 AM	Planted	Overcup oak (Quercus lyrata)		Institutional			27.0

ID	Crown: % Dieback	Total Height (ft)	Crown: Top Height (ft)	Crown: Base Height (ft)	Crown: Width N/S (ft)	Crown: Width E/W (ft)	Crown: % Missing	Crown: Light Exposure	Street Tree?	Comments
332	0%	19.00	19.00	6.00	20.0	15.0	0% 2 Sides		<input type="checkbox"/>	
335	1% - 5%	13.00	13.00	4.00	15.0	23.0	1% - 5% 3 Sides		<input type="checkbox"/>	
349	15% - 20%	18.00	18.00	3.00	12.0	11.0	0% 5 Sides		<input type="checkbox"/>	
351	1% - 5%	23.00	23.00	4.00	12.0	10.0	0% 5 Sides		<input type="checkbox"/>	
361	0%	57.00	57.00	7.00	60.0	62.0	0% 3 Sides		<input type="checkbox"/>	



Data > Inventory Value > Benefit Prices

**Adjust your Benefit Prices (advanced users)**

- Notes:
- The Default values are those available at the time of software installation.
  - If you leave a value blank, the most current default value will be used for processing and displayed in the footnotes of reports.
  - Alternatively, you may enter your own values if you know them.
  - For future reference, use the CSV Export button in the ribbon above to save your current values BEFORE changing them.
  - You may change the values below and update their associated Report outputs WITHOUT resubmitting your entire Eco project.

Measurement Units: English

**Benefit Prices**

Electricity in \$ (USD)/kWh:	<input type="text" value="0.10"/>	<input type="button" value="Default"/>
Heating in \$ (USD)/therm:	<input type="text" value="1.58"/>	<input type="button" value="Default"/>
Carbon in \$ (USD)/ton:	<input type="text" value="133.04"/>	<input type="button" value="Default"/>
Avoided Runoff in \$ (USD)/gallon:	<input type="text" value="0.008936"/>	<input type="button" value="Default"/>

For any prices left blank above, and other values such as Pollution Prices, the most current values will be used for processing.

Data > Inventory Value > Annual Costs

**Enter the costs associated with your project**

- Notes:
- For future reference, use the CSV Export button in the ribbon above to save your current values BEFORE changing them.
  - You may change the values below and update their associated Report outputs WITHOUT resubmitting your entire Eco project.

	Public \$ (USD)	Private \$ (USD)	Total \$ (USD)
Planting \$ (USD):	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Pruning \$ (USD):	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Tree Removal \$ (USD):	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Pest Control \$ (USD):	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Irrigation \$ (USD):	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Repair \$ (USD):	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Cleanup \$ (USD):	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Legal \$ (USD):	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Administrative \$ (USD):	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Inspection \$ (USD):	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Other \$ (USD):	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Total Costs \$ (USD):	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>

Data > Report Classes > Crown Health

**Health Classes are used for REPORTING**

	ID	Description	% Dieback <=
▶	1	Excellent	0
	2	Good	10
	3	Fair	25
	4	Poor	50
	5	Critical	75
	6	Dying	99
	7	Dead	100

## Air Quality Health Impacts and Values by Trees

Location: Athens-Clarke County (balance), Clarke, Georgia, United States of America

Project: UGA Campus Arboretum, Series: Campus Inventory, Year: 2011

Generated: 6/1/2021



	NO2		O3		PM2.5		SO2	
	Incidence (Reduction/yr)	Value (\$/yr)	Incidence (Reduction/yr)	Value (\$/yr)	Incidence (Reduction/yr)	Value (\$/yr)	Incidence (Reduction/yr)	Value (\$/yr)
Acute Bronchitis					0.000	0.02		
Acute Myocardial Infarction					0.000	8.29		
Acute Respiratory Symptoms	0.009	0.28	0.691	59.09	0.183	17.97	0.000	0.01
Asthma Exacerbation	0.124	10.36			0.087	7.04	0.003	0.23
Chronic Bronchitis					0.000	28.62		
Emergency Room Visits	0.000	0.07	0.000	0.13	0.000	0.06	0.000	0.01
Hospital Admissions	0.000	13.87	0.001	26.79			0.000	0.66
Hospital Admissions, Cardiovascular					0.000	2.20		
Hospital Admissions, Respiratory					0.000	1.39		
Lower Respiratory Symptoms					0.002	0.12		
Mortality			0.000	1,870.50	0.000	2,373.17		
School Loss Days			0.164	16.14				
Upper Respiratory Symptoms					0.002	0.09		
Work Loss Days					0.032	4.39		
<b>Total</b>	<b>0.134</b>	<b>24.58</b>	<b>0.857</b>	<b>1,972.64</b>	<b>0.308</b>	<b>2,443.36</b>	<b>0.003</b>	<b>0.91</b>

