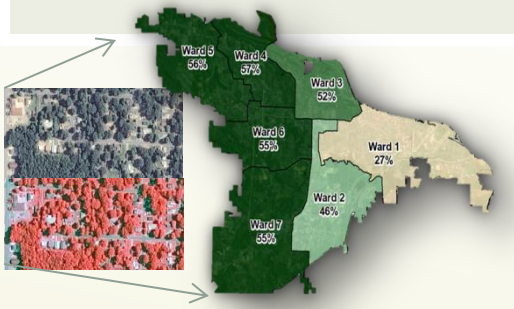
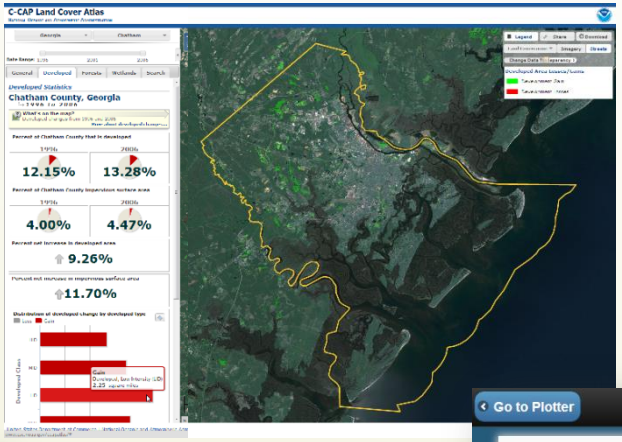
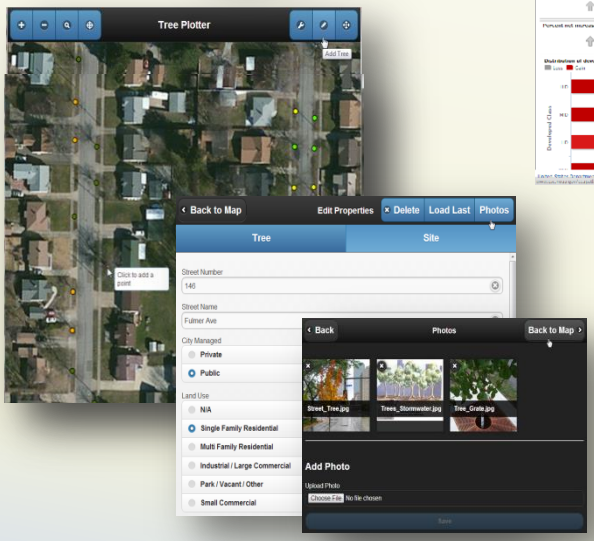
URBAN FORESTRY IN SMART GROWTH

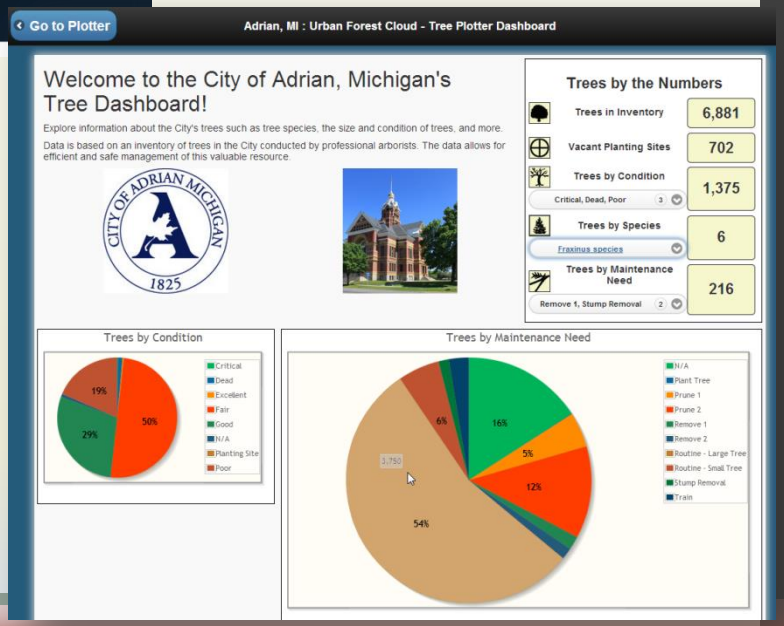
TECHNOLOGY APPLICATIONS

FEBRUARY 2014









Presented by:

Ian Hanou, plan-it GEO LLC

My Talk:

"An interactive demonstration of technological applications that engage planners, managers, NGOs, and the public in sustaining robust urban forests at various scales."

Question to the Audience:

As a planner, how would it change your ability to enhance urban forest benefits in your community by having tree and forest cover data readily available via tools & technology?

PRESENTATION COMPONENTS

- Smart Growth Principles
  - ✓ In the context of urban forestry and technology
- Planning urban forests
  - ✓ Trends as well as ways we study, assess, and inform urban forestry
- Seeing the Forest and the Trees
  - ✓ From tree inventory to canopy assessment
  - ✓ Tools & technologies for planners/managers
  - ✓ Maps, apps, and more
- Resources and Other Tools

SMART GROWTH PRINCIPLES

1. Mix land uses
2. Take advantage of compact building design
3. Create a range of housing opportunities and choices
4. Create walkable neighborhoods
5. Foster distinctive, attractive communities with a strong sense of place
6. Preserve open space, farmland, natural beauty, and critical environmental areas
7. Strengthen and direct development towards existing communities
8. Provide a variety of transportation choices
9. Make development decisions predictable, fair, and cost effective
10. Encourage community and stakeholder collaboration in development decisions

URBAN FOREST MANAGEMENT (50K' VIEW)

Plan-It Geo | planitgeo.com

Inventory

("bottom-up")

Public trees:
- Street/park
- Sample or 100%
- By staff, contractors, students, or volunteers

Plot-based:
- Public/private property

Related Software

- i-Tree (Streets, Eco, etc.)
- Open Tree Map
- Tree Plotter
- TreeKeeper
- ArborPro
- Talking2Trees
- Many others …

Assessment

("top-down")

Urban Tree Canopy Ass't
- GIS/Remote Sensing
  - ✓ >200 completed
- i-Tree Canopy
- 30m NLCD or C-CAP

Other:
- Forest Health
- LU/LC Change Analysis
- Stewardship Mapping

Related Software

- i-Tree (Canopy, Vue)
- NOAA Digital Coast
- StewMap
- Canopy Planner

(Urban Forest Cloud©)

Planning

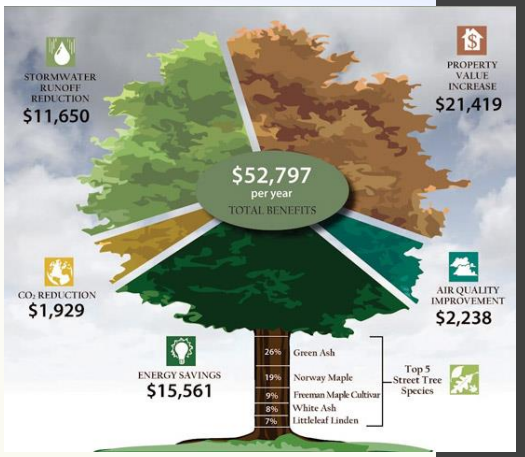
Mgmt./Master Plans:
- Street trees
- Park trees
- Open Space
- Strategic UFMPs

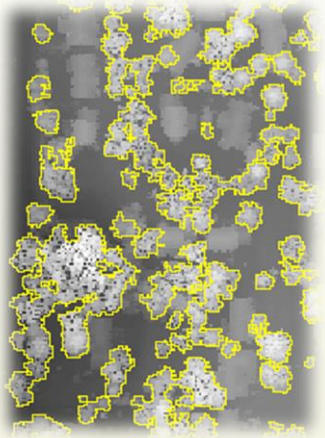
Related Plans:
- Green Infrastructure
- Climate Action Plan
- Comprehensive Plan

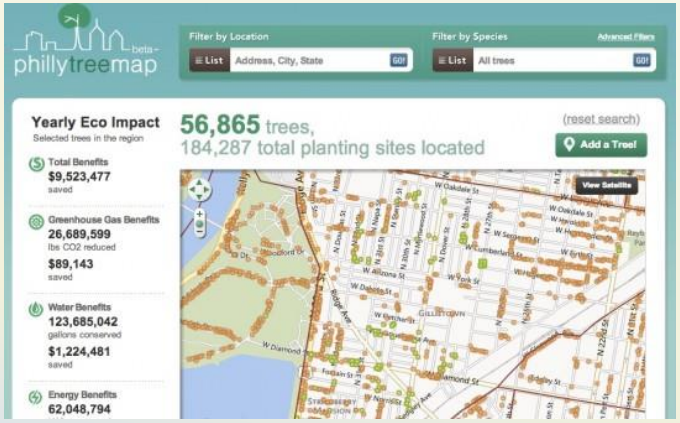
Regulations/Ordinances:
- Tree preservation
- Landscaping req'ts
- Fee in-lieu of programs
- Street and park trees
- Conservation Subdivision Ordinance

TECHNICAL TRENDS IN URBAN FORESTRY

- Ecosystem services (regulatory compliance)
- Urban Tree Canopy (UTC) assessments
- Crowdsourcing
  - Online, web-based tree inventory
- Canopy cover goals
- 1M tree planting initiatives







FACILITATING MANAGEMENT | DECISION SUPPORT TOOLS

Goals/objectives through tools and technologies

Collect, edit, update data in real-time

View, query/filter, summarize, share

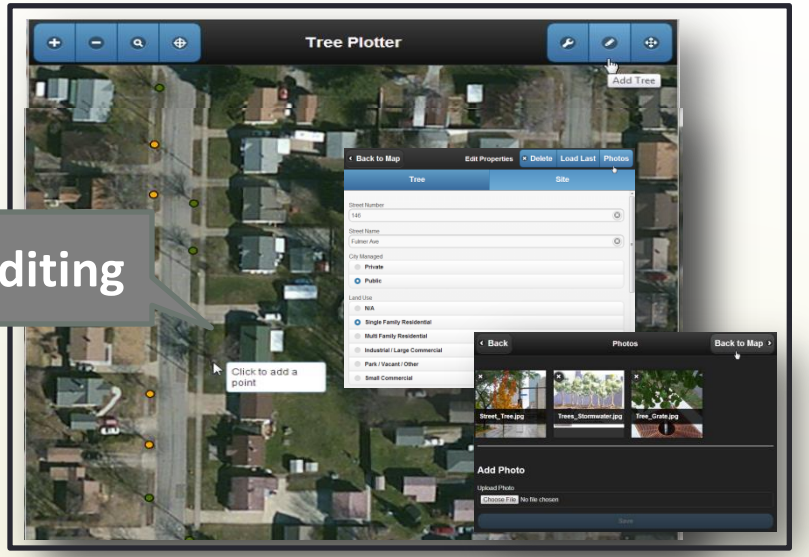
Prioritize, simulate, and track progress

Accessibility, transparency, ease-of-use

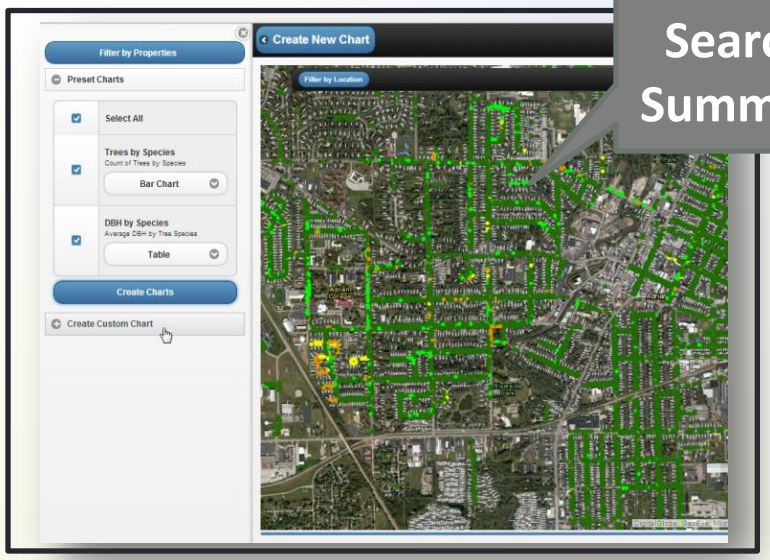
Inform, collaborate, efficacy

Smart "Urban Forest Technology" Principles???

