

Woody Plants: Trees

Three Part Class:

Nature and Functions

Overview of Native Trees

Meeting Trees Up Close

Presented by the Peninsula MG Tree Stewards

What Makes Trees Special?

- “...trees and forests are the highest-functioning members of ecological society, irreplaceable players at the apex of the complex ecological web around us.”
Jim Robbins, The Man Who Planted Trees”
- “...my version of a planted tree—envoy to the future, repository of history, index of our respect for the land, spring of aesthetic pleasure,...” Michael Pollan, Second Nature

En Masse

Oak/Hickory Forest



Bald Cypress



Red Maple

In our Landscapes



River Birch



Compton Oak

Very Special Trees: Site, History, Uniqueness



Ancient Origins

- “...the first trees recognizable as trees appeared on earth around 400 million years ago and the first men recognizable as men appeared around 3 million years ago...” Hugo and Kirwan, Remarkable Trees of Virginia
- “Across Earth’s land surface, wherever there was enough moisture and warmth, trees came to be the dominant organisms, shading out their competitors.” Daily and Katz, The Power of Trees

Reminder

Gymnosperms

- Exposed Seeds
- Usu Aromatic Resins
- Usu Evergreen
- E. US, largely Conifers
 - 650 species worldwide

Angiosperms

- Seeds in Ovaries
- Flowering Plants
- Herbaceous or Woody
- 250-400K species in all

Ginkgo biloba

- Single species genus
- 190 million year old fossils
- Usu listed with Gymnosperms
 - Subject of expert discussion
- Great urban tree (male)



What is a Tree?

- A usually tall, woody plant, distinguished from a shrub by having comparatively greater height and, characteristically, a single trunk rather than several stems. American Heritage Dictionary 1991
- Woody plants that produce one main trunk and a more or less distinct and elevated head (height of 15 feet or more). VCE Master Gardener Handbook 2009



Crepe Myrtle 'Red Rocket'

Crepe Myrtle 'Acoma'

Main Trunk: Single

- Easily identified, regardless of size
 - Examples
Oaks, Maples,
Tulip Poplar,
Sycamore



Beeches

Main Trunk: Multiple



Live Oak

- Growth tends to upright, thick stems
 - Examples River Birch, most Crape Myrtles, Live Oak

Distinct Elevated Head

- Many possible shapes
 - Examples in some field guides, pruning books
 - Genetics, influenced by growing conditions
 - Important to understand likely growth dynamics



Dawn Redwood

Yellowwood



Height

- Probably the least distinctive part of the definition of a tree



Natural Shape and Mature Size

- When selecting for planting, it helps to anticipate height and canopy



Blue Spruce

Some Grow Faster...



Sycamore 2010



Sycamore 2013

...Than Others



Live Oaks

READ THE PLANT TAG!



Deodar Cedar



How Does a Tree Work?