EPA Environmental Benefits Mapping and Analysis Program <http://www.epa.gov/airquality/benmap/index.html>

Incidence: the total number of adverse health effects avoided in a year due to a change in pollution concentration

Value: the economic value that is associated with the incidence of adverse health effects

## Susceptibility to Pests by Stratum

Location: Athens-Clarke County (balance), Clarke, Georgia, United States of America

Project: UGA Campus Arboretum, Series: Campus Inventory, Year: 2011

Generated: 6/1/2021



Pest Name	Stratum	Number of Trees		Structural Value (\$)		Leaf Area (%)		Leaf Area (ac)	
		Not		Not		Not		Not	
		Susceptible	Susceptible	Susceptible	Susceptible	Susceptible	Susceptible	Susceptible	Susceptible
Aspen Leafminer	Campus	5	8,051	6,649	10,627,812	0.1	99.9	0.5	490.9
Asian Longhorned Beetle	Campus	1,275	6,781	1,044,451	9,590,011	11.8	88.2	58.2	433.3
Beech Bark Disease	Campus	10	8,046	17,911	10,616,550	0.1	99.9	0.7	490.7
Butternut Canker	Campus	5	8,051	14,293	10,620,168	0.1	99.9	0.5	491.0
Balsam Woolly Adelgid	Campus	0	8,056	0	10,634,462	0.0	100.0	0.0	491.5
Chestnut Blight	Campus	0	8,056	0	10,634,462	0.0	100.0	0.0	491.5
Dogwood Anthracnose	Campus	446	7,610	118,070	10,516,391	0.8	99.2	4.1	487.3
Douglas-fir Black Stain Root Disease	Campus	1	8,055	1,366	10,633,096	0.0	100.0	0.1	491.4
Dutch Elm Disease	Campus	58	7,998	93,720	10,540,741	1.3	98.7	6.5	485.0
Douglas-Fir Beetle	Campus	1	8,055	1,366	10,633,096	0.0	100.0	0.1	491.4
Emerald Ash Borer	Campus	12	8,044	10,622	10,623,840	0.2	99.8	0.8	490.7
Fir Engraver	Campus	1	8,055	1,366	10,633,096	0.0	100.0	0.1	491.4
Fusiform Rust	Campus	418	7,638	767,590	9,866,871	7.0	93.0	34.4	457.1
Gypsy Moth	Campus	2,268	5,788	5,722,673	4,911,789	55.1	44.9	270.8	220.6
Goldspotted Oak Borer	Campus	0	8,056	0	10,634,462	0.0	100.0	0.0	491.5

# II. Eco, Harvest



[Project: UGA Campus Arboretum] [Series: Campus Inventory] [Year: 2011] - i-Tree Eco v6.0.22

**File** Project Configuration Data View Reports Forecast Support

Project Definition Land Use Crown Health Project & Strata Area CSV Editing Mode: Off

Define Data Fields Export

### Help

To get started, go to the **File** menu and select one of the following options:

- **New Project** – to create a new Eco project.
- **Open Project** – to open an existing Eco project.
- **Open Example Project** – to open and explore an example project provided by Eco.

Choose from the available tabs at the top of the ribbon bar to access the different phases of an Eco project. Within each tab, you can click on one of the functions or buttons in the ribbon above. The feature that you choose will become available in the action panel to the right.



On this tab, you can set up your new i-Tree Eco project or make changes to an existing project. There are five groups of available functions (see Notes below), including:

- **New Project**
- **Project Definition**
- **Project Data**
- **Project Reports**
- **Project Forecast**

A plot-based sample project is one in which you must measure a set of randomly generated plots throughout your study area. You must collect data for all of the trees in your plots. This type of project is most applicable to the analysis of a broad, diverse landscape, such as a city or large university campus where it is impractical to measure all trees. Plot sample type projects do include calculations of sampling error which results when only a subset of the population of interest is being measured.

**Notes:**

- Data import is only enabled for complete inventory projects and is not possible for plot-based projects.
- You cannot change between Complete inventory and Plot Sample projects once you click OK so be sure to select the correct project type.

**OK** **Cancel**

**Note:**

- Functions that are greyed out on the ribbon cannot be accessed. For more information about your project, additional functions will be available in the action panel to the right.