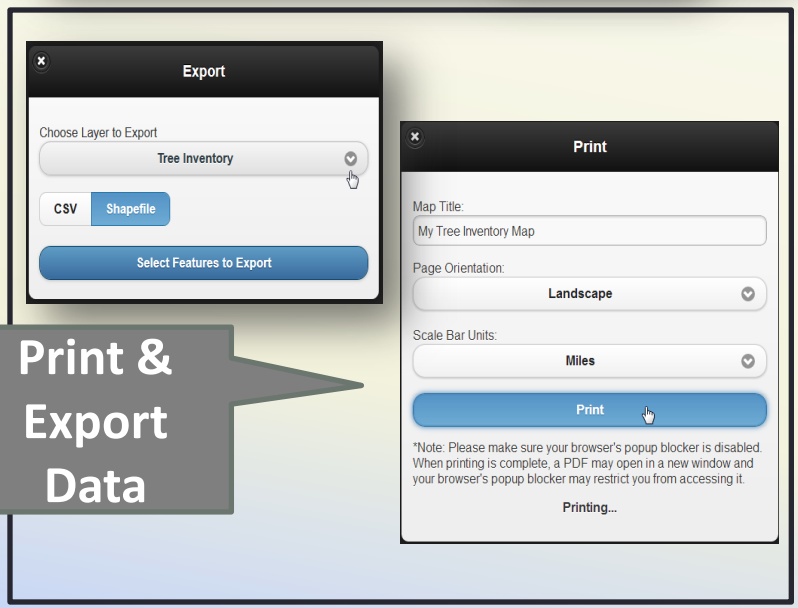
WEB-BASED TREE INVENTORY MANAGEMENT



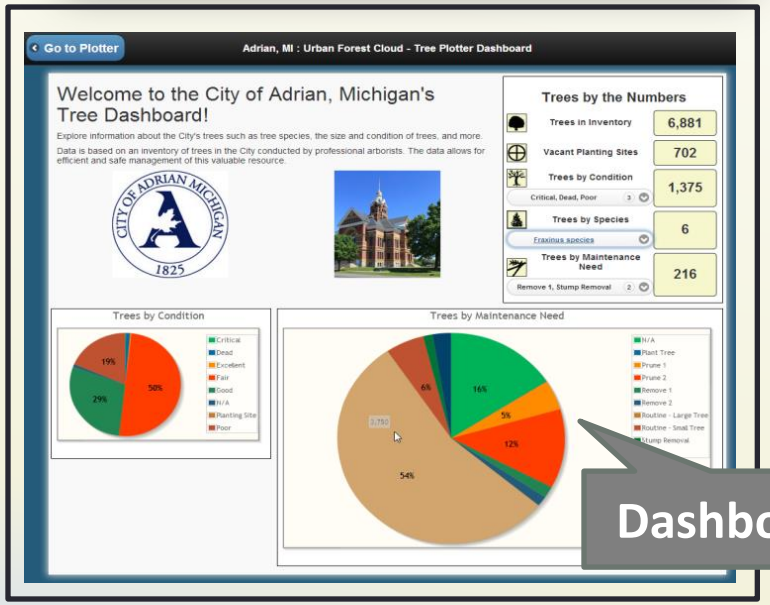
Editing



Search & Summarize

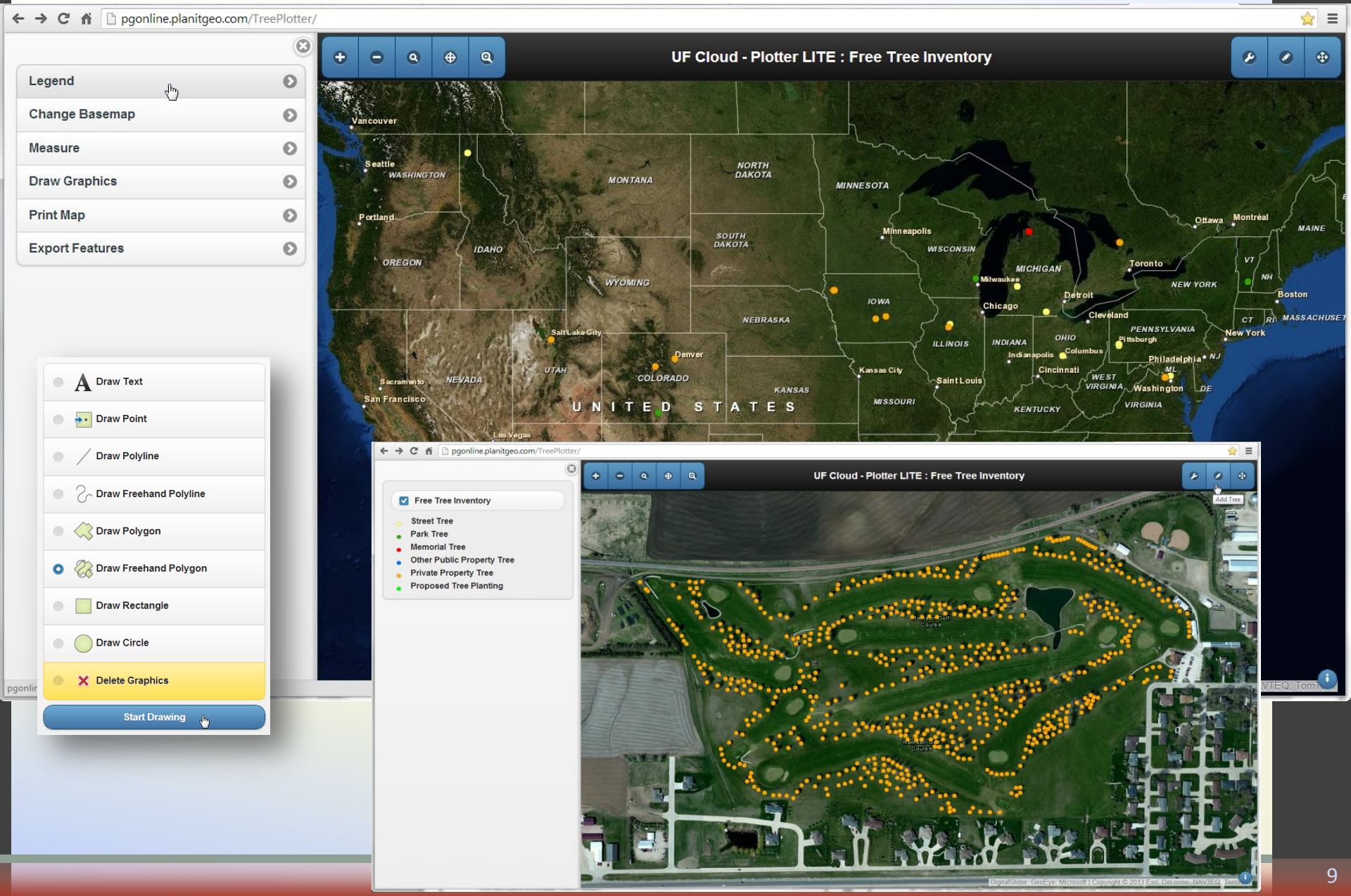


Print & Export Data

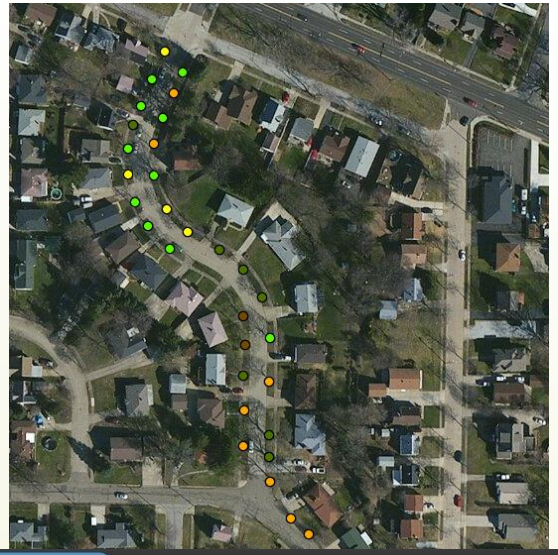


Dashboard

TREE PLOTTER "LITE": FREE INVENTORY APP



TOOLS TO PUT YOUR TREE DATA TO USE



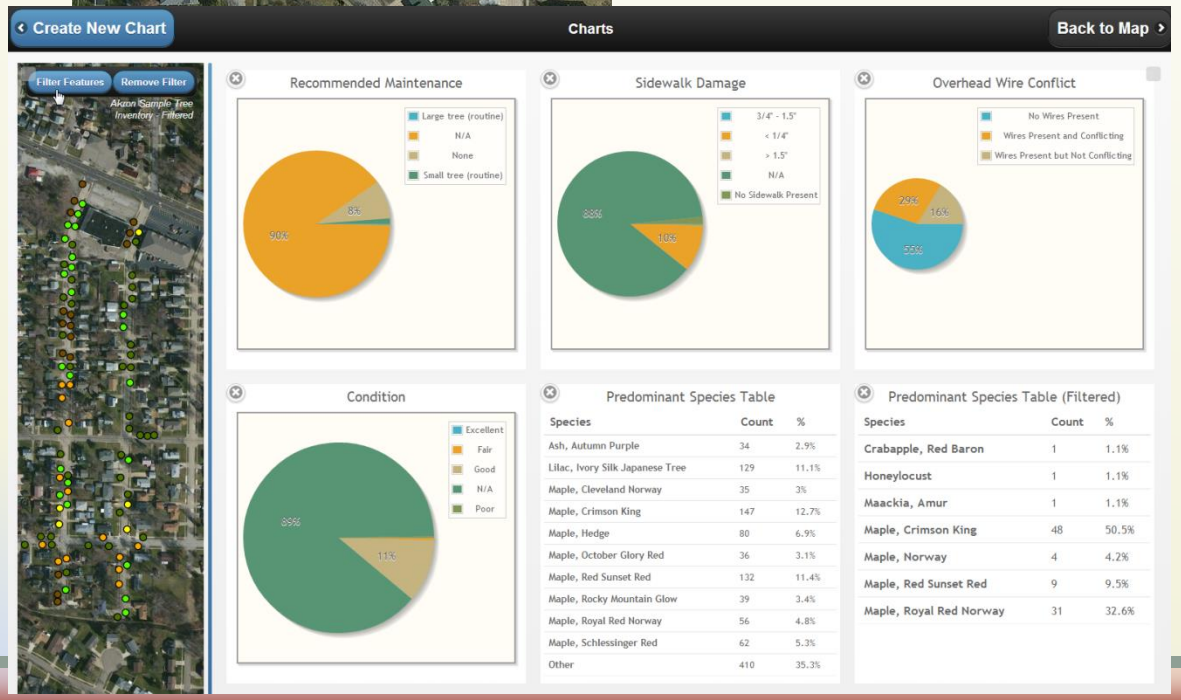
Summarize data based on location or attributes, then summarize data in charts, maps, and tables.

Hypothetical Example:

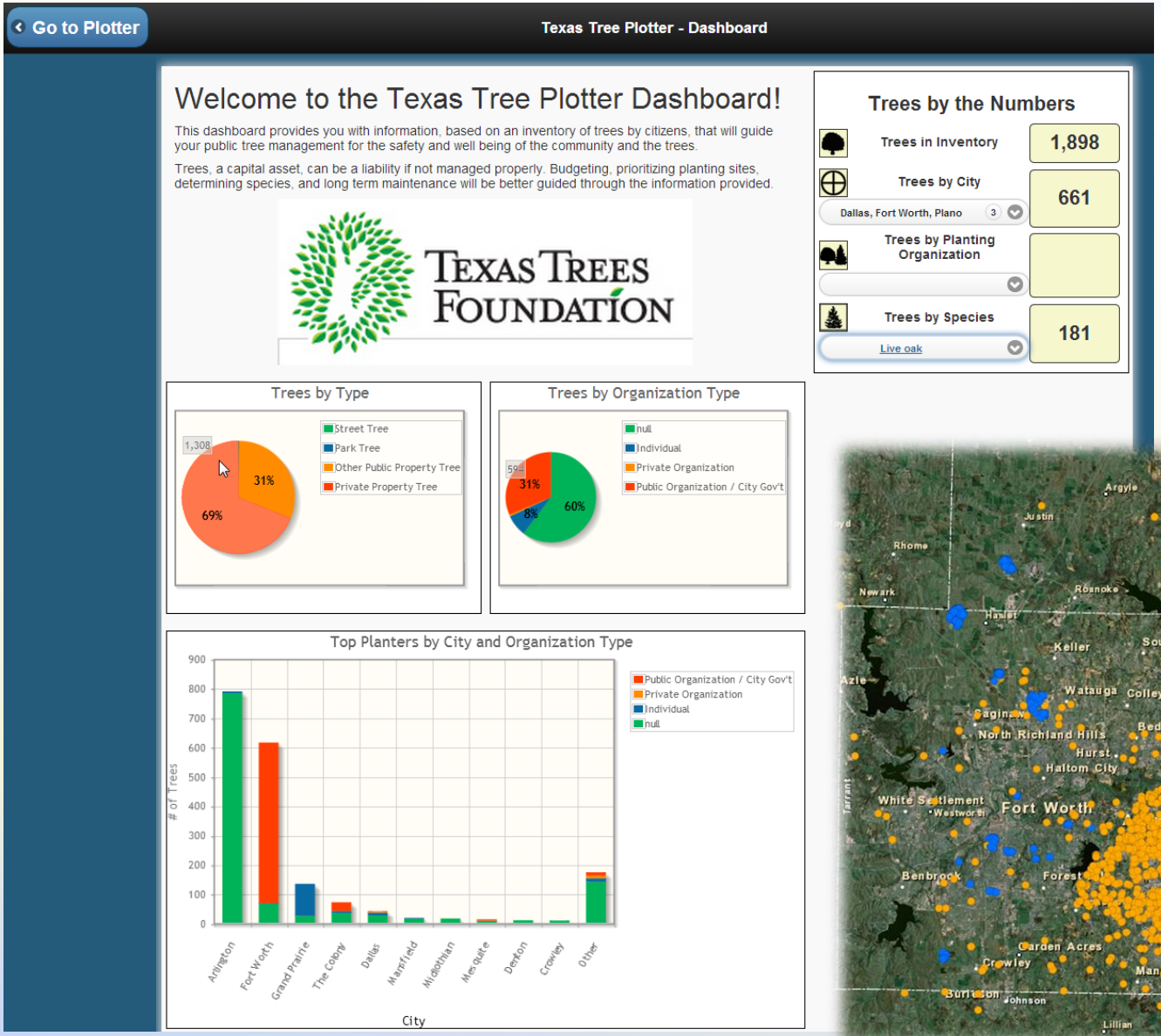
Do we have good tree species diversity in ABC park?

