i-Tree Open Academy

2025

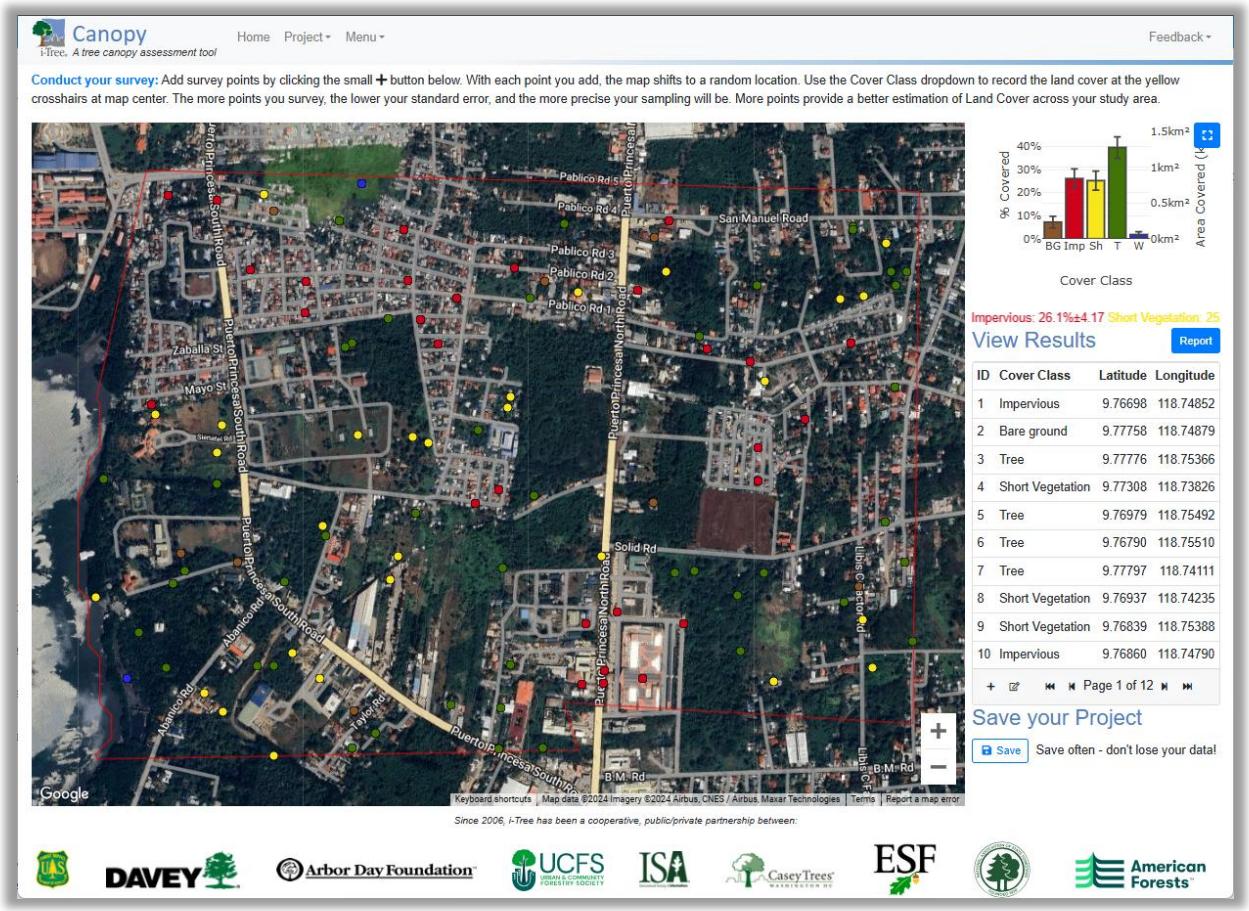
Session 3: The View From the Top

Assessing your canopy cover with i-Tree Canopy

May 21, 2025
1:00pm Eastern Time

Plan for today

- Introduce i-Tree Canopy
- i-Tree Canopy demo
- Using i-Tree Canopy to look at change over time



i-Tree Team

Jason Henning
Alexis Ellis
Krista Heinlen
Ana Castillo
Jay Heppler
Scott Maco

i-Tree Canopy

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Core individual tree tools

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Core canopy tools

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* *i-Tree Tools that can be used internationally*

