

STATE VEGETATION MANAGEMENT TASK FORCE

FINAL REPORT

**ISSUED TO THE CONNECTICUT DEPARTMENT OF
ENERGY & ENVIRONMENTAL PROTECTION**

AUGUST 28, 2012

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Acknowledgments

While the impacts from both storms are still fresh, the Task Force applauds the leadership and commitment of Governor Dannel P. Malloy and Commissioner Daniel C. Esty of the Department of Energy & Environmental Protection (CT DEEP) in forming both the Two Storm Panel and the State Vegetation Management Task Force. Their timely action will ensure that we learn from these storms and take actions that will minimize risks from future storms and preserve the benefits that trees provide to our urban, suburban, and rural communities.

We also owe a great debt of gratitude to the Co-Chairs of the Two Storm Panel – Joe McGee, V.P., Business Council of Fairfield County and Major General James Skiff, U.S. Air Force (retired) – and the many panelists and experts who took the time and energy to analyze the many issues raised by these two storms, and publish them in the *Two Storm Panel Report* with 82 excellent recommendations. [The Recommendations on Tree Trimming from the *Two Storm Panel Report* are excerpted as *Appendix 4*.]

I want to personally thank the members of the Task Force for their dedication, consistently high attendance, and for sharing their expertise with all of us. I want to specially recognize the following Task Force members who were willing to put an extra shoulder to the wheel by leading Working Groups: Mary Hogue (Public Education), Karl Reichle (Regulations, Legislation & Funding); and Jeffrey Ward, PhD (Technical Standards). We also need to thank Task Force member Kimberly Barbieri for her outstanding work on designing brochures and developing other above-and-beyond graphics for this report.

Bill Logue deserves high praise as our consulting facilitator for this effort, and the CT DEEP team of Deputy Commissioner Susan Whalen, State Forester Chris Martin, and Urban Forestry Coordinator Chris Donnelly have been highly knowledgeable and dedicated to supporting the Task Force throughout this process.

In addition, there were several individuals who provided significant content for the report despite not officially being on the Task Force. Tom Degan of Burns & McDonnell was the lead author on the chapter entitled “Roadside and Utility Line Forest Management for a more Storm Resistant Future;” Professor Glenn Dreyer of Connecticut College was the co-author with Jeffrey Ward of the Right Tree, Right Place standards. The Right Tree, Right Place list was assembled with contributions from several papers and professionals: Alexopoulos et al. (2007), Gerhold et al. (1993), the Connecticut Nursery and Landscape Association, Audubon Connecticut, the Connecticut Notable Trees Project, and the Urban Resources Initiative.

The Task Force benefitted from thoughtful presentations on legal issues by Melinda Decker, GIS/Inventory issues by Mike Gantick and Mark Goetz, and Risk Assessment 101 from Tim Brady. Others who attended meetings of the Task Force and provided helpful input included Joseph Aresco and Rich Skarzynski of AT&T, Mikey Hirschhoff of the New Haven Garden Club, and Pam Klomberg of the Westport Tree Board.

Sincerely,

Eric Hammerling, Executive Director, Connecticut Forest & Park Association
Chair, State Vegetation Management Task Force

I. The State Vegetation Management Task Force

Mission: CT DEEP established and appointed the members of the State Vegetation Management Task Force (hereafter Task Force) based upon recommendation #23 from the *Two Storm Panel Report* with the following mission:

“To develop standards for road side tree care in Connecticut, vegetation management practices and schedules for utility rights of way, right tree/right place standards, standards for tree wardens, municipal tree inventories and pruning schedules.”

Members: There are 20 members of the SVMTF representing electrical and telecommunications utilities as well as state, municipal, and private tree managers, non-profit environmental representatives and other experts. Short bios for each of the Task Force members are found in *Appendix 1*.

Process: The first meeting of the Task Force was held on April 24, 2012 at Town Hall in Rocky Hill, CT. Since then, the 20 members of this Task Force have met every two weeks and worked diligently in between meetings to reach the goal of issuing a final Task Force report by August 28th.

The Task Force has been led through a consensus-based process by professional facilitator, William (Bill) Logue. The ground rules and roles that Task Force members agreed to are included in *Appendix 2*.

