Sustainability Index for Urban Trees

WHAT LARGE SUSTAINABLE TREES MEAN *

- **More Shade = More Energy Savings**
- **Cleaner Air = Better Health & Fewer Hospital Visits**
- **More Stormwater Management = Lower Costs for Stormwater Controls**
- **More Shaded Streets**

Large Trees Pay Us Back

"We now know that, dollar for dollar, large-stature trees deliver big savings and other benefits we can't ignore. Small-stature trees like crape myrtles deliver far fewer benefits. In fact, research at The Center for Urban Forest Research shows that their (small stature trees') benefits are up to eight times less."

Cost vs. Benefits

"In most areas of the country, communities can care for their largest trees for as little as $13 per year, per tree and each tree returns an average of $65 in energy savings, cleaner air, better managed stormwater, extended life of streets, and higher property values. Even at maturity, small stature trees do not come close to providing the same magnitude of benefits."

What Do You Lose If You Don't Plant Large Trees?

"Municipal tree programs are dependent on tax-payer supported fundraising. Therefore, communities must ask themselves, 'are large-statured trees worth the price to plant and care for?' Our research has shown that benefits of large-statured trees far out-weigh the costs of caring for them, sometimes as much as eight to one. The big question communities need to ask is, 'can we afford not to invest in our trees?' Are we willing to forego all of these benefits? Or, would we rather make a commitment to provide the best possible care and management of our tree resources and sustain these benefits for future generations."

The Future Without Large Trees

"Cities that are using small-stature trees to reduce costs may achieve some short-term savings, but over the long term, they have destined themselves to a future with fewer and fewer benefits as large-statured trees are replaced with smaller ones. We recognize that on some restricted sites, small-stature trees may be the best choice. However, let's not succumb to the limited space argument so easily. We need to continue to fight for more space for trees in every new project and every retrofit. The bigger the tree, the bigger the benefits and, ultimately, the better our quality of life."

* The information on this page is from "The Large Tree Argument", Center for Urban Forest Research (Davis, CA), Southern Center for Urban Forestry Research & Information (Athens, GA), September 2006.
For more information, please visit http://www.urbanforestrysouth.org/Resources/Library/the-large-tree-argument-1-up/view

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Evaluation based on specific site conditions

Evaluation Tree: _____

A. Bio-Mass Potential: In general, the largest healthiest trees have the most positive impact on the environment (for more information, please visit http://urbanforestrysouth.org/Resources/Library/the-large-tree-argument-1-up/view). Obviously, space considerations for roots and canopies are critical to tree selection. Two genetic criteria are especially important to Bio-Mass Potential:

1. POTENTIAL SIZE GENETICS - A large-growing shade tree would get a higher score than a small ornamental tree.

2. GENETICS THAT SUPPORT LONG LIFE EXPECTANCY IN TOUGH URBAN CONDITIONS - These genetics have much to do with Life Expectancy in the Urban Landscape. Knowing the tough, often uncontrollable conditions of the urban environment, how long would you expect the tree to live and thrive. Select one from the following and enter a score:

	Score Range	Your Score
Large Size Potential and Long Life Expectancy	+ 30	
Medium Size Potential and Medium Life Expectancy	+ 10	
Small Size Potential and Short Life Expectancy	+ 0	
Total for Section A (30 points max.)		

B. Provenance: Is the tree appropriately native (adapted to climate and conditions), non-native, or what is the threat of invasiveness? Native to a particular climate is understandable, but often urban conditions are so altered or fabricated that 'native' is no longer as desirable in terms of the non-native site conditions. According to Peter Del Tredici in the February 2006 issue of *Landscape Architecture,* "The critical question faced by the professionals who design, build, and maintain our urban landscapes is not what plants grew there in the past, but which ones will grow there in the future?" (Peter Del Tredici is senior research scientist at the Arnold Arboretum of Harvard University and Harvard Graduate School of Design.*)
Select one from the following and enter a score:

	Score Range	Your Score
Appropriately native - native and adapted to climate and conditions	+ 15	
Inappropriately native - native but not adapted to conditions	+ 0	
Appropriate non-native - non-native and adapted to climate and conditions	+ 10	
Invasive/Inappropriate non-native - should not be planted **	+ 0	
Total for Section B (15 points max.)		

*Visit www.gsd.harvard.edu/loeb_library/information_systems/projects/E_vue/files/plantsFeb06.pdf for referenced article.
**Visit http://www.fs.fed.us/r9/wildlife/range/weed/?open=Sec3B.htm for more information on invasive plants .

