

# Planning the Urban Forest

Lancaster, PA  
October 6, 2010



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Wallace Roberts & Todd, LLC 

*Sponsored in part by a grant from the US Forest Service Urban and Community Forest Program*

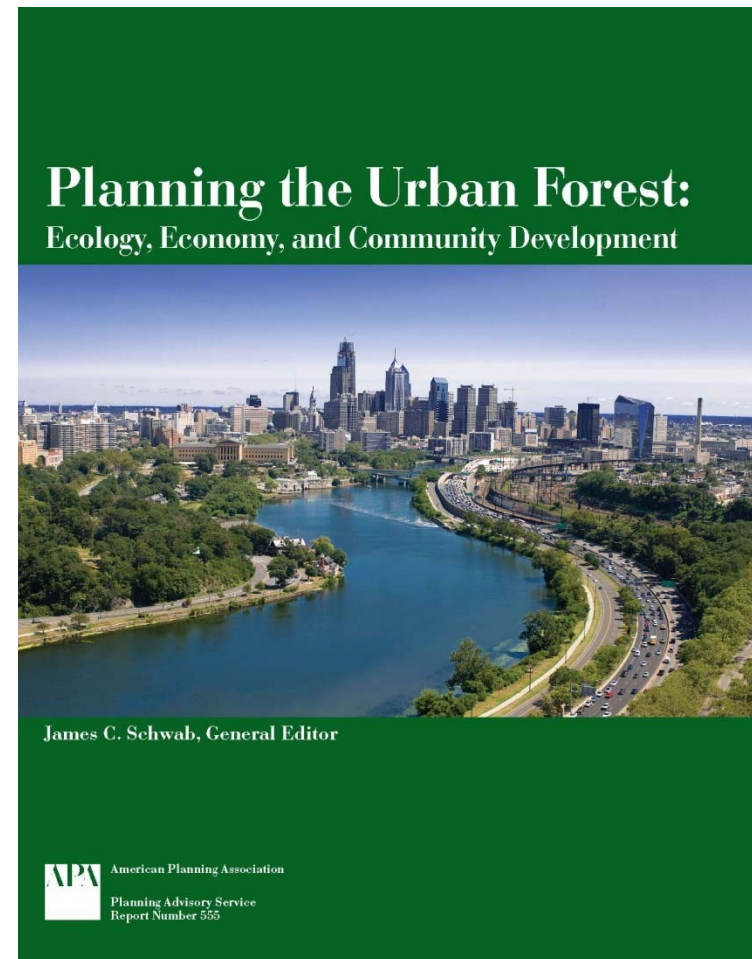
## Principles of an Effective Urban Forestry Program

- 5 General Principles
- 6 Planning Principles
- 4 Design Principles

*Source: APA PAS Report No. 555*

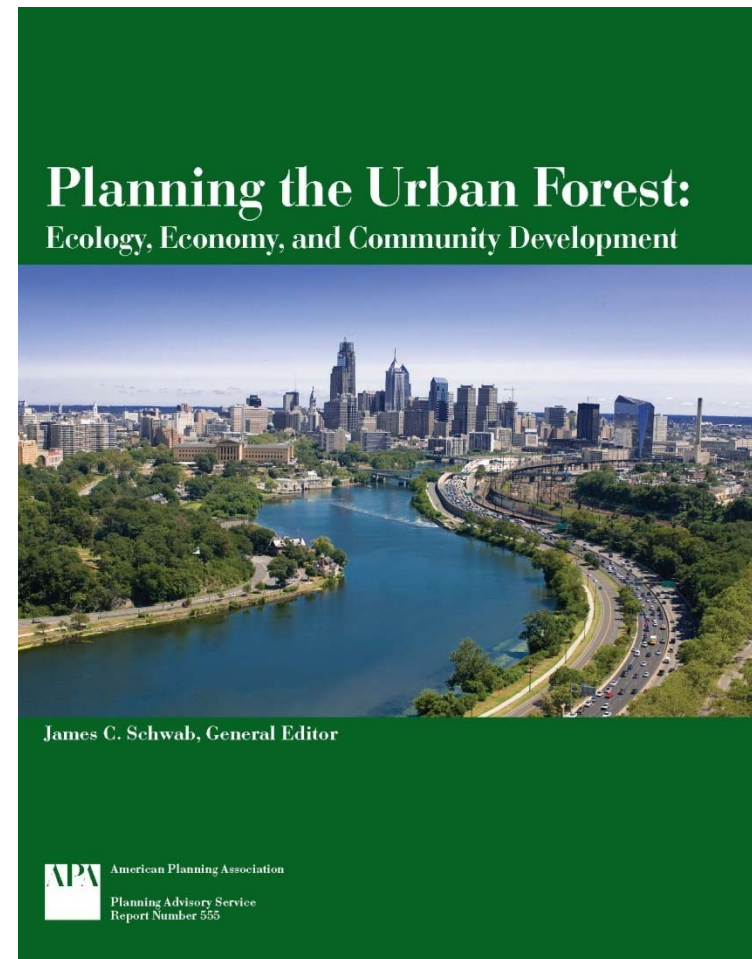
### Discussion Questions:

- Why do these principles matter?
- Are you applying them in your work?
- If not, would they work in your community?



