



Planting for the Future

Embracing Climate Change and the
Unknown in Municipal Forestry

Emily Hamilton, Davey Resource Group
May 20th, 2014

Planting for the Future

- Climate change in the context of Urban Forestry (Context)
- What approach do we take? (Approach)
- What options are available? (Action Planning)
- What are other cities doing? (Networking)
- Available tools and resources (Tools & Resources)

Context

Climate Change
Effects
Impacting Trees



Trees Impacting
the Effects of
Climate Change

Context

Climate Change
Effects
Impacting Trees



Immediate Impacts

Gradual Change

Context

Climate Change
Effects
Impacting Trees



Image courtesy ReGreen Springfield

Immediate Impacts

Gradual Change

Context

Climate Change
Effects
Impacting Trees



Immediate Impacts



Gradual Change

Context

Climate Change
Effects
Impacting Trees



Image courtesy ReGreen Springfield



Emergency Funds

Billions to Eradicate

Immediate Impacts

Gradual Change

Context



Trees Impacting
the Effects of
Climate Change

“\$\$\$”

Context



Methods:

- * Benefits and costs were quantified for typical large, medium, and small deciduous trees and a conifer
- * The analysis assumed that trees were planted in a residential yard, public park, or street side with a 66-percent survival rate over 40 years
- * Tree care costs were based on results from a survey of municipal and commercial arborists
- * Benefits were calculated by using tree growth curves and numerical models that consider regional climate, building characteristics, air-pollutant concentrations, and prices

Benefits analyzed:

- * Energy savings (electricity and natural gas)
- * Air pollution reduction (carbon dioxide, nitrogen dioxide, sulfur dioxide, ozone, airborne particles, and volatile organic compounds)
- * Runoff reduction (rainfall interception)
- * Property values

Costs analyzed:

- * Tree purchase and planting
- * Pruning
- * Irrigation
- * Pest and disease prevention and control
- * Removal and disposal
- * Sidewalk repair
- * Leaf litter cleanup
- * Liability, legal aspects, and administration

Study conducted by: USDA, USFA, Pacific SW Research Station

Context



\$5,870

The Value of a Tree in the Northeast

A large tree in the Northeast will provide \$5,870 in environmental and other benefits over its lifetime. That's nearly a 440-percent return on investment!

Properly cared for, trees are valuable and growing assets worth nearly four and a half times the investment.

Trees produce benefits for us when we plant and nurture them in our urban environments. The Urban Ecosystems and Social Dynamics Program at the USDA Forest Service Pacific Southwest Research Station is assessing the ways that trees pay us back and their value to us.



Healthy trees mean:

Healthy people

Each year, 100 large, mature street trees

- * Remove 24 tons of carbon dioxide (CO₂)
- * Remove 261 pounds of other air pollutants
- * Catch about 190,900 gallons of rainwater



Healthy communities

Tree-filled neighborhoods

- * Report lower levels of domestic violence
- * Are safer and more sociable
- * Reduce stress of body and mind
- * Decrease need for medication, and speed recovery times

Homeowner savings

One well-placed large tree

- * Provides average savings of \$39 in home heating costs each year

Better business

In tree-lined commercial districts, shoppers report

- * More frequent shopping
- * Longer shopping trips
- * Willingness to pay more for parking
- * Willingness to spend 12 percent more for goods



Higher property values

Trees increase the resale value of houses

- * Each large front yard tree adds 1 percent to the sales price of a house
- * Large specimen trees can add 10 percent to property value



It pays to care for trees

Landscape trees provide benefits that far exceed the costs of planting and care over their lifetime.

Environmental and aesthetic benefits, such as energy savings, stormwater runoff reduction, cleaner air, and higher property values, are consistently many times greater than tree care costs.

The greatest benefits are higher property values and energy savings from heating and cooling.

One large public tree, 40 years after planting, averaged:

Annual benefits	\$147
Annual costs	\$34
Annual net benefit	\$113

Over 40 years, 100 large public trees total:

Benefits	\$587,360
Costs	\$134,280
40-year net benefit	\$453,080

Context

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Healthy communities

Tree-filled neighborhoods

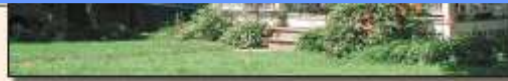
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NYC Dept. of Parks and Recreation