- Roots
- Trunk
- Foliage
- Reproductive System



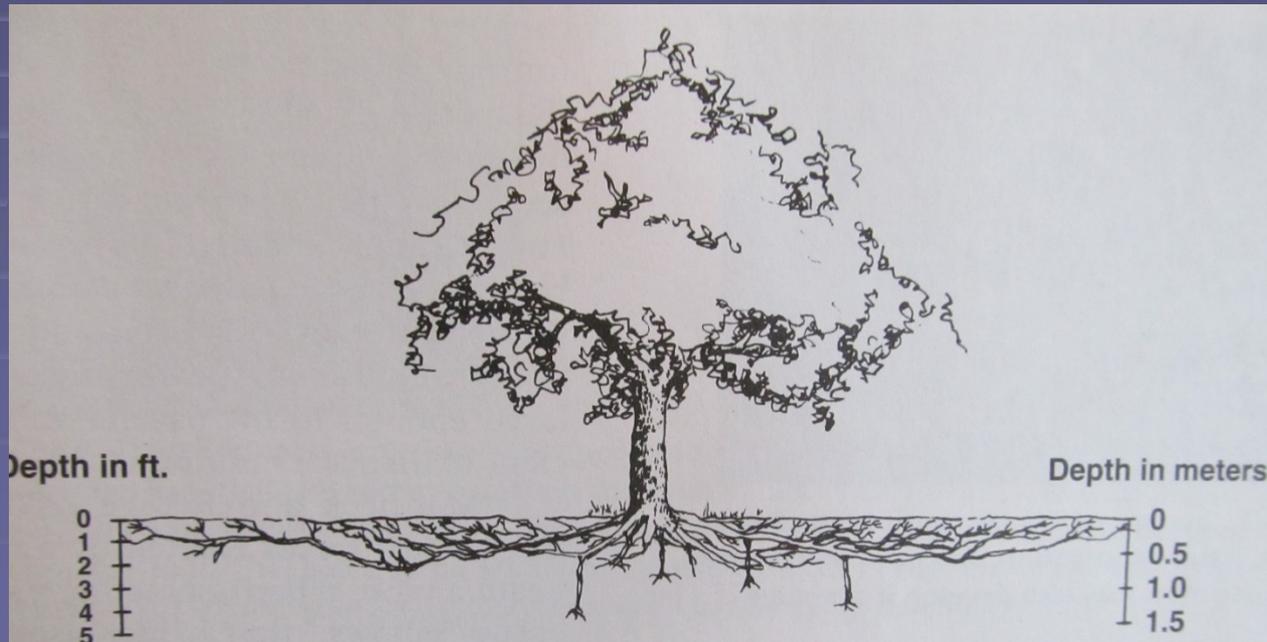
Cup and Saucer Magnolia



Black Gum

Roots

- Take in nutrient minerals and water
- Store and send out food from leaves
- Anchor the tree and hold soil in place



Roots Need Space



Roots Hold Soil



Hackberry



Swamp White Oak

Allelopathy

- Chemicals released into the soil inhibit the growth of other plants
 - Black Walnut is the best known: juglone
 - Hickories and pecans to a lesser extent
 - Other allelopathic trees (VCE Pub 430-021) :
 - Hackberries, Wax Myrtle, Sycamore, and others
- Research on weed control via allelopathy: some grasses on roadsides, possible crop/weed combinations



Black Walnut

Trees and the Rhizosphere

- Micorrhizae (“fungus root”) occur in 80-90% of vascular plants
- Fungi form coverings on the root tips
 - Hyphae go into the root and into the soil
- Increases plants’ stress tolerance and can protect from other fungi
- Anecdotally, may help trees communicate



Sassafras in the woods

A Special Case

- Pando, a single quaking aspen in Utah
 - 40,000 trunks stemming from one root system
 - Covers 100 acres, at least 12,000 years old



Trunks

- Vascular system as in all plants
 - But on a much larger scale, with a bark coating
- Woody tissue provides structural support