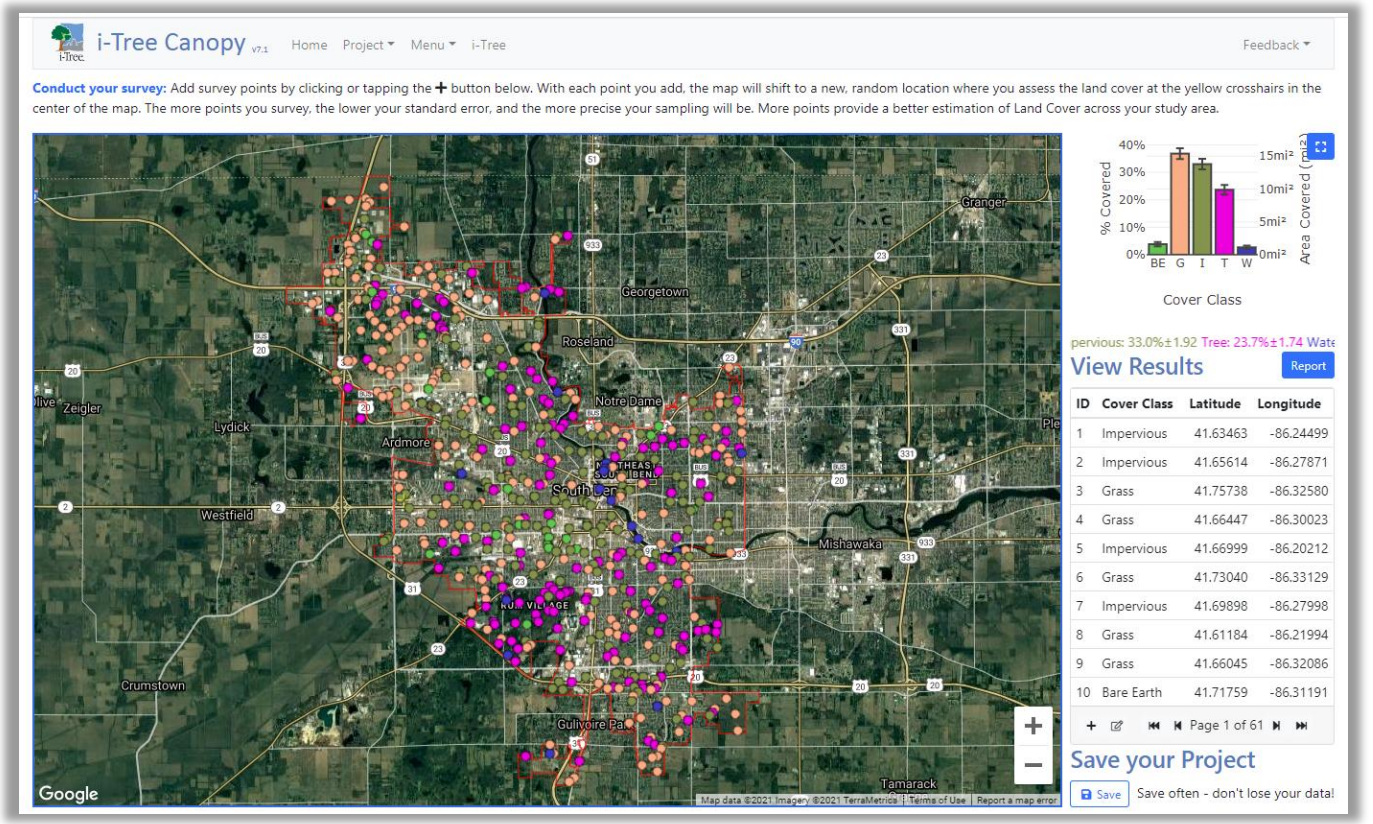
i-Tree Canopy

- **Defining Canopy Assets: Start Simple To See The Big Picture**
  - Combining the utility of Google with US Forest Service science
  - Available online – no download required!
  - Imagery covers the globe
  - User can assess what's on the ground for desired location…*quickly*

What Do I Have?

Where Do I Have It?

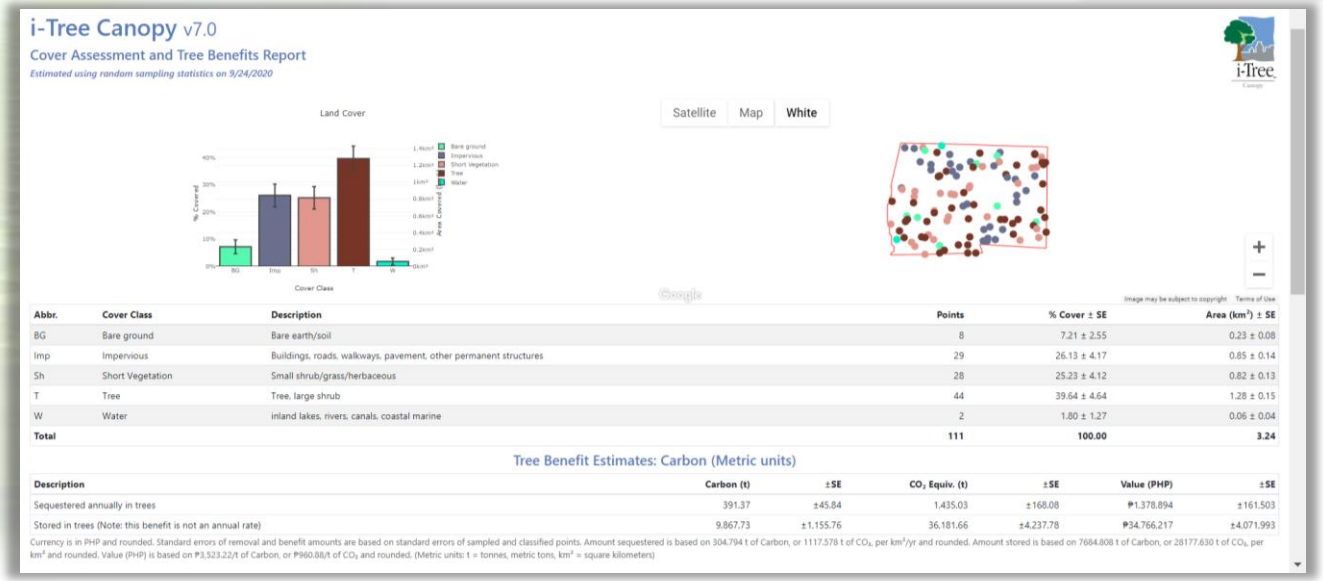
There's a map for that…



canopy.itreetools.org

i-Tree Canopy

- **The view from the top**
  - Capturing data on land cover ***(percent canopy, impervious, and more),*** using aerial imagery: ***establishing your baseline***
  - Estimate air pollution, hydrology, and carbon benefits of tree canopy, with associated values
  - Ability to measure change over time



i-Tree Canopy v7.0

Cover Assessment and Tree Benefits Report

Estimated using random sampling statistics on 9/24/2020

Land Cover

Satellite | Map | White

Abbr.	Cover Class	Description	Points	% Cover ± SE	Area (km²) ± SE
BG	Bare ground	Bare earth/soil	8	7.21 ± 2.55	0.23 ± 0.08
Imp	Impervious	Buildings, roads, walkways, pavement, other permanent structures	29	26.13 ± 4.17	0.85 ± 0.14
Sh	Short Vegetation	Small shrub/grass/herbaceous	28	25.23 ± 4.12	0.82 ± 0.13
T	Tree	Tree, large shrub	44	39.64 ± 4.64	1.28 ± 0.15
W	Water	inland lakes, rivers, canals, coastal marine	2	1.80 ± 1.27	0.06 ± 0.04
Total			**111**	**100.00**	**3.24**