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Approach



Resistance

- Fight to keep things the same

Resilience

- Accept temporary change with the goal of returning to a previous condition

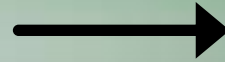
Adaptation

- Respond to new conditions by accommodating change

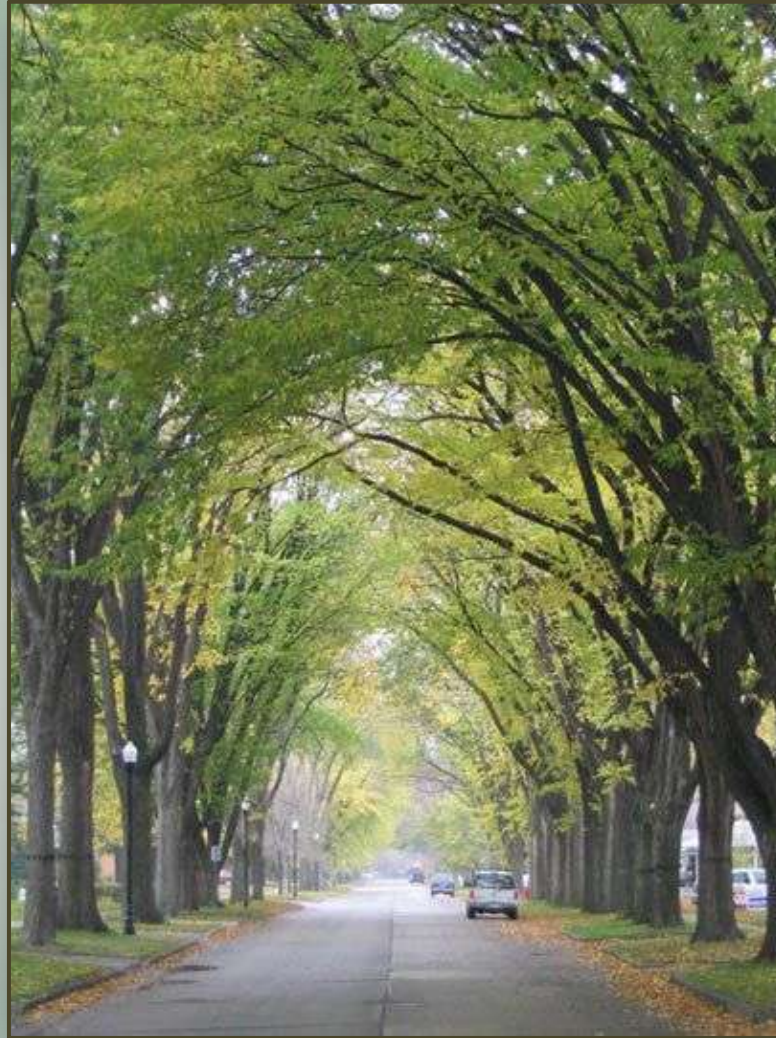
chestnuts



elms



maples



Elm – Lined Street.

Image courtesy Ferrebecker on wordpress.com

Approach



Sweetgum



American Hophornbeam



Amur Corktree



White Oak



Black Tupelo



American Hornbeam

Approach



Sweetgum



American Hophornbeam



Amur Corktree



White Oak



American Hornbeam

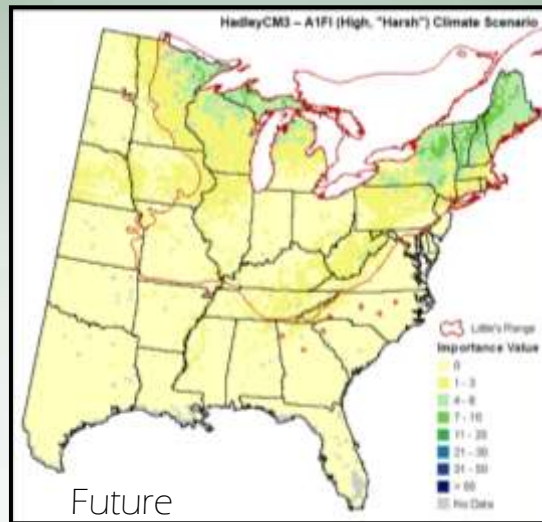
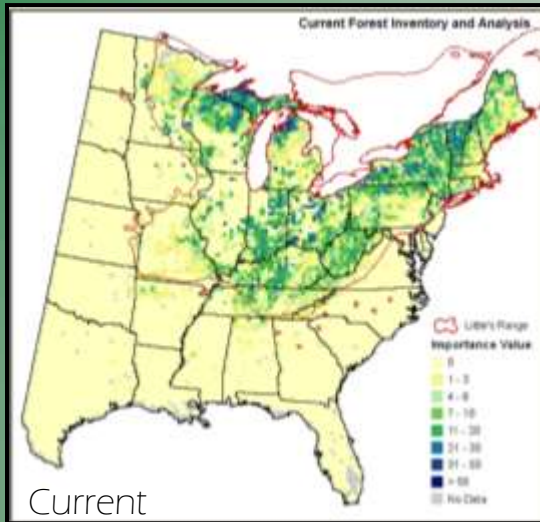


Black Tupelo

Right tree, right place ... Right purpose!
Performance Based Planting

USDA's Forest Service Tree Atlas

Acer saccharum



Species adaptability:

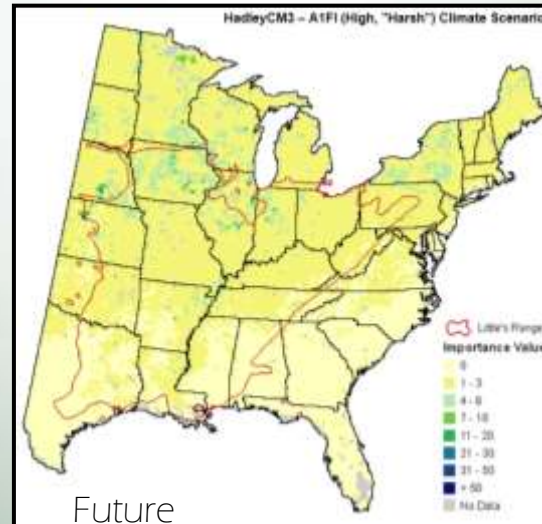
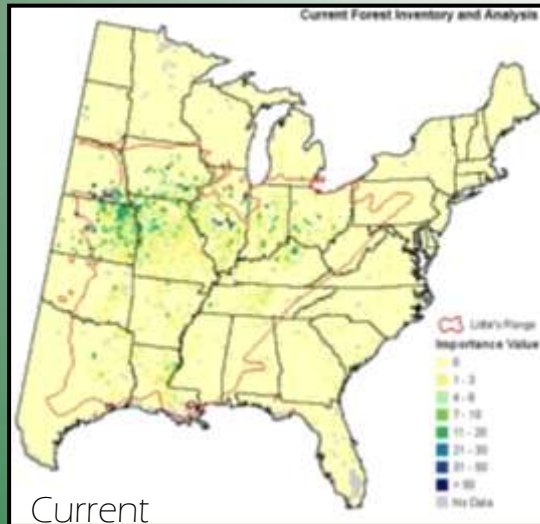
Positive traits

- Shade tolerance (tolerant)
- Environmental habitat specificity (not specific)

Negative traits

- none

Gleditsia triacanthos



Species adaptability:

Positive traits

- None

Negative traits

- Shade tolerance (intolerant)

Right tree, right place ... Right purpose!

