

The State of Our Urban Forest: Neglect and Abuse of Lexington's Trees

A Citizen's Report



Tom Kimmerer, PhD

www.kimmerer.com

tom@kimmerer.com

This report was prepared voluntarily by the author, who received no compensation for its preparation. An online version of this report with extensive photographs and maps is available at

www.kimmerer.com/stateofurbanforest.

Summary

The urban forest of Lexington is in serious trouble. Ice storms, drought and the emerald ash borer have all contributed to the decline of our urban forest. However, the major problem in our urban forest is the incompetence with which we manage trees, especially on public land.

Trees on public land are planted at considerable cost. Yet except in a few places like Woodland Park, little or no money is spent on maintenance. Trees are not adequately watered during establishment (the first few years after planting), and soil conditions are often poor. Once trees are established, contractors and city employees kill them by repeatedly striking the stems with lawn mowers and string trimmers.

To better understand the condition of Lexington's urban forest, I systematically surveyed trees in city parks and streets between April and August 2012. I determined the size, species and health of each tree and photographed hundreds of trees. I did a quantitative assessment of all planted trees in Veteran's Park and in the easement along Southpoint Drive to validate the observational data.

These observations lead to a startling conclusion: over 85% of the trees planted in parks and on roads in Lexington have been heavily damaged by improper planting methods, poor initial care, mowing, string trimming, over-mulching and other injuries. The damage is so pervasive that it indicates that Lexington has an urban forest crisis on our hands: almost none of the trees that I have examined will survive for anything close to their normal life cycle. A properly planted and maintained urban tree should last over 100 years. It is likely that few of the trees shown in this report will survive more than 20 years.

Lexington appears to have adopted a policy for managing trees that kills them. By failing to spend any money on tree maintenance, and by failing to require employees and contractors to practice due care in mowing, we have created a system in which we spend money to plant trees and then spend money to kill them.

What can be done about this? Fortunately, the solutions are fairly simple:

1. LFUCG should place a moratorium on planting trees with public funds, until better management plans and training for employees and contractors are in place.
2. LFUCG should engage the services of a Registered Consulting Arborist to develop a street and park tree management plan and training program.
3. All city employees and contractors should be required to pass a training program on tree maintenance and proper mowing techniques. For city employees, implementation of good tree management should be part of their performance evaluation. Contractors should be held to best management practices as a condition of being paid.
4. Lexington needs to raise the level of citizen participation in tree care. Citizens can be trained to maintain trees, including pruning, and to spot and report problems. Citizen groups can be enlisted to conduct tree inventories under the supervision of a professional forester or arborist.

Statement of Author's Qualifications and Independence

Tom Kimmerer has a B.S. in forest biology from the SUNY College of Environmental Science and Forestry and a PhD in forestry and botany, with a specialization in tree physiology from the University of Wisconsin – Madison. He was a professor of forestry, natural resources and plant physiology for 18 years at the University of Kentucky. He has done research in the tree stress-decline complex and taught tree physiology and urban forestry in three countries and lectured extensively on tree health, urban forestry and tree physiology in the United States, Canada, Malaysia and Indonesia. He is presently a consulting scientist in the renewable energy industries.

This report was prepared voluntarily at the sole initiative of the author. No discussions were held with anyone in LFUCG or any other government entity. The author received no compensation for preparing this report. The author does not consult in urban forest management except in the utilization of urban trees as biomass feedstock for renewable energy projects.

Background

In the eyes of an experienced forest scientist, Lexington's urban forest is in decline by almost any measure. Ice storms in 2003 and 2009 exposed the fundamental weakness of many urban trees: nearly all the trees that came down had significant structural defects and decay. The emerald ash borer is now killing all our ash trees, approximately 11% of all the trees in the city. These impacts are important, but the most serious problem facing our urban forest is mismanagement and willful destruction of urban trees.

In the absence of a major event like an ice storm, damage to our trees is more subtle and easier to overlook. The moderate drought of the early summer of 2012 emphasized that many of our trees, especially smaller and more recently planted trees, are not in good condition. Wilting, leaf loss, dieback and death were common in June and July. The drought was not severe enough to cause these effects in healthy trees. The severe reaction of trees to the drought indicated that our urban forest was already under considerable stress. Over the last 10 years, several local experts have noticed an apparent decline in the health and vigor of many trees in Lexington.

To better understand the conditions of Lexington's urban forest, I engaged in a systematic study of the condition of trees throughout urban Lexington in April through August 2012. The intent of this study was not to determine the present state of trees (e.g. temporary drought symptoms), but to look at long-term damage and injury that makes trees more susceptible to stress, and that shortens the lives of trees.