To facilitate public input and ensure transparency of the work and deliberations of the Task Force, CT DEEP also developed a web page to post meeting summaries, ground rules, and other information. <http://www.ct.gov/dep/cwp/view.asp?a=2697&q=503040>

Working Groups: To effectively accomplish its work the Task Force established three primary working groups: 1) Public Education; 2) Regulations, Legislation, & Funding; and 3) Technical Standards. [The questions and topics of focus for each of the Working Groups are described in *Appendix 3*.]

EXECUTIVE SUMMARY OF TASK FORCE RECOMMENDATIONS

Members of the State Vegetation Management Task Force share a strong belief that if municipalities and the state increase their investment in roadside forest¹ management over time, Connecticut could reduce economic losses, enhance public safety, and have healthier trees along its roadsides.

There is a clear need for investment – both of human and financial resources – at the municipal level and at the state level for improved management of the roadside forest. The storms of 2011 were estimated to cause more than \$3 billion in economic losses in Connecticut alone, and CL&P estimates that 9 out of 10 power outages in its service territory were caused by trees and branches falling on power lines. Some of these future losses and disruptions will be avoided if the Task Force’s recommendations are implemented.

There are some necessary additional investments that have been proposed and are currently being implemented by electric utilities (CL&P and UI) to manage roadside forests where electric infrastructure exists. Together, the electric utilities (CL&P and UI) expect their vegetation management budgets to increase to the \$50-60 million/year level over the next 2 years (please note: these increased budgets focus on tree pruning and removals but generally do not include funding for tree replanting). **With these proposed utility increases, investment by utilities would be an estimated 6 times greater than tree maintenance expenditures by the state’s Department of Transportation and all municipalities combined.** This budget imbalance combined with chronic underfunding for forest management at the state and municipal levels has led to the current situation where utilities serve as *de facto* tree managers for most towns. There are many examples of the utilities assisting the towns and tree wardens, but the utility goals of keeping the lights on does not always sync neatly with the goal of building a healthy, more storm resistant roadside forest for the future.

The Task Force understands that there is no “one size fits all” solution to achieve a better maintained, healthier roadside forest. This makes sense given the large differences between urban, suburban, and rural areas, various tree species, and diverse aesthetic visions from town to town. The Task Force also acknowledges that the many benefits provided by trees are maximized when those trees are healthy and well-maintained.

The Task Force has chosen to highlight several recommendations in this Executive Summary, but we encourage you to read the entire report for the full set of recommendations and the context for each:

¹ Roadside Forest is defined as follows: “The roadside forest consists of all trees and shrubs growing alongside roads, streets and highways on all land ownership types (municipal, state, and private) and across all population gradients from urban to rural. The roadside forest extends from the road to a distance that is equal to the potential mature height of any roadside tree that could impact the road or utilities.”

Recommendations for Municipalities

- Municipalities are required by law to appoint a tree warden, but there is no requirement that the tree warden have the knowledge and qualifications that the position requires. The Task Force recommends that all tree wardens need to be certified as to their qualifications for the position within 1 year of being appointed.
- Municipalities should develop 5-year roadside forest management plans (based upon a model ordinance) that include tree pruning and removal guidelines for trees along public roads; and standards for tree planting that include the avoidance of overhead and underground power and communications lines, road signals and/or the obstruction of other state, municipal or private infrastructure.
- All trees planted within the public right-of-way and on municipal property should be reviewed and approved by the town tree warden.

Statewide Recommendations

- Informational resources including frequently asked questions about the roadside forest need to be centralized in a logical place for private landowners, municipalities, businesses, and others.
- The Right Tree, Right Place guidelines must be used for planting trees and shrubs in roadside forest areas where trees have either failed or have to be removed. It is important to note that large trees have an important place in the current and future roadside forest.
- Roadside Forests must be managed to become more storm resistant over time (decades) through a combination of tree pruning, removals and Right Tree, Right Place planting.
- Standards are essential to ensure tree removals are done based upon science-based professional training, shared methods of hazard assessment, and planning for tree replacement.
- Property owners need to be made more aware of the stewardship required to properly maintain trees to maximize benefits and reduce potential community hazards.

