

Green Community Revitalization

City of Pass Christian, Mississippi

Urban Forestry Plan 2011



The Blue Rose, one of the many historic homes along the Scenic Drive



This project was funded in part by the Mississippi Forestry Commission, the USDA Forest Service and the Southern Group of State Foresters.

A Green Plan for the City of Pass Christian

About the Plan: The purpose of this plan is to provide general recommendation on how to use community forestry. The plan includes providing training, technical tools, and professional assistance to enhance the natural environment for multiple environmental and social benefits.

1. General Information.....	3
2. Photographic Tour of Pass Christian	5
3. Recommendations for Comprehensive Green Planning.....	6
4. Urban Forestry Training and Workshop.....	12
5. Urban Forest Council Sustainable Practices.....	13
6. Urban Forestry Management Plans and Recommendations	17
7. Pass Christian’s Street Tree Population and the Benefits they Produce	43
a. Aerial Images Created Tree Points	43
b. Tree Distribution Percentages.....	46
c. Predominant Trees Age Distribution.....	47
d. Pass Christian Structural Analysis.....	49
e. Street Tree Distribution and Species Composition	49
f. Calculating Net Benefits and Benefit Cost Ratio	51
8. Recommended Tree Species	54
9. Ordinance Recommendations:.....	63
10. Model Planting	81

I. General Information

Pass Christian, in spite of its nationwide popularity, has remained a small community on the Mississippi Gulf Coast, reaching 6500 residents only in most recent years.

Having an entrenched heritage since 1699, Pass Christian processed through changes of the guard and national banners from French, to English, to Spanish, to an Independent Republic, and then to the American flag. Pass Christian had emerged as a small fishing and commercial harbor and became a main trading center on the Mississippi Sound. Because of its proximity to New Orleans, the first Lighthouses in Mississippi were built as sister towers at Cat Island and Pass Christian in 1831, when it became the first mainland lighthouse in Mississippi.

Because of the healthy ozone quality of the area and blending scents of salt breezes and piney woods, plantation owners, investment bankers, and brokers from New Orleans and upper Mississippi, established dual residences at the Pass. Tourists followed in their path bringing about the first Coast hospice of grandeur – the Pass Christian Hotel. This was where, in 1849, southern yachting was born as sailing competitors celebrated the first boating Regatta and started the second yacht club in the United States. The Yacht Club became a Mecca for sailing enthusiasts. Voyages at sunset, or by moonlight along the magnificent coastline, or to the nearby islands, or for the thrill of renewed regattas, have created a constant parade of billowing sails throughout the years.

The longest operating newspaper, the *Tarpon-Beacon*, started in 1880 and closed in 1993. ---And, the Coast's longest operating private library, the Town Library, operated from 1893 to 1996. The Pass also had an Opera House in its early days. Its Historic District today traverses the coastal beaches for three miles, revealing hundreds of antebellum and fine old homes that are listed in the National Register of Historic Places. The Pass has a Preservation Commission and a Tree Commission with alert members who are ever mindful of heritage and historic values. Scenic Drive is lined with Live Oaks, water oaks, and magnolia trees presenting a wonderful pageantry that borders the many architectural gems that are ornately guarded by wrought iron works or white picket fencing – providing a showcase of Victorian and Creole-Caribbean design.

One of the most devastating moments in the town's history was that it was targeted for near destruction by Hurricane Camille in 1969.

Popular annual events that attract many coastians and tourists are the St. Paul Mardi Gras Parade, the St. Patrick's Walking Parade, the Spring Pilgrimage, -- the Blessing of the Fleet, -- the Tour of Homes,---_Jazz in the Pass_festival, the Sea Food Festival, the Collage – Art in the Park, -- Celebrate the Gulf, and Christmas in the Pass. Most of these events include food-fare ranging from fast-food items to specially prepared gourmet cuisine. These annual events are mostly cross-supporting and have some of the same volunteers who see the need to herald the community. In addition, there are many charity and support groups that participate in fund-raising for their pet community projects including their canine friends for Paws in the Pass.

The Pass Christian Municipal Harbor is very busy with commercial boats that dredge the eight Oyster Reefs just off-shore and drag their nets for shrimp during the seasonal change. Visitors enjoy the benefits of the only harbor along the Coast that is so openly visible from the main highway. The Pass Christian Yacht Club doesn't fail in promoting regional and annual Regattas. Pass Christian is remembered as having organized Southern Yachting by initiating the second yacht club in the United States following New York.