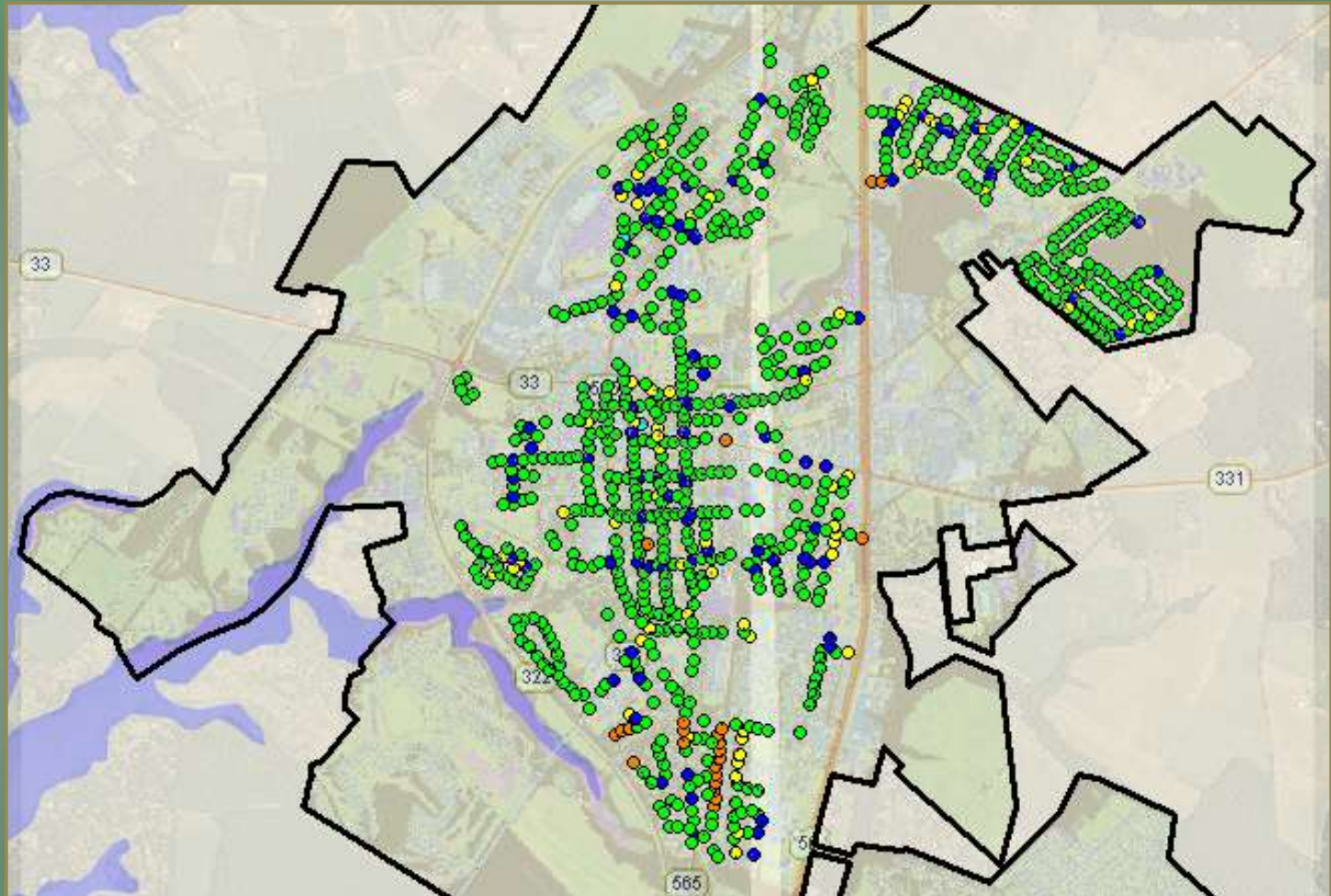
Action Planning

Basic Elements of Urban Forestry Management Planning

*Know what you have,
know your potential.
Get the support!*

- Tree inventory
- Urban Tree Canopy Assessment
- Maintenance & Budget plan
- Political Structure
- Staffing and Resources
- Networking
- Funding!

Action Planning



Tree Inventory - species, condition, risk, etc.
Pruning/Removal, Planting, Pest/Disease Control, etc.

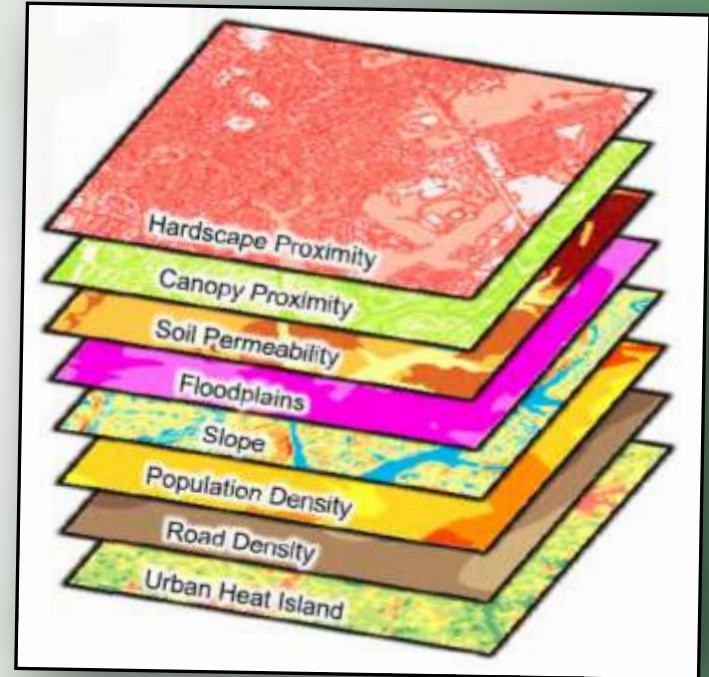
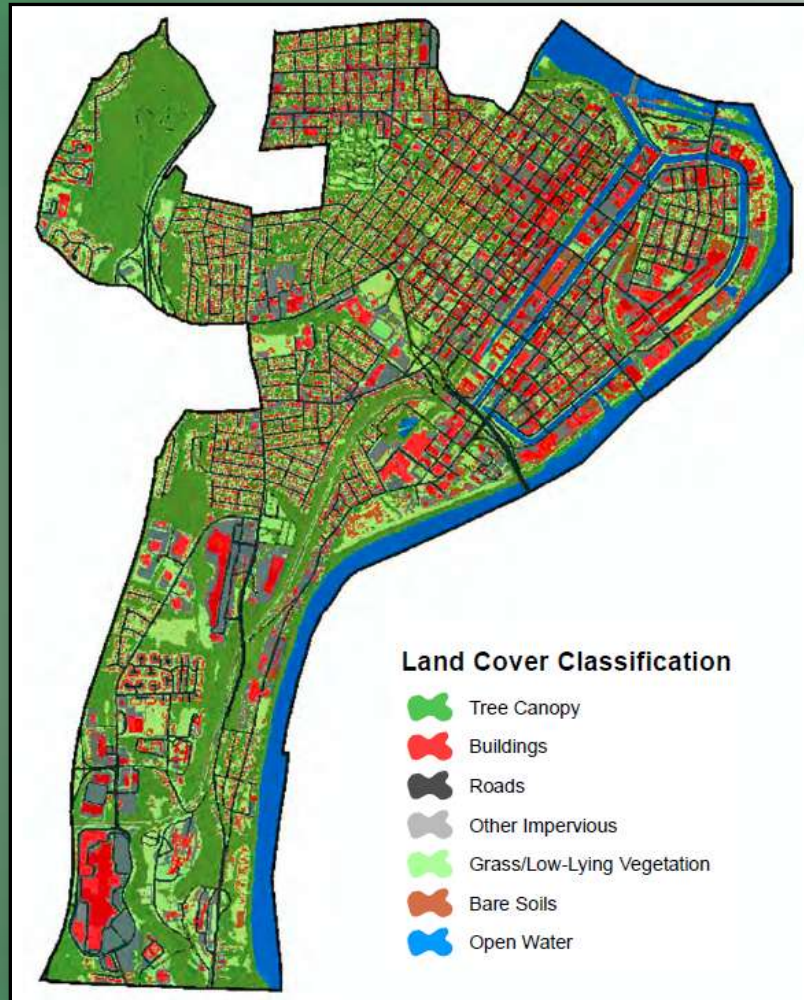
Action Planning