## Principles of an Effective Urban Forestry Program

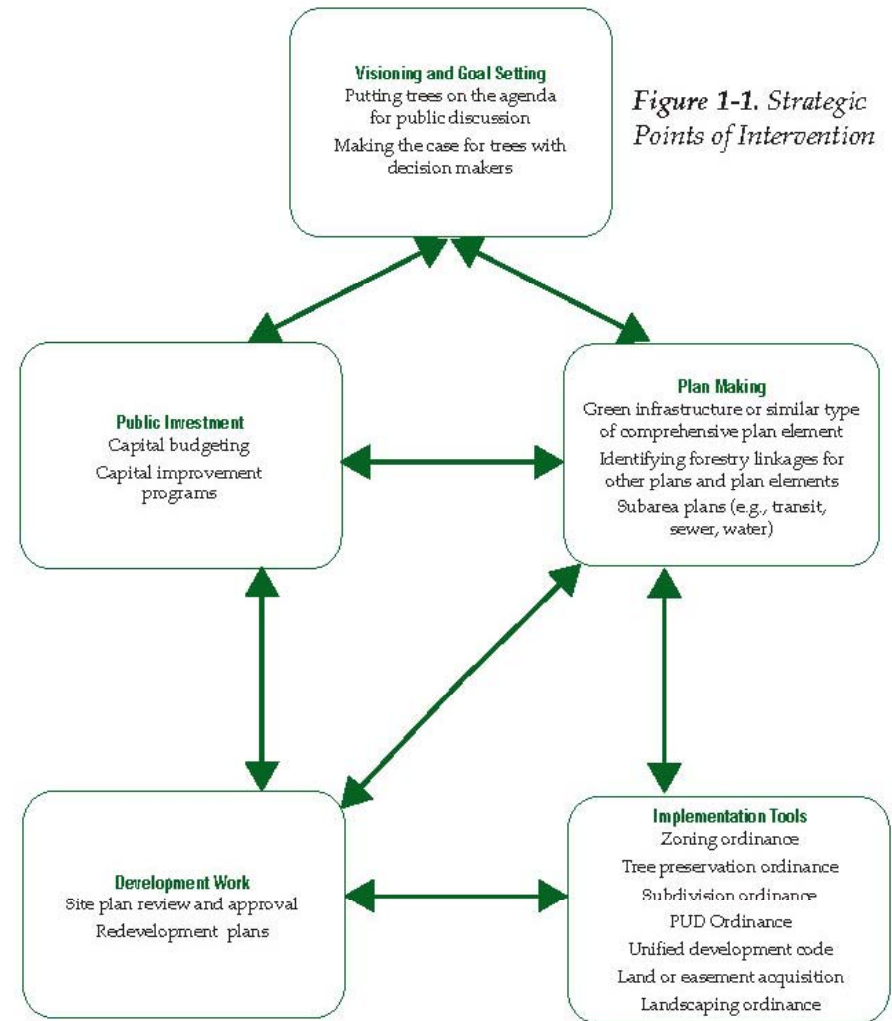
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# General Principles

## 1. Get trees to the forefront of the planning process

- Visioning and goal setting
- Comprehensive planning
- Subarea / functional planning
- Plan implementation



Source: PAS Report No. 555, p. 23



# Visioning: Green Street (Before)



# Visioning: Green Street (After)



Source: WRT for the Philadelphia Water Department



# Visioning: Green Homes (Before)





# Visioning: Green Homes (After)



WRT wrtdesign.com

Source: WRT for the Philadelphia Water Department



# Visioning: Green Industry (Before)





# Visioning: Green Industry (After)



Source: WRT for the Philadelphia Water Department



# Visioning: Green Business (Before)



# Visioning: Green Business (After)



*Source: WRT for the Philadelphia Water Department*



2. Know where you came from to know where you are going
  - Conduct quantitative assessments of tree canopy conditions and document change over time
3. Seek out private and civic partners
  - Private property owners / volunteers
  - Business partners / media
  - Nonprofits
4. Investing in trees makes economic sense
  - Quantify financial benefits: increased property values, increased retail activity, reduced energy costs, reduced costs of grey infrastructure, etc.



