



Urban Tree Inventories

What Are They?

Why Do We Need Them?

How Do We Use Them?



What is a Tree Inventory?

- ✓ A record of the location, characteristics and assessment of individual trees over a well defined area.
- ✓ Most modern inventories use GPS/GIS technology.
- ✓ Dependent on budgets.
- ✓ Based on depth of information collected:
 - ✓ Species
 - ✓ Diameter
 - ✓ Condition
 - ✓ Maintenance
 - ✓ Notes

Attributes

- ✓ Species

- ✓ Species diversity and distribution (% limits)
- ✓ Pests susceptibility
- ✓ Scheduling maintenance

- ✓ Diameter

- ✓ Provides estimate of age
- ✓ Defines population structure





25 inch REACH
BILTMORE STICK

TREE DIAMETER

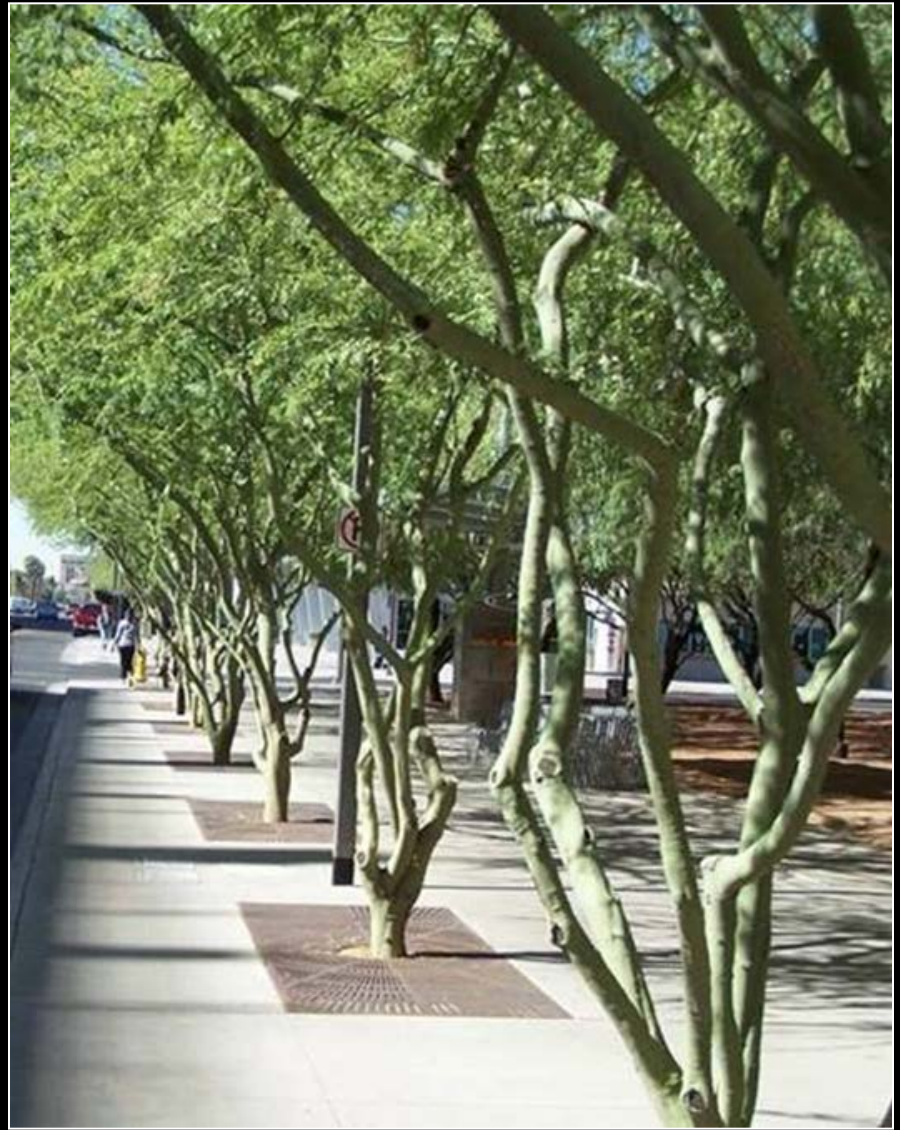
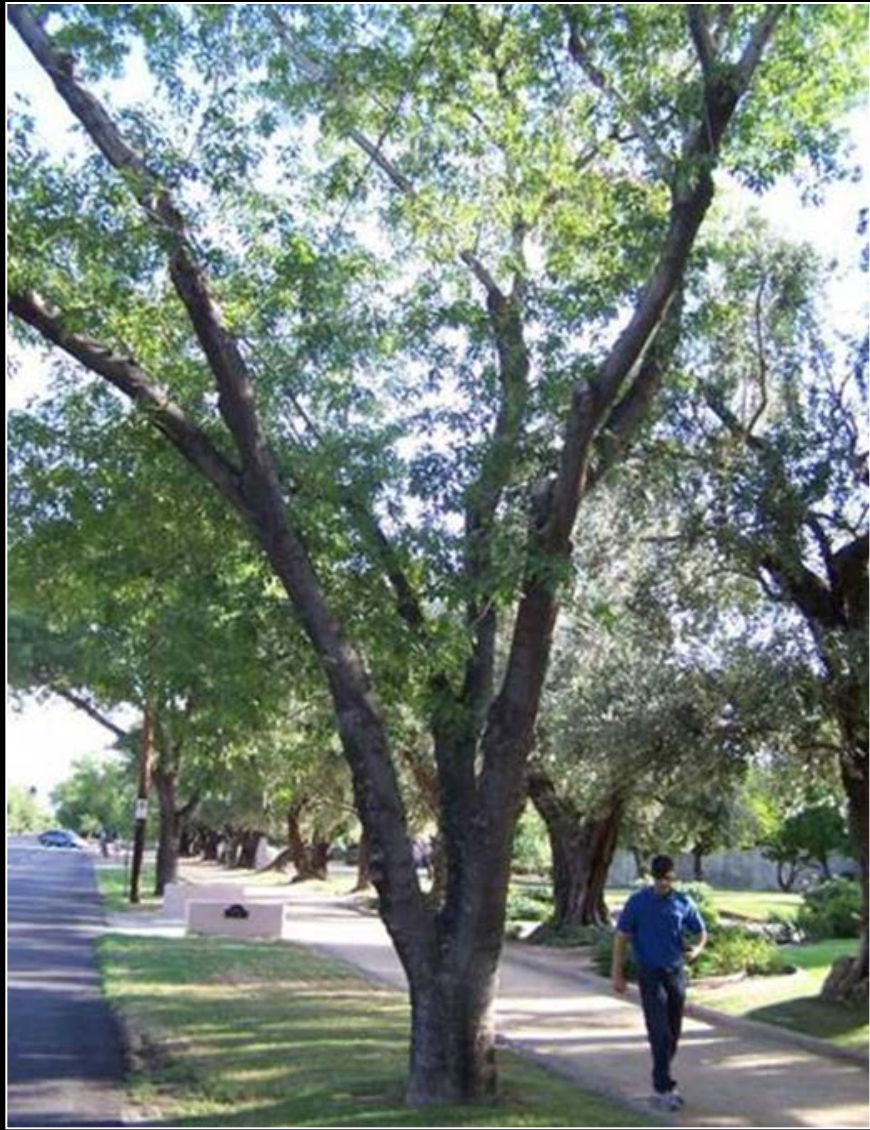
Attributes