How about on Elm Street in the Sunnyside neighborhood?

Are the trees in good health (condition)?



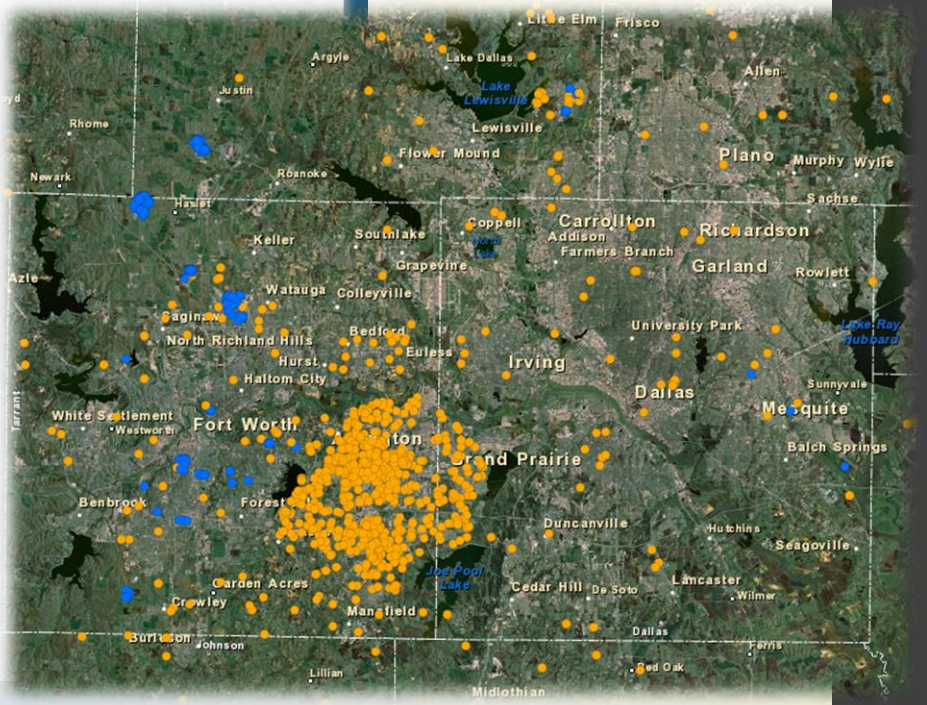
REGIONAL TREE TRACKING TOOL



Where are the most engaged citizens and businesses?

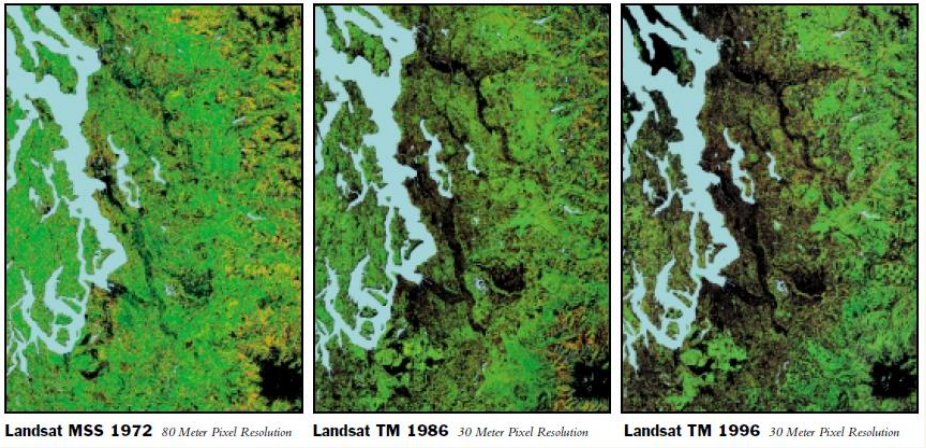
What city's leading the way in planting?

Are we on track with tree planting goals?



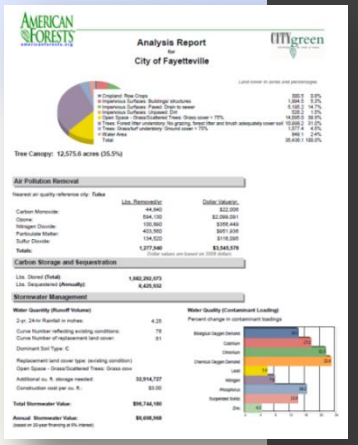
URBAN TREE CANOPY ASSESSMENTS

1 American Forests, 30-m resolution Urban Ecosystem Analysis (1990's)

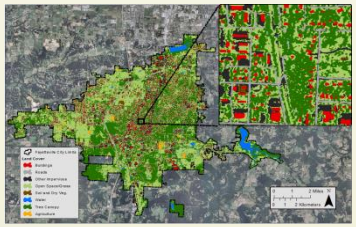


Landsat MSS 1972 *80 Meter Pixel Resolution* | Landsat TM 1986 *30 Meter Pixel Resolution* | Landsat TM 1996 *30 Meter Pixel Resolution*

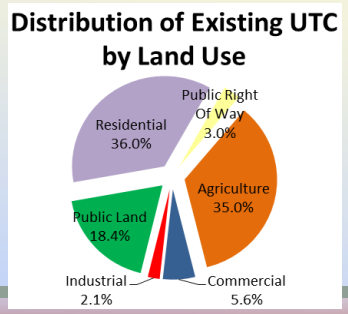
2 High-resolution land cover and CITYgreen study ('90's/early 2000)

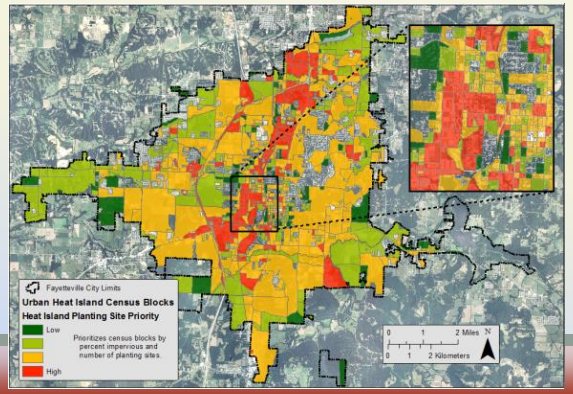


3 UTC Assessments (starting early 2000's)

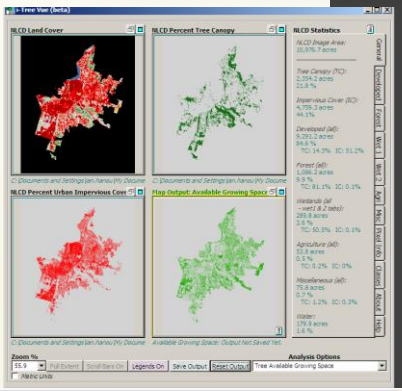


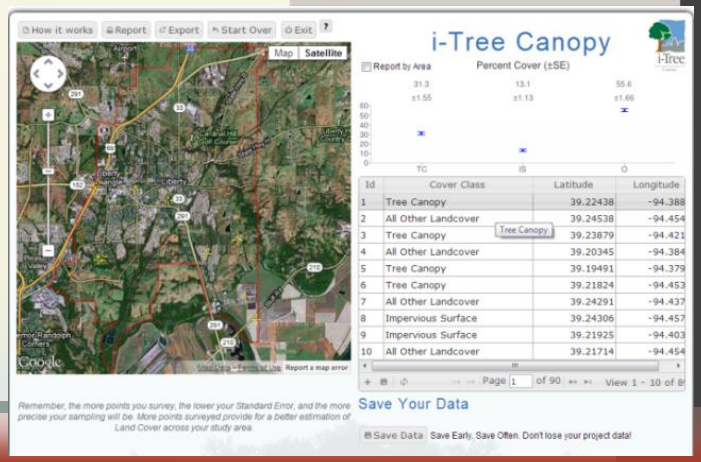
Land Use Category	Total Acres	Land Area (acres)	% of Total City Area	UTC (acres)	Existing UTC %
Agriculture	9,880	9,757	27.9%	4,353	44.6%
Commercial	3,985	3,943	11.2%	702	17.8%
Industrial	957	949	2.7%	258	27.2%
Public Land	6,731	6,106	19.0%	2,285	37.4%
Residential	11,017	10,968	31.1%	4,475	40.8%
Public Right Of Way	2,867	2,863	8.1%	368	12.9%
TOTALS	35,437	34,586	100.0%	12,441	36.0%



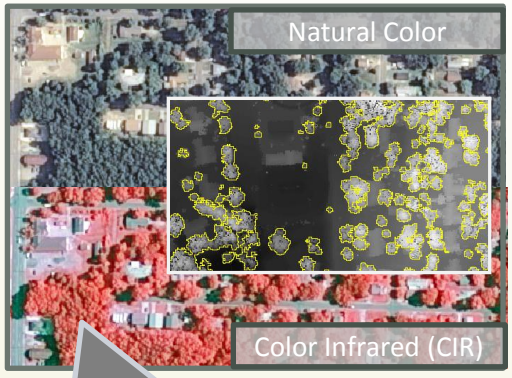


4 i-Tree Vue (30-m) and i-Tree Canopy (statistical tool)



