

# Urban Forests

trees, forests, management, health, and services

## TreeKeeper Training Trees Atlanta Kendeda Center August 15, 2009

Dudley R. Hartel, Center Manager  
Urban Forestry South  
Athens, GA

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Presentation to Trees Atlanta TreeKeepers on August 15, 2009 at the Kendeda Center.

This presentation focuses on an overview of urban forestry and urban forest management, challenges in urban settings, and the environmental services that we can expect if we work diligently.

## Presentation Objectives

- Understand the concept of urban forestry & urban forest management
- Understand the environmental services that urban forests provide in urban settings
- Look at Atlanta's tree canopy – Identify threats & stressors
- Understand how urban environments affect trees

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The audience (students) will understand these four key ideas...

# Presentation Agenda

- The setting – Piedmont Crescent
- Urban forestry, urban forest management, arboriculture
- Essential environmental services
- Tree canopy, threats, and stressors
- Healthy trees in urban settings – the basics

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To meet these objectives, the presentation will discuss and present these five basic elements...

# Piedmont Crescent

- 2007-2008 regional study
  - American Forests
  - [http://www.youtube.com/watch?v=r6p\\_f6IOeDY](http://www.youtube.com/watch?v=r6p_f6IOeDY)
- Concepts
  - Human Network
    - Migration
  - Transportation
  - Gray & Green Co-existence

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A recent study by American Forests focused on the role human settlement had (has) on the development, and use of the region.

This historic human impact (migration, transportation) is still influencing our decisions, and more importantly, these patterns are still playing out in our day-to-day problems, management, and decisions.

- density
- sprawl (transportation)
- landuse
- water
- environmental justice
- environmental degradation

The *nature & human network* concept being proposed calls for a closer connection between our objectives, planning and decisions, and the natural setting that we live in. Urban forestry is one component of that concept.

# Urban Forests & Forestry

- Trees – woody plants, single or multiple stem with some minimum size
- Forests – aggregations or collections of trees; may or may not be directly tied to the landscape (e.g. bottomland hardwoods); may or may not be natural; often implies management for wood products

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A few definitions...

- trees are defined within your own management context
- forests are defined within your management setting

# Urban Forests & Forestry

- Urban Forests – forests in our urban and developed areas
- UF Management – discipline that sets goals/objectives, assesses the components (inventory), identifies needs, and creates a means for attaining the desired outcomes (product or service related)

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More definitions...

- an urban forest exists within *developed* areas (human settlement), and within managed landscapes (i.e. not natural)
- community forestry – typically European concept of more traditional forest management within urbanized areas
- urban forest (UF) management – a *planned* approach

# Urban Forests & Forestry

- Arboriculture - the science and art of caring for trees (culture)
- **Urban forestry provides arboriculture with context...**
- **Arboriculture is the means to urban forestry's ends...**



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More definitions...

- arboriculture – the culture of trees (plant, prune, assess, treat, remove, plant)

# Benefits of Trees

- Benefits - usually implies that we are receiving something that we are not entitled to...
- Service – something produced and consumed



The standard dictionary definitions of these words are revealing!



# Environmental Services

- Benefits Listed
  - <http://www.treesatlanta.org/BenefitsofTrees.aspx>
- Environmental
  - Air (carbon)
  - Water (quality and quantity)
  - Soil (erosion, heavy metals, OM)
  - Temperature (health & energy implication)
  - Biodiversity
  - Noise abatement

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See URL for nice discussion.

More recently (last 10 years) speaking more of *services* provided by the urban forest

# Environmental Services

- Environmental
  - Air (carbon)
  - Water (quality and quantity)
- Social
  - Human interaction (crime, self-esteem)
- Human Health
  - Physical
  - Psychological

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Short list of the important *services*; they encompass three areas:

- the physical environment
- societal (the community)
- human health impacts

# Tree Canopy

- What's the big deal?
  - Leaves!
- The picture in Atlanta, at the interface, and exurban counties
  - <http://narsal.uga.edu/atlandcover/landcover.html> (1992-2001)
  - <http://narsal.uga.edu/glut.html> (1991 - 2005)
  - <http://narsal.uga.edu/urbancanopy/urbancanopy.php> (1991 - 2001)

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Why be concerned about canopy?