I examined trees in Lexington-Fayette County Parks, on major roadways that are under city management, and on streets where homeowners are responsible for tree care. In each area that I visited, I examined at least 100 trees. In each case, I assessed the overall vigor of the tree, which included crown fullness, leaf health, growth rate, size relative to others in the area, and stem condition.

This study did not include trees on private property that were not between the street and sidewalk (the easement). It is clear that the majority of Lexington's trees are on private property, but there was no way to systematically assess their condition.

The examples that follow are not a random sample, but they do represent a true picture of the health of our trees. Where there were healthy, well-maintained trees, I documented that. Where trees were in poor

condition, I assessed the reasons. Other than photographs and notes, I took no samples and did not examine samples for insect and disease presence. The emphasis of my study was the physiologic conditions of the trees.

Most of the observations discussed here are of damage to the lower stems, often referred to as basal injury. Damage to crowns, including loss of branches, leaves and buds is often temporary. Trees have an extraordinary ability to rebuild the crown. Damage to the stem is much more serious. Stem damage limits the capacity of the tree to transport water and nutrients, and exposes the tree to infections and diseases. Basal injury is often irreversible and fatal.

Observations

Parks

Planted trees in most parks are heavily and fatally damaged. I was unable to find more than a dozen healthy, vigorous recently-planted trees in any city park except Woodland Park. Older trees in the parks, most of which are remnant hedgerow and farm trees, are in better condition. In Jacobson, Kirklevington, Shillito and Veterans Parks, trees are being systematically battered to death by lawn mowers and string trimmers. Little effort is being made to ensure that trees survive their establishment period, when irrigation is a necessity. Little effort is being made to protect trees from damage by machinery. Where tree guards and shelters have been emplaced, they are left on too long and damage the trees, or are beaten off by heavy equipment. The figures below show a few representative trees. More pictures are in the online version of this report.



Jacobson Park. Ginkgo with extensive basal injury from prior years and from 2012. Tree is in decline.



Jacobson Park. Ash tree with fatal basal injury. Picture is prior to leaf-out, but tree is unlikely to survive even in the absence of emerald ash borer.



Jacobson Park. Sugar maple with extensive, multiple-year basal injury. Pale brown wounds are from very recent mowing in 2012.



Kirklevington Park. Weeping willow with bark entirely stripped from lower stem.



Kirklevington Park. Yellow-poplar with basal stem undercut by machinery.



Veteran's Park. Trees with tree shelters left on too long. Shelters and bark have been flayed by mowing equipment. Trees are in decline.



Veteran’s Park. Flowering plum flayed by mower in 2012, but with damage apparent from prior years.



Veteran’s Park. A stand of recently-planted white pine. Each of these trees has been heavily damaged and many are already declining or dead.



Shillito Park. These oaks were inadequately maintained after planting, and not watered frequently enough. One has died and the rest will likely die. While the proximate cause of death may be the 2012 drought, these trees were already severely stressed by neglect.



Shillito Park. White oak planted with stakes and tree guards, insufficient to protect stem from serious damage.



Shillito Park. Many trees in our parks are remnant hedgerow trees from when these parks were farmed. These are among the healthiest trees in our urban forest, but many have been damaged by mowing.



Woodland Park. Alone among Lexington parks, Woodland Park meets an adequate standard of tree management. Properly managed, these trees will live decades longer than trees in other Lexington parks.

Streets (under LFUCG management)

Lexington streets were once lined with large elm trees. After Dutch elm disease eliminated most of these trees, some streets were planted in pin oak and other species. Many of these are now dead or dying and are being replaced. LFUCG has planted trees along a number of major roads in Lexington. Nearly all of these planted trees are in poor condition except for the new plantings on Main Street and some recently planted trees in major road medians.



Main Street. Excellent planting and care with an adequate soil volume. These willow oaks will become very large rapidly and provide shade for sidewalks and streets.



Tates Creek Road at Turkeyfoot. While some trees in this median appear healthy, many have significant basal wounds.



Southpoint Drive at Veterans Park. A row of red maples with heavy damage, both old and new (2012). Every one of these trees is severely damaged and unlikely to survive.



Elm Tree Lane. All the ginkgos in the median and the flowering crabs along the sidewalk are heavily damaged.



Richmond Road at Shriner's Hospital. Rows of sycamores between the sidewalk and street all have stem wounds.



Richmond Road at Shriner's Hospital. Rows of sycamores in the road median are damaged and in decline.