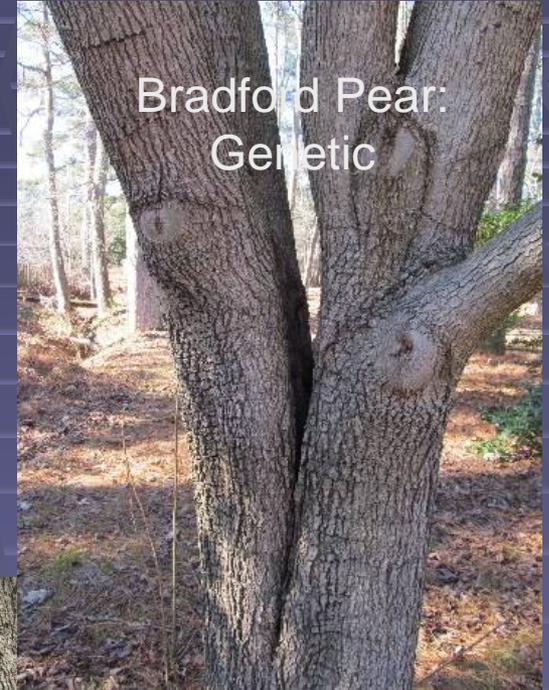


Willow Oak

Branch Structure

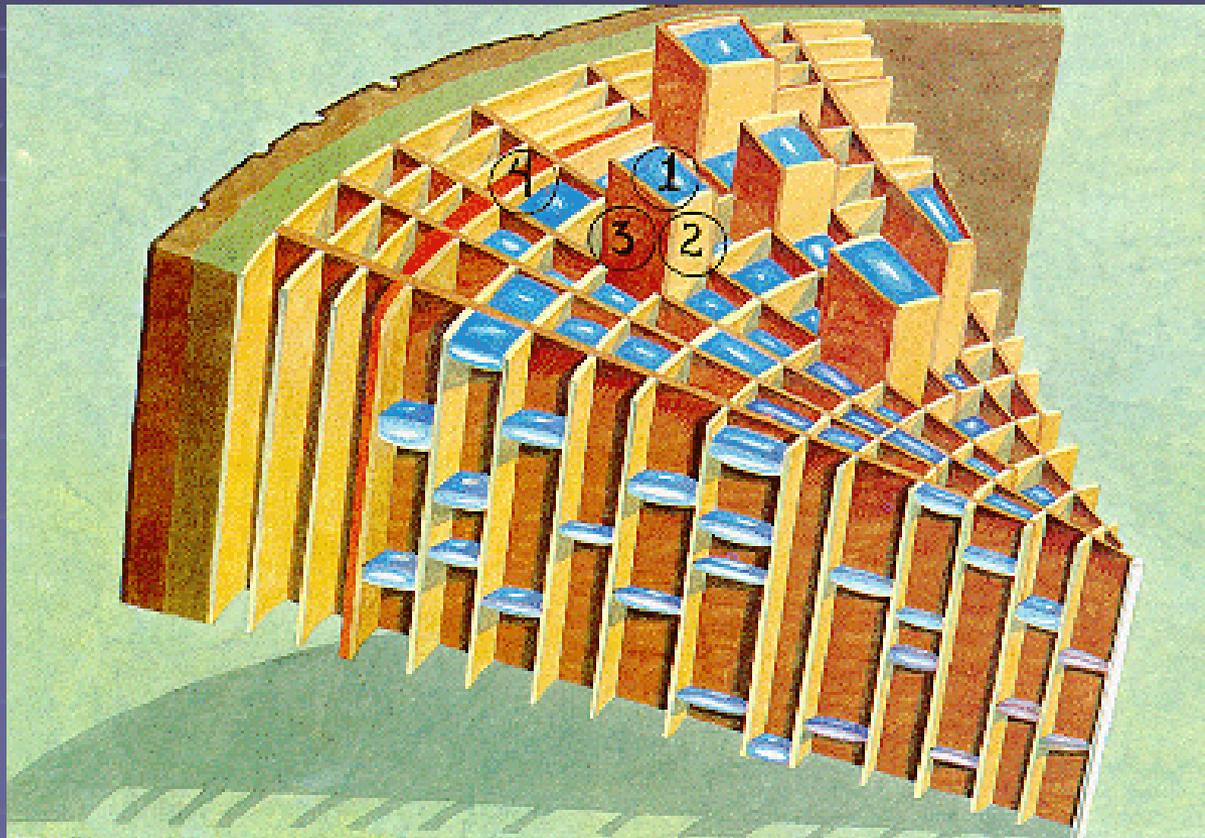


NARROW
ANGLE:
May Lead
To Failure



Compartmentalization

- Trunk damage is walled off in rings and rays
 - A special feature of trees (dicots)





Southern Magnolia

An Extreme Case



White Oak



When Trees Can't Cope: Girdling

- If a significant portion of the trunk has suffered damage to its vascular system, leaves and roots cannot communicate
- Borer insects and some diseases kill by eating vascular tissue
- Many human-caused tree losses are due to girdling in one of several forms:
 - Mulch
 - Planting too deeply
 - Weedeater damage
 - Neglected guy wires and plant tags
 - Girdling roots not caught at planting





Ornamental Cherry Planted Too Deep



Red Maple
Weedeater Damage



Peach Tree Tag Wire Still On



Wax Myrtle
and Guy Wires

Foliage

- Leaves manage photosynthesis
- They also provide:
 - Shade
 - Screens and windbreaks
 - Habitat and food
- Consider health of
 - Individual leaves
 - Canopy as a whole



Cunninghamia

Which Came First, Wires or Tree?