# *Today's i-Tree Core Topics*



✓ *I. Design, MyTree, Species, Planting*

✓ *II. Landscape, County*

✓ *III. Canopy*

✓ *IV. Eco, Harvest*

*V. Application (CO FAP, Citizen Science)*

# II. Application

## CO Forest Action Plan



THEME: URBAN FORESTRY

### GOALS AND STRATEGIES

#### GOAL #1



CONSERVE



PROTECT



ENHANCE

**PROMOTE THE ROLE AND INFRASTRUCTURE DEVELOPMENT OF URBAN AND COMMUNITY FORESTS TO ADVANCE PUBLIC HEALTH, WELLNESS AND SAFETY**

Improving and enhancing urban living environments through healthy and resilient community forests is a cost-effective tool that contributes to positive health outcomes. Strategic planning related to population density and growth, green and gray infrastructure, expansion of the wildland-urban interface and the enhancement of public spaces will maximize community and ecosystem sustainability.

**STRATEGY 1:** Master planning efforts that include urban and community trees and forests need to occur at city, regional and state scales.

#### Approaches

1. Increase overall urban canopy to reduce impacts of urban heat sinks and stormwater flow while improving air quality
2. Engage in community planning efforts including public and private tree inventories, monitoring, planting to increase urban canopy, selection of climate-adapted species, proper maintenance schedules and continuous hazard tree removal

3. Reduce landscape fragmentation by creating green infrastructure corridors
4. Alter forest structure and composition to reduce risk or severity of wildfire, focusing on the wildland-urban interface

**STRATEGY 2:** Develop resources and tools to improve and highlight the positive and synergistic relationships among green infrastructure, forest, trees, and public health and wellness.

#### Approaches

1. Inventory private and public urban and community forests to monitor ecosystem services with the

U.S. Forest Service Urban Forest Inventory and Analysis (UFIA), CO-Tree View and/or i-Tree

Reporting Protocol

**STRATEGY 3:** Expand opportunities for collaboration among residents, collaboratives, agencies and other sectors.

#### Approaches

1. Create redundancy of habitat types, riparian areas and refugia on the landscape
2. Connect existing tree-affiliated groups and organizations through electronic resources

# II. Application

## CO Forest Action Plan

### GOAL #2



#### ENHANCE

#### PROMOTE AND INCREASE PUBLIC AWARENESS, LEADERSHIP DIVERSITY AND EQUITY WITHIN THE URBAN FORESTRY COMMUNITY

Current and projected changes in Colorado's demographics require understanding and engaging different perspectives, cultures, genders and ages. This broadens economic and social opportunities while building and strengthening

communities. Understanding the critical importance of community, economics and ecosystem benefits protects, conserves and enhances the urban and community forests of today and tomorrow.

**STRATEGY 1:** Create, maintain and enhance educational programs that focus on urban and community forests.

#### Approaches

1. Identify current urban forestry education programs and organizations responsible for the programs (e.g., Project Learning Tree)
2. Enhance educational outreach of urban-forestry-focused organizations (e.g., Colorado Tree Coalition)
3. Coordinate with state agencies that provide education and

outreach programs to ensure the largest impact on students and communities

**STRATEGY 2:** Increase engagement of underserved and minority communities within urban and community forestry.

#### Approaches

1. Identify underserved and minority communities within Colorado that would benefit from urban and community forestry programs

# *II. Application*

## *CO Forest Action Plan*

### **GOAL #2**



### **ENHANCE**

2. Determine existing programs to increase engagement (e.g., Project Learning Tree) and assess the need for additional programs
3. Translate existing English publications into Spanish and other languages as needed
4. Partner with professional groups like the International Society of Arboriculture and the Society of American Foresters to host training events in Spanish

**STRATEGY 3:** Increase workforce development opportunities and green jobs.

### **Approaches**

1. Inventory private and public urban forests to monitor ecosystem services with the U.S. Forest Service Urban Forest Inventory and Analysis (UFIA), CO-Tree View and/or i-Tree
2. Research and develop alternative renewable biomass energy markets and resources
3. Provide education about forestry careers through Project Learning Tree's Green Jobs curriculum

# II. Application

## CO Forest Action Plan

### GOAL #3



CONSERVE



PROTECT



ENHANCE

**IMPROVE AND ENHANCE ECOSYSTEM HEALTH AND BIODIVERSITY FOR LONG-TERM RESILIENCE BY INTEGRATING URBAN AND COMMUNITY FOREST MANAGEMENT, MAINTENANCE AND STEWARDSHIP INTO ALL SCALES OF PLANNING**

A dynamic green infrastructure provides residents, cities, towns and municipalities with a sustainable job market, stormwater management, improved habitat, quality drinking water, energy conservation, and

enhanced public health, wellness and safety.