Beaumont Center Drive. These trees are all heavily damaged and in decline due to improper planting, poor soil and excess mulch, killing the bark and roots. A number of these trees are already dead. (Note: these may have been planted and maintained by the developer).



Man O'War Boulevard at Sir Barton Way. Ash trees in the median have heavy stem damage and are in decline. Many are dead. These trees will be killed by the emerald ash borer, but are already in decline.



Tates Creek Road median at Landsdowne. These trees received inadequate watering prior to the 2012 drought. The gator bags were put in place after the trees were severely wilted, and the bags were not refilled regularly. Several of these trees are now dead.

Streets (city easement on private property)

Trees on private property that lie between the street and the sidewalk are not the legal responsibility of the city. However, LFUCG has put street tree regulations in place requiring permits for planting and removal and a list of approved trees. The vast majority of street trees in the city are on these rights-of-way.

Since the death of most of the pin oaks in town, and following the damage caused by the ice storms, the majority of property owners have chosen not to plant trees in these sites. As a result, most potential planting sites are empty.

These narrow strips often require more maintenance than homeowners are willing to provide. The poor quality of the soil, the tendency to be compacted and the lack of adequate soil volume will prevent adequate growth unless the homeowner takes exceptional care of the trees.

In new developments, trees are planted by the developers as a requirements by LFUCG. These trees are often in very poor soil, are damaged at planting time, and are not maintained. Homeowners who buy these properties frequently lack adequate knowledge to care for the trees. In many cases, the soils are so poor that no amount of homeowner care will allow the trees to thrive.



Rebecca Drive. An increasingly common scene in Lexington, where homeowners have chosen not to replace trees lost to age, pests and pathogens, or weather.



Southpoint Drive. Poorly maintained street trees in very poor soil. These trees are all in decline. These trees are directly across from the Veteran's Park trees. The decline of both the Park trees and the private trees will soon leave Southpoint with few trees.

Shopping Centers & Other Commercial Property

Shopping centers present a unique challenge and opportunity for tree planting. The parking lots of shopping centers represent some of the largest impervious surfaces in the city. Small islands of trees are exposed to an extremely harsh environment, with very high temperatures and limited soil volumes. I sample three shopping centers with large differences in the health of trees. These differences have important consequences for the environment. Trees on many commercial properties, including businesses, apartments, and hospitals are in poor condition.



Fayette Mall. Vast impervious surface with very small, poorly maintained tree islands characterize this site. All the trees in the Fayette Mall parking lot are in decline and have basal wounds. Emerald ash borer (center picture) is also present.



Fayette Mall. About half the tree islands are now empty of trees or may have one or two trees in precipitous decline. Fayette Mall will likely be devoid of trees within a few years.



Tate's Creek Centre. Somewhat larger tree islands have allowed trees to survive, but all have basal wounds and many are in decline. Emerald ash borer is present, and will kill about half of the trees. Baldcypress trees are planted in beds far too small for these very large trees.



Hamburg Pavilion. Tree islands are large with good soil quality. Trees are very well maintained and nearly all are thriving. This is the best example of tree planting in large impervious surfaces in the region.



Hamburg Pavilion. Healthy, vigorously growing trees. No evidence of equipment damage. None of these trees wilted or lost foliage during the drought.

Fayette Mall and Hamburg Pavilion Comparison



This figure shows Fayette Mall on the left and Hamburg Pavilion on the right. The higher tree density of Hamburg Pavilion is apparent. I measured temperatures at both sites 6 feet above ground level. On a day when the temperature at the airport was 87 F for several hours, the average temperature at Fayette Mall was 98 F and the temperature at Hamburg Pavilion was 91 F. I was able to repeat these measures on a similar day. On a cloudy day, temperatures at both malls were the same. This result is most likely due to the cooling effect of the vegetation at Hamburg Pavilion.

Quantitative Assessment

The above descriptions are largely anecdotal. A quantitative assessment of street and park trees affirmed that the observations are accurate. I assessed the conditions of 100% of the planted trees in Veterans Park (excluding trees in woodlands and Reforest the Bluegrass plantings) and along one mile of Southpoint Drive from Clearwater Drive to Brookridge Drive. I identified trees by species, estimated the diameter at breast height (DBH) by class, and assessed the condition of the woody plant parts. The condition assessment evaluated lower stem damage, crown dieback, poor branch condition and pruning need, with a numerical score assigned ranging from 1 (dead or nearly dead) to 5 (excellent). I used iTree Street to analyze the data to calculate percent of trees in each condition class by ownership and species.