- an index and the basis for nearly all services and benefits

Most recent analysis of the Atlanta area (and statewide) tree canopy

# Tree Canopy

- Tools to monitor the changes
  - Forest
    - Canopy measurement
      - NAIP aerials; GIS Clearinghouse
    - Leaf Area Index (LAI)
    - Vegetation change
    - Policy
  - Tree
    - Adopt, follow, and encourage *standards*
    - Observe

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Monitoring canopy and more importantly, canopy change.  
An index to assess UF management success.

Tree canopy:

- at the forest level
  - percent
  - LAI (“rates” the canopy; i.e. not all canopy is created equal)
- over time (temporal)
- at the community legal level
- at the tree level

# Tree Canopy

## Calculating Canopy

- Define & measure area
- Select sample points
- Calculate factor
- Canopy – Yes/No
- Do the math
  
- Percent canopy



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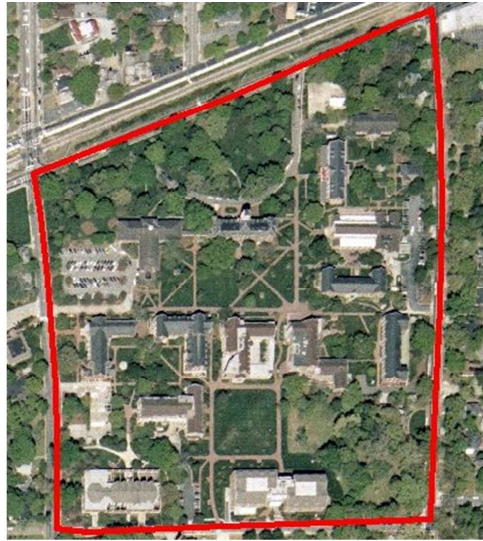


A simple, and effective way to monitor canopy change over time; five steps.

# Tree Canopy

## Calculating Canopy

- **Define & measure area**
- Select sample points
- Calculate factor
- Canopy – Yes/No
- Do the math
  
- Percent canopy



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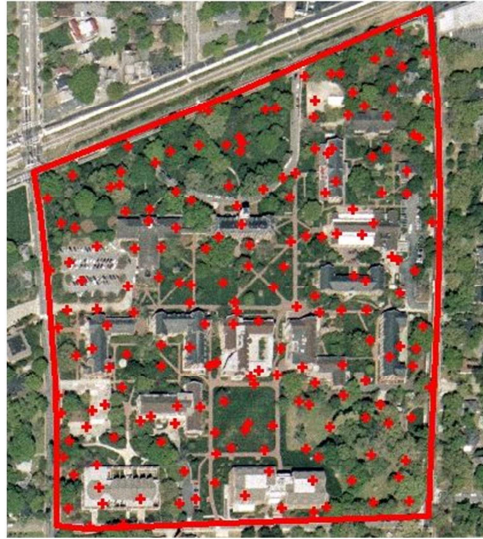


Delineate the area of interest (AOI).

# Tree Canopy

## Calculating Canopy

- Define & measure area
  - **Select sample points**
  - Calculate factor
  - Canopy – Yes/No
  - Do the math
- 
- Percent canopy



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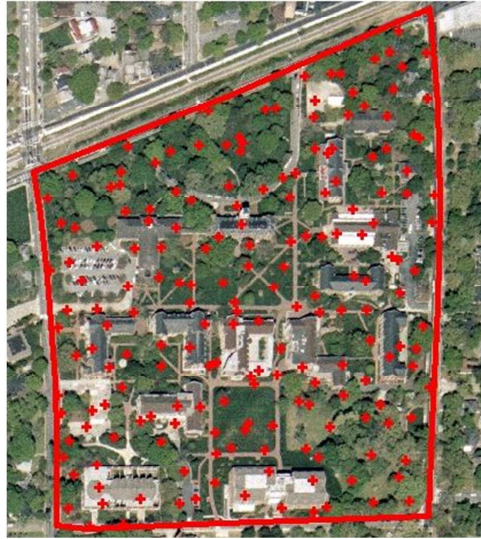


Randomly select canopy assessment points (GIS approach).