Estimated Costs for the Town of Easton's Five-Year Tree Maintenance Program

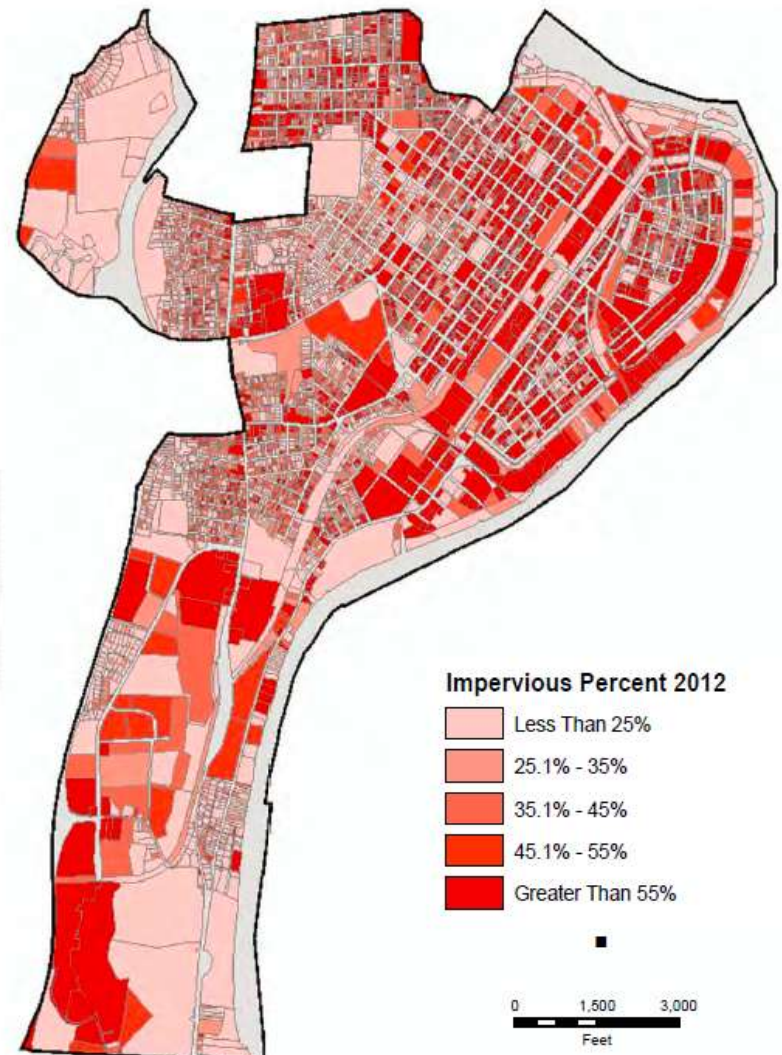
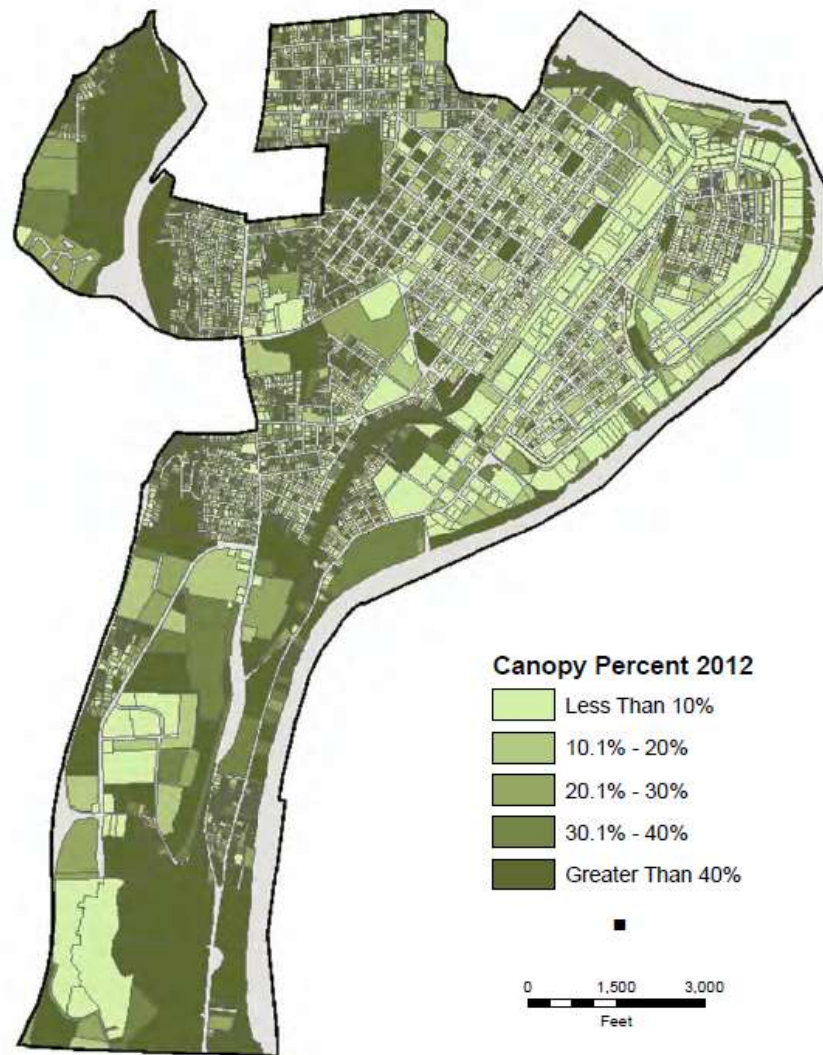
Estimated Costs for Each Activity			2014		2015		2016		2017		2018		Five-Year Cost
Activity	Diameter	Cost/Tree	# of Trees	Total Cost	# of Trees	Total Cost	# of Trees	Total Cost	# of Trees	Total Cost	# of Trees	Total Cost	
Severe-Risk Removal	1-3"	\$25	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
	4-6"	\$105	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
	7-12"	\$220	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
	13-18"	\$355	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
	19-24"	\$525	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
	25-30"	\$845	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
	31-36"	\$1,140	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
	37-42"	\$1,470	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
	43"+	\$1,850	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
Activity Totals:			0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
High-Risk Removal	1-3"	\$25	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
	4-6"	\$105	3	\$315	0	\$0	0	\$0	0	\$0	0	\$0	\$315
	7-12"	\$220	3	\$660	0	\$0	0	\$0	0	\$0	0	\$0	\$660
	13-18"	\$355	7	\$2,485	0	\$0	0	\$0	0	\$0	0	\$0	\$2,485
	19-24"	\$525	9	\$4,725	0	\$0	0	\$0	0	\$0	0	\$0	\$4,725
	25-30"	\$845	6	\$5,070	0	\$0	0	\$0	0	\$0	0	\$0	\$5,070
	31-36"	\$1,140	2	\$2,280	0	\$0	0	\$0	0	\$0	0	\$0	\$2,280
	37-42"	\$1,470	1	\$1,470	0	\$0	0	\$0	0	\$0	0	\$0	\$1,470
	43"+	\$1,850	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
Activity Totals:			21	\$17,005	0	\$0	0	\$0	0	\$0	0	\$0	\$17,005
Moderate-Risk Removal	1-3"	\$25	20	\$750	0	\$0	0	\$0	0	\$0	0	\$0	\$750
	4-6"	\$105	10	\$1,050	0	\$0	0	\$0	0	\$0	0	\$0	\$1,050
	7-12"	\$220	9	\$1,980	0	\$0	0	\$0	0	\$0	0	\$0	\$1,980
	13-18"	\$355	3	\$1,065	0	\$0	0	\$0	0	\$0	0	\$0	\$1,065
	19-24"	\$525	4	\$2,100	0	\$0	0	\$0	0	\$0	0	\$0	\$2,100
	25-30"	\$845	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
	31-36"	\$1,140	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
	37-42"	\$1,470	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
	43"+	\$1,850	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
Activity Totals:			47	\$8,840	0	\$0	0	\$0	0	\$0	0	\$0	\$8,840
Low-Risk Removal	1-3"	\$25	0	\$0	4	\$100	0	\$0	0	\$0	0	\$0	\$100
	4-6"	\$105	0	\$0	1	\$105	0	\$0	0	\$0	0	\$0	\$105
	7-12"	\$220	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
	13-18"	\$355	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
	19-24"	\$525	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
	25-30"	\$845	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
	31-36"	\$1,140	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
	37-42"	\$1,470	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
	43"+	\$1,850	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	\$0
Activity Totals:			0	\$0	4	\$205	0	\$0	0	\$0	0	\$0	\$205