## Example: Benefits of Philadelphia's Existing Urban Forest

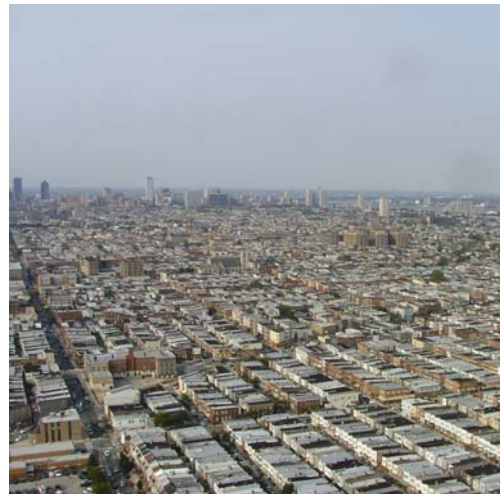
- Pollution removal (802 tons/yr.)..... \$3.9 million/yr.
- Carbon storage (530,000 tons)..... \$9.8 million
- Carbon sequestration (16,100 tons/yr.).....\$297,000/yr.
- Building energy reduction..... \$1.2 million/yr.
- Structural value (replacing 2.1 million trees)..... \$1.8 billion

*Source: USDA, U.S. Forest Service, Northeast Research Station. Assessing Urban Forest Effects and Values: Philadelphia's Urban Forest, February 2007*



## GreenPlan Philadelphia: Quantifying the Benefits of Planting One Million Trees

- Target: Achieve at least 30 percent tree cover in every neighborhood
- Cost / Benefit Analysis: Allegheny West / Tioga Neighborhood



Source: GreenPlan Philadelphia, 2010

### Cost/Benefit Analysis Trees

#### Allegheny West/ Tioga

30% canopy (+62,883 trees)

#### ANNUAL COSTS

##### CAPITAL/O&M (AVG. OVER 40 YRS)

Planting	
- \$7.50/tree	- \$471,623
Admin/Inspection/Outreach	
- \$2.50/tree	- \$157,208
Pruning	
- \$7.65/tree	- \$481,055
Removal/Disposal	
- \$4.29/tree	- \$269,768
Infrastructure Repair	
- \$3.24/tree	- \$203,741
Clean Up	
- \$0.36/tree	- \$22,638
Liability & Legal	
- \$0.35/tree	- \$22,009
-	<b>\$ 1,507,601</b>

#### ANNUAL BENEFITS

##### AIR QUALITY

Carbon Dioxide (CO <sub>2</sub> ) Removal	
0.0075 lbs/tree × \$128/lb	\$55,901
Ozone (O <sub>3</sub> ) Removal	
6.55 lbs/tree × \$0.34962/lb	\$133,348
Nitrogen Dioxide (NO <sub>2</sub> ) Removal	
6.55 lbs/tree × \$0.32977/lb	\$125,778
Sulfur Dioxide (SO <sub>2</sub> ) Removal	
1.91 lbs/tree × \$0.60209/lb	\$66,965
Particulate Matter (PM <sub>10</sub> ) Removal	
0.56 lb/tree × \$2.3036/lb	\$75,118
+	<b>\$ 457,111</b>

##### HEALTHY WATERSHEDS

Stormwater Volume Reduction	
2566 gal/tree × \$0.0099/gal	\$1,479,060
+	<b>\$ 1,479,060</b>

##### HOSPITABLE CLIMATE

Carbon Sequestration	
10.8 lbs/tree × \$0.0092593/lb	\$5,823
+	<b>\$ 5,823</b>

##### EFFICIENT ENERGY USE

Electricity Savings (75% of trees)	
63 kWh/tree × \$0.15/kWh	\$412,710
Natural Gas Savings (25% of trees)	
332 kbtu/tree × \$0.0135/kbtu	\$65,248
+	<b>\$ 477,958</b>

##### NET ANNUAL BENEFIT

+	<b>\$ 912,351</b>
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##### ONE-TIME BENEFIT

##### HOSPITABLE CLIMATE

Carbon Storage	
172 lbs/tree × \$0.0092442/lb	\$92,587

##### VALUABLE PROPERTIES

Property Value (5% increase)	\$30,774,183
+	<b>\$ 30,866,770</b>

5. Urban forestry must be sustainable financially
- Reposition trees as a wise public investment – a profit center, not a cost center
  - Use the concept of **green infrastructure** to transform the conversation from “environmental costs” to “cost-benefit ratios”

*Much as we are trained to see investment in traditional infrastructure, such as roads and bridges, as a means of spurring economic development, environmental investments including urban forestry are acquiring a new status as wealth generators rather than as mere externalities.*

Source: APA PAS Report No. 555, p. 30





## Example: Philadelphia Long Term Control Plan Update A Green Infrastructure Approach

- A “triple-bottom line” approach calling for \$1.01 billion in green stormwater infrastructure investments over 20 years
- After 40 years, the program is projected to generate more than \$2 in benefits for every dollar invested (\$2.2 billion)