Tree Benefit Estimates: Carbon (Metric units)

Description	Carbon (t)	±SE	CO_2 Equiv. (t)	±SE	Value (PHP)	±SE
Sequestered annually in trees	391.37	±45.84	1,435.03	±168.08	₱1,378,894	±161,503
Stored in trees (Note: this benefit is not an annual rate)	9,867.73	±1,155.76	36,181.66	±4,237.78	₱34,766,217	±4,071,993

Currency is in PHP and rounded. Standard errors of removal and benefit amounts are based on standard errors of sampled and classified points. Amount sequestered is based on 304.794 t of Carbon, or 1117.578 t of CO_2 per km^2/yr and rounded. Amount stored is based on 7684.808 t of Carbon, or 28177.630 t of CO_2, per km^2 and rounded. Value (PHP) is based on ₱3,523.22/t of Carbon, or ₱960.88/t of CO_2 and rounded. (Metric units: t = tonnes, metric tons, km^2 = square kilometers)

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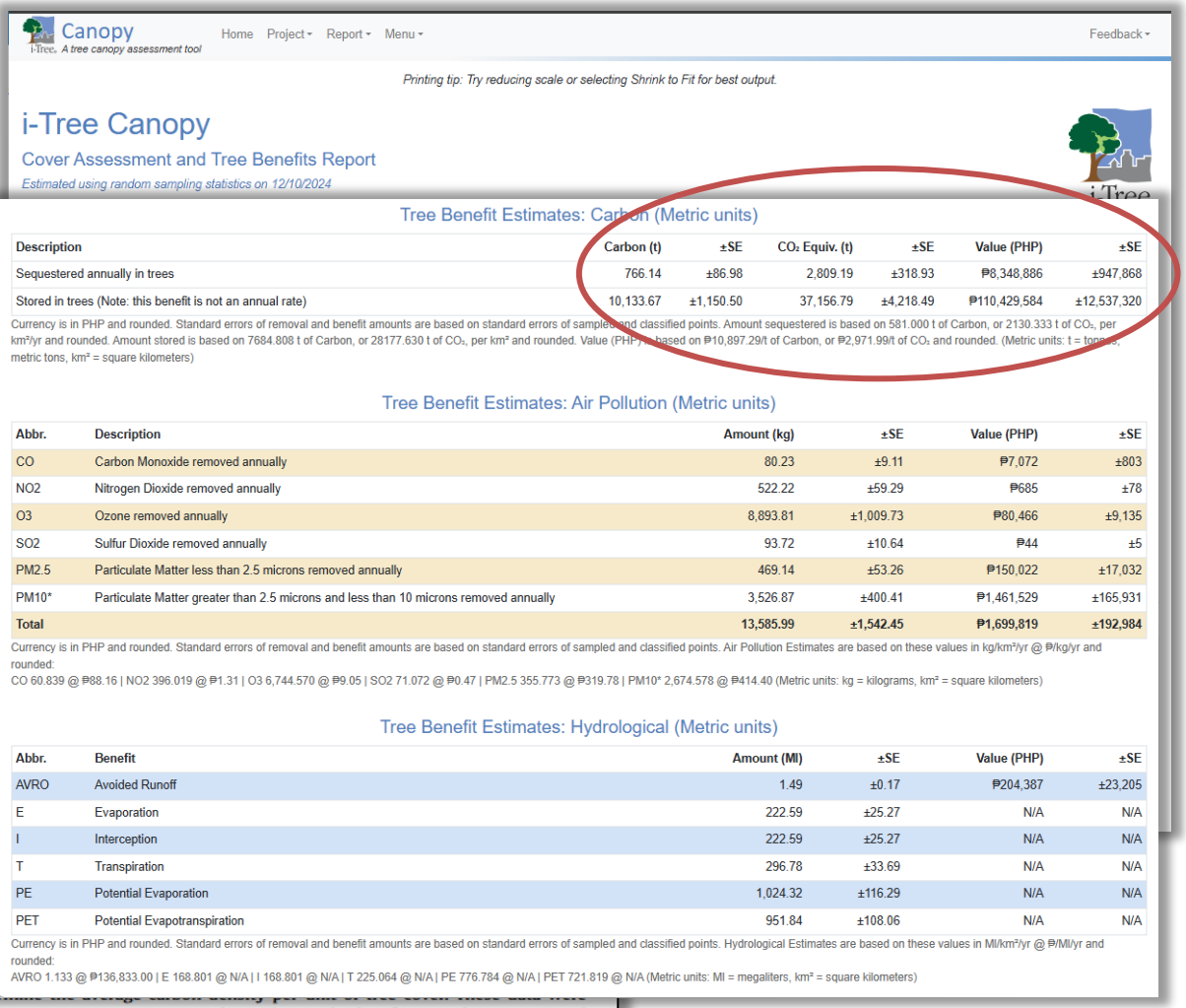
i-Tree Canopy

- **The science: statistical land cover sampling for canopy and benefits multipliers**



Canopy
i-Tree. A tree canopy assessment tool
Home Project Report Menu Feedback

Printing tip: Try reducing scale or selecting Shrink to Fit for best output.

i-Tree Canopy

Cover Assessment and Tree Benefits Report

Estimated using random sampling statistics on 12/10/2024

Tree Benefit Estimates: Carbon (Metric units)

Description	Carbon (t)	±SE	CO_2 Equiv. (t)	±SE	Value (PHP)	±SE
Sequestered annually in trees	766.14	±86.98	2,809.19	±318.93	₱8,348,886	±947,868
Stored in trees (Note: this benefit is not an annual rate)	10,133.67	±1,150.50	37,156.79	±4,218.49	₱110,429,584	±12,537,320