Maintenance and Budget Plan

Action Planning

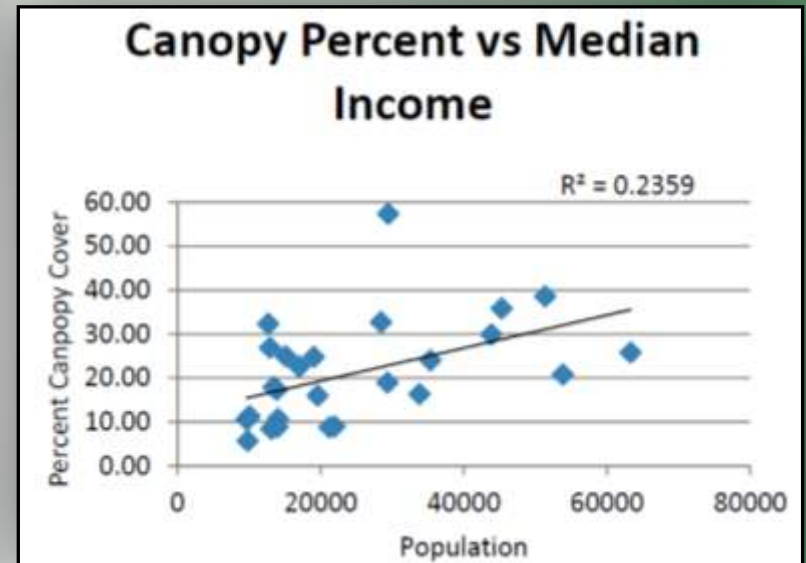
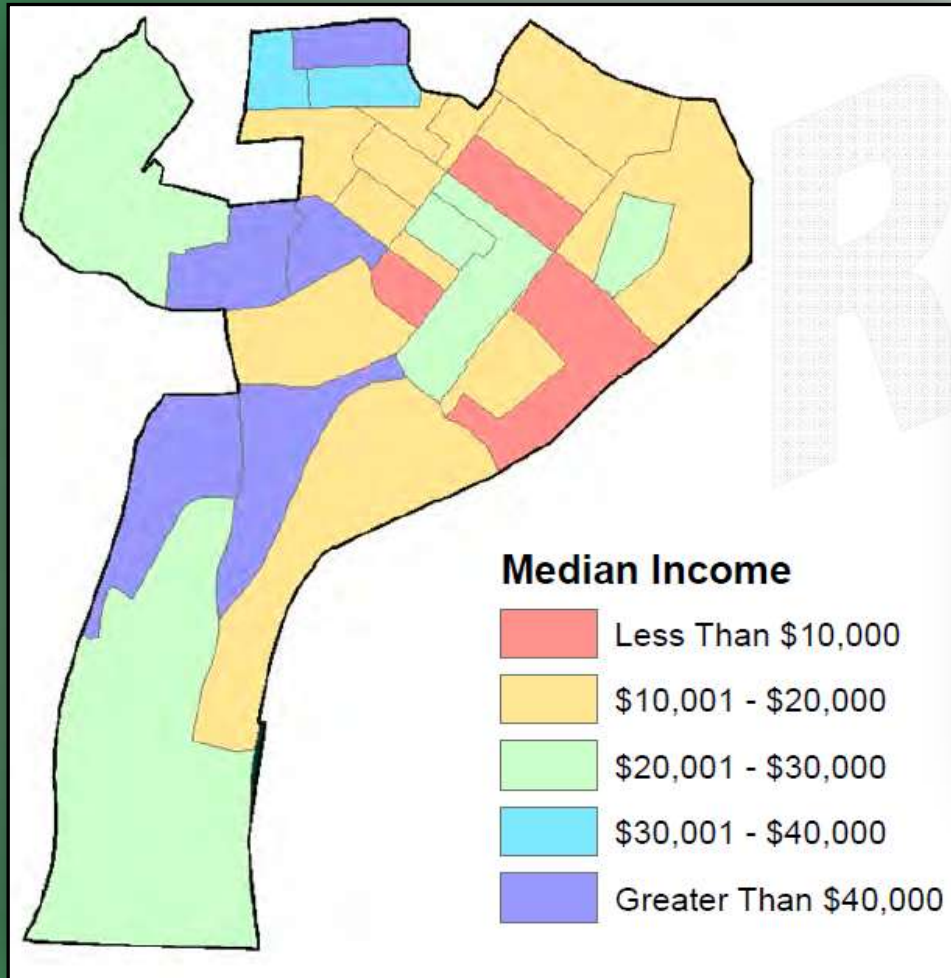


Urban Tree Canopy (UTC) Assessment



Urban Tree Canopy (UTC) Assessment

Action Planning



Urban Tree Canopy (UTC) Assessment

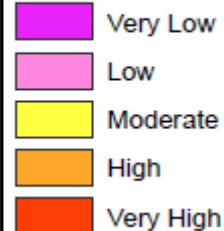
Action Planning



Urban Heat Island Threat



Environmental Need



Urban Tree Canopy (UTC) Assessment

Action Planning

- Governing Documents
 - Tree Ordinance
 - Set-back Planting Policy
 - Public Tree Master Plan
- Governing bodies
 - Tree Board/Committee
 - Law Enforcement
- Permanent Staff vs. Volunteers, Non-Profit/NGO/Friends-of Organizations
 - What can they bring to the table? How are they best utilized?
 - Who is certified? What jobs require certification?
- Knowledge of income, materials and resources available vs. needed



Effective Political Framework

Know your Nurseries!

ISA International Society of **Arboriculture**

Action Planning



Post your Progress!