Black Walnut

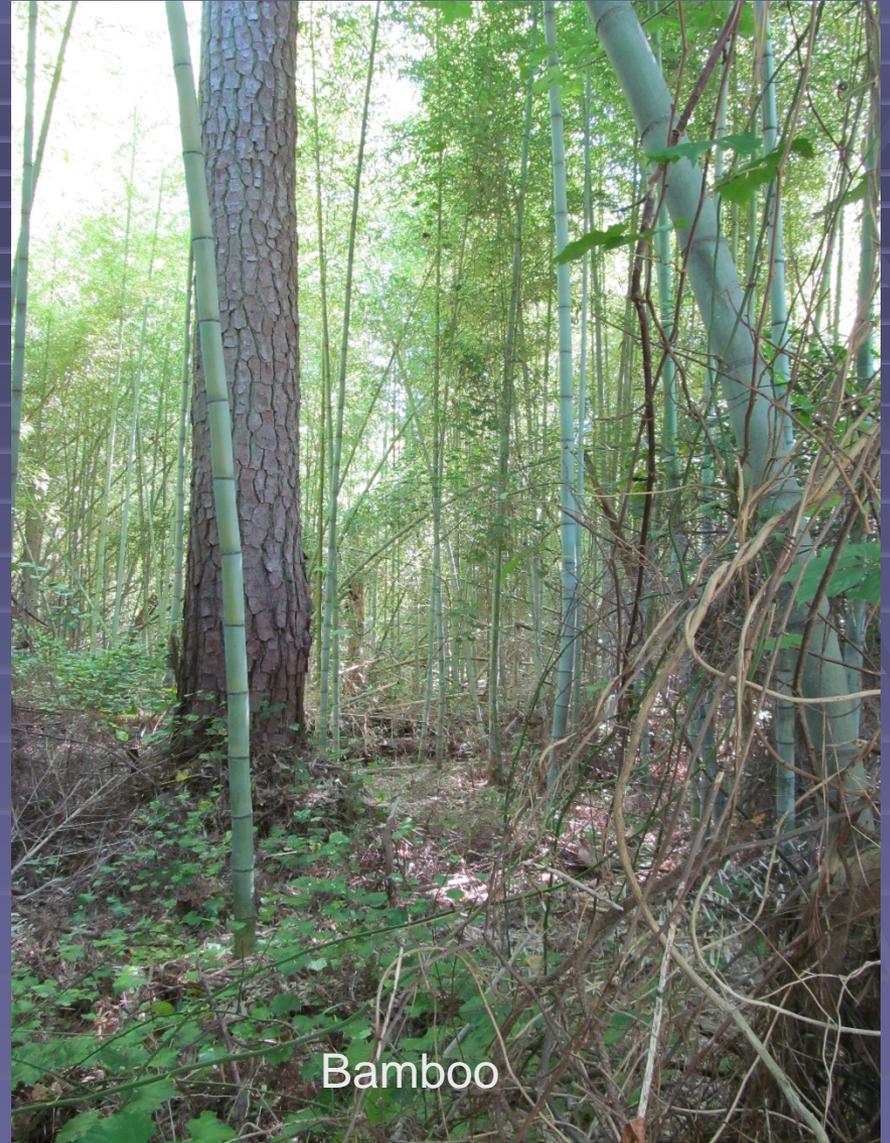
Reproductive System

- The tree's evolutionary goal
- A major attraction for humans
 - Beauty, food, and more trees
- Size and scale can have major impact
 - Think tree pollen and sweetgum balls