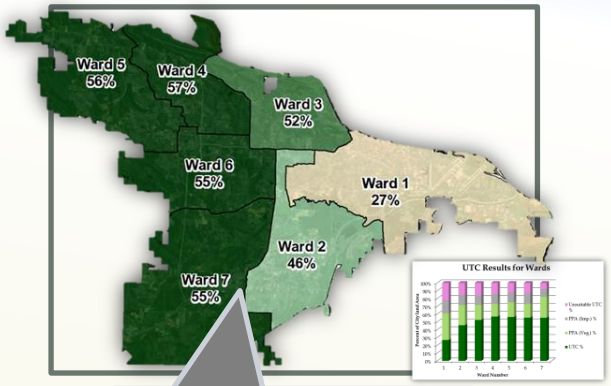


COMPONENTS OF URBAN TREE CANOPY STUDIES

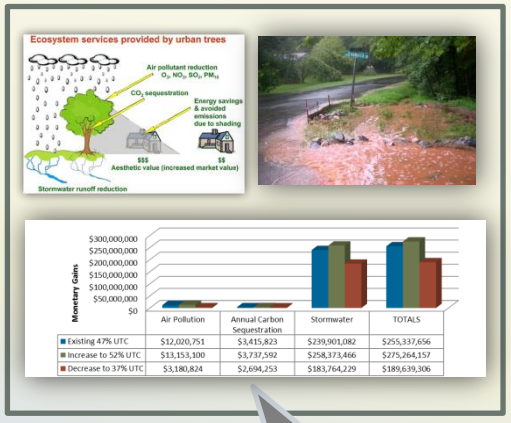


Multispectral Imagery & LiDAR

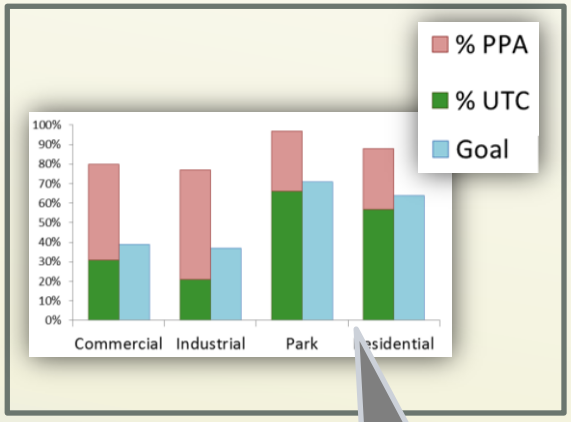
Land Cover Classification



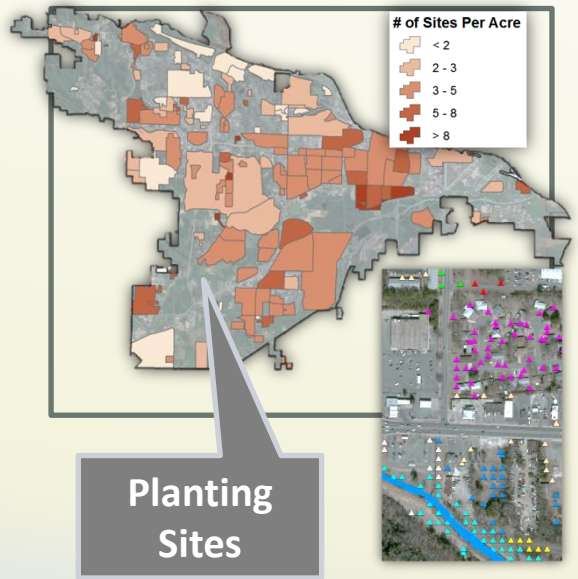
Assessment Maps



Ecosystems Services

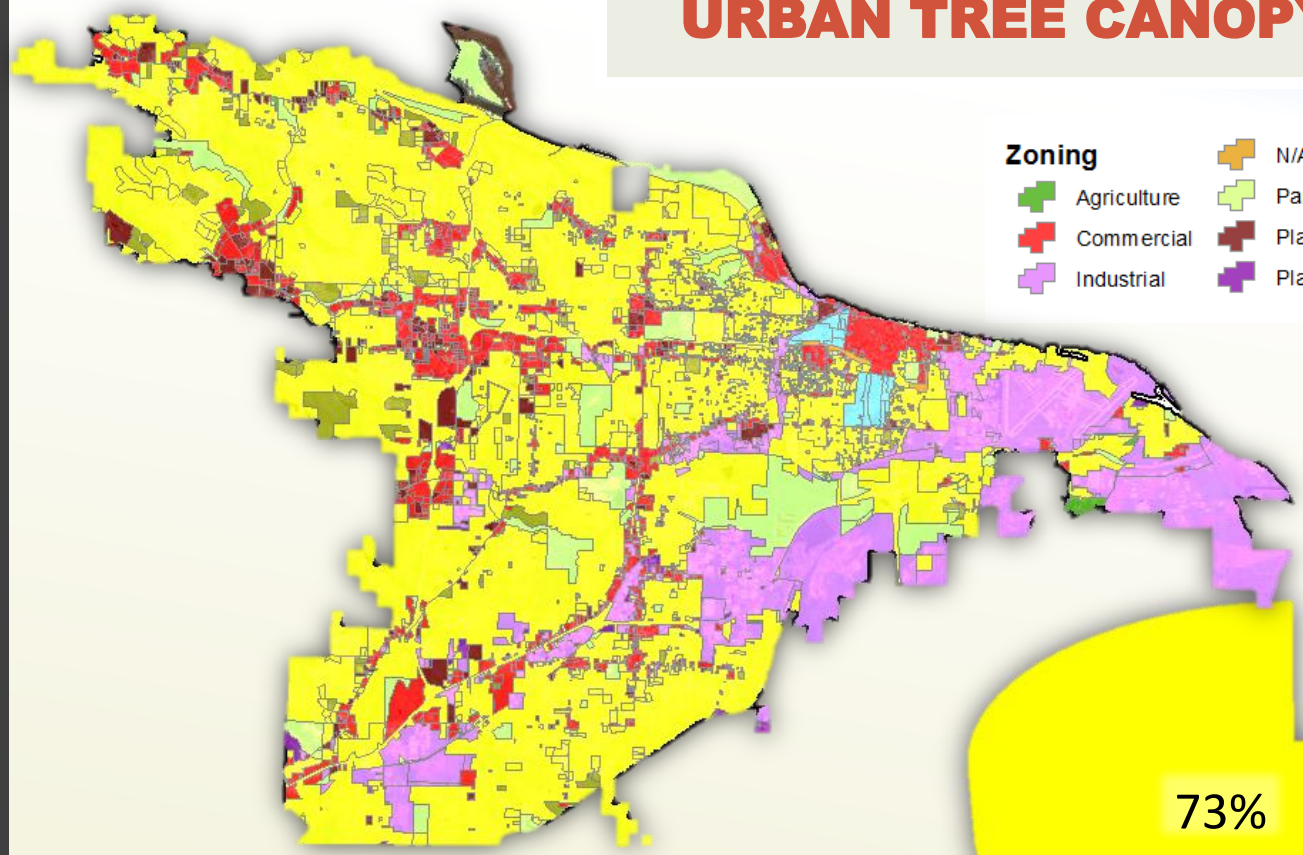


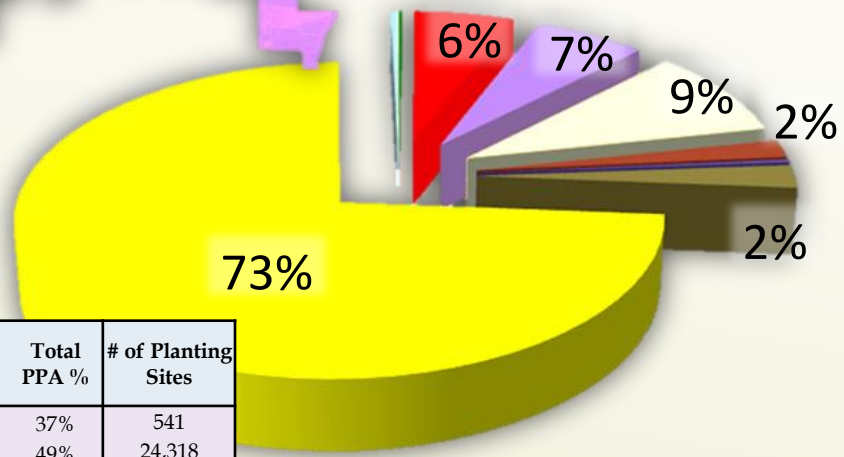
Goal Setting



Planting Sites

URBAN TREE CANOPY BY ZONING



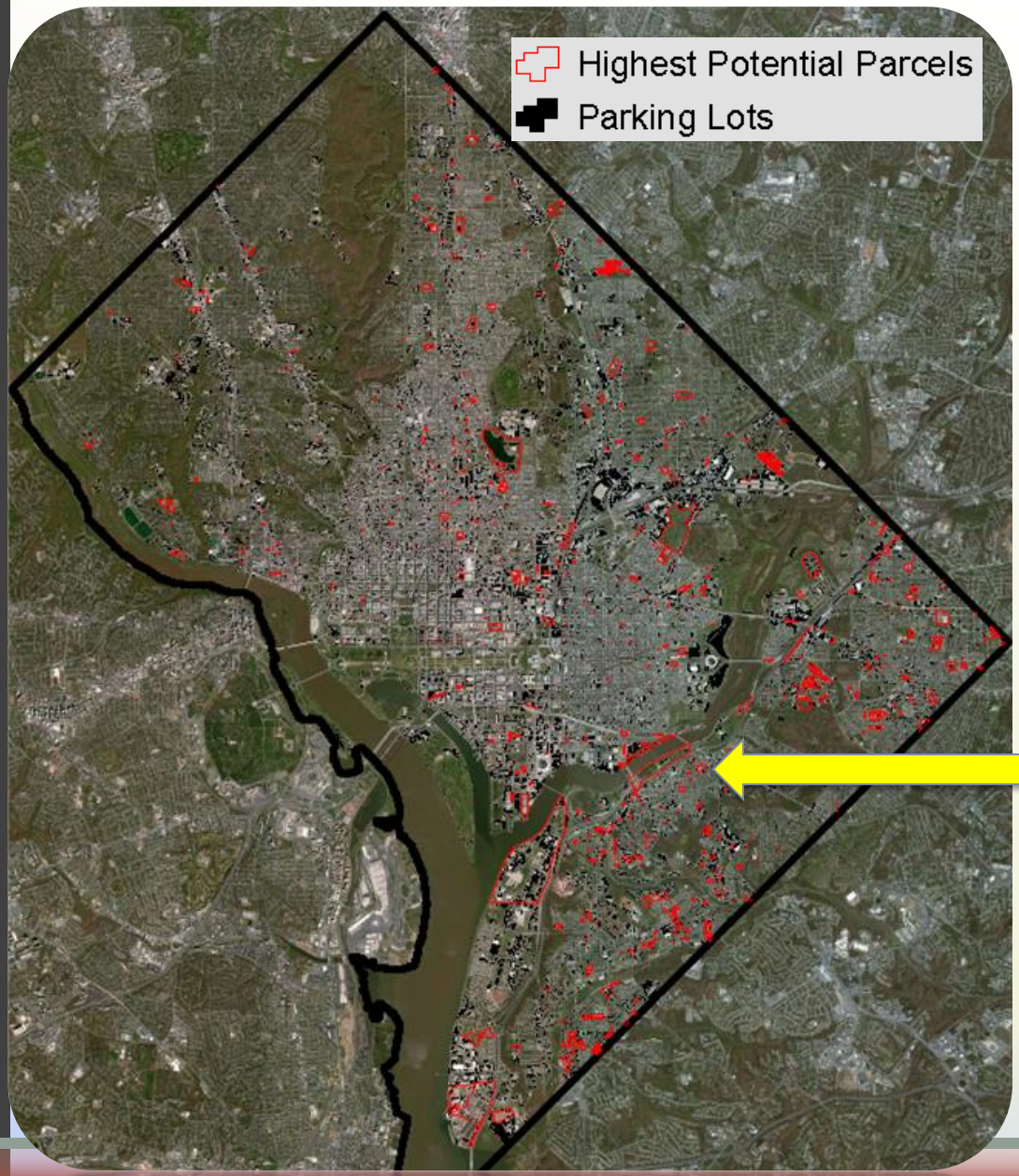


Zoning	Land Acres	% of Total Land Area	UTC Acres	UTC %	% of Total UTC	Total PPA Acres	Total PPA %	# of Planting Sites
Agricultural	135	0%	66	48%	0.2%	50	37%	541
Commercial	6,848	9%	2,096	31%	5.7%	3,341	49%	24,318
Industrial	11,472	15%	2,365	21%	6.5%	6,385	56%	55,678
Park	5,102	7%	3,391	66%	9.3%	1,558	31%	15,216
Planned Commercial	2,239	3%	689	31%	1.9%	1,135	51%	9,656
Planned Industrial	292	0%	104	36%	0.3%	145	50%	1,140
Planned Residential	1,623	2%	873	54%	2.4%	502	31%	5,850
Residential	47,350	63%	26,805	57%	73.4%	14,706	31%	171,511
State Capitol	532	1%	144	27%	0.4%	230	43%	2,426
N/A	90	0%	4	4%	0.0%	53	58%	756
TOTALS	75,683	100%	36,535	48%		28,103	37%	287,092

Distribution of UTC by Zoning Categories

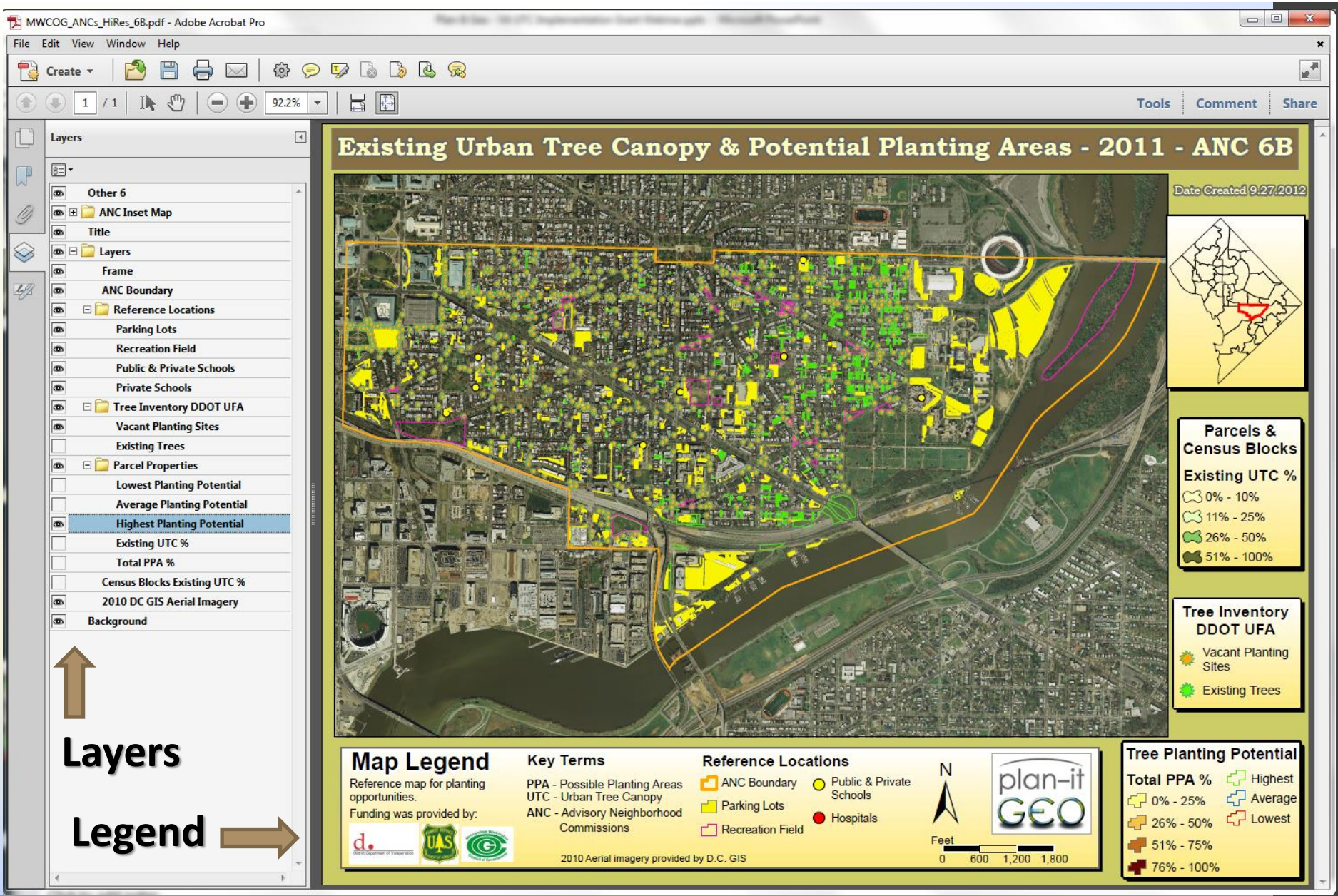
Little Rock, AR

MEETING MULTIPLE GOALS: PRIORITY TREE PLANTING



- ✓ *Room for Large Trees*
- ✓ *Urban Heat Island (extensive impervious areas)*
- ✓ *Social Benefits (recreation)*
- ✓ *Water Quality (Anacostia River)*
- ✓ *Air Quality (major highway)*