# Tree Canopy

## Calculating Canopy

- Define & measure area
- Select sample points
- **Calculate base**
  - **190 points**
- Canopy – Yes/No
- Do the math
  
- Percent canopy



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Count number of assessment points (the base number in the math section).



# Tree Canopy

## Calculating Canopy

- Define & measure area
- Select sample points
- **Calculate base**
  - **190 points**
- **Canopy – Yes/No**
- **Do the math**
  
- Percent canopy
  - **63 canopy points of 190**
  - **63/190 – 33% canopy**



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Assess each point:

- is it tree canopy (yes/no)

Do the math:

- sum number of canopy points
- divide by base
- express as percentage

Repeat as necessary

# Healthy Trees

- An urban forester's guest!
  - Healthy trees = maximum services
  - Strive for efficiency of effort & economics
- In urban areas, intervention
  - Replace natural cycles (nutrient, water, OM)
  - Protect
  - Regenerate
  - Manage risk

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Trees, and canopy without health wastes time and money.

In urban forestry, the manager must intervene (i.e. intensive management).

# The Urban Setting

- Soil
  - Structure
  - Compaction
  - Contamination
  - Fertility
- Planting Environment (the site)
  - Restrictions (infrastructure)
  - Drainage
- Physical
  - Damage (construction, other)
- Change
  - Constant

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What is so difficult about growing trees in urban areas!

What's easy?

# Healthy Trees

Dr. Ed Gilman University of Florida

<http://hort.ifas.ufl.edu/woody/>

1. Site Evaluation
2. Species Selection
3. Tree Selection at Nursery
4. Planting
5. First Year Care
6. Annual Care
7. Young Tree Structural Pruning
8. Mature Tree Care



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Dr. Ed Gilman with the University of Florida (Environmental Horticulture) has developed an excellent series of standards that are applicable throughout the southern region. These include:

- site selection (evaluation)
- species selection
- tree selection
- planting
- young tree structural pruning
- mature tree care (pruning)

To this list we add:

- first season care
  - mulch
  - water
- annual care
  - root collar
  - weed control
  - mulch
  - pH monitoring
  - other soil/site issues

# Healthy Trees

Dr. Ed Gilman University of Florida

<http://hort.ifas.ufl.edu/woody/>



## Introduction

Tree selection does not end with choosing the appropriate species or cultivar for the planting site. Suitable nursery stock must be chosen based on planting site conditions and intended after-care, which should dictate maximum tree size at planting, root ball characteristics, appropriate tree production methods, and tree structure.

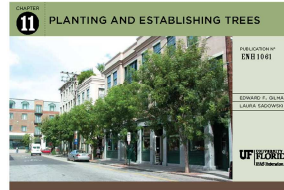
Nursery stock must be inspected carefully to pick high quality trees. Trees of poor quality may be inexpensive, but might perform poorly in the landscape. Quality factors to evaluate include root ball defects, size, shape, and

structure of the canopy, nursery planting death, presence of included bark, trunk form and branch arrangement, pruning cuts, presence of pests and disease, leaf color, top die-back, clear trunk length, and canopy uniformity.

## Important considerations for selection

There are advantages to selecting good quality nursery stock. Good quality trees are more likely to survive poor planting, establish more quickly, and live longer in the landscape. Choosing good quality trees also reduces the likelihood of future firm structural defects during a lifetime. Defects in the trunk and branch structure are more likely to occur than defects in the root system. This makes it more important to check trees from a nursery with a demonstrated capacity to produce good quality systems. Check the following evaluation over systems thoroughly.