The small downtown section with narrow streets keeps traffic at a slow pace and is most inviting to tourists who are in search of antiques, crafts, or just strolling. Not to be missed is the Musee Bourdin, a museum-in-a-plumbing shop, where thousands of photographs are on display as well as hundreds of cataloged heritage items on people, places and events of Pass Christian.

Out of state visitors enjoy the cool Gulf breezes, the refreshing waters, and the sophisticated elegance offered only in Pass Christian. The many who return, frequently speak of the attractiveness of the *Pass* and the special allure that brings them back.

Nestled upon a peninsula and surrounded almost completely by water and imbedded with springs, bayous, and canals makes the area most alluring to fishermen, golfers, and retirees. The small retirement settlement of Henderson Point is on its West, the small villages of DeLisle and the Kiln to the North and the small City of Long Beach is at East --- leading to Gulfport, Biloxi, Ocean Springs, and Pascagoula along the Gulf shoreline beaches.

New Orleans can be quickly reached by accessing Bay St. Louis on the West which is only a one hour drive passing by the NASA Complex and through Slidell across Lake Pontchartrain at the Rigolets.

Economy

Personal income

The median income for a household in the city was \$40,743, and the median income for a family was \$46,232. Males had a median income of \$35,352 versus \$22,195 for females. The per capita income for the city was \$26,008. About 8.2% of families and 10.8% of the population were below the poverty line, including 18.0% of those under age 18 and 6.2% of those age 65 or over.

2. Photographic Tour of Pass Christian



3. Recommendations for Comprehensive Green Planning

Donna Yowell

Visit our web site:

www.msurbanforest.com for more information.

Scenic Communities of MS:	Grant, resources and technical assistance
MS Environmental Education:	Current environmental education and outreach documents
Urban Forestry Certification:	Promote community success
Tree City USA:	Learn more about city wide certification and community forestry program nationwide.
Urban Forest Masters:	Attend training and other educational opportunities

General Recommendations:

Use aerial photography, GIS data and site visits to identify and inventory possible planting sites, planting size, utility conflicts and species selection. Include all land uses in the inventory including private and public properties.

Develop a community wide tree planting campaign to encourage landowners and citizens to plant the right tree in the right place. Develop resources to provide trees to citizens, such as local seedling stock, donations or other.

Trees are a renewable resource, so planting to enhance the community now does not have to be permanent. Of course, the longer trees and landscapes remain in place the more social and environmental value and services are obtained while increasing the value of the property and the quality of life in the community. Planting should be completed based on long term placement, but not always.

Plantings in front of store fronts do not decrease business by blocking views, this is a myth. The opposite is actually true. Green space, trees and landscapes attract people and business to areas. Include your business owners in all efforts and provide education and outreach to both private and public segments of the population. Include under-served populations; churches and students. A well landscaped business area actually enhances business and attracts more customers, while increasing property values. Tree planting is the lowest cost community activity that improves any area.

As business increases, the merchants/city may want to consider developing more creative ways to green areas and branch out into other areas.

It is important that the charm, history and character of a community are integrated community wide. The newest parts of Waveland host beautiful public buildings but very little greening. This in the long term will not create a resilient community as far as economic development, quality of life, property values and other reasons people invest.

Creative uses of greening the community may need to be investigated if there is not enough plant able space in an area. We suggest setting priorities along with each section of the community inventoried. Be sure to provide ways citizens can get involved and do their part. For example, if you find that part of a downtown street does not have much space for large trees then more creative methods of greening should be explored. Activities such as planter boxes, hanging baskets, vines, small tree planting, better maintenance of existing trees and other methods should be considered.

Develop a campaign to encourage homeowners and business owners to place large canopy trees where possible and small flowering trees in small spaces; avoid utility conflict. Place native bush grasses and low maintenance plants to create a welcoming sidewalk.

Tie traffic corridors together to lead visitors to areas you want them to visit.

Develop planting spaces along Main Street for small trees. Add trees to any open areas; avoid utility conflict, add planter boxes at store fronts, climbing plants, large trees in front of Depot, hanging baskets. Prune Crepe Myrtles to look like trees (not shrubs). Place brick overlay along existing concrete sidewalks.