Funding Recommendations

- Because of the importance of this issue both to public health and to the state's economy, there needs to be state or federal funding dedicated to incentivize municipal investments in this area. We recommend the state should provide "one-time funding" at the level of \$100,000/town for 2 years (perhaps through Municipal Road Aid) to assist tree maintenance and establishment of 5-year municipal tree management plans.
- As proposed in the Two Storm Panel Report, 1.5 % of all funds approved for utility vegetation management by PURA should fund the removal of hazard trees in the roadside forest that are on private property for 5 years.

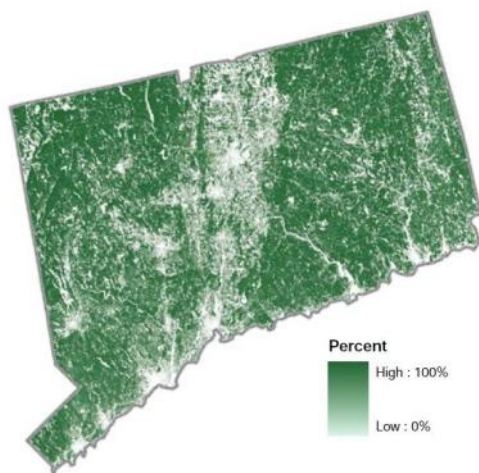
- Municipalities are encouraged to use a rule-of-thumb formula, similar to the one we propose, for building their annual budgets for roadside forest management based upon forested road miles.
- As utility vegetation management budgets are increased, the amount of vegetation management funding (~20-25%) that currently goes to “non-vegetation management costs” such as traffic control must be reduced.

II. Introduction & Key Definitions

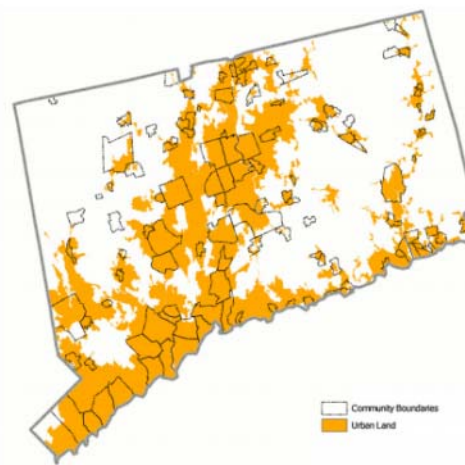
One year after the “two storms” of 2011, Connecticut citizens and businesses are still recovering from Tropical Storm Irene and the October Nor’easter which caused widespread tree failures, power outages, structural damage, and economic disruptions well beyond the “norm” for Connecticut. Conservative estimates have placed the cost of damage done by the October Nor’easter alone at close to \$3 billion. Much of the blame for power outages has been attributed to trees without regard for the many benefits that trees provide or an understanding of the need to better manage our roadside forest to reduce the expense of future storms.

As we begin, it is important to understand how the Task Force defines the “Roadside Forest” in this report:

Roadside forest: The roadside forest consists of all trees and shrubs growing alongside roads, streets and highways on all land ownership types (municipal, state, and private) and across all population gradients from urban to rural. The roadside forest extends from the road to a distance that is equal to the potential mature height of any roadside tree that could impact the road or utilities.