### Green Stormwater Infrastructure Tools



Stormwater Tree Trench



Stormwater Wetland



Bump-out

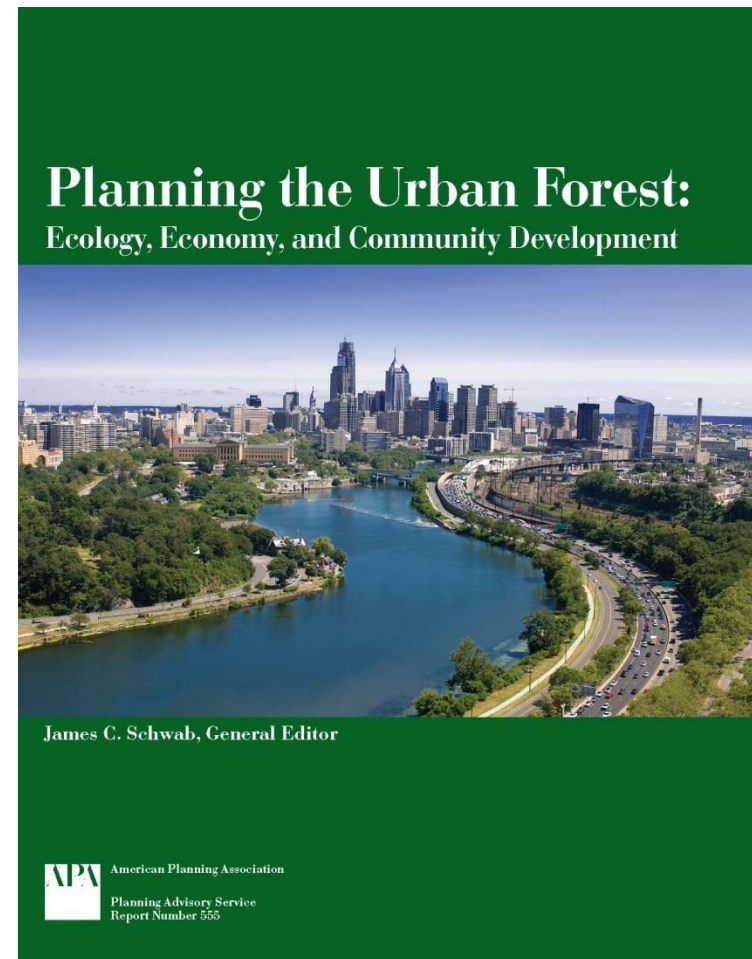


Stormwater Planter

Source: Philadelphia Water Department

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*Ushering vision into reality through regulation...*

1. Incorporate the tree ordinance in the development code and ensure consistency with other codes
2. Collaborate with developers, environmentalists, and other stakeholders to draft ordinances
3. Planned Unit Development (PUD) and similar regulations should include an urban forestry evaluation checklist or guidelines
4. Ordinances must include provisions for enforcement personnel

## 5. Take an adaptive management approach to resources...

*...where actions are designed and executed and effects are monitored for the purpose of learning and adjusting future management actions, which improves the efficiency and responsiveness of management.*

Source: Code of Federal Regulations – Title 36: Parks, Forests, and Public Property



**Search**  
Search the IGIA web site

### Member services

#### Guidelines for Growing, Installing and Maintaining Healthy Trees

Prepared by the Illinois Tree Specification Review Committee

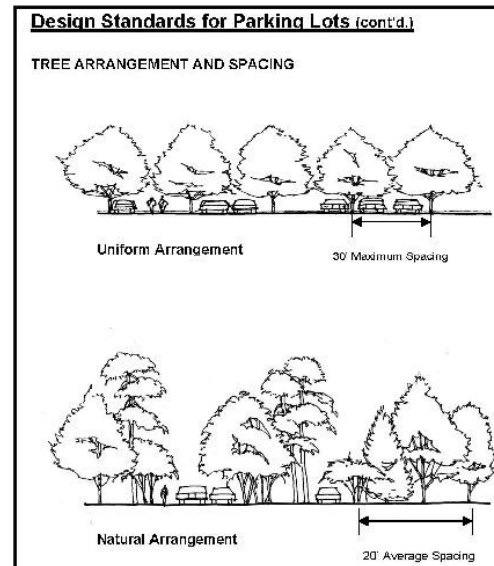
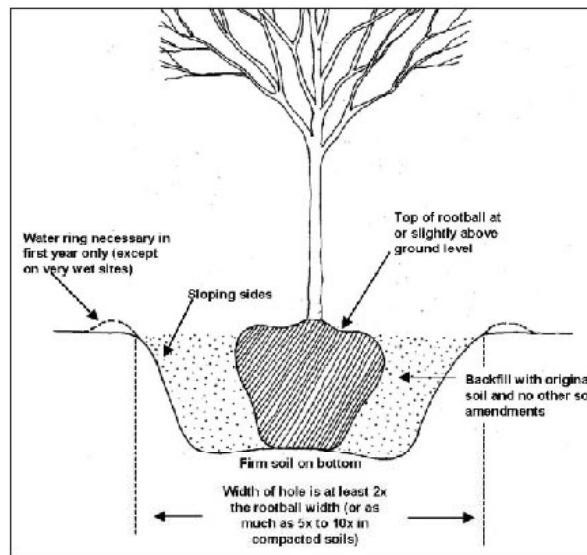
@Nursery Propagation, Growing, Harvesting & Handling

Every phase of production and handling of nursery trees must be done well to have high quality trees to plant in the landscape. There is no substitute for obtaining quality liners and planting them correctly in the nursery. Harvesting correctly and creating a good "package" will assure that trees arriving on the landscape site, can be planted without having to spend extra time correcting problems resulting from the production process.