Use empty lots, public or private, for trees. Trees in the backdrop of areas, along back and side property lines can contribute just as much as those planted along streets and sidewalks, plus take less city maintenance.

Merchants and home owners can contribute one tree or one planter box and provide maintenance for one item at a much lower cost than the city can provide. No need to try to match things, diversity of species is critical for long term sustained community forestry. Selecting species specific to your growing areas is very important, coastal areas will want to include storm resistant varieties.

Merchant and homeowners should add trees only where there is adequate space and no utility conflicts- right tree, right place.

Cities should develop policy and ordinances for all public spaces and new development.

Public maintenance crews should be trained on protection and maintenance of trees or else your investment may just disappear.

Connect tree planting projects to federal grants for water quality, air quality, transportation, gardening, health and other social issues funded federally. See Scenic Communities and Grants.Gov for current grants. Use TEA-21 Transportation Funds to plant right tree, right place at the HWY Interchange. Community forestry is only successful when all citizens, leaders, businesses in the community get involved. Combine activities that include all citizen groups- business, grant funds and other resources to get the job completed. Grant funds alone will not ever produce enough funding and other resources needed for success.

Find a way to turn any business, eye-sore or other site that is considered to be a negative impact into a more positive impact.

For example in the Town of Terry, Ms.:

Railroad Property

Use this site as an educational opportunity (agro-business) for adults and children. Due to this unsightly facility, plant buffers between the rail yard and the depot museum and the downtown business just to soften the impact. Install educational signage at the rail yard and other industry items to emphasize the process of timber marketing, etc. Use the green spaces around the Depot and in the general area to increase beautification by planting a variety of flowering trees, green buffers, and pruning existing crepe myrtles to look tree like.

Use Google maps or other aerial photos to indicate possible planting sites to the general public.

Red trees indicate possible planting site, avoid utilities and traffic conflicts. It is important to plant a diverse variety of trees (never one variety), specific to the site. Never limit tree planting to a straight line. Try to establish as much slow growing, larger canopy trees as space allows. Identify and inventory all existing planting sites along Cunningham Drive, parallel streets and side streets. Obtain collaboration from business and home owners to plant a variety of flowering and green trees in the appropriate spaces.

Learn more about Green Planning at <http://www.gicinc.org/methods.htm>

Individuals: Actions you can take to conserve your natural assets

- Plant trees along streams and shade trees for homes and streets.
- Minimize the use of paved or impervious surfaces so water can infiltrate and recharge aquifers.
- Plant native species of trees and plants.
- Establish non-mowed areas to increase habitat and water infiltration.
- Install bird boxes and bat houses in urban areas.
- For larger properties, employ conservation easements to conserve land and reduce tax burden.
- Work with your county forester or local extension agent to develop a management plan for your forest or farm.
- Make local government aware of the need to plan for green infrastructure and encourage them to create their own plans. See steps below!

Communities: Six steps for community green infrastructure planning

Step 1: *Set Goals – What does the community value?*

- Forests for wildlife and timber?
- Recharge areas to protecting drinking water supplies?
- Conserving historic landscapes and battlefields?
- Protecting and promoting working farms?



Step 2: *Data Review – What do we know and what do we need to know?*

- Research existing studies – what are the findings and are they relevant? (e.g. watershed plans, wildlife plans, open space plans, ecological inventories, groundwater studies, air studies etc.)
- What data are needed? (If using Geographic Information Systems you may need digital layers – data arranged spatially that can be overlain and compared.)
- Examples of data types include streams and watersheds, key agricultural soils, recreation routes, forested areas, wetlands, etc.

Step 3: *Asset Mapping – Map the community’s ecological, cultural and economic assets. What is mapped is based on goals established in Step 1.*

Following are examples.

- Large intact forests or native meadows
- Large farms and farm communities
- Streams, rivers, wetlands and groundwater recharge areas
- Recreational areas (fishing, boating, hiking, biking, birding)
- Historic and cultural features (battlefields, historic landscapes)
- In urban areas, street trees, tree canopy and local parks, streams.

Step 4: *Risk Assessment – Find out what’s at risk and what could be lost.*

- Which areas are zoned for development and do they overlap key assets?
- Are there forests which have been fragmented by roads or subdivisions?
- Which streams are impaired (or might be in the future)?
- Where are new roads planned – do they fragment key assets?
- Are there areas that are now impaired or lacking habitat that could be restored?

