FOR 215

UF UNIVERSITY of FLORIDA
IFAS Extension

Gainesville's Urban Forest Canopy Cover[1]

Francisco Escobedo, Jennifer A. Seitz, and Wayne Zipperer[2]

Ecosystem benefits from trees are linked directly to the amount of healthy urban forest canopy cover. Urban forest cover is dynamic and changes over time due to factors such as urban development, windstorms, tree removals, and growth. The amount of a city's canopy cover depends on its land use, climate, and people's preferences. This fact sheet examines how tree cover changes over time, how tree composition and location influence urban forest canopy and leaf area, and how tree and ground surface covers vary across Gainesville.

In 2006, 93 random sites were sampled and measured across Gainesville, Florida using the USDA Forest Service's Urban Forest Effects (UFORE) methods (http://www.ufore.org/). Crown measurements, tree species, land use conditions, shrub characteristics, and surface cover information were used to determine the urban forest cover and total leaf area in Gainesville. *Leaf area*, as estimated by the UFORE model, is the sum of all tree leaf surfaces. *Urban forest canopy cover* is the proportion of land surface area that lies directly beneath the crowns of all trees and tall shrubs. *Urban forest* includes all trees on private and public lands within the city limits of Gainesville.

Results indicate tree cover in Gainesville at 51 percent while *shrub cover*, often present under trees, was 16 percent. Pervious surface cover (bare soil, lawns, gardens, pastures) was 73 percent, impervious surface cover (concrete, roads, tar) was 15 percent, and buildings covered 9 percent of Gainesville. In addition to tree and shrub cover, information on surface covers can help planners and other professionals assess the potential for positive or negative environmental effects such as the ability of areas to infiltrate excess rainfall or identify areas that can be sources of excess stormwater runoff. Figures 1 and 2 show canopy cover and the proportions of surface covers for seven different land uses in Gainesville. Commercial land uses are office spaces and shopping districts, park/institutional land uses are schools and city parks, transportation land uses are street and highway right of ways, while vacant land uses are undetermined and vary by parcel or tract. Forest, industrial, and residential land uses are self-explanatory.

Gainesville's urban forest cover has changed over time. *Urban forest* canopy cover in 1995, 2000, 2004, 2005, and 2007 varied from 66 percent, 60 percent, 58 percent, 55 percent, and 59 percent, respectively (Szantoi and others 2008). Although these covers were estimated using aerial photos and

1. This document is FOR 215, one of a series of the School of Forest Resources and Conservation Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Original publication date March 2009. Visit the EDIS Web site at http://edis.ifas.ufl.edu.
2. Francisco Escobedo, Assistant Professor, Jennifer A. Seitz, Extension Associate, School of Forest Resources and Conservation, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL 32611. Wayne Zipperer, Research Scientist, USDA Forest Service.

do not account for overlapping tree and shrub crowns, they are similar to actual field measurements and can be used to study trends over time. The change in Gainesville's canopy over time is likely a result of Hurricanes Frances and Jeanne, site clearing for development, tree removals, and canopy maintenance. Live oaks, despite comprising only 4% of all trees in Gainesville, contribute to 14% of the city's total leaf area.

Figure 3 shows a comparison between the top ten tree species contributing to the canopy cover as