Currency is in PHP and rounded. Standard errors of removal and benefit amounts are based on standard errors of sampled and classified points. Amount sequestered is based on 581.000 t of Carbon, or 2130.333 t of CO_2, per km²/yr and rounded. Amount stored is based on 7684.808 t of Carbon, or 28177.630 t of CO_2, per km² and rounded. Value (PHP/yr) based on ₱10,897.29/t of Carbon, or ₱2,971.99/t of CO_2 and rounded. (Metric units: t = tonnes, metric tons, km² = square kilometers)

Tree Benefit Estimates: Air Pollution (Metric units)

Abbr.	Description	Amount (kg)	±SE	Value (PHP)	±SE
CO	Carbon Monoxide removed annually	80.23	±9.11	₱7,072	±803
NO2	Nitrogen Dioxide removed annually	522.22	±59.29	₱685	±78
O3	Ozone removed annually	8,893.81	±1,009.73	₱80,466	±9,135
SO2	Sulfur Dioxide removed annually	93.72	±10.64	₱44	±5
PM2.5	Particulate Matter less than 2.5 microns removed annually	469.14	±53.26	₱150,022	±17,032
PM10*	Particulate Matter greater than 2.5 microns and less than 10 microns removed annually	3,526.87	±400.41	₱1,461,529	±165,931
Total		**13,585.99**	**±1,542.45**	**₱1,699,819**	**±192,984**

Currency is in PHP 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 kg/km²/yr @ ₱/kg/yr and rounded:
CO 60.839 @ ₱88.16 | NO2 396.019 @ ₱1.31 | O3 6,744.570 @ ₱9.05 | SO2 71.072 @ ₱0.47 | PM2.5 355.773 @ ₱319.78 | PM10* 2,674.578 @ ₱414.40 (Metric units: kg = kilograms, km² = square kilometers)

Tree Benefit Estimates: Hydrological (Metric units)

Abbr.	Benefit	Amount (Ml)	±SE	Value (PHP)	±SE
AVRO	Avoided Runoff	1.49	±0.17	₱204,387	±23,205
E	Evaporation	222.59	±25.27	N/A	N/A
I	Interception	222.59	±25.27	N/A	N/A
T	Transpiration	296.78	±33.69	N/A	N/A
PE	Potential Evaporation	1,024.32	±116.29	N/A	N/A
PET	Potential Evapotranspiration	951.84	±108.06	N/A	N/A

Currency is in PHP 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 Ml/km²/yr @ ₱/Ml/yr and rounded:
AVRO 1.133 @ ₱136,833.00 | E 168.801 @ N/A | I 168.801 @ N/A | T 225.064 @ N/A | PE 776.784 @ N/A | PET 721.819 @ N/A (Metric units: Ml = megaliters, km² = square kilometers)

Environmental Pollutio

Contents lists available

Environmen

journal homepage: www.

ELSEVIER

Carbon storage and sequestration by tre areas of the United States

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ABSTRACT

Carbon storage and seques
magnitude and role of urban
6 states were used to dete
applied to statewide urban tree cover measurements to determine total urban forest carbon storage and annual sequestration by state and nationally. Urban whole tree carbon storage densities average 7.69 kg C m^{-2} of tree cover and sequestration densities average 0.28 kg C m^{-2} of tree cover per year. Total tree carbon storage in U.S. urban areas (c. 2005) is estimated at 643 million tonnes ($50.5 billion value; 95% CI = 597 million and 690 million tonnes) and annual sequestration is estimated at 25.6 million tonnes ($2.0 billion value; 95% CI = 23.7 million to 27.4 million tonnes).

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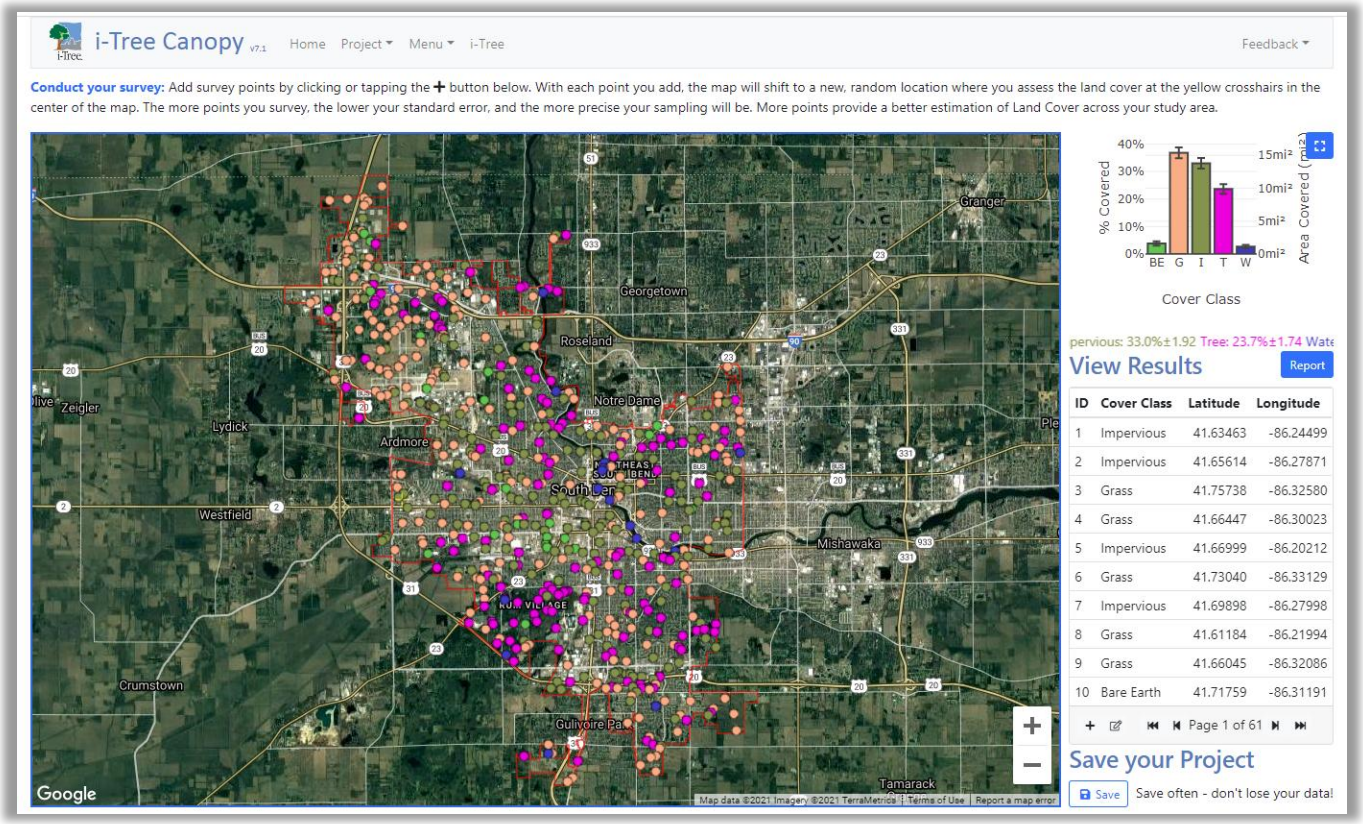
i-Tree Canopy Change Surveys