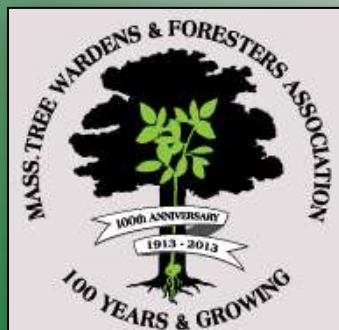


Fall River, MA



Energy and
Environmental
Affairs

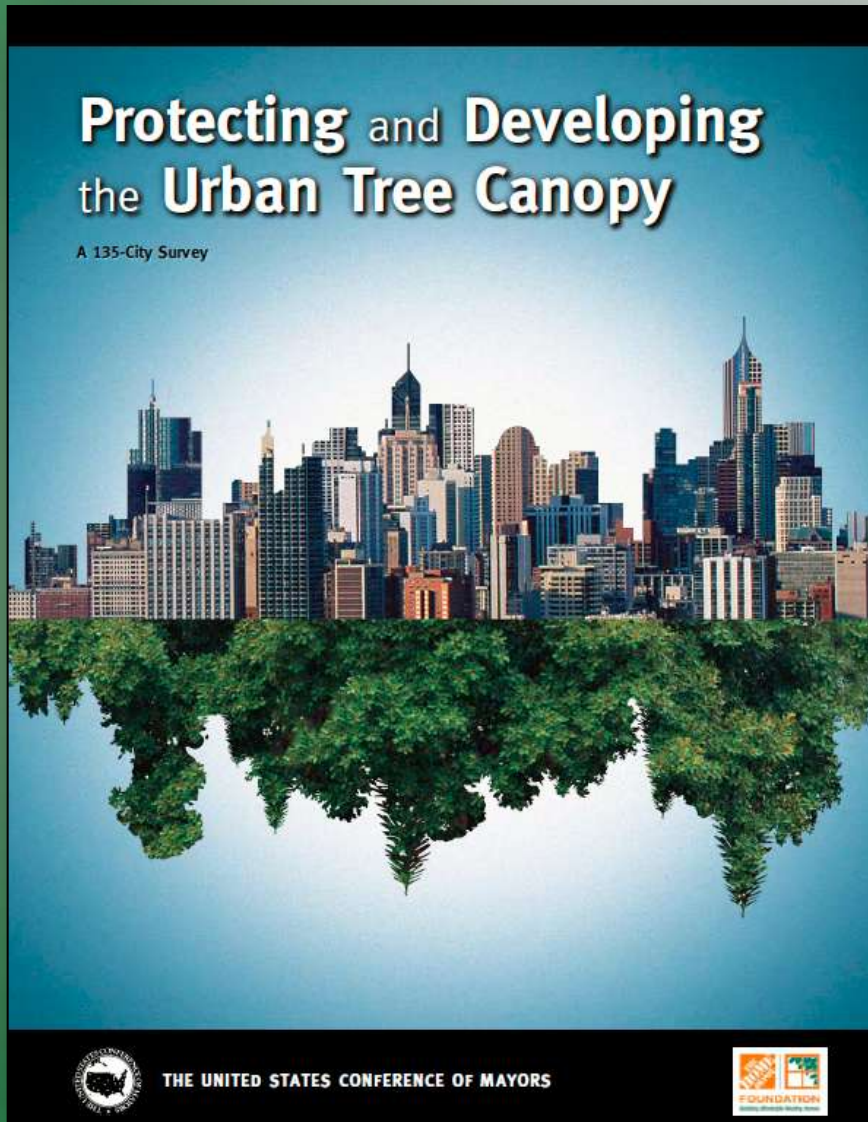
Holyoke, MA



Keep Up with Grant Opportunities!



Action Planning



“Community trees leverage the social, economic, and environmental value of cities, with forestry and related industries providing employment for over 1.6 million people and contributing \$231.5 billion to US economy.”

Tools

**i-Tree**
Tools for Assessing and Managing
Community Forests

Get the Tools. 

Google Custom Search
Username Password
Forgot Username or Password? Search Login Register



Home About Applications Utilities Resources Support News

i-Tree Design v6.0*

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](#).



Enter an address below to get started:
40 Avon Street, Keene, NH 03431
[Get](#)

-or-

[Load Previously Saved Project](#)





Category	CO2 (Pounds)
Separate	~22
Assisted	~23