## 6. Plan for the long-term maintenance of trees

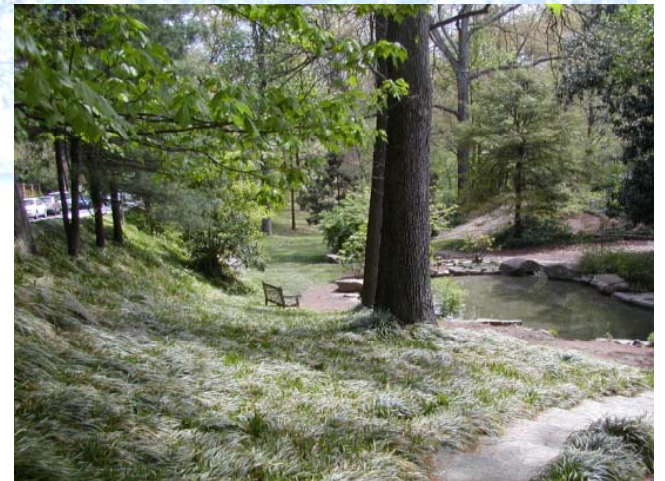
- Conduct an operations review
- Review and maintain tree inventory data (provides basis for adaptive management)
- Budget for equipment
- Maintain adequate personnel
- Disseminate information on proper planting and maintenance practices



Source: *Best Management Practices for Community Trees, Athens-Clarke County, GA*

## Example: Atlanta's Project Greenspace and Urban Forestry Program

- An element of the City's Comprehensive Development Plan, **Project Greenspace** establishes a vision and strategy to achieve a world-class green infrastructure system by 2030
- It sets a goal of protecting and restoring Atlanta's tree canopy in order to increase coverage from 26% to 40%