LOW-TECH INTERACTIVE COMMUNITY TREE PLANTING MAP

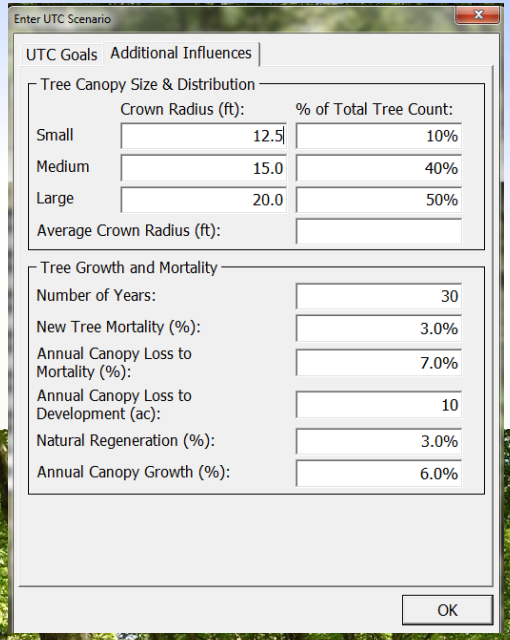


SETTING AN URBAN TREE CANOPY GOAL

- Are we content where we are
- Will investing in ***greater*** canopy have a net positive gain
- What is our ***Potential*** Urban Tree Canopy
- UTC goals by land use, zoning, or ownership
- Do we have political/regulatory support or social capital
- Duration / planning horizon

URBAN TREE CANOPY CALCULATOR TOOL

Parameters



Welcome to the Plan-It Geo UTC Calculator!

This tool allows you to predict changes to Urban Tree Canopy by altering the following parameters:

Canopy Cover and Tree Planting Goals, Average Tree Size, Rate of Growth and Mortality, and Development

Click Here to Edit UTC Goals

Boise, Idaho

										(+)		(+/-)		(-)		(+)				(=)			
Land Use Classes	Current	Total Land (Acres)	Existing UTC (Acres)	(%)	Total Possible Planting Area (Acres)	(%)	Goals	Urban Tree Canopy (%)	(No. Trees)	Predictions	Natural Regeneration (Acres)	(%)	Canopy Growth & Mortality (Acres)	(%)	Loss to Development (Acres)	(%)	Tree Planting Required (Acres)	(No. Trees)	Net UTC Increase (Acres)	(%)	UTC in 2043 (Acres)	(%)
Agriculture		1,404	56	*4.0%*	24	*2%*		*3%*	-		1	*1%*	(15)	*-26%*	(25)	*-45%*	26	1,199	(14)	*-25%*	42	*3%*
Commercial		6,009	482	*8.0%*	3,112	*52%*		*10%*	-		93	*19%*	(125)	*-26%*	(25)	*-5%*	181	8,447	119	*25%*	601	*10%*
Industrial		862	47	*5.5%*	553	*64%*		*5%*	-		17	*35%*	(12)	*-26%*	(25)	*-53%*	17	804	(4)	*-8%*	43	*5%*
Open Space		1,446	164	*11.3%*	1,079	*75%*		*15%*	-		32	*20%*	(43)	*-26%*	(25)	*-15%*	91	4,234	53	*32%*	217	*15%*
Other		1,377	21	*1.5%*	1,074	*78%*		*10%*	-		32	*153%*	(5)	*-26%*	(25)	*-119%*	118	5,517	117	*556%*	138	*10%*
Parks		1,129	287	*25.4%*	638	*57%*		*20%*	-		19	*7%*	(75)	*-26%*	(25)	*-9%*	20	929	(61)	*-21%*	226	*20%*
Public		6,802	400	*5.9%*	4,154	*61%*		*10%*	-		125	*31%*	(104)	*-26%*	(25)	*-6%*	293	13,664	280	*70%*	680	*10%*
Residential High		1,932	417	*21.6%*	389	*20%*		*20%*	-		12	*3%*	(109)	*-26%*	(25)	*-6%*	94	4,381	(31)	*-7%*	386	*20%*
Residential Low		4,226	931	*22.0%*	2,515	*60%*		*15%*	-		75	*8%*	(242)	*-26%*	(25)	*-3%*	-	-	(297)	*-32%*	634	*15%*
Residential Medium		11,664	3,360	*28.8%*	3,481	*30%*		*25%*	-		104	*3%*	(875)	*-26%*	(25)	*-1%*	362	16,855	(444)	*-13%*	2,916	*25%*
Rights-of-Way		7,565	923	*12.2%*	953	*13%*		*10%*	-		29	*3%*	(240)	*-26%*	(25)	*-3%*	72	3,368	(167)	*-18%*	757	*10%*
Schools		810	60	*7.4%*	447	*55%*		*10%*	-		13	*22%*	(16)	*-26%*	(25)	*-42%*	50	2,314	21	*35%*	81	*10%*
Citywide Total		**45,226**	**7,149**	*16%*	**18,418**	*41%*		*15%*	**61,711**		**553**	*8%*	**(1,861)**	*-26%*	**(300)**	*-4%*	**1,324**	**61,711**	**(427)**	*-6%*	**6,721**	*15%*

*Change Calculated after 30 Years

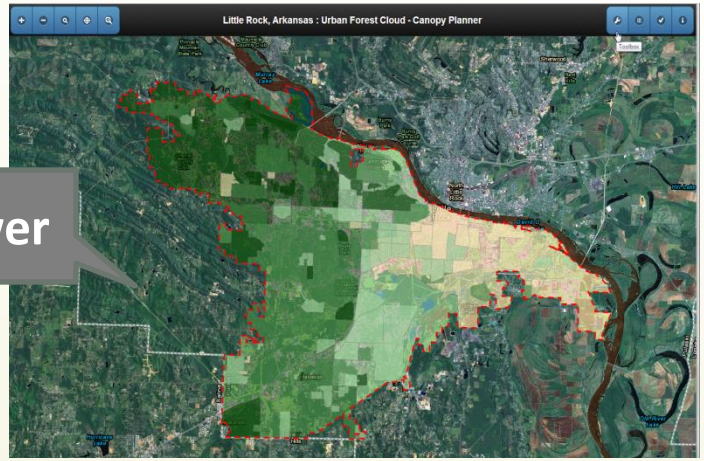
*Regeneration, Growth, Mortality, and Loss may result in negative Planting numbers

Assessment Results (Inputs)

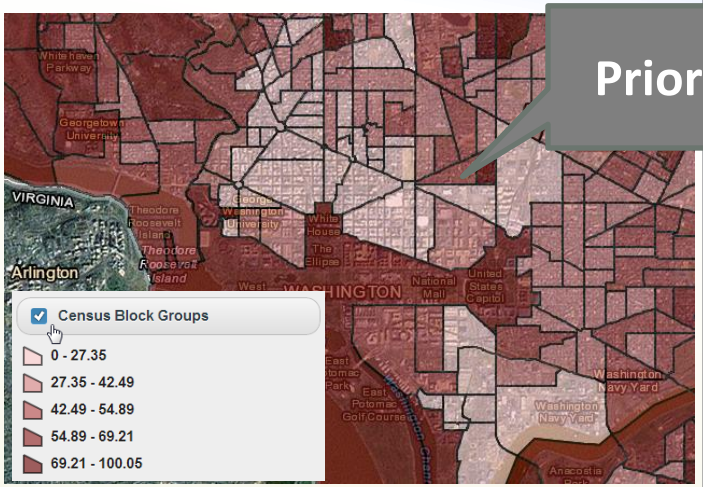
Scenario Results (Outputs)

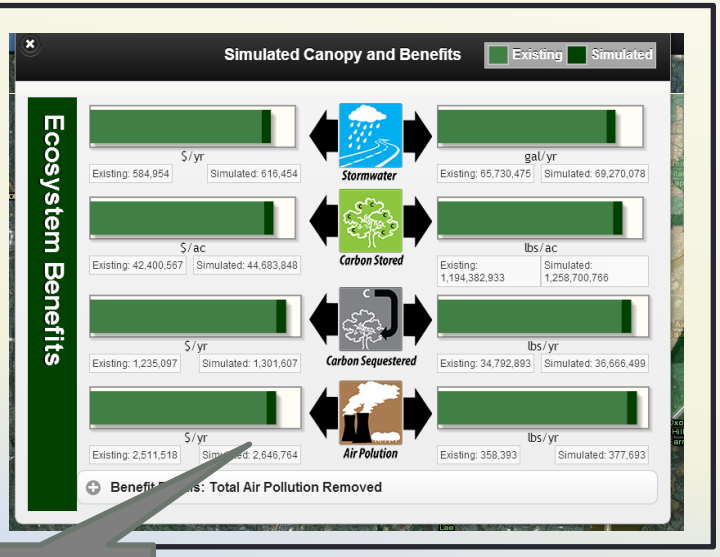
WEB-BASED TOOLS FOR URBAN FOREST PLANNING