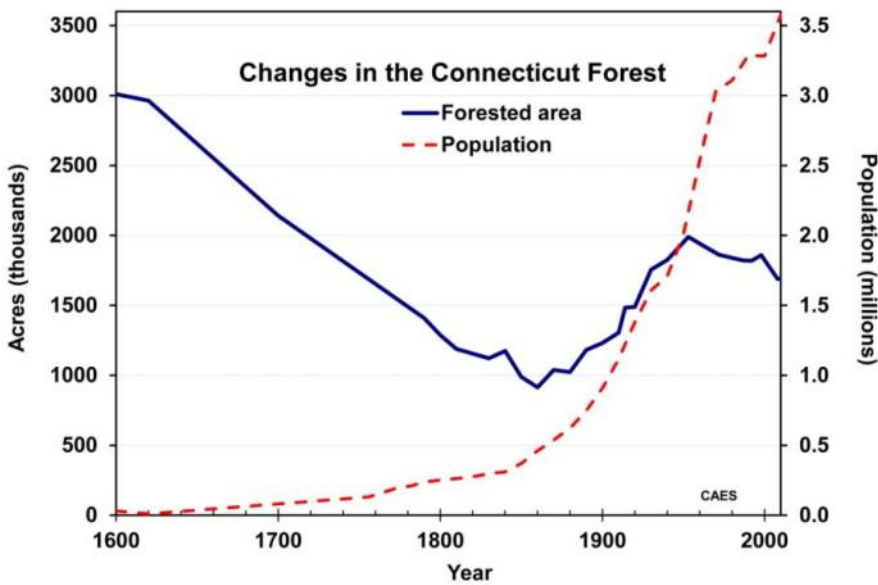


Forest Cover in Connecticut, USDA Forest Service (2012)



Forest Cover in CT Urban Areas, USDA Forest Service (2012)

Connecticut has the distinction of being the 5th most forested state in the nation (72.6%), and leads the nation in the forest cover found in our urban areas (67.4%). Connecticut also leads the nation in the measure known as Wildland Urban Interface, which means we have the highest percentage of forested land that has homes and trees in close proximity. Of course, this situation has evolved over the course of many decades and, in fact, the forest cover of Connecticut has changed dramatically over time.



Although the overall forest cover of Connecticut is much higher than it was 100 years ago, the state’s forest cover has generally declined and become more fragmented over the past two decades. The roadside forest, however, has increased as communities have sprawled and the roadside forest has matured.

It is helpful to think about how many trees are estimated to be part of the roadside forest. According to testimony that was presented to the Two Storm Panel by Task Force member Dr. Jeffrey Ward, there are an estimated 2.1 million trees lining almost 21,000 miles of roads in Connecticut (based upon an average of 100 trees/mile found beside 3,731 miles of state highways and 17,232 miles of town roads). Around 1.2 million of these trees are estimated to be larger than 1 foot in diameter, and almost half (~48%) of all of the trees are maples.

Key Definitions

Before presenting the Task Force’s findings and recommendations, there are a few other key definitions that are important to consider within the context of this report:

Easement: the right to use the real property of another for a specific purpose. The easement is itself a real property interest, but legal title to the underlying land is retained by the original owner for all other purposes. Typical easements are for access to another property (e.g., a right-of-way for "access and egress"), for utility or sewer lines both under and above ground, use of spring water, and other uses.

Hazard or Risk Tree: a tree that has a defect that could cause it to break apart or fall over and if it did, harm or damage a valuable target.

Right-of-Way: the legal right, typically established by an easement, to transit a specific route on property belonging to another. In this report, this term is used two ways to describe: 1) a

right-of-way along a public road, and 2) a right-of-way utility corridor that may go along roads as well as on properties with no public road.

Tree Maintenance: refers to the activities involved with maintaining the health of trees through their life cycles, i.e., tree pruning, tree removal, and tree planting.

Taking action to improve the health and safety of our roadside forests simply cannot be put off any longer. We have a window of time NOW while the memory of the 2011 storms lingers, and at a time when many diverse interests are motivated and working together to prepare for future storms.

III. Task Force Findings and Assumptions

In arriving at its recommendations, the Task Force made a number of assumptions along with the requisite underlying conditions for implementation. The Task Force also attempted to rely on pre-existing work, definitions, standards and practices both to avoid creating confusion and to build and improve on existing beneficial practices. The following represents the findings and assumptions of Task Force members who embody a breadth of experience in roadside tree maintenance and care with the perspectives of diverse groups: the state, municipalities, private landowners, electrical and telecommunications utilities, environmental organizations, private arborists, and forestry research experts:

- There were three overarching findings: 1) the roadside forest is aging; 2) the roadside forest is populated with trees that are likely to become “hazard trees” over time; and 3) any policies developed to reduce risks of failing trees in the roadside forest will impact a large area, be expensive, and take time to implement in a way that tree maintenance, professional tree care standards, and community values and aesthetics are appropriately balanced.
- Trees provide enormous societal, environmental, and economic benefits that would be more fully realized if there were dedicated investments in better roadside forest management by municipalities, the state, utilities, businesses, and other landowners.
- The longer Connecticut delays investment in better roadside forest management, the more expensive the damage will be from future storms.
- Historically, financial resources have been allocated toward utilities, police, fire, hospital, paramedic/EMT, and other “emergency services.” However, it is important to note that these emergency services cannot be effectively utilized without clear, safe roads. If estimates by CL&P are correct that suggest 90% of power failures during the storms were due to power line interactions with trees, then better management of the roadside forest should save both time and lives by enabling emergency efforts to be dispatched more quickly after a storm event.
- Utilities have been generally vilified in the wake of the major storms of 2011, but it is also important to recognize that there are several examples of utilities sharing resources with municipalities, tree wardens, and individual landowners to address management issues of mutual interest in the roadside forest.
- There is no “cookie cutter solution” for managing the roadside forest. Each storm is unique as is each species of tree as well as each landowner or municipality.