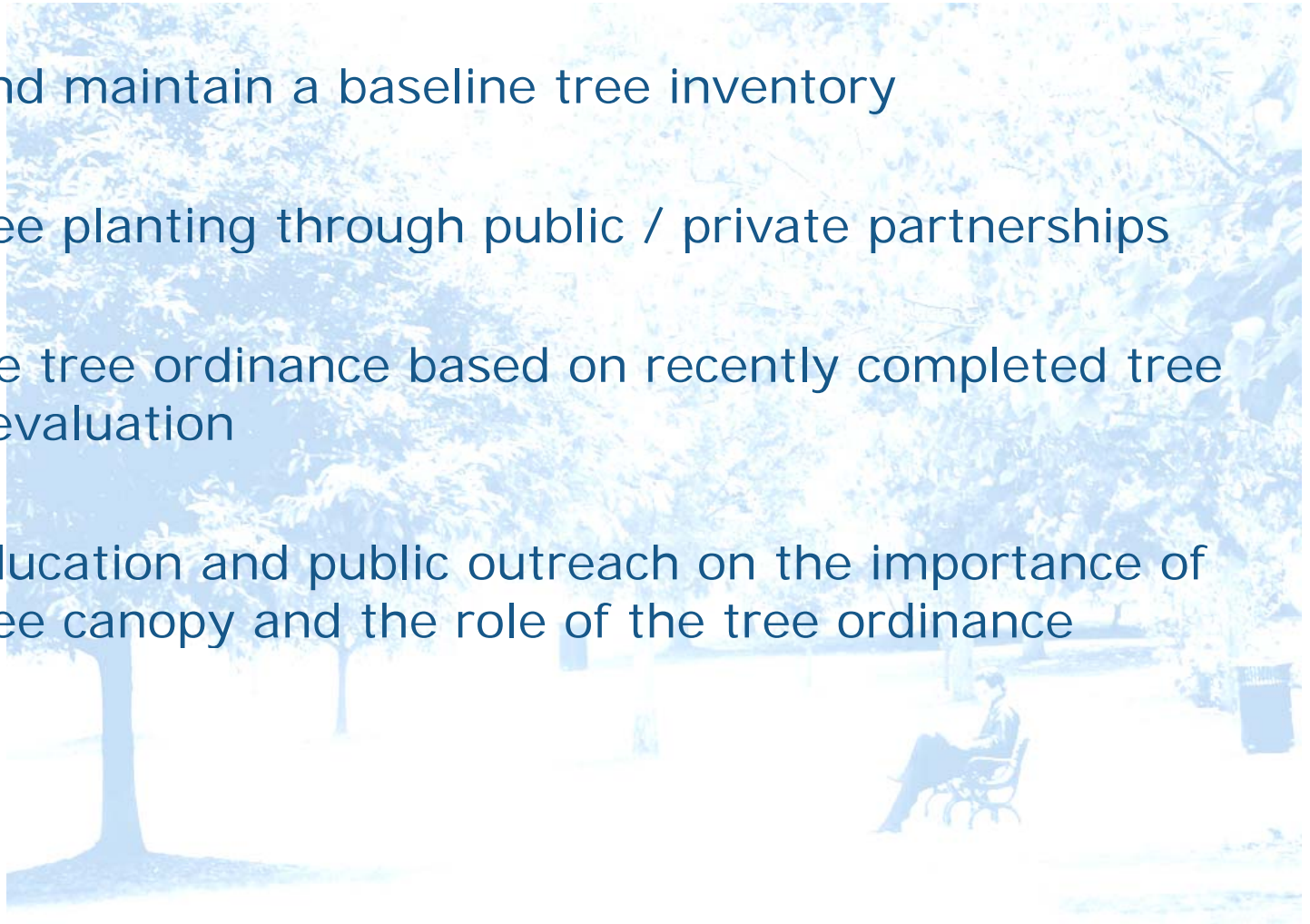


## Atlanta's Project Greenspace and Urban Forestry Program

- Atlanta has a strong **Urban Forestry Program**
  - The Arborist Division administers and enforces the tree ordinance  
[http://www.atlantaga.gov/client\\_resources/government/planning/arborist/tree\\_ordinance.pdf](http://www.atlantaga.gov/client_resources/government/planning/arborist/tree_ordinance.pdf)
  - The Office of Parks is responsible for trees located in city parks, public spaces, and right-of-ways (street trees)
- **Tree Protection Ordinance**
  - Purpose is to achieve "no net loss" of trees
  - Permits required to remove hardwood trees 6" or greater DBH (pines 12" or greater DBH) on private property
  - "Recompense" is required to replace the value of trees removed through replanting and/or payment into the Tree Trust Fund
  - Violations of the ordinance are subject to fines and/or jail

## Atlanta's Project Greenspace and Urban Forestry Program Priorities to Achieve 40% Tree Canopy Coverage Goal

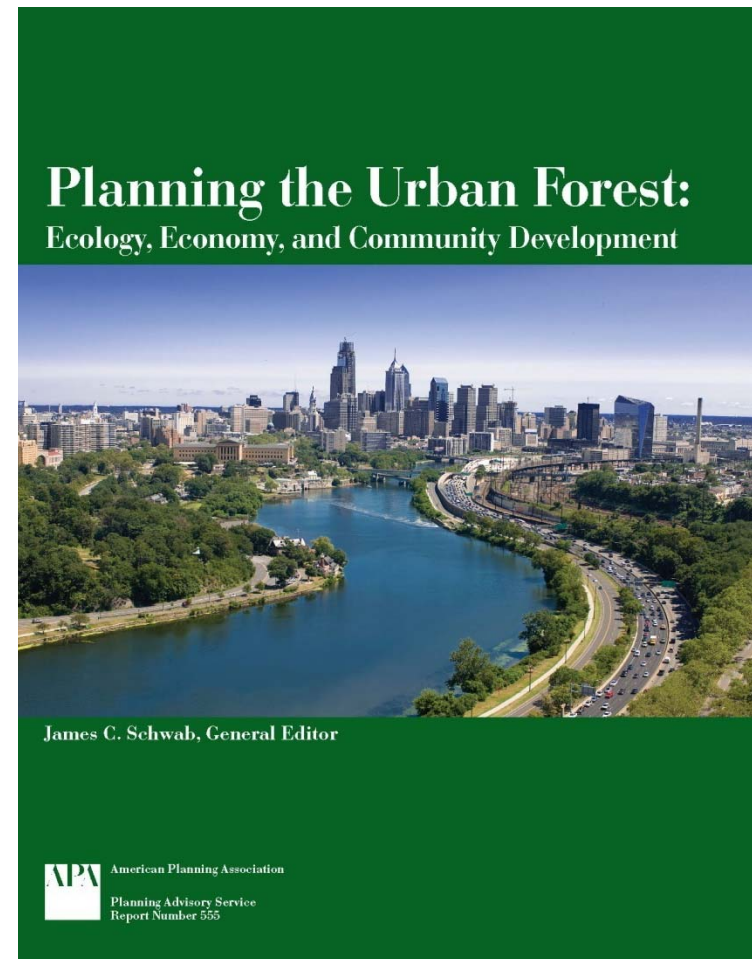
- Establish and maintain a baseline tree inventory
- Increase tree planting through public / private partnerships
- Improve the tree ordinance based on recently completed tree protection evaluation
- Increase education and public outreach on the importance of Atlanta's tree canopy and the role of the tree ordinance