*The current version of i-Tree Design (v6.0) includes expanded performance and updated benefit estimates. Users wishing to access the previous version (v5) should click [here](#). i-Tree Design v5 will continue to be available through June 2014.

www.itreetools.org/design.php


i-Tree
 Tools for Assessing and Managing
 Community Forests

Get the Tools. 

Google Custom Search
 Username Password
 Forgot Username or Password? Login Register



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i-Tree Design v6.0

40 Avon Street, Keene, NH 03431, USA

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

Get started with these easy steps:

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

Describe your tree:

- Tree species:
- Tree diameter: or circumference:
- Tree condition:
- Tree exposure to sunlight:

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](#)



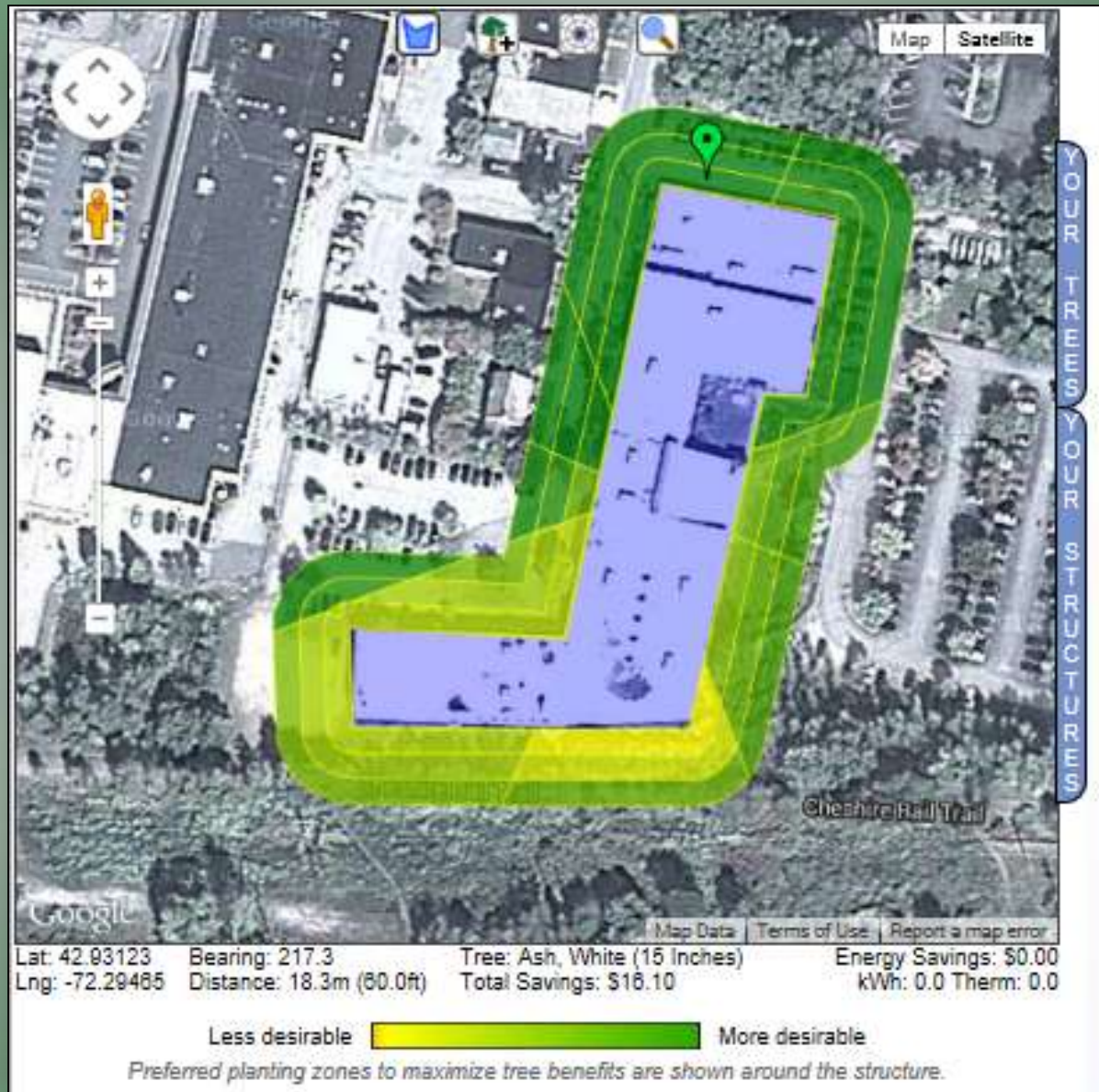
Lat: 42.93261 Bearing: 343.7
 Lng: -72.29425 Distance: 29.0m (\$5.3ft)