Management plans must be both comprehensive and flexible to accommodate many differences across the state.

- Better management of our roadside forest will have other benefits such as putting more experts in the field to enable early detection and response before invasive pests such as the Emerald Ash Borer (which impacts ash trees) and the Asian Long-horned Beetle (which impacts many species of hardwood trees that are common along the roadside such as maple, elm, sycamore, birch, and poplar) create even larger hazards along the roadsides of Connecticut.

Although we believe the risks from future storms can be reduced by implementing science-based standards for improved tree care, it should also be noted that this will not immunize trees against failure or prevent property damage in the event of a tornado or a Category I, II, or III hurricane. The recommendations made by the Task Force should make a difference 99% of the time during “normal” New England weather conditions, and, just as importantly, will help the state, towns, and individuals determine the desired future conditions of the roadside forest. They will also help set in place some of the practices and systems that will allow for more timely and coordinated restoration of transportation, power, and communication services when more extreme events do occur.

The Benefits of Trees

Too often, walking along a street or driving down a road, we barely notice the healthy trees we pass. We may briefly appreciate a spot of cool shade, an eye pleasing color, or a graceful leaf blowing in the breeze, but rarely do we think about the broader benefits of trees. When an unhealthy tree falls or a storm blows a branch down we do think about the immediate inconvenience or cost, but again, we don't think about the decades worth of benefits that this tree has already provided.

Such benefits of public and privately managed trees are well documented by the Urban and Community Forestry Division of the USDA Forest Service. The three primary sources used for this report are the "Northeast Community Tree Guide: Benefits, Costs, and Strategic Planning"; "Planning the Urban Forest: Ecology, Economy, and Community Development"; and a USDA Forest Service brochure entitled "Trees Pay Us Back"².

Several well-documented benefits from healthy trees follow:

Healthy Trees, Lower Energy Bills: Trees planted strategically for shade or windbreaks can result in significant energy savings. Shade trees can save up to 56% on annual air-conditioning costs, and evergreens that block winter winds can save up to 30% on heating. The benefits of trees occur over multiple seasons. For example, a deciduous tree can provide cool shade during the summer and admit light for warmth in the winter. Reduced heating and cooling costs are matched by fewer emissions being created from power generation.

Healthy Trees, More Valuable Homes and Commercial Space: On average, each large front yard tree adds 1% to the house sales price, and large specimen trees can add 10-15% to a property's value. Apartments and offices in wooded areas rent more quickly, have higher occupancy rates, and retain tenants longer. Also, businesses leasing office space in wooded developments find their workers are more productive and absenteeism is reduced.

Healthy Trees, Healthy Economy: Tree care is directly tied to jobs performed by arborists, landscapers, and other "green" professionals, as well as sales for nurseries and other businesses. At the same time, trees give, economically, more than they take. The Forest Service reports that the considerable economic benefits generated by trees are an average of three times greater than tree care costs.

² Each of these publications are available by means of download from the USDA Forest Service website. The first is available as a General Technical Report (GTR 201) at www.fs.fed.us/psw/publications. The other two publications may be found by visiting na.fs.fed.us/urban/index.shtm.

Healthy Trees, Better Business: In tree-lined commercial districts, shoppers report more frequent shopping, longer shopping trips, willingness to pay more for parking, and willingness to spend 12% more for goods.

Healthy Trees, Fewer Floods and Less Erosion: Trees reduce flooding, stormwater runoff, and erosion problems. Trees increase soil permeability (the ability of the soil to hold water), help recharge drinking water aquifers, and tree roots serve as anchors that reduce erosion and sediment flowing into our streams and Long Island Sound. 100 mature trees will catch about 139,000 gallons of rainwater per year. Looking at this another way, without trees, towns might need to increase stormwater drainage channels and/or waste treatment capacities to handle increased water runoff.