- ✓ Condition (health) Keep it simple
 - ✓ Define and be consistent
 - ✓ Good = no visible defects
 - ✓ Fair = minor problems
 - ✓ Poor = major problems
 - ✓ Dead = dead

Attributes

- ✓ Maintenance requirements (prioritized)
 - ✓ removal (dead, hazardous, management)
 - ✓ prune (structure, health, aesthetics)
 - ✓ clean (dead, dying, broken, diseased)
 - ✓ thin (density)
 - ✓ raise (pedestrian/vehicular)
 - ✓ reduce (signage, utilities, lights)
- ✓ Comments
- ✓ Other/Supplemental







Data Collection

	\$	Accuracy	Training/Supervision
Volunteers	Low	Poor-Good	High
PT/Temp	Low-Medium	Fair-Good	
Full-time	Medium-High	Good-Excellent	
Contractor	High	Good-Excellent	Low



Why a Tree Inventory?

- ✓ Establish community needs/priorities
- ✓ Set goals
 - ✓ Population ID and characteristics
 - ✓ Maintenance assessment
 - ✓ Forest health
 - ✓ Safety monitoring
 - ✓ Work history
- ✓ Efficient use of Resources
 - ✓ Staff time
 - ✓ Budget and Investment
- ✓ Development of an Urban Forest Management Plan

Why a Tree Inventory?