The Urban Forest Hurricane Recovery Program <http://trees.urbanforestry.ifas.ufl.edu>



## Introduction

Planting and establishing trees is all about managing air and moisture in the soil. Manage these correctly and trees will grow quickly following planting. Three of the most common causes of poor plant establishment or tree death are planting too deep, under watering, and over watering. If appropriate trees are planted at the right depth and they are irrigated properly, the planting has a good chance of success. As simple as this appears to be, problems often arise that lead to poor establishment or plant failure.

## Ten steps to proper tree planting

1. Look up for wires and lights
2. Dig shallow and wide hole
3. Find the topsoil root and treat root defects
4. Carefully place tree in hole
5. Position top root 1-2 inches above landscape soil
6. Straighten tree
7. Remove synthetic materials
8. Add and firm backfill soil
9. Add mulch
10. Stake and prune if needed

The Urban Forest Hurricane Recovery Program <http://trees.urbanforestry.ifas.ufl.edu>

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Dr. Ed Gilman

University of Florida

<http://hort.ifas.ufl.edu/woody/>

# Healthy Trees

Dr. Ed Gilman University of Florida

<http://hort.ifas.ufl.edu/woody/>

**12** DEVELOPING A PREVENTIVE PRUNING PROGRAM: YOUNG TREES

DEVELOPED BY  
**EDWARD F. GILMAN**  
ANNEKA EGGON

**UF FLORIDA**  
Institute of Food and Agricultural Sciences

**Introduction**

Young trees in urban and suburban landscapes offer many benefits to the community. However, when a tree or part of a tree breaks, it can cause serious damage to people and/or property (Figure 1). A preventive pruning program is an important tool to maintain the value of trees. The most common defects are root collar rot and girdling. Root collar rot is caused by a fungus that attacks the cambium of the stem just above the soil line. Girdling is caused by a bark beetle that attacks the cambium of the stem. Both of these defects can kill a tree. A preventive pruning program can help prevent these defects from occurring. Pruning can remove dead and dying branches, which can reduce the risk of breakage. Pruning can also remove branches that are rubbing against each other, which can cause damage to the cambium. Pruning can also remove branches that are growing in the wrong direction, which can cause damage to buildings or power lines. Pruning can also remove branches that are growing in the wrong direction, which can cause damage to buildings or power lines. Pruning can also remove branches that are growing in the wrong direction, which can cause damage to buildings or power lines.



**Figure 1**  
A large hole in a tree trunk that occurred during a storm. The hole has prevented the tree from falling.



**Figure 2**  
The hole in the stem that is left from the bark beetle. It is a common defect in young trees.



**Figure 3**  
The hole in the stem that is left from the root collar rot. It is a common defect in young trees.

<http://hort.ifas.ufl.edu/>

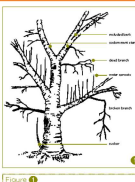
**13** DEVELOPING A PREVENTIVE PRUNING PROGRAM IN YOUR COMMUNITY: MATURE TREES

DEVELOPED BY  
**EDWARD F. GILMAN**  
ANNEKA EGGON

**UF FLORIDA**  
Institute of Food and Agricultural Sciences

**Introduction**

A preventive pruning program should be designed to create structurally sound trees and branch architecture that will sustain a tree for a long time. The goal with mature trees is to develop and maintain a sound structure to minimize hazards such as branch failure. This task is easier provided a good structure was established earlier in the tree's life. When properly executed, a variety of benefits are derived from pruning. Benefits include reduced risk of branch and stem breakage, better clearance for vehicles and pedestrians, improved health and appearance, and enhanced views. When properly performed, pruning can help a tree's health, stability, and appearance. Several consequences occur when pruning is not performed at all (Figure 1). These consequences include development of poor branch, weak, codominant stems, defects such as included bark, broken and dead branches and large dead branches. Formation of codominant stems and defects such as included bark can lead to increased risk of breakage.