Healthy Trees, Healthy Air: Trees provide great benefits to human health by improving air quality. Trees trap and hold pollutants like dust, ash, pollen and smoke that damage human lungs. One hundred trees will remove 430 pounds of these pollutants each year. Also, on average, an acre of trees will produce enough oxygen for 18 people every day, and will absorb 2.6 tons of carbon each year (enough CO₂ to offset driving a car for 26,000 miles).

Healthy Trees, Healthy People: Trees directly influence human health by providing us with clean air, clean water, reduced exposure to damaging sunlight and a generally more hospitable environment. They also improve people's outlook, uplifting us as we move through our busy days simply by their presence. Studies have shown the many positive effects of trees on people's mental and physical well-being.

Healthy Trees, Less Noise: Thick strips of vegetation can reduce noises, such as road noise, by 6 to 15 decibels. Plants absorb more high-frequency noise than low frequency, which is advantageous since higher frequencies are most distressing to people with noise sensitivities.

Healthy Trees, Healthy Streets: Trees casting shade on streets can help extend the life of asphalt by protecting pavement from weathering in direct sun. Tree lined streets also have a traffic calming effect, helping to reduce traffic speed.

Healthy Trees, Safer Communities: Tree-filled neighborhoods have been documented to have lower levels of domestic violence as well as being safer and more sociable. This is not surprising because, in general, trees create feelings of relaxation and well-being, provide privacy and a sense of solitude and security while also encouraging people to engage with their neighbors, and (when well managed) contribute to a sense of community pride.

Healthy Trees, Healthy Wildlife: Trees and associated vegetation are fundamental to local ecosystems that provide habitat and food for birds and animals. Trees can also offer suitable "mini-climates" for biodiversity that could otherwise be absent from urban areas.

Many of these benefits of healthy trees are viewed as “free” benefits to society because they lack a formal market like more traditional “goods and services.” Unfortunately, we tend to take trees for granted and can forget that healthy trees and forest ecosystems are literally life-support systems that help sustain our well-being. Forests, even the subset that we refer to as roadside forests, provide a rich suite of goods and services that are vital to human health and livelihood. Trees cannot be neglected on Connecticut’s “balance sheet” any longer.

This healthy, tall elm tree in West Hartford (below) provides benefits worth approximately \$150 every year. These benefits³ include:

- \$12.31 in reduced heating costs, due to the tree being a wind break
- \$31.10 in reduced cooling costs, from the shade cast
- \$59.12 in reduced storm water processing costs
- \$41.70 in air pollutants removed
- \$5.93 in removed carbon dioxide

Of this \$150 total, the first \$42.41 is money saved directly by the homeowner, \$59.12 is money saved by the town, and \$47.63 are general environmental benefits translating into reduced medical expenses within the citizenry at large.



Clearly, with a tree such as this elm, there are expenses associated with its maintenance, and so the benefits must be balanced against the cost. However, the authors of the Northeast Community Tree Guide⁴, published by the US Forest Service, estimate the annual net benefits of an average large tree in the northeastern US is between \$85 and \$113 per year.

³ Benefits are derived through the i-Tree Design application within the i-Tree Tools software package. These tools may be downloaded without charge from www.iTreeTools.org.

⁴ *Northeast Community Tree Guide: Benefits, Costs and Strategic Planting*, by E. Gregory McPherson, James R. Simpson, Paula J. Peper, Shelley L. Gardner, Kelaine E. Vargas, and Qingfu Xiao. US Department of Agriculture, Forest Service, Pacific Southwest Experiment Station, August 2007

The Importance of Large Trees

There is a concern that large trees, simply because of their sheer size and mass, present a significantly greater danger to people and to infrastructure, and so should not be allowed to grow alongside streets and roads. It is true that the larger and heavier a tree is, the greater capability it has to cause injury or damage should it fail. It is also true that, given the large potential for destructive violence in any extreme weather event, no tree is fully protected from failure in a storm. No tree is ever absolutely safe. No matter how old a tree is, how significant it is as a specimen, or how healthy it appears to be, all trees will eventually decline.