The analysis for Veterans Park (public) and Southpoint Drive (private, easement and median) confirm the qualitative assessment discussed above. Table 1 shows the percent of trees (n=340) in each condition class on

public property and private property. Of all the trees, 85% are in the fair, poor or dead/dying category and are therefore unlikely to live more than a few more years.

Table 1 Percent of Trees in each condition class.

	Public	Private	All
Dead or Dying	12	20	17
Poor	40	39	39
Fair	21	35	29
Good	26	2	13
Excellent	0	4	2

In spite of the poor condition of these trees, they are still producing quantifiable benefits to Lexington. Table 2 shows the annual benefits to the city of each species of tree in this small inventory.

Table 2 Economic value of trees in the quantitative analysis

Species	Energy	CO ₂	Air Quality	Storm water	Aesthetic & Other	Total
Callery pear	\$80	\$25	\$31	\$250	\$2,600	\$2,985
Red maple	\$88	\$12	\$27	\$195	\$2,199	\$2,521
Eastern white pine	\$29	\$7	\$26	\$300	\$735	\$1,097
Green ash	\$70	\$15	\$25	\$168	\$853	\$1,132
Eastern redbud	\$7	\$1	\$2	\$12	\$349	\$371
Austrian pine	\$17	\$6	\$15	\$191	\$348	\$578
Pin oak	\$52	\$12	\$17	\$133	\$458	\$671
Flowering crab	\$2	\$0	\$1	\$3	\$157	\$163
Bur oak	\$3	\$1	\$1	\$8	\$249	\$261
Sweetgum	\$10	\$2	\$4	\$24	\$128	\$167
Norway spruce	\$1	\$0	\$1	\$15	\$76	\$93
Eastern cottonwood	\$17	\$4	\$5	\$54	\$272	\$352
Other	\$11	\$3	\$5	\$53	\$271	\$343
Total	\$387	\$88	\$159	\$1,405	\$8,695	\$10,734

Since the majority of trees in this small study will die soon, they represent an annual loss in benefits to the city of \$10,734. Multiply this by the total number of street and park trees in the city, and the number could easily be in the millions of dollars.

Community Forestry

While Lexington has an urban forestry program, it does not have a real community forestry program. Except for Reforest The Bluegrass, there is little opportunity for citizens to supplement the city's meager funding for urban forestry through voluntary effort.

In many cities, citizens are engaged in tree planting, pruning and maintenance and tree inventory. Citizen pruners in many cities are trained in basic tree care. In many cities, volunteers water trees during the early establishment years and almost eliminate early tree death due to lack of water. During the drought of 2012, citizens in many cities kept trees well watered. During the height of the drought, Chicago crowdsourced watering of 250,000 trees at risk.

Citizens can also assist with urban forest inventory and management planning. The City of Frankfort did a tree inventory of the downtown area with a dedicated group of citizen volunteers. With the availability of free software (iTree and related applications) and smartphones, the cost of inventory is lower than ever. The Alliance for Community Trees (actrees.org), the US Forest Service and the Kentucky Division of Forestry provide assistance to communities to improve citizen action in urban forestry.

Conclusions

The urban forest of Lexington is in very poor condition. The primary cause of this poor condition is the utter disregard for proper maintenance by city employees, contractors and private landowners. There are some bright spots, such as Woodland Park and Hamburg Pavilion. These serve to demonstrate that it is not difficult to maintain healthy, vigorous trees throughout the city.

The deliberate nature of the destruction of our urban forest is infuriating. The city is paying to acquire and plant trees while at the same time paying to destroy the trees with heavy equipment. The lack of investment in tree maintenance negates the investment in tree acquisition and planting.

This poor management is layered on top of other problems, including increased drought frequency, the emerald ash borer and extensive impervious surfaces. Taken together, these factors greatly reduce the value of our urban forest.

Recommendations

1. LFUCG should place a moratorium on planting trees with public funds. It is a pointless waste of money to buy or grow trees and plant them if we are then going to spend money to kill them. A one or two year moratorium on tree planting in public spaces will allow for time to plan for better tree management and to train employees and contractors in tree maintenance and proper mowing.
2. LFUCG should engage the services of a Registered Consulting Arborist to develop a street and park tree management plan and training program. Funds for a consultant could be made available from the savings of a planting moratorium.
3. All city employees and contractors should be required to pass a training program on tree maintenance and proper mowing techniques. For city employees, implementation of good tree management should be part of their performance evaluation. Contractors should be held contractually to best management practices as a condition of being paid.
4. Lexington needs to raise the level of citizen participation in tree care. Citizens can be trained to maintain trees, including pruning, and to spot and report problems. In addition, citizens can be enlisted to conduct tree inventories under the supervision of a professional forester or arborist.