Viewer

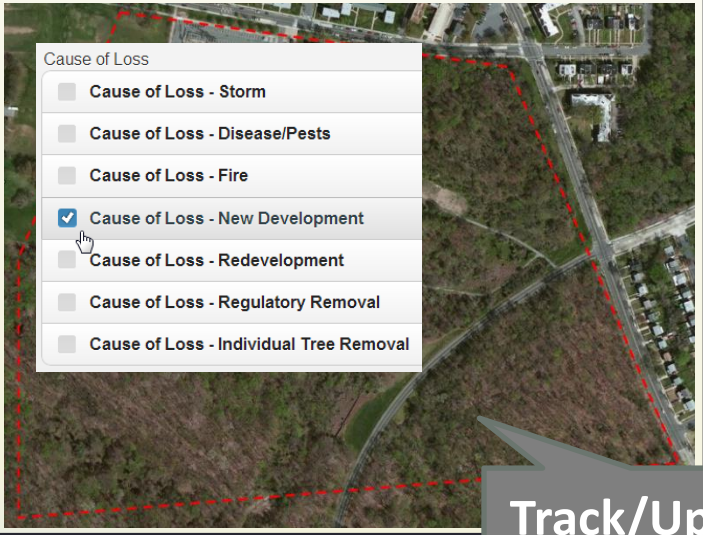


Prioritize



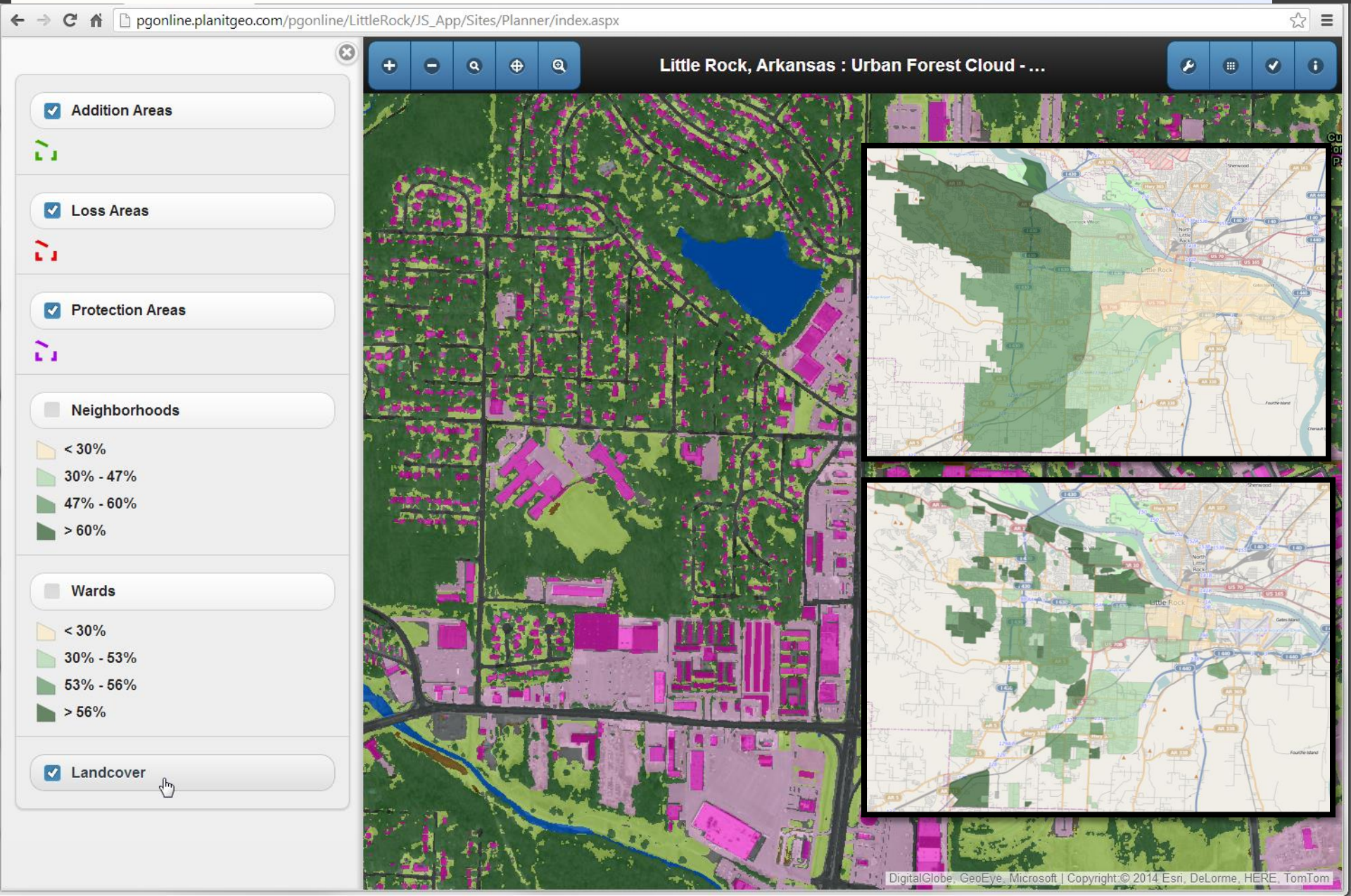


Simulate

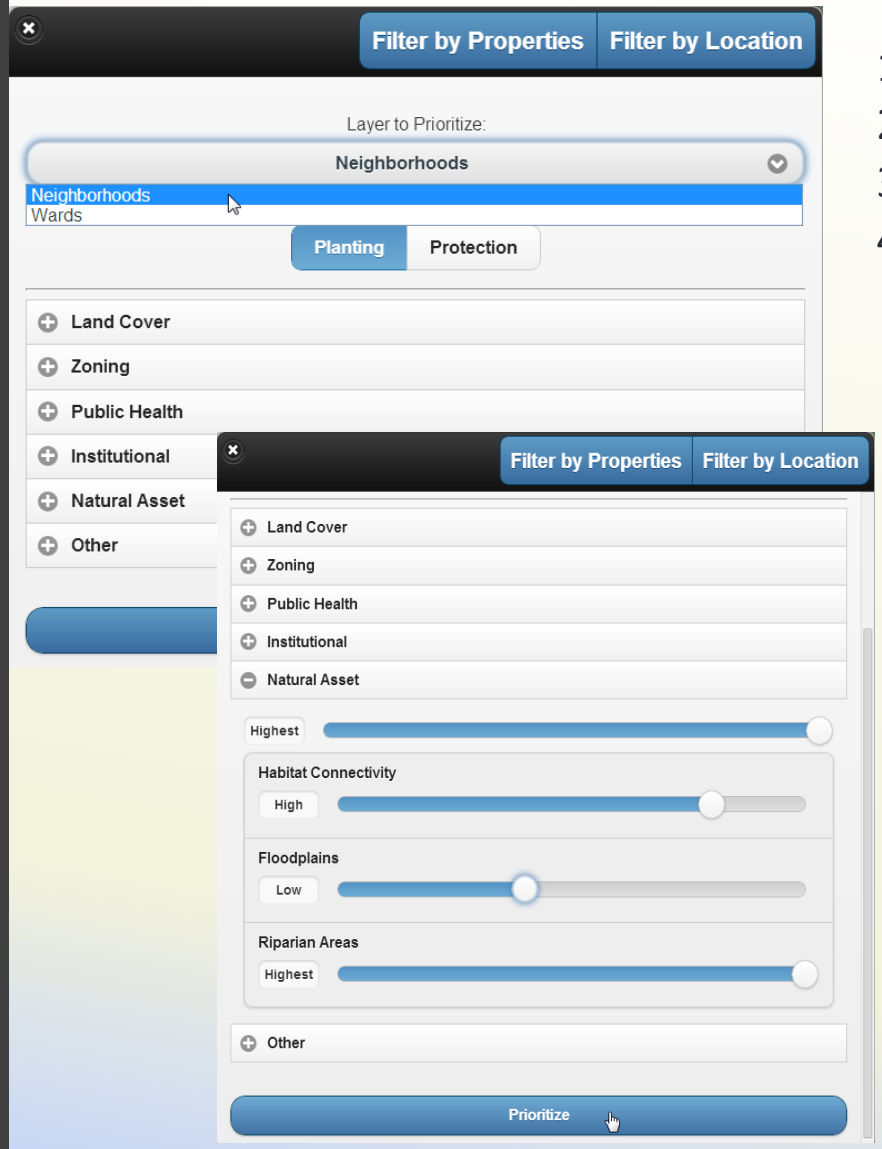


Track/Update

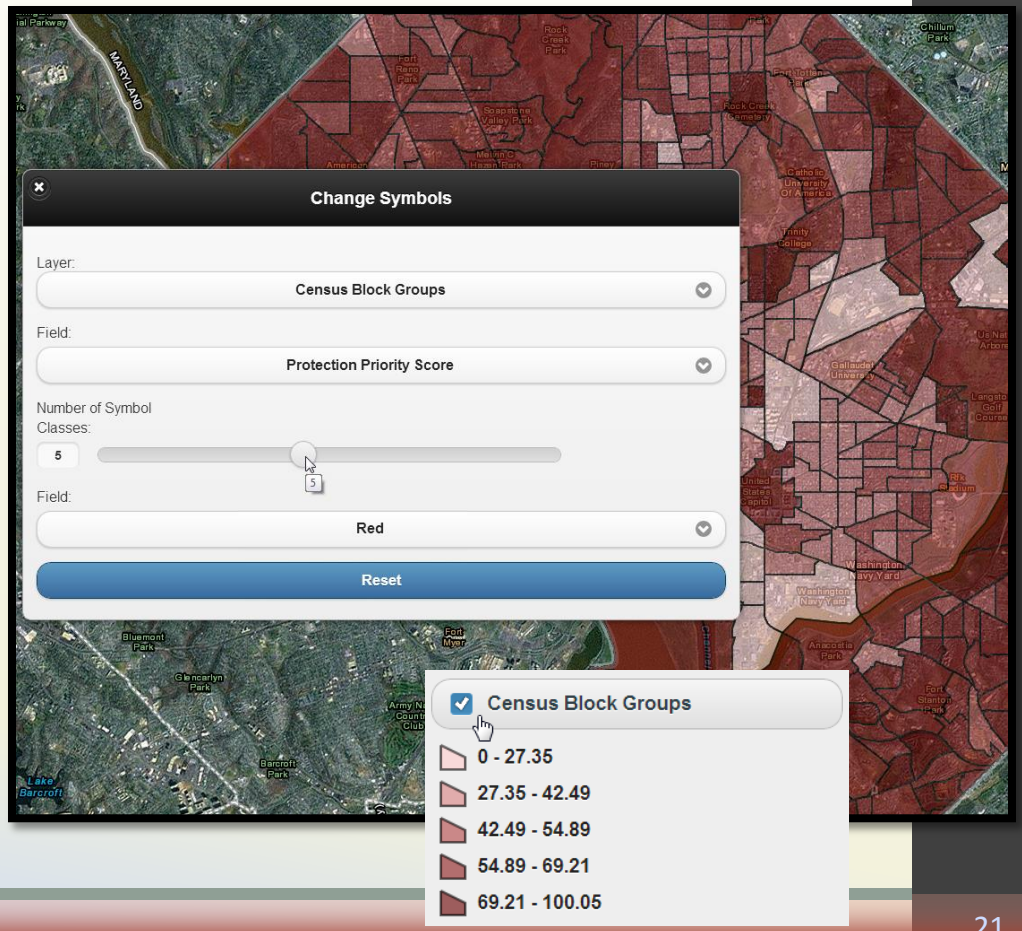
LAND COVER AND TREE CANOPY VIEWER



PRIORITIZE TOOL - PLANTING AND PRESERVATION



1. Choose your scale (parcel => citywide)
2. Choose planting or protection
3. Set weights to each criteria (factor)
4. Run model, view color-coded priority map



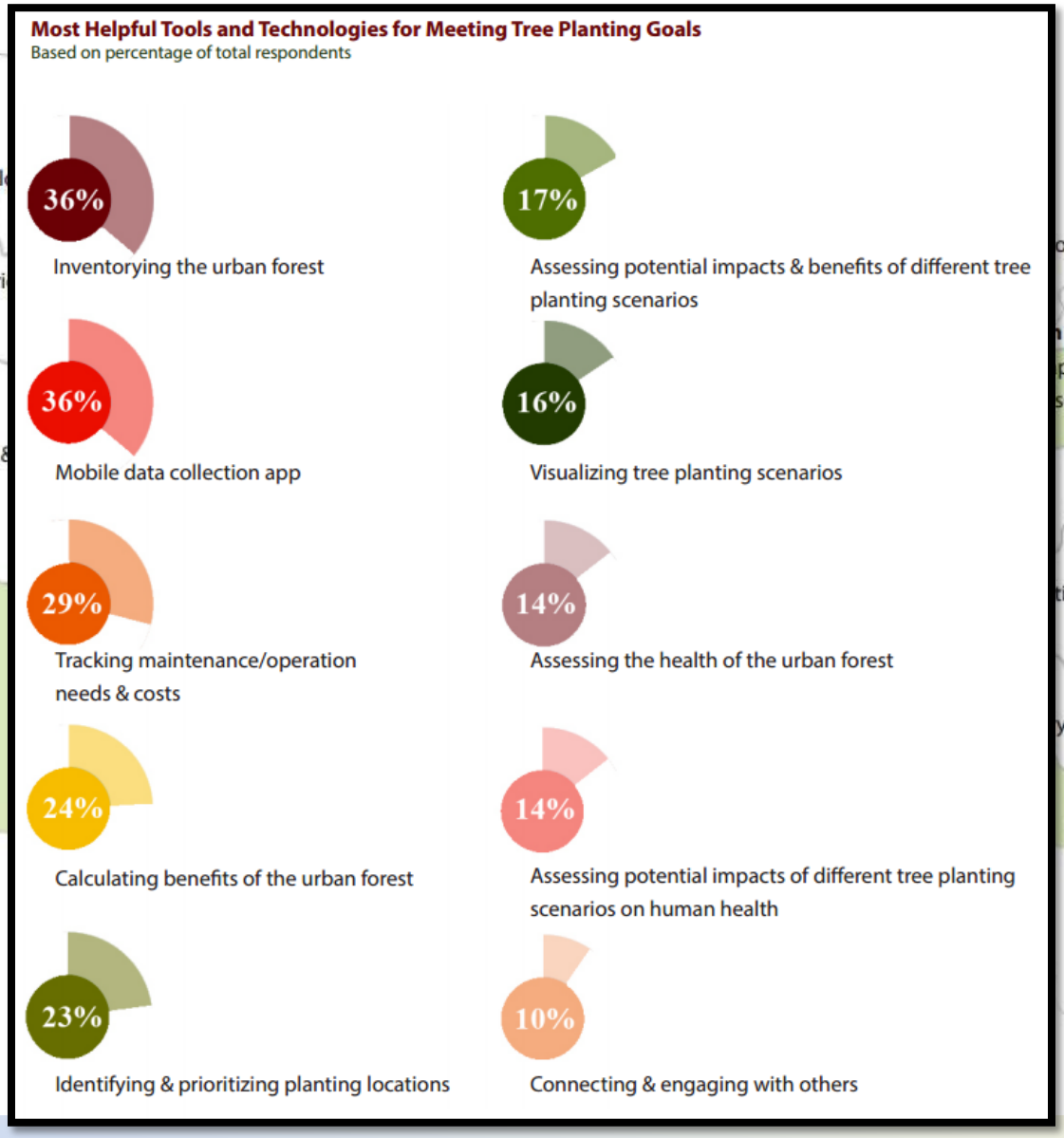
Most Helpful Tools and Technologies for Meeting Tree Planting as Identified per City

Portland
1. Identify & prioritize planting l
2. Inventory aid
3. Mobile apps
4. Human health impact scenari