- ✓ Change from REACTIVE to PROACTIVE
- ✓ Increased efficiency/scheduling
- ✓ Improve community relations
- ✓ Emergency preparedness
- ✓ Justify budgets and identify needs
- ✓ Document activities
- ✓ Set planning benchmarks

i-Tree Tools

- ✓ www.itreetools.org
- ✓ Developed and monitored by the USDA Forest Service, Davey Tree Expert Company, National Arbor Day Foundation, Society of Municipal Arborists, The International Society of Arboriculture, and Casey Trees.
- ✓ Urban and Community Forest analysis and benefits assessment tools.
- ✓ Quantifies the structure, function, and value of the urban forest resource.

iTree Tools

- ✓ i-Tree Eco – broad picture of entire forest.
- ✓ i-Tree Streets – street trees; good basic inventory.
- ✓ i-Tree Hydro – tree and impervious cover types; water quality.
- ✓ i-Tree Vue - satellite-based imagery to assess cover types.
- ✓ i-Tree Design – tree assessment at the parcel level.
- ✓ i-Tree Canopy – cover type from Google maps.

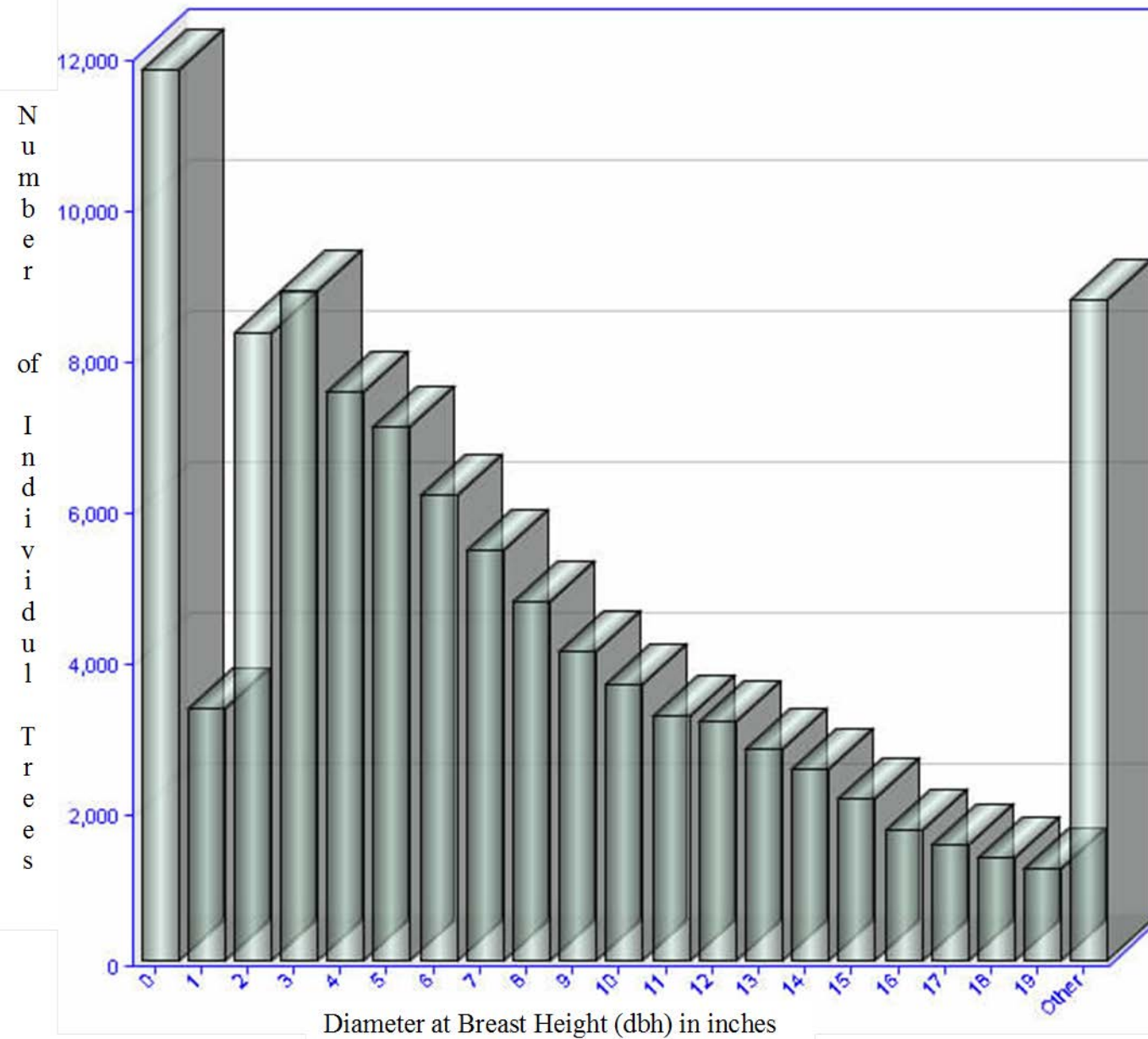
- ✓ i-Tree Species – help selecting “Right Tree, Right Place”.
- ✓ i-Tree Pest Detection Module – insect/disease protocols.
- ✓ i-Tree Storm – assess wide-spread storm damage.