**STRATEGY 1:** Sustain or restore fundamental ecological functions.

#### Approaches

1. Increase forest species biodiversity, structure variability, and tree health and resilience to disturbance and climate change
2. Maintain and restore hydrological functions and riparian areas
3. Monitor the introduction of invasive species and mitigate

existing invasive species

4. Reduce landscape fragmentation by creating green infrastructure corridors

**STRATEGY 2:** Enhance carbon storage to mitigate greenhouse gas emissions and support climate change resilience, restoration and sustainability within urban and community forests.

#### Approaches

1. Increase overall urban canopy to help offset greenhouse gas

emissions and lower energy demands for heating and cooling buildings

2. Revegetate sites after natural and land-use conversion disturbances
3. Increase species biodiversity, structure variability and individual tree health
4. Select species that match projected climate and site conditions
5. Realign significantly disrupted ecosystems to meet expected future conditions

# *A Short Note on i-Tree & CO TreeView*



You inquired if i-Tree can accumulate statewide data for access? The short answer is no for the off-the-shelf i-Tree tools.

The core i-Tree applications are limited and designed for use for individual community, city and regional projects scales. Therefore, they would be limited for statewide assessments due to the amount of data. I have seen the Colorado Tree View tool which stores and makes many community tree inventories available for public access and I believe that is a PlanitGeo developed platform. Other states like Wisconsin and Iowa have similar tools for sharing statewide community inventory data, and some estimate ecosystem services. I don't know how the PlanitGeo underlying system works specifically but in many cases statewide tools using i-Tree derived estimates work off a webservice that generates ecosystem services based on i-Tree application methods, and then serves up estimates up on the fly in an online interface. So, this is somewhat of a customized process working directly with i-Tree Development systems or companies like PlanitGeo may develop their own processes for integrating and generating i-Tree estimates on the fly.

As for the core i-Tree Tools, there is not currently a way to import very large amounts of community tree inventory data into the Eco application for an assessment of dozens of communities. The underlying Microsoft Access database structure of i-Tree Eco has import limitations due to memory and it can't handle large amounts of data beyond 300,000 trees depending on the types of data variables. In the future as the platform and systems improve, there may be more opportunities to work with statewide data.

Otherwise, tools like i-Tree Landscape have some capabilities at large scales but there are limitations and advantages to consider when assessing trees and forests using aerial assessment tools, which we will learn about on the 31st.



# Which Tool Should I Use?

May 12, 2020

## For forests and many trees:

- *i-Tree Eco (desktop app)* Flagship tool that quantifies the structure of, threats to, benefits, and values provided by forest populations globally.
- *i-Tree Projects (web app)* An online platform for sharing results and data from i-Tree Eco assessments. Currently in beta - additional projects coming soon!
- *i-Tree Landscape (web app)* Rapidly assess human and forest population information; threats to help prioritize areas for tree planting; protection.
- *i-Tree County (web app)* Quickly learn the numerous benefits that trees provide within your county.
- *i-Tree Canopy (web app)* Easily estimate tree canopy and benefits using aerial photographs. *see Canopy report example*

## For individual and small amounts of trees:

- *i-Tree Design (web app)* Parcel level analysis of current and future tree benefits.
- *i-Tree MyTree (web app)* Easily assess the value of one to several trees in a mobile web browser.

## For effects on stream flow & water quality:

- *i-Tree Hydro (desktop app)* Quantify the effects of tree canopy and impervious cover on water quantity and quality.

## For recommendations on what species to plant:

- *i-Tree Species (web app)* Determine the best species that meet your desired benefits.

## For benefits of new tree planting projects:

- *i-Tree Planting (web app)* Estimate the long-term environmental benefits from a tree planting project.

## For carbon stored in harvested wood products:

- *i-Tree Harvest (web app)* Estimate the amount of carbon stored in harvested wood products.

<https://www.itreetools.org/tools/which-tool-should-i-use>

# i-Tree Tools for Colorado and Our Communities



A banner for i-Tree Academy Online Training. On the left is the i-Tree logo (a green tree and grey city skyline). To the right of the logo, the text "i-Tree Academy" is written in a large, bold, green, sans-serif font. Below this, the text "Online Training" is written in a smaller, black, sans-serif font. At the bottom, the text "March 3rd – June 2nd, 2021" is written in a black, sans-serif font. The entire banner is enclosed in a yellow border.



# *Thank You!*

## *Thoughts & Questions?*

i-Tree

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Learn about i-Tree

More than beauty and shade, trees work hard for us all. Explore how trees improve the environment in communities big and small, urban and rural... even in your own backyard!



<https://www.itreetools.org/>