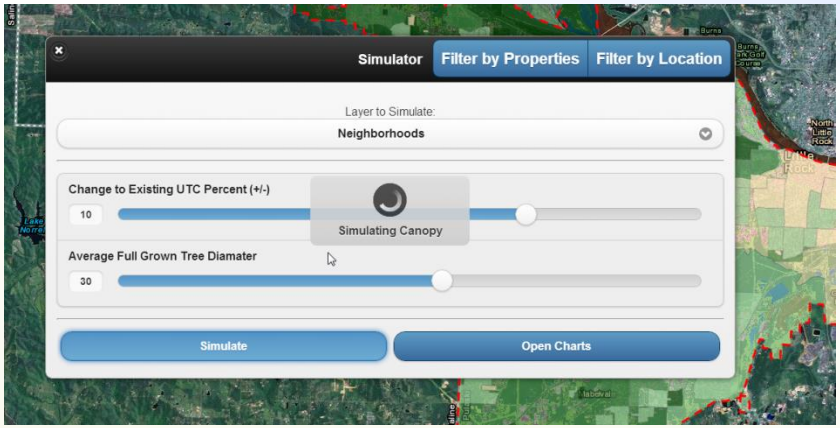
Sacramento
1. Land-use data access &

Phoenix
1. General scenario modeling

operations tracker
pps
scenario modeling
tize planting locations
y aid



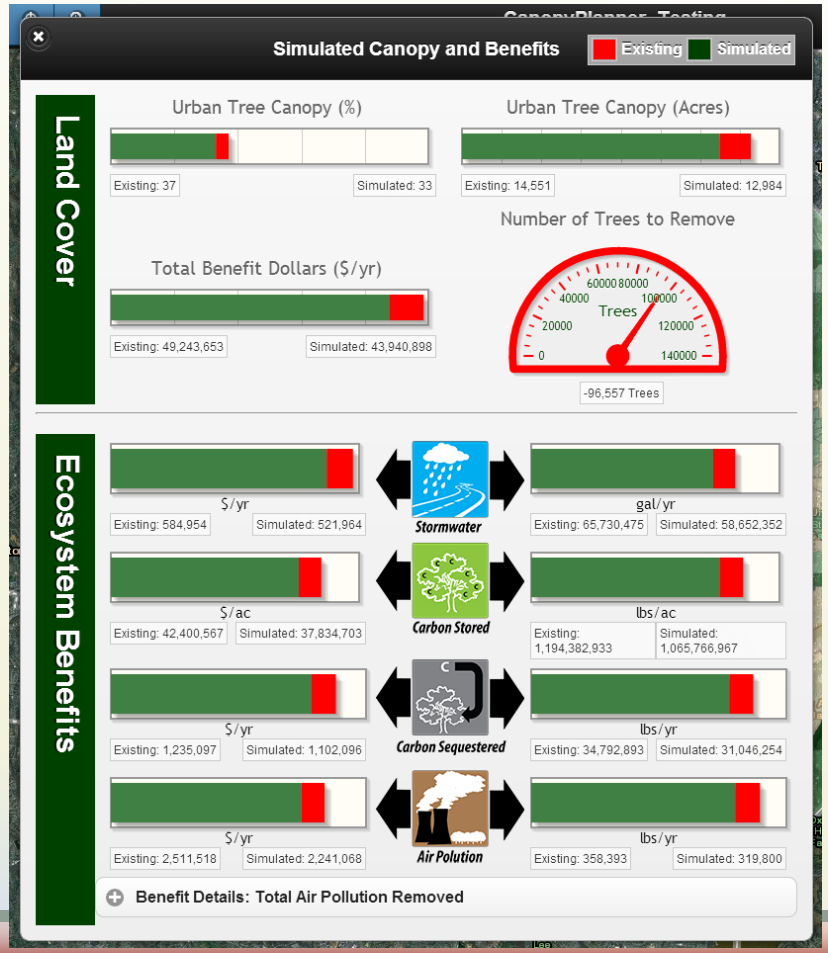
Simulate (Forecast) Canopy & Benefits



1. Choose your scale (parcel => citywide)
2. Choose a gain or loss in canopy
3. Set average tree size
4. Run model, view scenario impacts

GAIN EX.

LOSS EX.



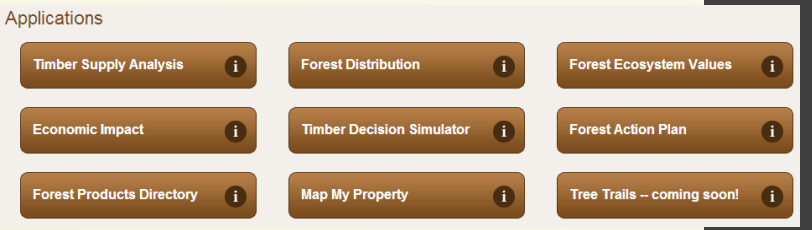
RESOURCES / EXAMPLES

General Applications:

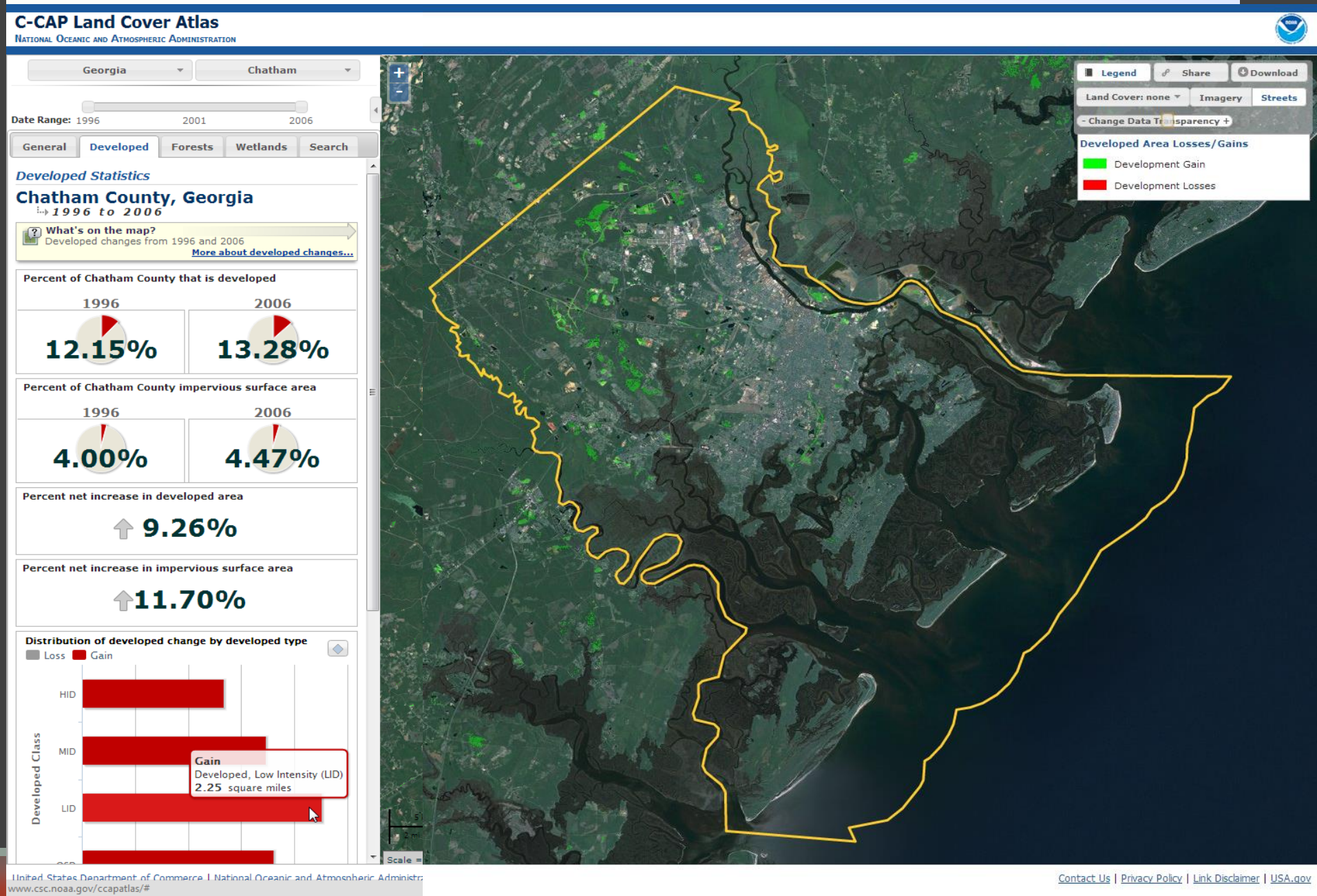
- UF Management Plan Toolkit
- i-Tree (itreetools.org)
- Conservationalmanac.org
- Landvote.org
- Statewide Tree Ordinance Databases (VA, PA, etc.)
- National Conservation Easement Database (NCED)
- UTC websites
  - www.nrs.fs.fed.us/urban/utc/
  - www.forestsforwatersheds.org/urban-tree-canopy

Webmap Applications:

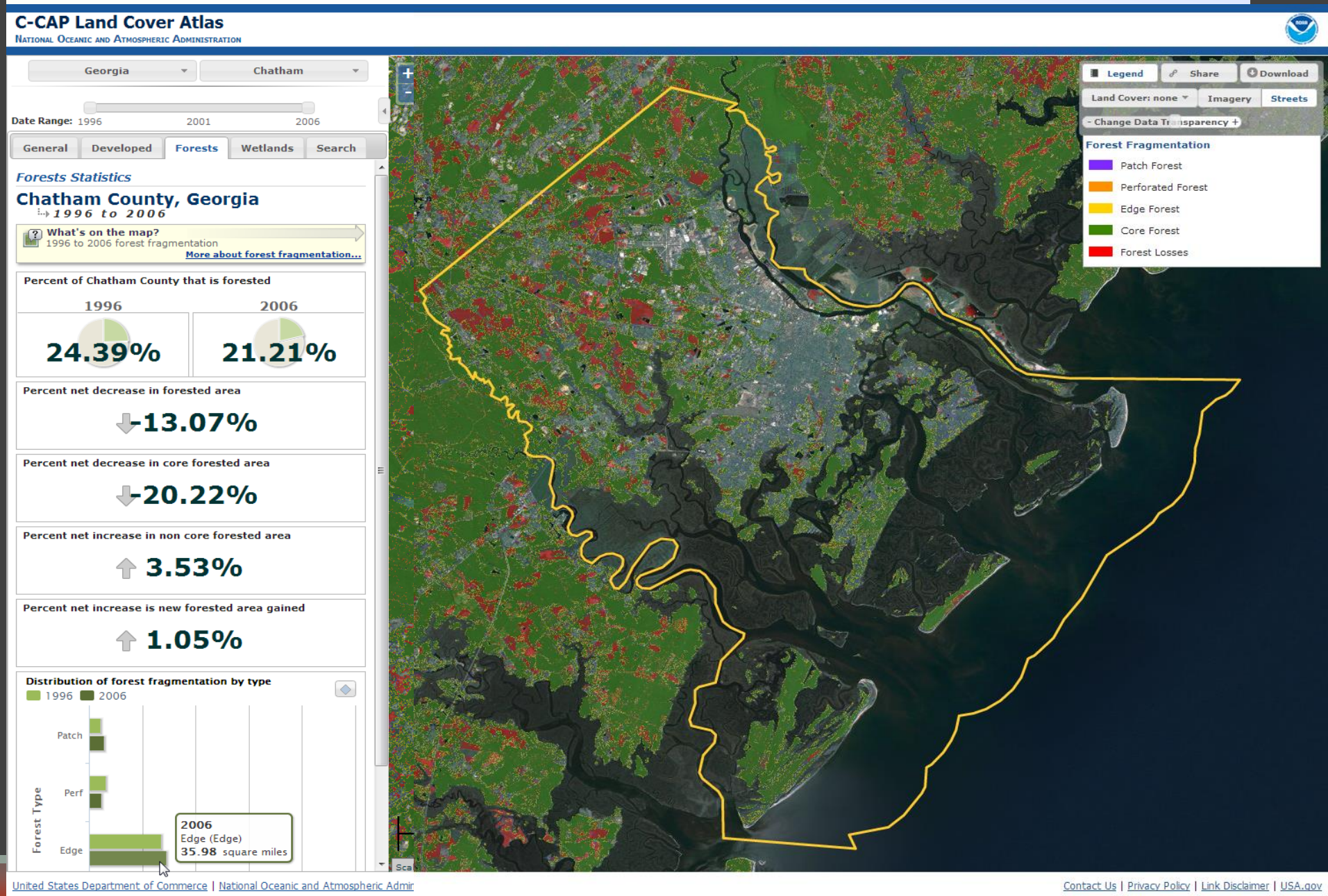
- Onemilliontrees.ca/
- Tree Plotter LITE (free)
- Open Tree Map
- StewMap
- NOAA Digital Coast
- MA U&CF Information
- PennTreeMap
- TexasForestInfo.com



NOAA DIGITAL COAST TOOL



NOAA DIGITAL COAST TOOL



TREE TRACKING AND COMMUNITY OUTREACH TOOL

onemilliontreesmississauga ABOUT COUNT MY TREES PLANTING PROGRAMS PLANTING TIPS EVENTS CONTACT US

top5planters

LARGE ORGANIZATION

City of Mississauga	31647
Credit Valley Conservation	10858
Toronto and Region Conservation Authority	8994
Evergreen	2169
Scouts Canada	800

SMALL ORGANIZATION

Credit River Anglers Association	10324
Art of Living	1480
Sierra Club	920
Ecosource	690
The Riverwood Conservancy	389

SCHOOL

St. Marcellinus Catholic Secondary School	930
Mississauga Secondary School	500
Port Credit Secondary School	364
Turner Fenton Secondary School	300
Erin Mills Middle School	262