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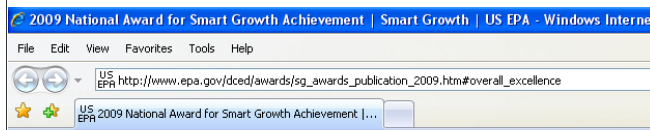
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1. Use urban forestry to support other planning goals, e.g.:
  - Contemporary community development practices
    - Smart growth / new urbanism
    - Low-impact / conservation development
    - Multimodal transportation / TOD / walkable neighborhoods
    - Sustainable development
  - Emphasize the role of trees in place-making
2. Include green infrastructure elements in local comprehensive plans
  - Link to other plan elements



## Example: Envision Lancaster County Comprehensive Plan 2009 EPA Overall Excellence in Smart Growth Award Winner



### Overall Excellence in Smart Growth

#### Envision Lancaster County Comprehensive

Plan and Implementation, Lancaster County Planning Commission, Lancaster



Lancaster County's growth management and nationally ranked farmland preservation programs help preserve the agricultural economy, rural character, and unique culture of the area.

Lancaster County, in south central Pennsylvania, is proud of its rich cultural heritage, its historic towns and villages, and its fertile farmland. To maintain the character of the county, as well as its diverse economy and natural resources, for future generations, the Lancaster County Planning Commission established a regional, countywide comprehensive growth management plan, which protects its valuable farmland and historic landscapes by strategically directing development to established towns and cities in the county.

#### For More Information:

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Principal Planner

Lancaster County Planning Commission

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Like many rural areas, Lancaster County has a lot of farmland and open space.

In response, the Lancaster County Planning Commission created Envision Lancaster County, a comprehensive growth management plan that manages growth and maintains the county's rural character. Envision Lancaster County directs development to the farmland, rural areas, and natural resources. The plan considers the entire region to encourage more compact, intermodal transportation choices.

One of the defining features of Envision Lancaster County is the balance between protecting natural resources and promoting development in appropriate areas. Using the Agricultural Preserve Board and the Lancaster County Agricultural Preserve, the commission permanently protect almost 82,000 acres of farmland, a local agricultural economy viable. To protect recharge areas, the commission worked with the National Lands Trust to preserve near the water throughout the county. This preservation program that establishes a countywide framework.

The plan directs development to selected areas and agriculturally important land. The farmland protection by encouraging more compact development will be designated for long-term rural use. In addition, Rural Centers, including villages, are encouraged.

The commission worked with municipalities to implement Lancaster, 62 projects have been completed. These projects will enhance the livability of the county.

Throughout the process, the commission actively engaged the public and local governments. The county's good working relationship with municipalities encouraged them to buy into the plan's principles. To ensure public input, the commission conducted educational workshops and public forums and developed a citizens' task force. The county also reached out to Lancaster's Amish and Plain Sect communities through targeted publications and meetings with religious leaders. This plan will help Lancaster County continue to be a model for communities that balance growth with natural, historic, and cultural preservation.

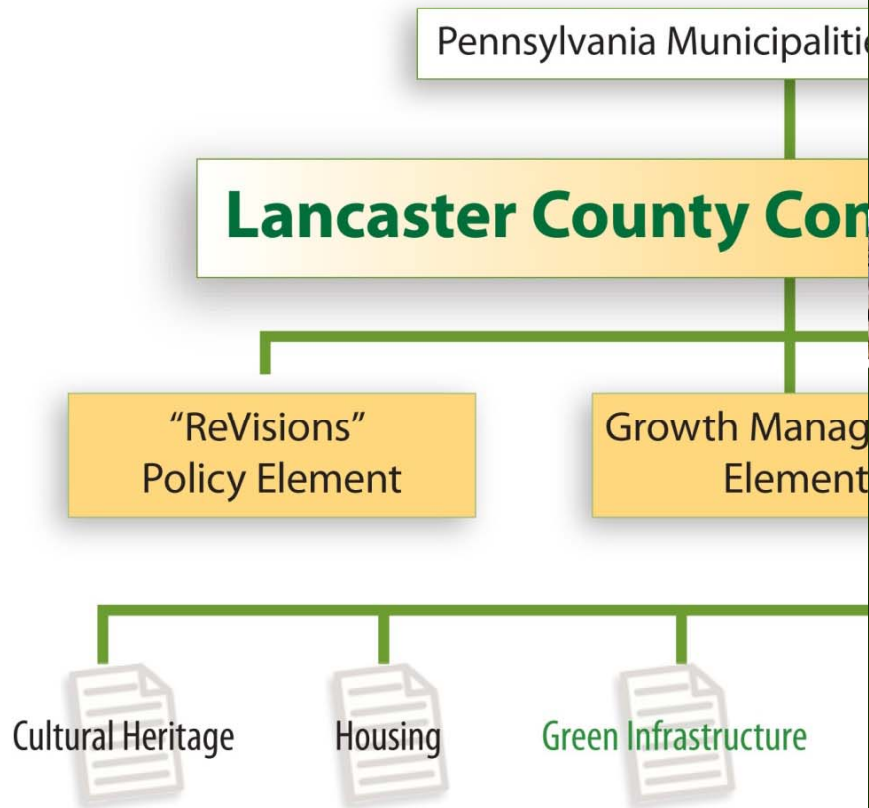
"Smart growth in Lancaster County thrives due to citizens' dedication to maintain its unique sense of place."