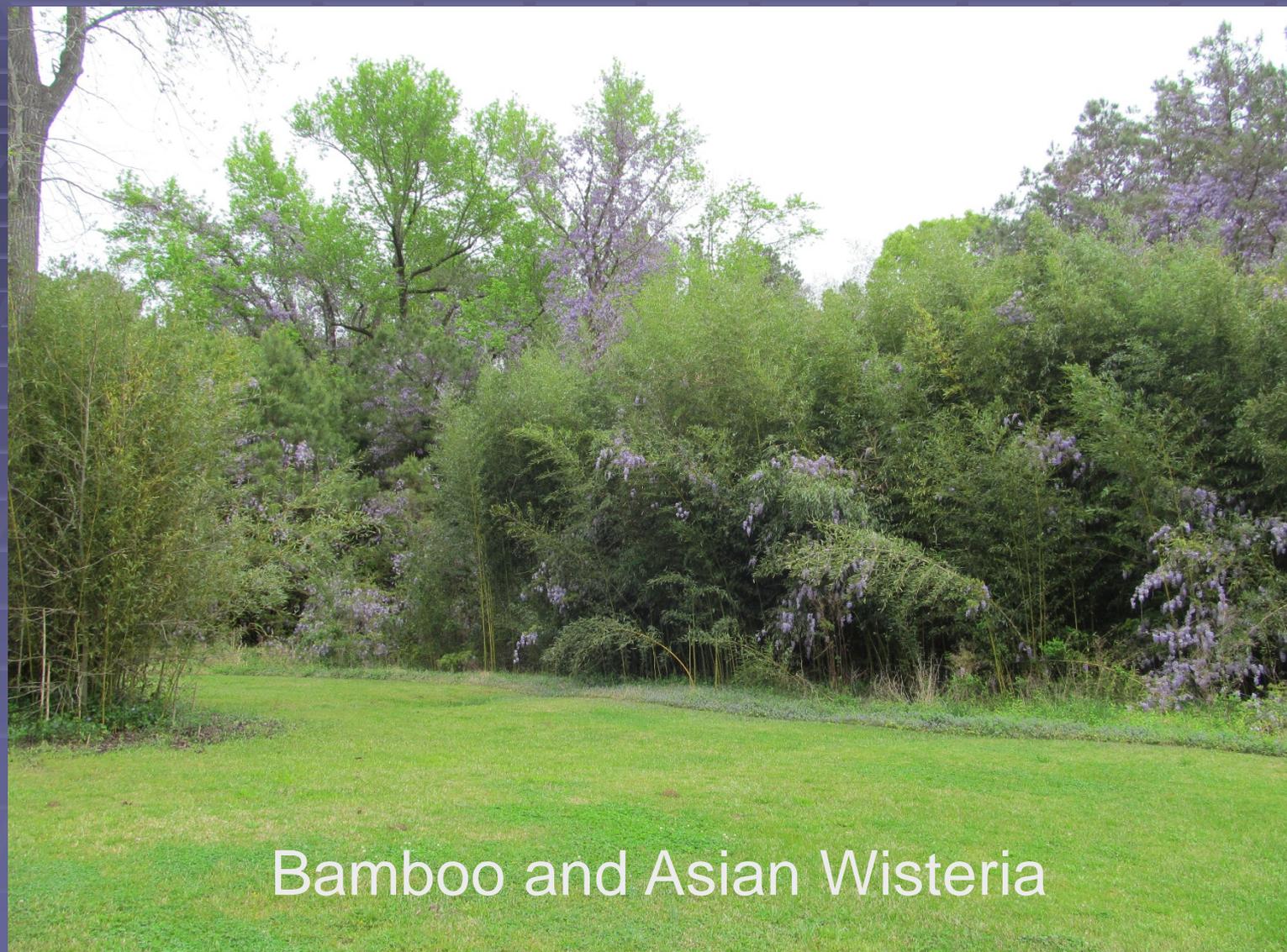


A Word About Invasives

- Most of the invasive trees in the forest came as garden exotics
 - Spread by birds, wind, suburbs/small farms
 - Some are specific serious threats
 - Locally bamboo and tree of heaven
 - Lesser threats can add up to major damage
 - Bradford pears, mimosa, Russian olive and so on
 - Some vines as well: kudzu, Oriental wisteria
- And there are native invasives



Bamboo



Bamboo and Asian Wisteria

The Functions of Trees in the Human Landscape

- Photosynthesis and the environment
- Water quality and retention
- Air pollution reduction
- Shade and heat reduction
- Windbreaks and screens
- Human Food
- Wildlife Habitat
- Aesthetics
- Human interactions



Red Maple

Photosynthesis

- World's largest CO₂-O₂ exchange machines
 - One acre of trees = oxygen for 18 people/day
 - One average tree stores 13 lbs of carbon each year



Water Quality and Retention



- Trees intercept rain and hold runoff water

Water Quality and Retention



- Trees also stabilize shorelines and serve as riparian buffers

Air Pollution Reduction

- Ozone, sulfur dioxide removed
- Leaves intercept particulates
 - Pollen picks up some too
- Effect closest to traffic