- **Assess Change Over Time**
  - See impact of planting projects
  - Considerations for development and land use diversity
  - Advocate for maintaining and enhancing existing canopy

What Do I Have?

Where Do I Have It?

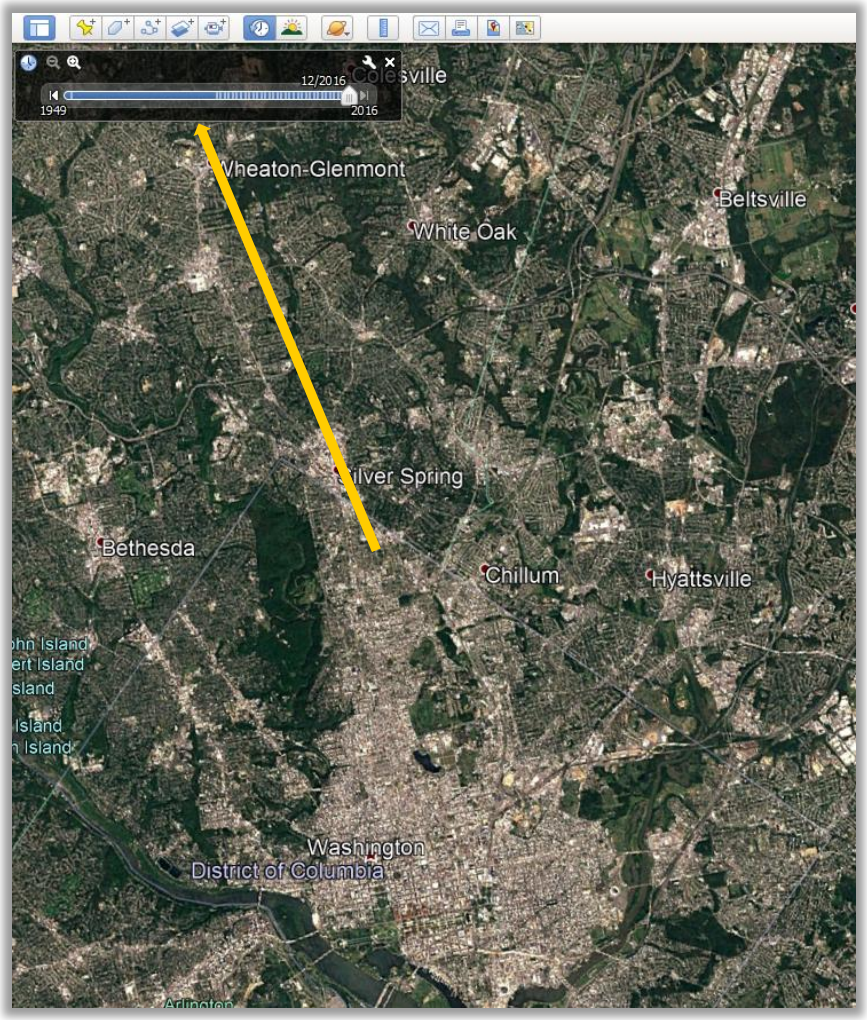
Where Do I Want to go Next?…



i-Tree Canopy Change Surveys

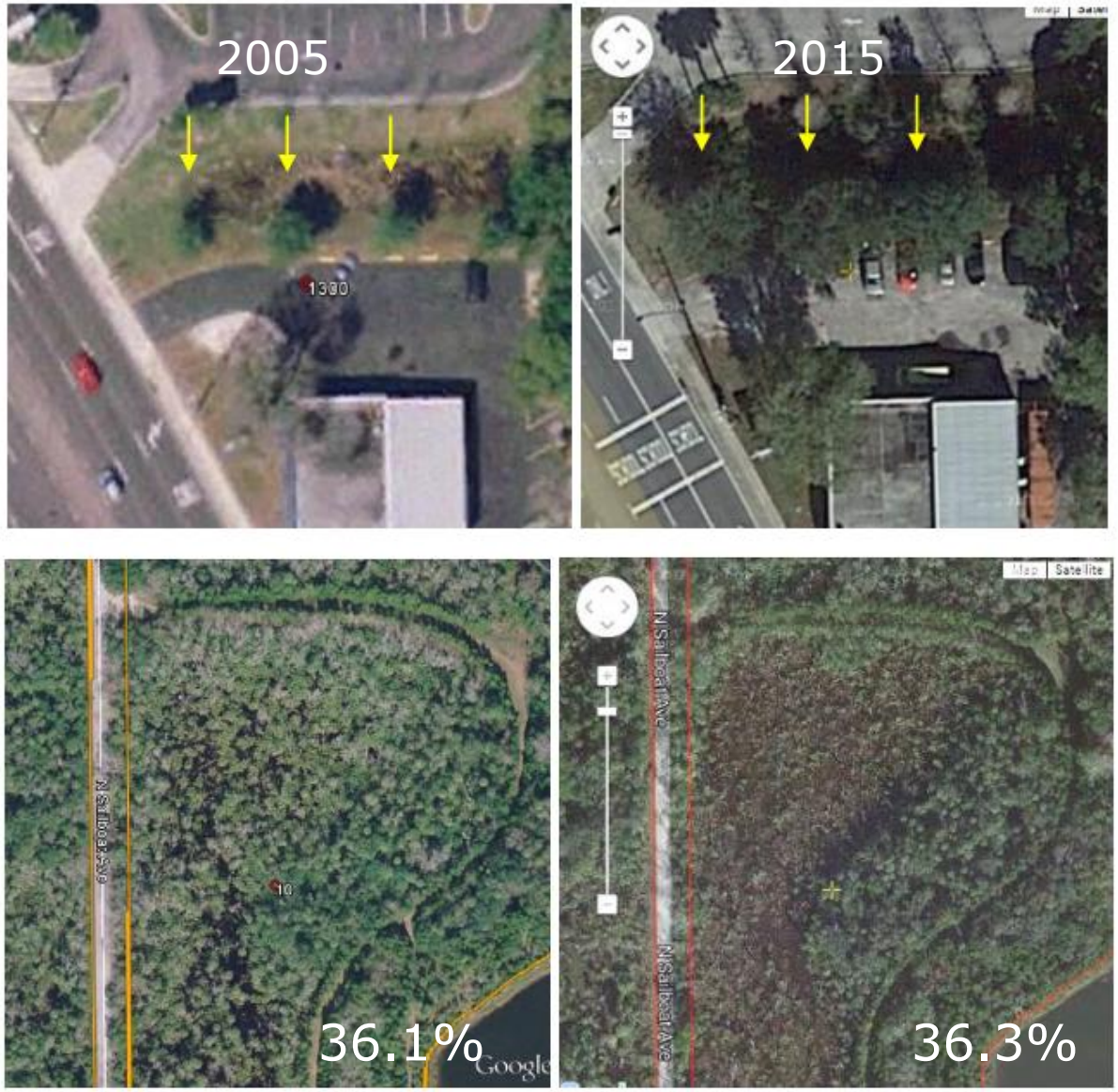
- Utilizes **Google Earth** to see historic imagery for your area
  - Free to access
  - Converts i-Tree Canopy points to KML file
  - Capture changes to your sample over time

Land Use	2005	2016
Tree	23.0%	23.7% (+)
Impervious	32.1	33.0 (+)
Grass	38.4	36.8 (-)
Bare Ground	4.33	3.83 (-)
Water	2.16	2.67 (+)