— Harry Loshnowsky, East Hempfield Township resident



# Design Principles

## Envision Lancaster County Comprehensive Plan and Green Infrastructure Plan (Greenscapes)





3. The natural environment makes neighborhoods more livable
- From sense of place / community aesthetics to...
  - Measurable benefits such as crime reduction



4. Make the place right for trees and then pick the right trees

## Tree Selection Considerations


- Climate, soil type, and topography (water availability, hardiness zone / site aspect, drainage, slope, etc.)
- Urban environment (soil disturbance, space for root and canopy growth, proximity to utilities, microclimate, etc.)
- Species characteristics (native vs. non-native / invasive, hardiness, form at maturity, maintenance requirements, etc.)

**SelecTree**  
• A TREE SELECTION GUIDE •


**rightTree**rightPlace >>>

**rightTree**rightPlace

Utilities,  
Fire Safety,  
Root  
Damage?



Trees & shrubs are an important part of the environment and the communities that we live in. Use the health and safety links below to help avoid future conflicts with your valued plantings.

**Utility Precautions** 

Planting or pruning trees near utility lines requires careful consideration. Look for the utility friendly icon in search results lists.

**Hazardous Trees**

Trees with defects in trunks, roots or branches can fail creating the potential for property damage or even personal injury.

**Fire Safety**

Tree species and location can influence the fire safety of your home. Although all vegetation can burn, research has shown that some resist fire better than others.

**Tree Maintenance**

Proper planting, watering, feeding and pruning will lengthen a tree's life, maintain it's safety and improve it's aesthetics.

**Root Damage Potential**

Tree roots can cause costly damage to structures, hardscapes and underground utilities. Care should be taken to space trees appropriately.

**Allergy & Toxicity**

Some plants produce substances or allergenic materials which can harm humans or animals who come in contact with them.

**Invasive Plants**

Natural areas are damaged by invasive plants. If you live in or near a natural area, invasive species should not be planted.

**Biogenic Emissions**

An important consideration when large-scale tree plantings occur, especially in areas of poor air quality.

[http://selecttree.calpoly.edu/right\\_tree.html](http://selecttree.calpoly.edu/right_tree.html)



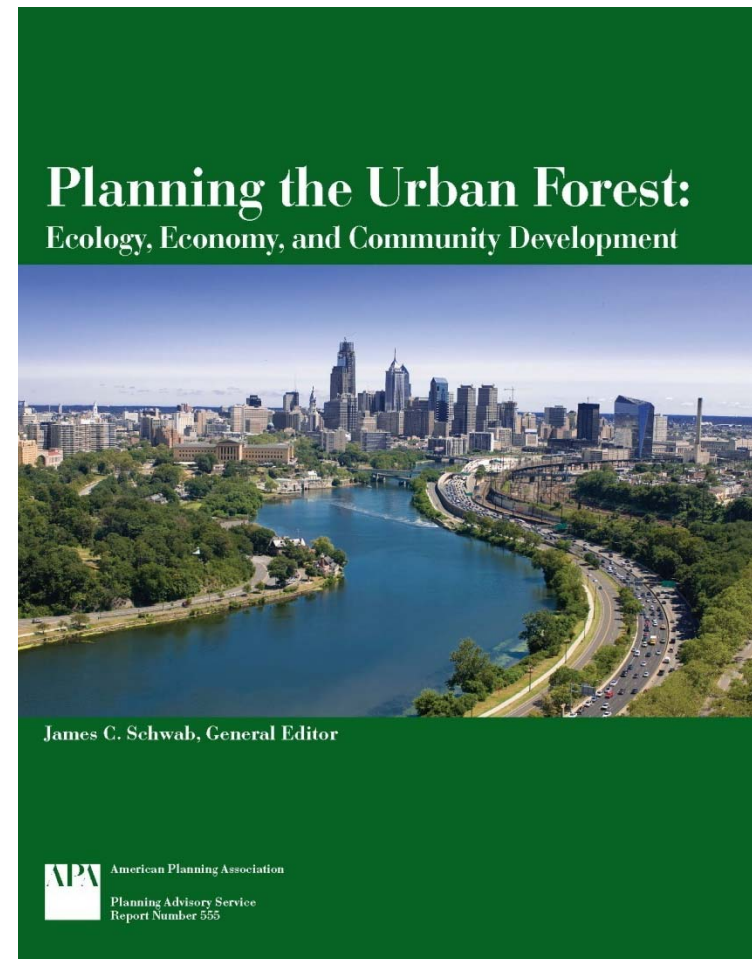
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