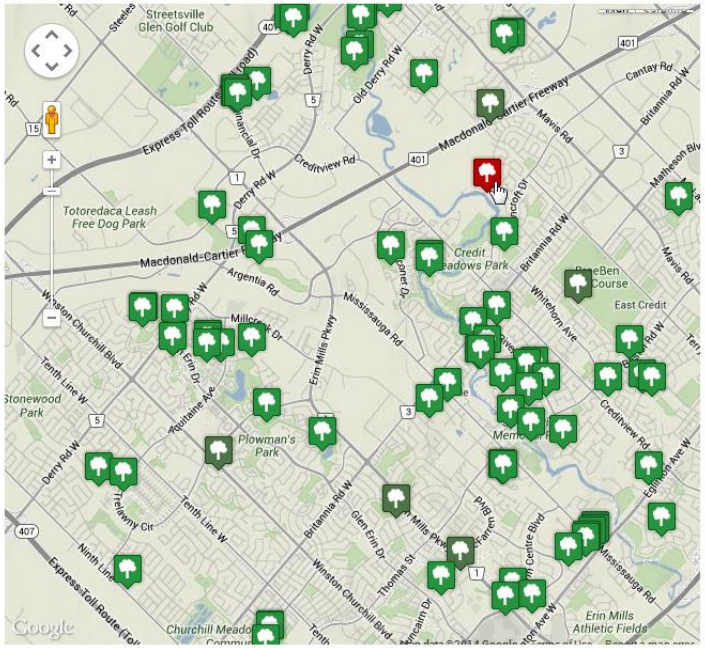
BUSINESS

Suncor	495
Target	415
SHARP Electronics Canada	400
Deloitte	
RBC	

INDIVIDUALS

Barbara Maj	28
Doug House	8
michael dewit	5
Eric Lucic	4
Ian Bennie	3

onthemap



2800 Trees Planted

planted by **Credit River Anglers Association**

Trees Planted - **2800**

Trees Specie - **Mixed Species**

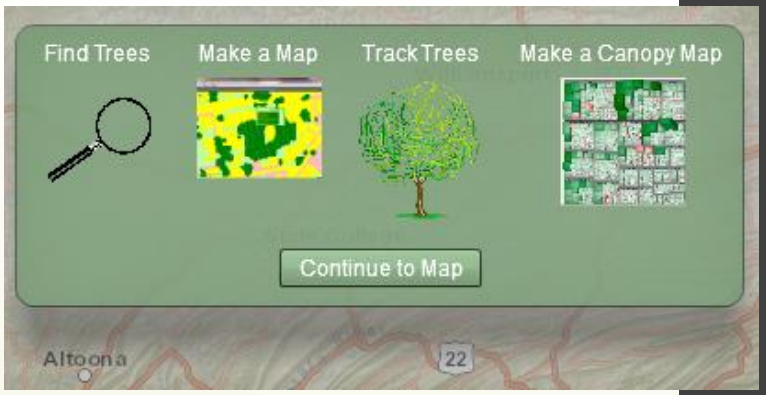
Trees Size - **Mixed Sizes**

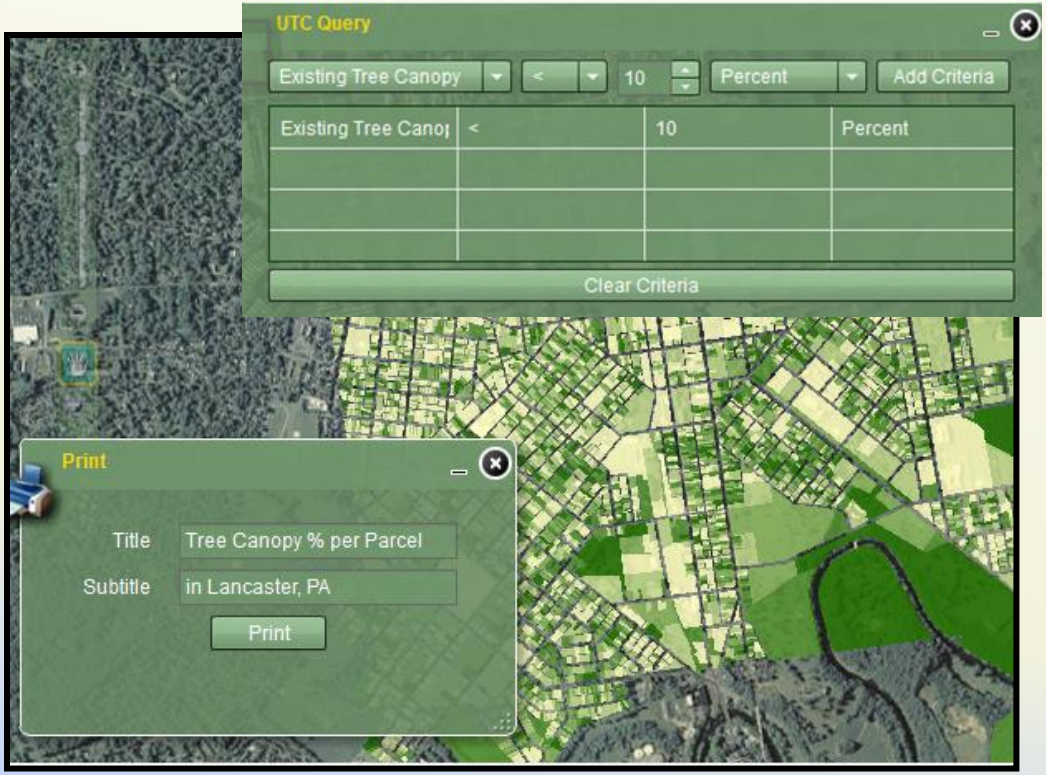
Planting Date - **Mon Apr 29 2013**

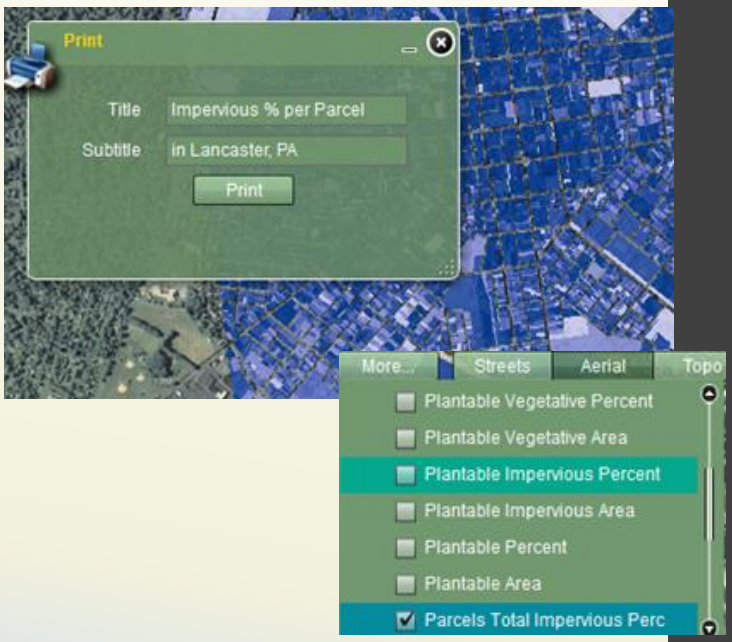
STATEWIDE TREE TRACKING & CANOPY TOOL

pennsylvania
DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
www.dcnr.state.pa.us
Home | Tree Map | Communities

- Create planting plans
- Query canopy cover by parcel and land use
- Estimate ecosystem services
- Print planting maps
- Report on usage

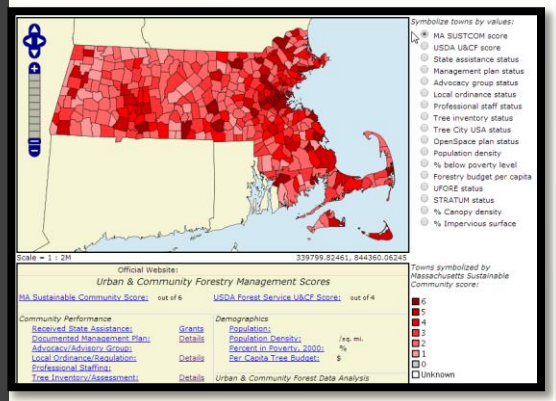


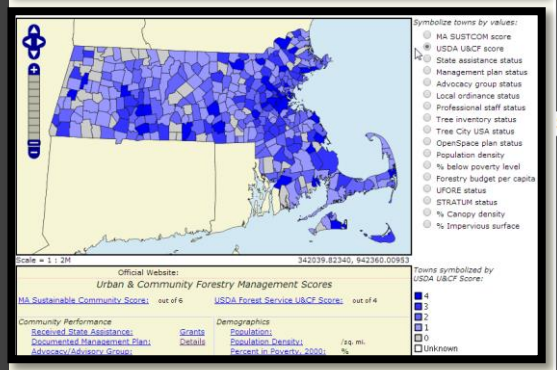


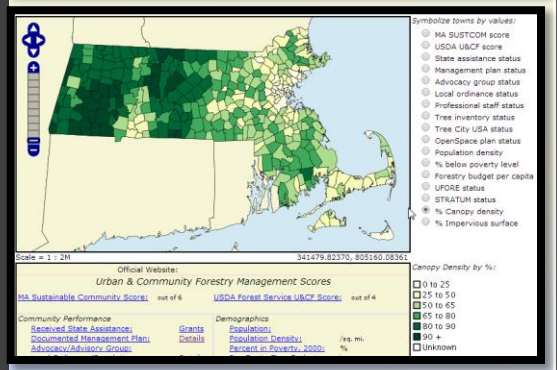


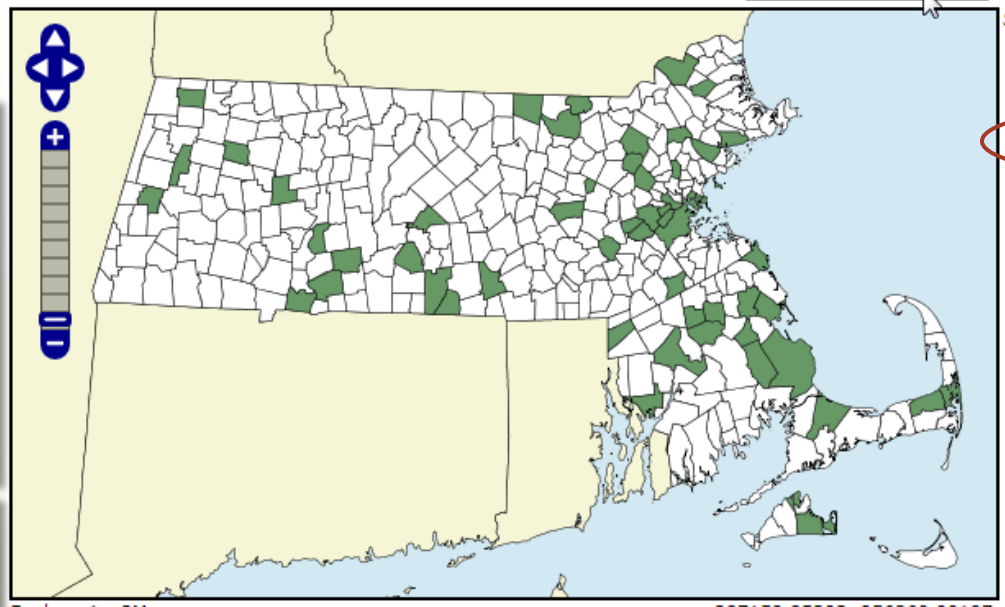
Massachusetts Urban & Community Forestry Information

Instructions on moving around the map are at the bottom of the page
Click on a town to view forestry information, or choose a town from the list: Choose a town









Scale = 1 : 2M 287159.85303, 956360.00197

Symbolize towns by values:

- MA SUSTCOM score
- USDA U&CF score
- State assistance status
- Management plan status
- Advocacy group status
- Local ordinance status
- Professional staff status
- Tree inventory status
- Tree City USA status
- OpenSpace plan status
- Population density
- % below poverty level
- Forestry budget per capita
- UFORE status
- STRATUM status
- % Canopy density
- % Impervious surface

Official Website:

Urban & Community Forestry Management Scores

MA Sustainable Community Score: out of 6 USDA Forest Service U&CF Score: out of 4

Community Performance

- Received State Assistance: Grants
- Documented Management Plan: Details
- Advocacy/Advisory Group:
- Local Ordinance/Regulation: Details
- Professional Staffing:
- Tree Inventory/Assessment: Details
- Tree City USA® Accredited:
- Updated Open Space Plan: Details

Demographics

- Population:
- Population Density: /sq. mi.
- Percent in Poverty, 2000: %
- Per Capita Tree Budget: $

Urban & Community Forest Data Analysis

- UFORE: Details
- STRATUM: Details

Tree Warden Contact Information

Phone:
Email:

Physical Characteristics

- % Canopy Density: %
- % Impervious Surfaces: %

Advocacy/Advisory Group websites:
Other Forestry-related websites for this town:
Tree Warden Qualifications:
Other Staff Qualifications:

Click on an attribute name to see the Glossary description of that attribute.
Links will open in a new browser window or tab.

Management plan status:

- Has management plan
- Does not have management plan

Web Services and Geographic Data from:
MASSGIS

THANK YOU!

Ian Hanou, Owner and Principal

Plan-It Geo LLC | Arvada, CO

info@planitgeo.com | planitgeo.com

Plan-It Geo is a geospatial analysis, technology consulting, and planning firm specializing in natural resource management and related fields. We provide a full range of services involving GIS, remote sensing, cost/benefit analysis, urban forestry planning, water resources analysis, decision support systems, and web-based solutions. ***Plan-It Geo team members have conducted more than 60 urban forestry and ecosystem benefits analysis studies across the country.***