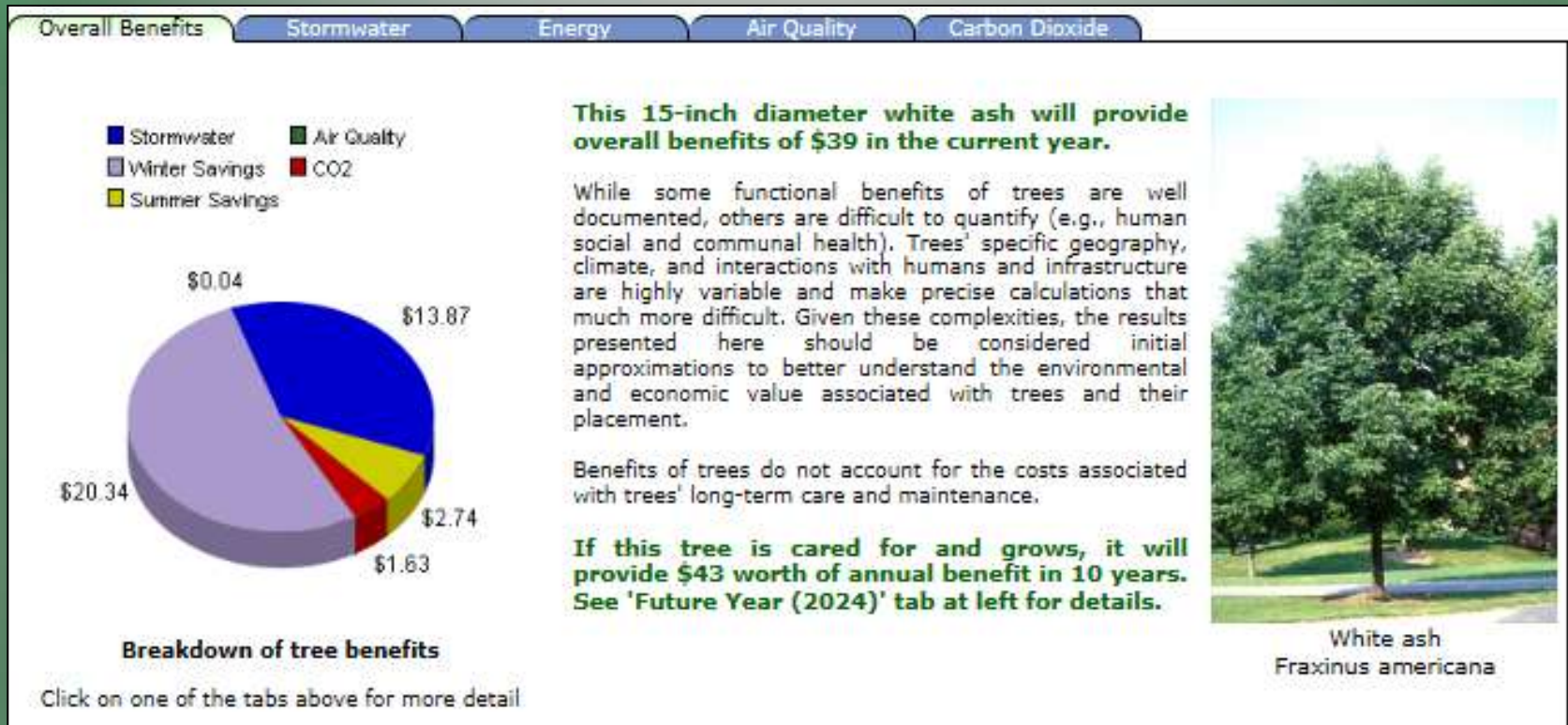
Tree: Ash, White (15 Inches)
 Total Savings: \$16.10

Energy Savings: \$0.00
 kWh: 0.0 Therm: 0.0

Less desirable  More desirable

Preferred planting zones to maximize tree benefits are shown around the structure.

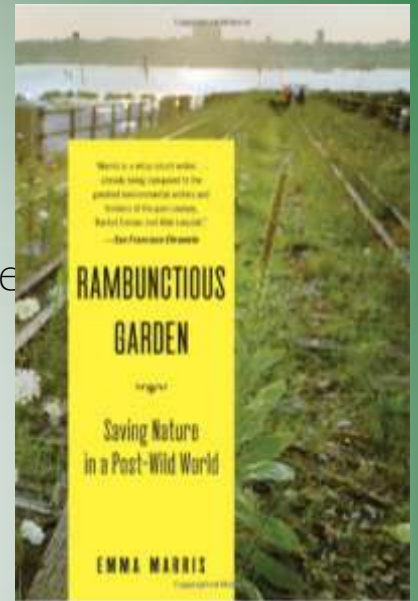




Available Tools and Resources

Links:

- i-Tree tools: www.itreetools.org
- USFS Tree Atlas: <http://www.nrs.fs.fed.us/atlas/tree>
- National Oceanic and Atmospheric Administration (climate anomalies): <http://www.ncdc.noaa.gov/sotc/global/2014/3>
- US Drought Monitor: <http://droughtmonitor.unl.edu>
- National Tree Benefits Calculator: www.treebenefits.com/calculator
- US Conference of Mayors: www.usmayors.org
- Urban Natural Resources Institute: www.unri.org
- Arbor Day Foundation: www.arborday.org
- Philadelphia Parks & Recreation Parkland Forest Management Framework: http://www.phila.gov/ParksandRecreation/PDF/PPR_Parkland_Forest_Mgmt_Framework.pdf
- City of Surrey, BC Climate Adaptation Strategy: http://www.surrey.ca/files/Climate_Adaptation_Strategy_-_FINAL.pdf
- ReGreen Springfield and the Tree Owners Manual: http://regreenspringfield.com/wp-content/uploads/2011/08/tree_owners_manual.pdf



Thank you!

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