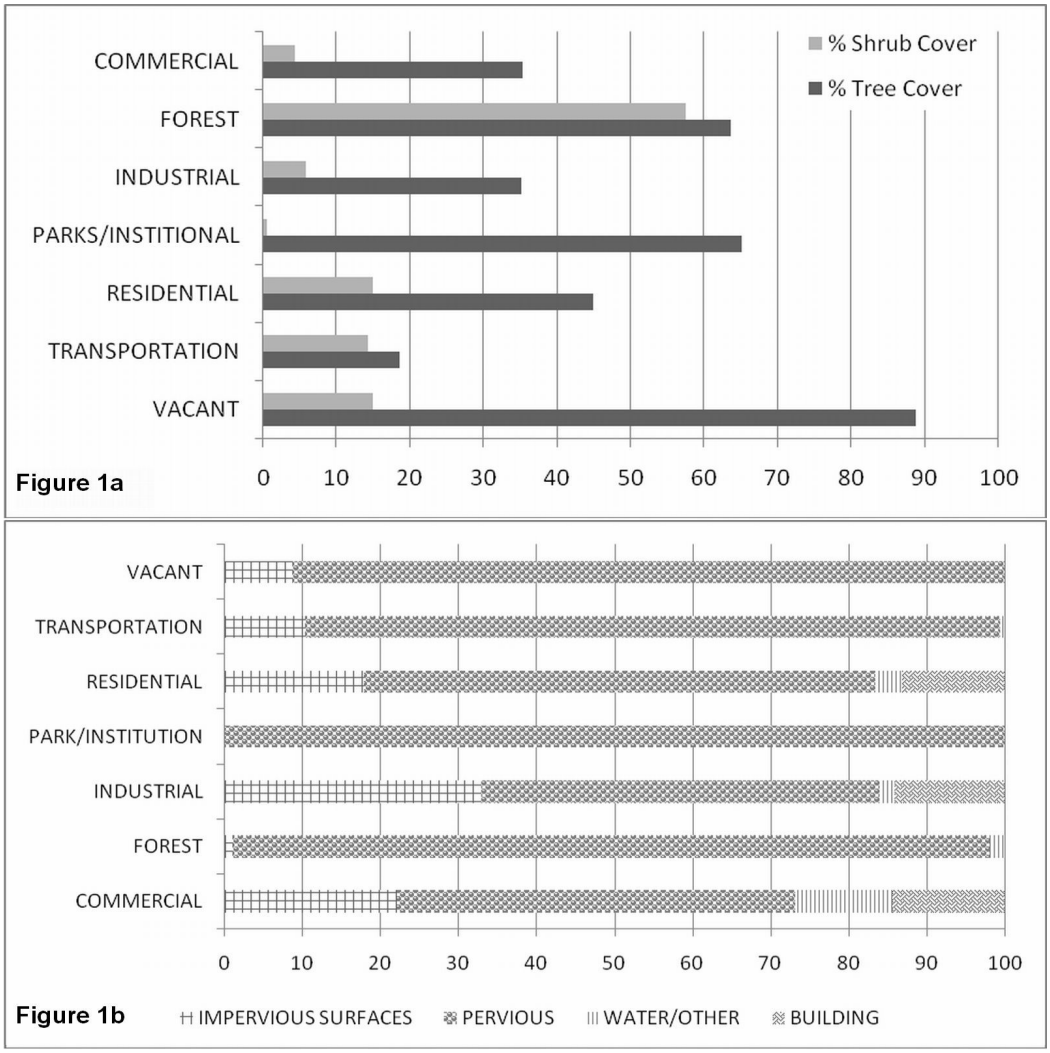

Fig. 1a and 1b. Tree and shrub canopy cover and proportion of surface cover by land use in Gainesville, Florida's urban forest. Escobedo and Zipperer. 2007.

While all tree species contribute to the community's overall urban forest cover, some species contribute more than others because of their size (e.g., a live oak contributes more than a crape myrtle). Fifty-nine percent of Gainesville's tree cover is evergreen (i.e., it maintains leaves year round). In Gainesville, trees that dominate in terms of leaf area are laurel oak (*Quercus laurifolia*), slash pine (*Pinus elliottii*), and live oak (*Q. virginiana*). Tree species that dominate in terms of numbers are slash pine, laurel oak, water oak, and loblolly pine (*P. taeda*). defined by leaf area relative to their total numbers in Gainesville. For example, even though Carolina laurel cherry (*Prunus caroliniana*) and red maple (*Acer rubrum*) are commonly found in Gainesville, their overall leaf area contributes less to Gainesville's canopy than their numbers would indicate. Finally, many tree species (e.g., bald cypress) will have denser crowns with more leaves than other species (e.g., crape myrtle) for the same comparable amount of canopy area.