Willow Oak

Shade and Heat Reduction

Shaded sites 20 deg cooler than sunny ones

- Up to 35 deg for paved areas
- Active evaporation from leaves dissipates heat

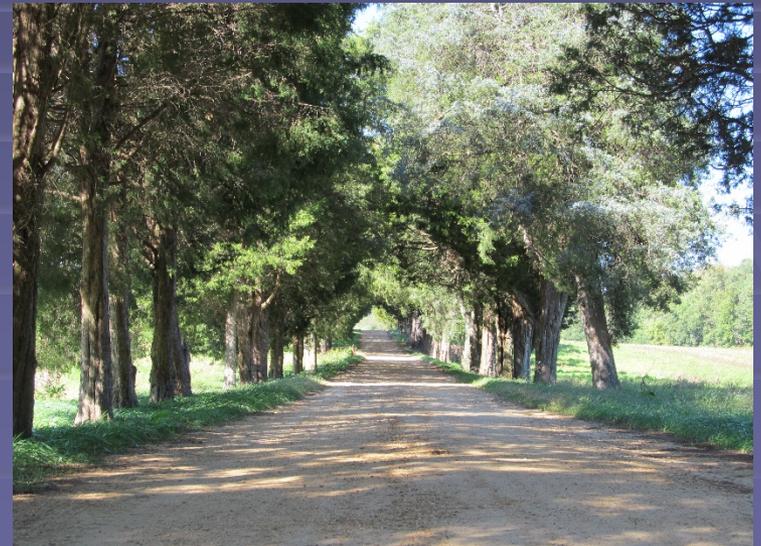


Zelkova



Windbreaks and Screens

- Usually evergreens
 - Try to avoid monoculture
 - Look out for shallow roots
- Some suggestions
 - E. Redcedar
 - Arborvitae 'Green Giant'
 - Chindo Viburnum
 - Avoid Leyland Cypress



Eastern Redcedar

Human Food



Hickory



Japanese Persimmon



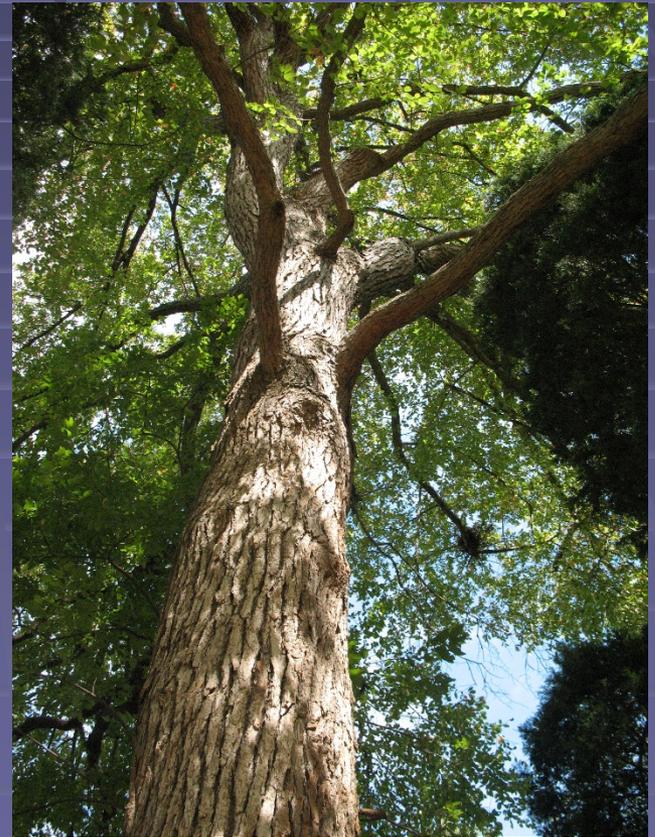
Fig

Wildlife Habitat

- Native species are especially important



Hackberry



Black Gum

Aesthetics 1: Shape



Japanese Maple

Aesthetics 2: Colors



Oak



Atlas Blue Cedar



Smoke
Tree



Redbud

Aesthetics 3: Flowers



Aesthetics 4: Scent



Littleleaf Linden

Human Interactions

- Health of people
 - Studies in hospitals and prisons
 - Recreational opportunities