**Figure 1**  
Pruning the codominant stem results in a weak stem, broken and dead branches and large dead branches that can lead to breakage.

<http://www.urbanforestry.ufl.edu/>

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Dr. Ed Gilman

University of Florida

<http://hort.ifas.ufl.edu/woody/>

# Discussion

Dudley R. Hartel, Center Manager

(706) 559-4236 voice

(706) 410-5568 cell

dhartel@fs.fed.us

[www.UrbanForestrySouth.org](http://www.UrbanForestrySouth.org)

[www.UFST.org](http://www.UFST.org)

[www.UrbanTreePhenology.org](http://www.UrbanTreePhenology.org)

[www.FirePerformancePlantSelector.org](http://www.FirePerformancePlantSelector.org)

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Also, James Urban, Up by Roots 2008

Questions, and comments...

# Urban Forests

Dudley R. Hartel, Center Manager  
Urban Forestry South  
320 Green St  
Athens, GA 30602

(706) 559-4236 voice  
(706) 410-5568 cell  
dhartel@fs.fed.us

[www.UrbanForestrySouth.org](http://www.UrbanForestrySouth.org)

Dudley R. Hartel

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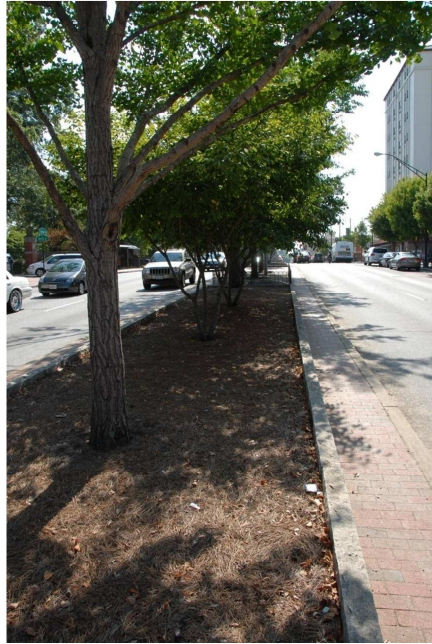
UGA Campus, Athens, GA 2009

Campus setting.



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Street trees



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8' median planting



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Shaded business district.



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Downtown raised planter



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Size/age diversity.



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Replacements & additions.



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Construction!

Note rubber protection mats for fire hydrant!





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Shade for construction crews.



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Athens, GA 2009

Infrastructure conflicts await.



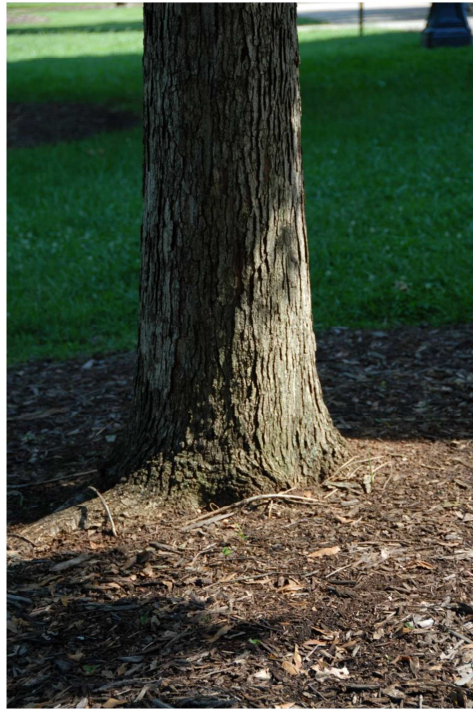
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Infrastructure conflicts.



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Root collar exposed.



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Planted deep (by 4")



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No root collar exposed.