- ✓ Chrome, FireFox, Safari (Internet Explorer has limitations)
- ✓ Desk top computer and hand held collection device.

How are Tree Inventories Used?

- ✓ Reveal planting needs.
- ✓ Monitor planting success rates.
- ✓ Identify potentially hazardous trees.
- ✓ Set priorities for maintenance.
- ✓ Develop maintenance schedules.

Age Distribution of City of Phoenix Maintained Trees (105,000)



City of Phoenix Tree Inventory

Top Ten Species in City of Phoenix (104,860)

Vacant space	11.5%
<i>Prosopis velutina</i> Mesquite	8.8%
<i>Parkinsonia florida</i> Blue Palo verde	6.8%
<i>Pinus halepensis</i> Aleppo pine	5.8%
<i>Parkinsonia praecox</i> Palo brea	5.3%
<i>Ulmus parvifolia</i> Evergreen elm	4.3%
<i>Dalbergia sissoo</i> Indian rosewood	4.1%
<i>Washingtonia filifera</i> California fan palm	3.8%
<i>Acacia stenophylla</i> Shoestring acacia	3.1%
<i>Washingtonia robust</i> Mexican fan palm	3.1%
<i>Fraxinus velutina</i> Arizona ash	3.0%

To Quantify Benefits

- ✓ Air quality, carbon sequestration
- ✓ Water quality, storm runoff
- ✓ Energy costs
- ✓ Property values

Average ROI of \$2.23 in the Phoenix area

National Tree Benefit Calculator

Beta

Overall Benefits

Stormwater

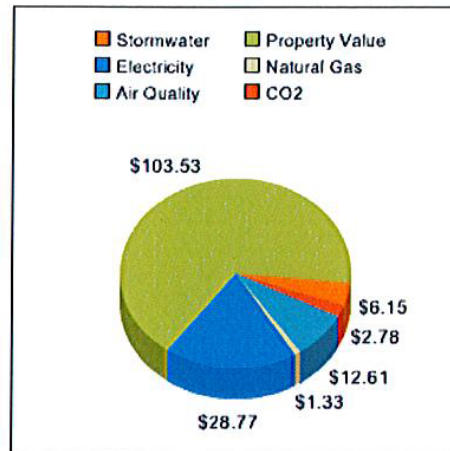
Property Value

Energy

Air Quality

CO2

About the model



Breakdown of your tree's benefits

Click on one of the tabs above for more detail

This 14 inch Blue paloverde provides overall benefits of: **\$155** every 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 is highly variable and makes precise calculations that much more difficult. Given these complexities, the results presented here should be considered initial approximations—a general accounting of the benefits produced by urban street-side plantings.

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

If this tree is cared for and grows to 19 inches, it will provide **\$217** in annual benefits.



Blue paloverde
Parkinsonia florida



The National Tree Benefit Calculator was conceived and developed by
[Casey Trees](#) and [Davey Tree Expert Co.](#)



www.treebenefits.com/calculator/

Benefit-Cost Analysis

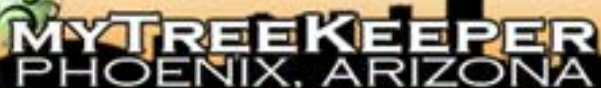
Murphy Bridle Trail - North Central

Total Annual Benefits, Net Benefits, and Costs for Public Trees

4/7/2009

Benefits	Total (\$) Standard Error	\$/tree Standard Error	\$/capita Standard Error
Energy	3,171 (N/A)	13.79 (N/A)	0.00 (N/A)
CO2	360 (N/A)	1.57 (N/A)	0.00 (N/A)
Air Quality	1,182 (N/A)	5.14 (N/A)	0.00 (N/A)
Stormwater	587 (N/A)	2.55 (N/A)	0.00 (N/A)
Aesthetic/Other	11,616 (N/A)	50.50 (N/A)	0.01 (N/A)
Total Benefits	16,916 (±0)	73.55 (±0)	0.01 (±0)
Costs			
Planting	1,000	4.35	0.00
Contract Pruning	5,000	21.74	0.00
Pest Management	0	0.00	0.00
Irrigation	3,500	15.22	0.00
Removal	500	2.17	0.00
Administration	0	0.00	0.00
Inspection/Service	500	2.17	0.00
Infrastructure	0	0.00	0.00
Litter Clean-up	1,500	6.52	0.00
Liability/Claims	0	0.00	0.00
Other Costs	0	0.00	0.00
Total Costs	12,000	52.17	0.01
Net Benefits	4,916 (±0)	21.37 (±0)	0.00 (±0)
Benefit-cost ratio	1.41 (±0)		