C. Structural Integrity: This component is divided into two sections:

1. Wood Density: Dense, hard wood is preferable in trees as it is usually more resistant to breaking. Soft wooded trees have more broken limbs which lead to increased maintenance and a shorter tree life. Enter a score below:

	Score Range	Your Score
Wood Density (Range: 0=soft wood & 5=hard wood)	+ 0-5	

2. Branch Angle: Important to the level of maintenance required as certain branching angles require more frequent pruning. Select one from the following and enter a score value:

	Score Range	Your Score
Moderate upright - Preferred as they do not interfere with clearance below the canopy and have wide branch angles that are less likely to result in included bark	+ 10	
Included upright - Prone to weak, included bark and ultimately broken limbs	+ 0	
Perpendicular - Typically offer strong branch attachments, but can cause clearance problems for vehicles and pedestraians	+ 5	
Weeping or descending - Offer little clearance below the canopy and will require more pruning	+ 0	
Total for Section C (1 + 2) (15 points max.)		

D. Environmental Tolerances: Sustainable trees will need to be tolerant of tough conditions without requiring constant maintenance to successfully transplant and thrive. They will also score higher in the criteria than less sustainable trees. Score tree in the ranges provided below for each criteria:

	Score Range	Your Score
Heavy/compacted soils - Typical urban soils have low oxygen levels and are poorly drained, hindering root growth and tree establishment.	+ 0-5	
Minimal water and/or drought - Restricted root zones and tough urban soil conditions leave little water available to the tree for extended periods of time.	+ 0-5	
Heat islands and reflective heat - Reflective heat in urban areas adds stress to the tree and slows growth.	+ 0-5	
Low levels of fertility - Poor quality urban soils lead to lower nutrional levels in the soil and trees will need to be efficient at utilizing what nutrients are available.	+ 0-5	
	Total for Section D (20 points max.)	

E. Maintenance Requirements (Relative to Bio-mass)(See A above): A tree that is sustainable in an urban environment and tolerant of the demanding environmental conditions will require less maintenance. Highly sustainable trees will score high in the following criteria. Score tree in the ranges provided below for each criteria:

	Score Range	Your Score
Pruning frequency - Trees with hard wood and healthy branching habits typically will not require frequent pruning and will score high.	+ 0-5	
Irrigation frequency - Trees that have vigor and strong root systems to tolerate heavy urban soils will not require frequent irrigation after establishment and will score high.	+ 0-5	
Nutrition/Fertility requirement - Trees that have strong root systems to tolerate degraded urban soils will not require frequent fertilizer applications and will score higher than those not suited to these conditions.	+ 0-5	
Pest susceptibility - Trees that are vigorous and thrive in tough urban conditions are typically not susceptible to a range of pests and diseases and will not have to be chemically treated to maintain tree health, thus these trees will score high.	+ 0-5	
	Total for Section E (20 points max.)	
	Total for ALL SECTIONS A thru E (100 points max.)	

Method of Propagation for Genetic Consistency: Enter your score from all sections above into the correct section below based on the method of propagation used to produce tree being scored.

Own-root clones (ORC): the most sustainable based on consistency and predictability of A thru E and structural integrity of propagation.	x 100%	
Budded or Grafted: lose consistency and predictability of above criteria due to seedling rootstock compared to ORC. Problems can also come from weak graft unions or graft compatabilites, causing the tree to fail.	x 50-75%	
Seedling: every tree is different genetically and will perform differently. Range is based on predictability of A thru E above.	x 50-75%	
	TOTAL SUSTAINABILITY SCORE	

Total **Sustainability Score**:

The obvious goal is to specify plants and trees with the highest scores.
Most importantly, the long lived **SUSTAINABLE TREES** with **LARGE BIO-MASS** will provide many years of **POSITIVE BENEFITS FOR THE ENVIRONMENT**.

SUSTAINABLE TREE EQUATION

Superior Genetics + **Proper Nursery Culture** + **Proper Installation and Maintenance** = **Sustainable Urban Trees**

The Sustainability Index for Urban Trees measures the sustainability of a tree based on **GENETICS**. All trees, regardless of where they score, must be grown under **PROPER NURSERY CULTURE** and **PLANTED AND MAINTAINED PROPERLY**. Removing any of these components of the **SUSTAINABLE TREE EQUATION** will increase the chance of tree failure and will decrease sustainability.