At the same time, the discussion regarding the use of large trees along roadsides should not turn solely on considerations of the potential for damage from large trees when they eventually fail or must be removed before failing. Other important aspects of the discussion ought to be the relative health and stability of the tree, how well it has been maintained and will be maintained in the future, and the contributions that a tree makes to the well-being of those who live in the vicinity of that tree, who travel the nearby streets, and who have benefitted from what that tree has provided over the decades of its life.

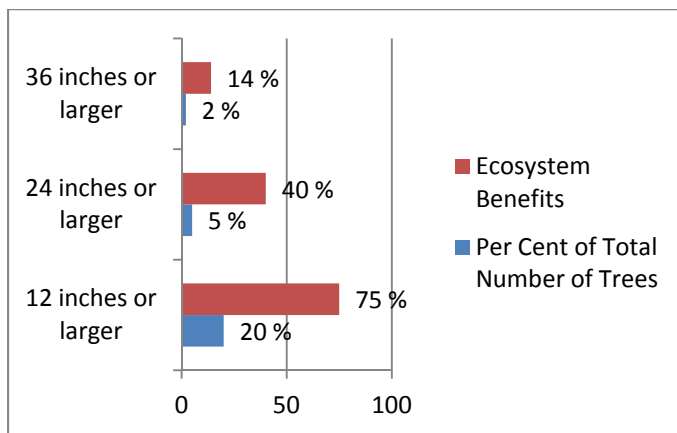
Trees provide many ecosystem benefits including cleaner air, cleaner water, the sequestration of atmospheric carbon, and enhanced nutrient cycling, that promote biodiversity and a more stable environment. What is not always noted is that these ecosystem services are almost always directly related to the volume of a tree's crown and the area of leaf surface within that crown. The more leaf surface area, the more photosynthesis that can occur, the more water that the tree will transpire from its leaves, the more carbon it will pull from the atmosphere, and the more surface area for certain atmospheric pollutants to settle out upon.

As a measure of tree size, diameter of the trunk as measured at 4-1/2 feet off of the ground (diameter at breast height, or dbh) is one-dimensional. The volume of the crown of the tree is three-dimensional. When looking at tree sizes and the ecosystem services they provide, increases in ecosystem services will be roughly geometric in proportion to increasing trunk diameter. This is because the volume increase of the crown is three-dimensional as compared to diameter increase of the trunk. This comparison of increasing crown volume to increasing trunk diameter is approximate because, of course, the change in crown volume is not always directly proportional to the change in the tree's trunk diameter.

The basic point is made, however, that large, healthy trees contribute much more in ecosystem services than do even an equivalent number of smaller trees whose trunk diameters add up to be the same as that of a single large tree.

A better way to illustrate this might be to look at Hartford’s tree population, as sampled during a survey completed in 2007⁵. In this study, the researchers found that 20% of Hartford’s trees are 12 inches in diameter (dbh) or greater, 5% of Hartford’s trees are 24 inches in diameter or greater and 2% of Hartford’s trees are 36 inches in diameter or greater. Their study also showed that 75% of the leaf area of Hartford’s trees are in trees 12 inches in diameter or greater, 40% of the leaf area of Hartford’s trees are in trees 24 inches in diameter or greater and 14% of the leaf area of Hartford’s trees are in trees 36 inches in diameter or greater. In other words, the largest 5% of the trees in Hartford contribute 40% of the ecosystem service benefits, while the largest 2% contribute 14% of the total benefits. This last figure relates to about 11,000 trees citywide, among a total tree population of about 568,000.

Comparison of Percentage of Trees by Size (dbh) and Contributed Ecosystem Service Benefits, Hartford Study - 2007



In cities, the relationship between tree size and tree benefits becomes especially important due to the relatively fewer trees there are in cities and the greater need for the ecosystem service benefits that they provide. Additionally, large trees in cities provide shade for walkers and buildings alike, reduce the amount of ozone found in congested streets, and can greatly enhance the quality of life in urban neighborhoods.