Key Findings (Summary)	Phoenix, AZ	El Paso, TX	Las Cruces, NM	Albuquerque, NM
Number of Trees (est.)	3,357,000	1,504,000	320,000	1,846,000
Size Land Area	519 sq. mi (1344 sq. km) 332,160 acres	256 sq. mi (663 sq. km) 163,840 acres	47 sq. mi (122 sq. km) 30,080 acres	181 sq. mi (469 sq. km) 115,840 acres
Tree Cover	9.7% - 13.6 trees/acre	5.9% - 14.9 trees/acre	4.5% - 11.4 trees/acre	14.3% - 21.8 trees/acre
Most Common Species	Velvet mesquite 9.6% California palm 7.4% Sweet acacia 6.7%	Italian cypress 24% Afghan pine 10.6% Mexican fan palm 6.5%	Italian cypress 19.4% Desert willow 14.7% Afghan pine 9.9%	Siberian elm 16.8% Desert olive 6.5% Desert willow 6.2%
Percentage of trees less than 6in DBH	44.10%	53.40%	65.10%	56.20%
Pollution Removal	1,880 tons/year (\$7.89 Million/year)	403 tons/year (\$294 thousand/year)	126 tons/year (\$339 thousand/year)	493 tons/year (\$1.44 million/year)
Carbon Storage	339,000 tons (\$24.1 Million)	105,000 tons (\$7.46 million)	21,700 tons (\$1.55 million)	302,000 tons (\$21.5 million)
Carbon Sequestration	36,300 tons/year (\$2.59 million/year)	8,460 tons/year (\$602 thousand/year)	1,800 tons/year (\$128 thousand/year)	12,900 tons/year (\$921 thousand/year)
Oxygen Production	90,100 tons/year (\$0 /year)	16,300 tons/year (\$0/year)	3,690 tons/year (\$0/year)	28,400 tons/year (\$0/year)
Building Energy Savings	\$22.2 million/year	\$3.02 million/year	\$651 thousand/year	\$4.35 million/year
Avoided Carbon Emissions	\$2.87 million/year	\$431 thousand/year	\$87.3 thousand/year	\$589 thousand/year
Structural Values (replacement value)	\$4.23 billion	\$1.7 billion	\$280 million	\$2.62 billion



City of Phoenix

Location Ex: 106 N 7th St

Search



Overlays

- ☐ Gold Medal Trees
- ☒ Phoenix Public Trees
- ☐ Vacant Sites

Base Layer

- Google Satellite
● Google Street

Find

TREE BENEFITS

92,864 total trees

Total Yearly Eco Benefits

\$5,663,209.94 saved

Greenhouse Gas Benefits

\$93,414.13
13,043,251.14 lbs CO₂ saved

Water Benefits

\$258,661.90
53,887,895.02 gallons saved

Energy Benefits

\$1,098,694.41
8,648,212.41 kWh saved

Air Quality Benefits

\$333,266.46
58,135.89 lbs pollutants saved

Property Benefits

\$3,879,173.04
8,676,738.61 leaf surface
area

The info tool lets you click on a tree for information.

myTreeKeeper was built
in cooperation with
the City of Phoenix

Tree Benefit
information
provided by i-Tree



DAVEY
TREE CARE COMPANY

Species

No photos available for this site

Species

Fraxinus velutina
ash, Arizona

Multiple Trunks Yes

DBH 1 15

DBH 2 8

DBH 3 0

Height 30



TREE BENEFITS

Total Yearly Eco
Benefits**\$192.89**Greenhouse Gas
Benefits**\$3.17****448.70 lbs saved**

Water Benefits

\$11.39**2,372.71 gallons
saved**

Energy Benefits

\$36.58**289.04 kWh saved**

Air Quality Benefits

\$17.68**2.58 lbs saved**

Property Benefits

\$124.06**263.00 leaf
surface area**

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Tree Benefit descriptions originally
published in the USDA Forest Service's
Center for Urban Forest Research *Tree
Guide* series.

Information

- ✓ www.itreetools.org
- ✓ www.isa-arbor.com
- ✓ www.treesaregood.org
- ✓ www.plants.usda.gov
- ✓ www.arborday.org



- <http://www.phoenix.gov/FORESTRY>

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