i-Tree Canopy Change Surveys

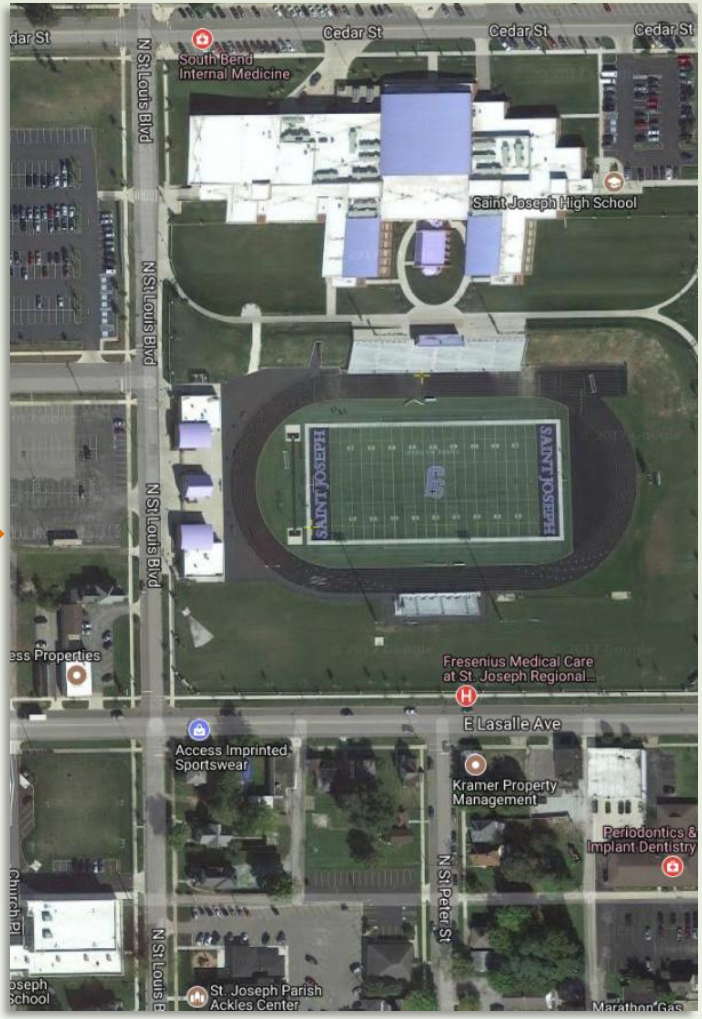
- **Some typical observations**



Canopy Change Over Time

2005

2016



DAVEY
Proven Solutions for a Growing World

Canopy Change Over Time

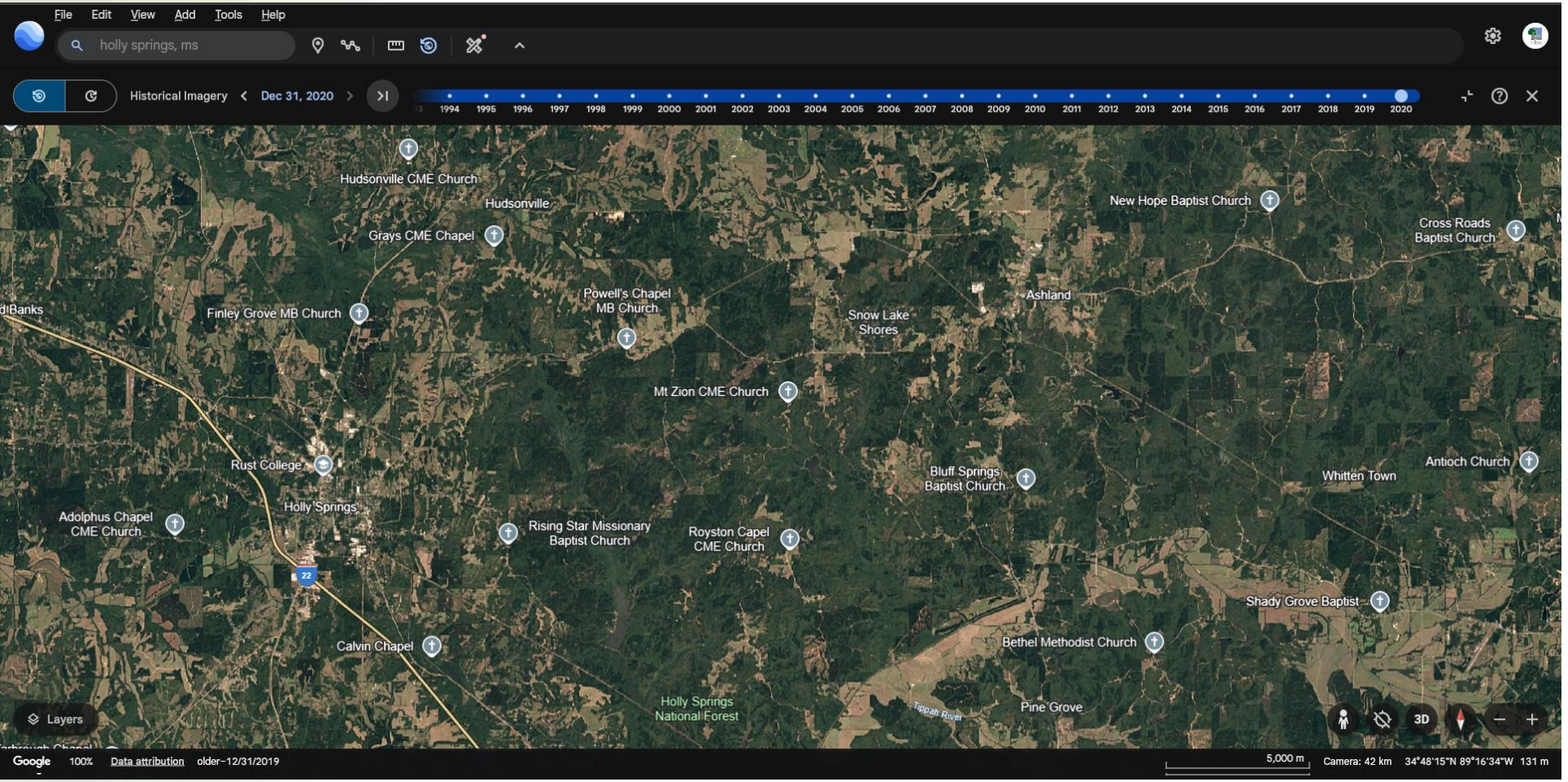
2005

2016

DAVEY
Proven Solutions for a Growing World

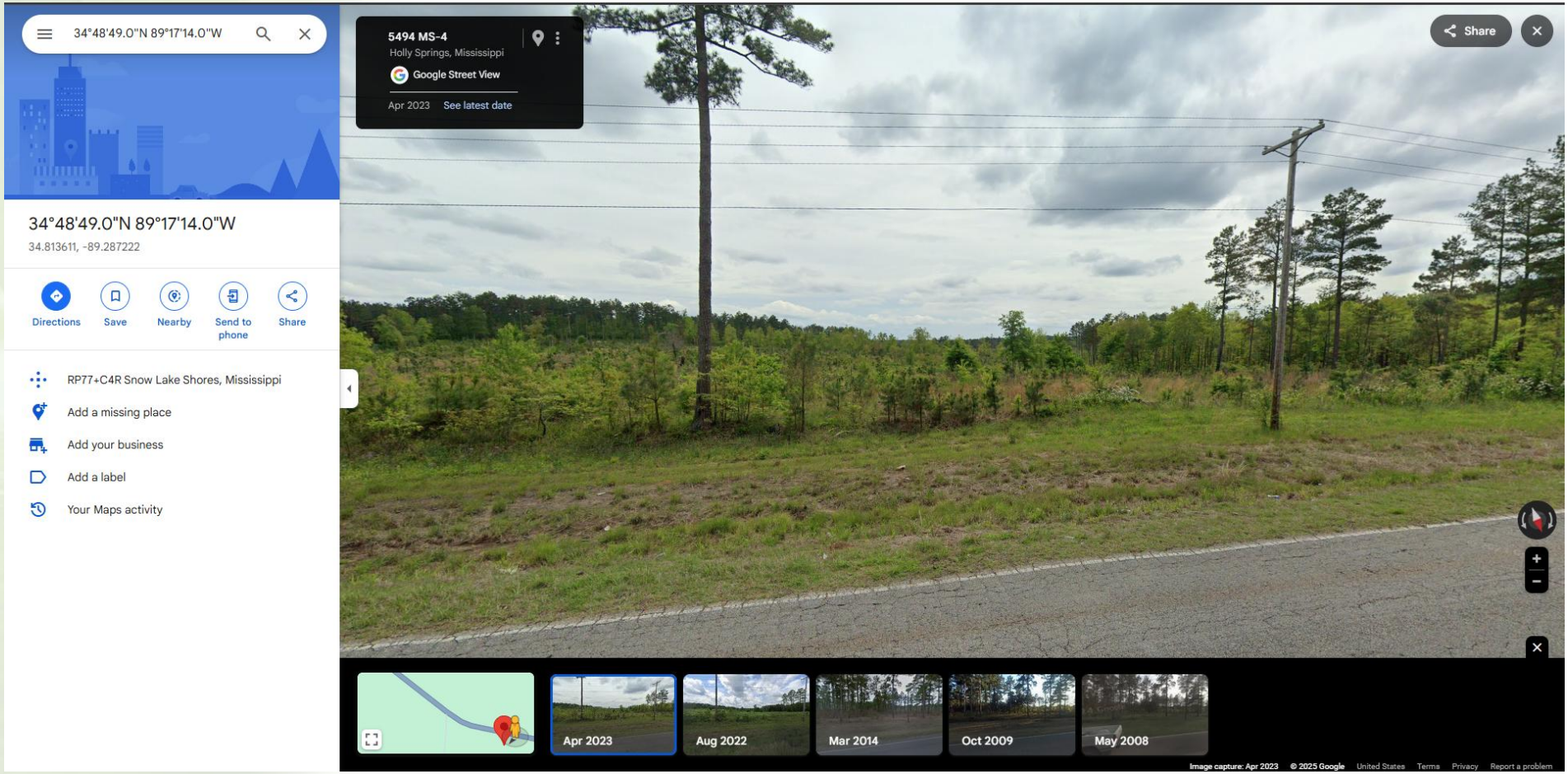
i-Tree Canopy Change Surveys

- **Monitoring canopy recovery**



i-Tree Canopy Change Surveys

- **Monitoring canopy recovery**



I Have My Canopy Estimates – Now What?

- What you know powers the way forward
  - ***What You Have, Where You Have It***
- Even subtle changes can be meaningful
- Stormwater/Urban Heat impact: Impervious just as important as Canopy
- Results can drive conversations with communities
  - Opportunities for input, engagement, and stewardship
  - What do you have, where do you have it, how can you use that knowledge to impact policy and manage resources
- ***Strategies that can build resilience for both trees and neighborhoods***

OAKS OF NORTH LAWNDALE

Community Roots That Grow On Trees

Spotlight: North Lawndale, Chicago, IL

The ways that trees benefit a community are as numerous as their branches. Planning for trees, understanding their benefits, planting them and caring for them fosters engagement, stewardship and sustainability.

When you add that to their public health and environmental advantages, trees can have a positive impact on neighborhoods for generations.

Inspired by the 7000 Oaks art installation, the Oaks of North Lawndale project partners neighborhood residents with the city and the School of the Art Institute of Chicago in an effort to nurture a greener, peaceful, and re-forested community.

Photos courtesy of Foundation for Human Square

In September 2017, SAIC set up its mobile foundry at their Homan Square campus, site of the project launch event with artist Pedro Reyes, who joined residents in the melting of weapons to create shovel heads which were used to plant the first trees.