These larger trees do come with greater responsibilities and expenses. Indeed, larger trees, should they fail, can cause proportionally much greater damage than smaller trees. Therefore, it is our responsibility to plant and grow trees in places where there is adequate space, both above- and below-ground, to support their size, and with a careful view toward what sort of damage they would cause should they fail. Roadside and urban trees need to be well-maintained, with dead limbs regularly removed and with regular monitoring of their overall health and structural stability. Certain species, known for their proclivity to unpredictable failure or messy habits should be avoided. Owners of large trees, or tree wardens when the tree is under the responsibility of the municipality, should be especially vigilant regarding large trees, and should be quick to take action when circumstances warrant. Any tree that appears

⁵ See "Hartford's Urban Forest - the Challenge" to be found on the Urban Forestry page of DEEP's Forestry web site- www.ct.gov/deep/forestry.

to be in a condition where it is likely to fail in the near term should be immediately removed or the problem should be remediated.



Sugar Maple in Bridgeport (center)

The Costs of Municipal Trees

The benefits of trees have been well-established. Also well-proven is that, under most circumstances, the benefits of trees outweigh their costs. Trees are a net positive to the community in terms of benefit/cost ratio, often by a wide margin.

However, sometimes overlooked in this discussion is the way the costs of municipal trees are borne by the city or town in which they are located. Even in circumstances in which trees save the municipality money, such as when trees reduce stormwater treatment costs, the manager of an individual town or city department often sees trees only as line-items on his or her budget, and as so, expenses in the budget. As a result, and as the benefits accrue to others, it can sometimes be difficult to convince a manager or financial control officer that trees are indeed a net positive.

The USDA Forest Service has produced figures on average tree costs for both public and private trees. For the Northeast, the annual costs for public trees, presented in the Northeast Community Tree Guide,⁶ are as follows:

Costs per year	small tree	medium tree	large tree	pine tree
planting costs	\$10.00	\$10.00	\$10.00	\$10.00
pruning	\$3.26	\$7.69	\$11.60	\$6.40
removal and disposal	\$1.28	\$1.62	\$2.06	\$1.47
pest and disease	\$0.09	\$0.13	\$0.17	\$0.11
infrastructure repair	\$1.13	\$1.55	\$2.06	\$1.37
clean-up	\$0.26	\$0.35	\$0.46	\$0.31
admin and inspect	\$3.96	\$5.42	\$7.21	\$3.10
Total	\$19.98	\$26.76	\$33.56	\$22.76

These numbers are based on the expected cost of a tree for the first 40 years after planting. In other words, during the first 40 years \$400 will be spent on planting the tree, \$130.40 on pruning a small tree, \$464 on pruning a large tree, and so on. One disadvantage of this approach is that it only considers the costs associated with relatively young trees, and not those associated with very large, very old specimens, which would present significantly greater pruning and removal costs on an annual basis. Also, the approach used assumes that 34% of the trees planted will die during this first 40 year period. This presents an additional

⁶ *Northeast Community Tree Guide: Benefits, Costs and Strategic Planting*, by E. Gregory McPherson, James R. Simpson, Paula J. Peper, Shelley L. Gardner, Kelaine E. Vargas, and Qingfu Xiao. US Department of Agriculture, Forest Service, Pacific Southwest Experiment Station, August 2007

underestimation of the removal and disposal costs for the municipal tree population as a whole.

Regardless, these numbers provide a useful framework for considering trees costs. They may not represent the true, typical costs of tree planting in a particular community, for example, if that community is hampered by having numerous undersized and heavily compacted tree pits in the downtown area. Alternatively, it is difficult to plan for emergency work, where cleanup and infrastructure repair costs can rise rapidly. Even in a relatively minor event, calling out a crew would likely mean paying at least 3 people time-and-a-half for a minimum 4 hour shift.

It is not our recommendation that these numbers be used directly to determine a tree budget. Given the limitations mentioned earlier, using these numbers as the basis for 'per tree' costs that can be extrapolated to the tree population of a community as a whole would likely not adequately represent the annual tree budget needs for that community. Also, these numbers likely underestimate equipment and personnel costs, such as the highly important investments that should be made in employee education and training. These numbers, however, are a start, and they serve to reinforce the notion that, for municipalities, the bottom line is the bottom line. For most managers, the costs for trees need to be accounted for as expenditures, regardless of what additional benefits might accrue to the community at large or show up as cost savings in other areas of the municipal budget.