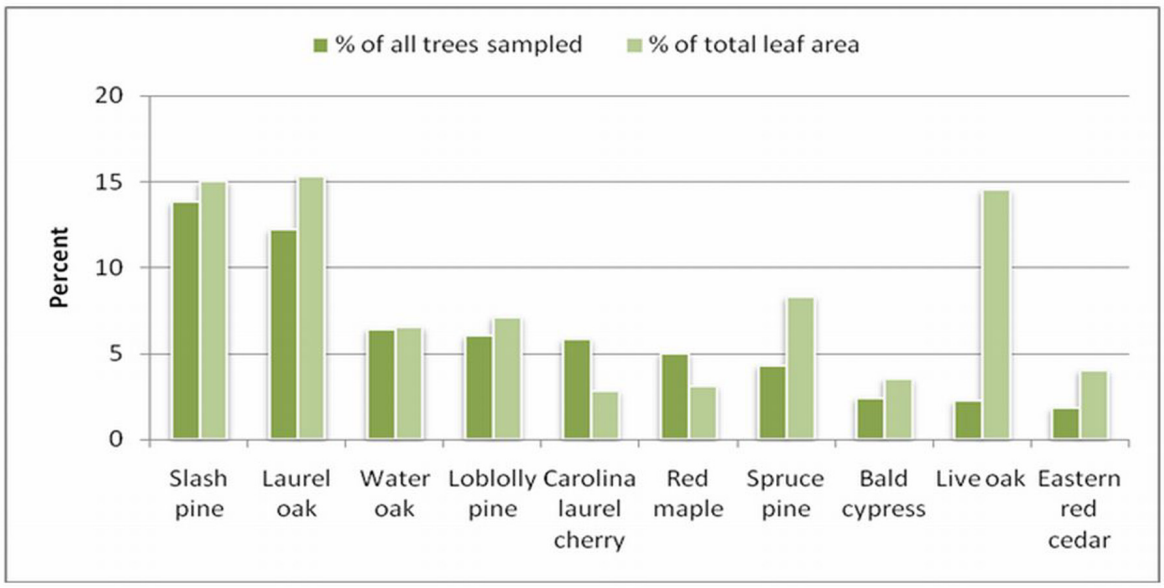

Fig. 2. The top ten trees with highest total leaf area compared to their quantity in Gainesville, Florida's urban forest. Escobedo and Zipperer. 2007.

Summary

In an urban forest, some tree species contribute more to a community's tree canopy cover than others because of their size relative to other smaller trees. This is sometimes the case even when the smaller trees are more numerous than the larger ones. Tree and shrub canopy cover is greatest in vacant areas and least in commercial and industrial areas, which are typically covered with impervious surfaces that create extremely difficult growing conditions for trees. It is important to realize that urban forest cover can change over time due to urban development, windstorms, tree growth, and land use. Many tree benefits are linked directly to the amount of healthy leaf surface area. Knowing how a tree canopy changes through time and how each tree species in the urban forest contributes to this canopy enables urban forest managers to develop comprehensive management goals and objectives to improve ecosystem services.

For more information about Gainesville's urban forest read the Gainesville Urban Forest Series.

Literature Cited

Escobedo, F. and W. Zipperer. 2007. Assessing Gainesville's urban forest effects and values. Unpublished raw data.

Szantoi, Z., F. Escobedo, C. Dobbs, and S. Smith. 2008. Rapid methods for estimating and monitoring tree cover change in Florida urban forests: The role of hurricanes and urbanization. In Proceedings of the 6th Southern Forestry and Natural Resources GIS Conference, eds. P. Bettinger, K. Merry, S. Fei, J. Drake, N. Nibbelink, and J. Hepinstall, 93–104. Athens, GA: Warnell School of Forestry and Natural Resources, University of Georgia.