The Oaks of North Lawndale project could raise canopy coverage in the neighborhood to at least 23%, representing an increase of more than 38% over current canopy amounts.

Trees would be planted over a multi-year period, providing opportunities for sustained collaboration among neighbors, artists and educators at SAIC, a local tree nursery and gardeners, the North Lawndale Employment Network and job skills training programs, along with other organizations.

Trees in urban environments are known to...

...improve human health.
- Improve air quality
- Improve respiratory health, overall well-being, and reduce stress
- Protect from harmful UV light

...benefit the community.
- Reduce crime by fostering neighborhood social interactions
- Lower summer air temperatures and reduce energy costs
- Provide aesthetic benefits and promote community equity
- Enhance property values

... provide environmental services.
- Reduce stormwater runoff
- Absorb carbon dioxide -a greenhouse gas that traps heat in the atmosphere

Shade: **3.5 million** square feet (about 60 football fields)

Store: **1500 tons** of carbon ($189,000)

7,000 trees can

Add: **$6.8 million** to landscape value based on mature tree worth

Divert: **17 million** gallons of stormwater runoff (saving $153,000)

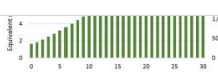
Provide: **$1.4 million** in health savings through air pollution removal

SAIC School of the Art Institute of Chicago

DAVEY Institute

Impacts from 7,000 newly planted trees in North Lawndale as they grow to maturity over 30 years

he community of North face temperatures about 10 han the regional average. trees in Douglas Park help ce by more than 3 degrees.



Trees improve public health by removing harmful air pollutants. Poor air quality is a common problem in many urban communities. It can contribute to serious respiratory health problems such as childhood asthma, bronchitis, and other cardiovascular health incidents

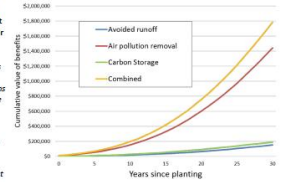
Trees help absorb stormwater runoff and reduce the risk of flooding. Precipitation is caught by leaves and filtered through soil, instead of running over pavement and impervious city surfaces that can overwhelm water and sewer lines during a heavy rainstorm.

Where the numbers come from: *The benefits and values associated with trees were estimated using* ***i-Tree Eco and Landscape*** *software from the US Forest Service. The programs use local weather, pollution, and population data to estimate how the woody and leafy parts of trees interact with the environment and the people who live there.*

Tree growth was predicted using ***i-Tree's Forecast*** *module, and assumed that all trees are cared for and survive to maturity. The growth predictions consider local climate along with the rates different sizes and species of trees typically grow. Five common trees were modeled to represent future tree species to be planted.*

Trees provide by cooling the surrounding air and providing shade. Higher temperatures magnify health risks, increase energy use, and worsen air pollution impacts. Increasing and protecting community tree canopy can help lessen these negative impacts.

Trees absorb carbon dioxide from the air and store it as wood. Carbon dioxide (CO_2) is a greenhouse gas that traps heat in the atmosphere. It enters the atmosphere through burning fossil fuels (coal, natural gas, and oil), solid waste, and fire wood, and also as a result of certain chemical reactions (e.g., manufacturing of cement).



A typical block of newly planted street trees (left) would see an increase of more than 10,000 sq.ft. in canopy coverage, and the environmental, economic, and health benefits that come with them.

Want to get involved? Visit https://www.facebook.com/oaksofnorthlawndale/ to learn more about the project and how to lend a hand.

Powered by i-Tree and The Davey Institute. i-Tree represents cutting-edge, peer reviewed, USDA Forest Service research packaged into tools and applications easily used by everyone. www.itreetools.org

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