Step 5: Opportunities – Based on assets and risks, assess what can or should be saved? What could be restored? What will be developed? Engage the community in ranking key areas of importance. Map these opportunities and draft strategies to conserve them.

- Where will future parks or recreational areas be located?
- Which forests can be conserved for forestry, recreation or wildlife habitats?
- Identify locations and routes for agri-tourism (local fruit, wines, honey, meat, vegetables, crafts).
- Identify areas where scenic views or routes for historic or cultural assets should be protected.
- Explore the extent to which current zoning adequately addresses the county's or region's land assets.
- Where should towns or developments be located in the future?

Step 6: Include strategies in local plans for parks, zoning, comprehensive planning, tourism development or recreational strategies.

Green infrastructure plans can fit into existing city and county planning efforts and can compliment already-identified conservation goals.

Following are several examples of how green infrastructure assessments may be utilized:

- Environmental chapters in comprehensive plans and/or to implement existing comp plan goals for resource assessments and conservation
- Park, open space and recreational planning or strategic land acquisition
- Strategies for determining where to zone land for conservation or growth
- Lands for purchase of development rights or transfer of development rights
- Heritage tourism strategies and view shed protection
- Urban tree canopy surveys and management
- Transportation planning for roads and multi-modal planning
- Targeting land for conservation easement programs
- Protection of at risk or endangered species, such as the Delmarva Fox Squirrel
- New ordinance development (stream buffers, water protection, historic landscape overlays)
- Rezoning decision basis either for up zoning or downzoning
- Conserving forest cover to protect surface water quality and supply, mitigate storm water runoff, and facilitate the infiltration of water into groundwater aquifers.

Of course, green infrastructure is not limited to “natural” or pristine areas. Green infrastructure planning is often needed because of the challenges in seeking to add grey infrastructure and buildings while not obliterating the green. In already developed areas, green assets can be reconnected through new corridors. Green infrastructure also can be restored by turning a brown field into a forested site.

Pass Christian, Mississippi Tree Planting Recommendations

The following recommendations were made for tree planting in Pass Christian using grant funds. Several planting locations on Pass Christian's new police station grounds were recommended for various 15 gallon size trees (i.e., live oak, crape myrtle, Leyland cypress, magnolia). Live oaks (13) and one magnolia were recommended for planting on the east side of police station in the lawn area east of sidewalk. Crape myrtles (5) were recommended for planting in the visitor's parking lot median on the north side of building. Leyland cypress (11) was recommended for planting as a screen along north side of police car parking lot. This use of the grant funds will allow volunteers to plant 29 trees around Pass Christian's police station and stay within budget.

4. Urban Forestry Training and Workshop



EXTENSION SERVICE

Greening Our Community

City of Waveland and Pass Christian, MS

Where: Waveland Community Center, Waveland Community Center, 335 Coleman Avenue, Waveland, MS 39576

When: September 20, 2011 (9 AM - 4 PM) No registration cost

Who Should Attend: Anyone wanting to learn about trees and green spaces; community leaders, homeowners, business owners, developers, foresters, arborists, city workers, nurserymen, city leaders, and others managing land and trees.

To Register: Send your **Name and Email** to the Mississippi Urban Forest Council at dyowell@aol.com or call Donna Yowell (601) 672-0755 or Liz Register at (228) 467-5701

<u>Time</u>	<u>Topic</u>	<u>Instructor</u>
9: 00 AM	Welcome, Waveland's Green Future	
9:10 AM	Green Re-vitalization, Creating a Green Plan	Donna Yowell, Mississippi Urban Forest Council
10:00 AM	Trees for Watershed Health	Janet Chapman, MS Dept. of Environmental Quality
10:00 AM	i-Tree, Right Tree, Right Place, Tree Values	Wes Jones, Urban Forest Consultant
Noon	Lunch on Your Own	
1:00 PM	Panel of Resource Agencies	Liz Smith-Incer, NPS and Jim Foster
1:30 PM	Grant Training 101	Melody Worsham, Coast connect

Continuing education hours for landscape architects, foresters, engineers, elected officials, parks and recreation, planners, Urban Forest Masters, arborists and others. Funded by an Urban & Community Forestry Grant from the MS Forestry Commission, in cooperation with the USDA Forest Service and the Southern Group of State Foresters* Co-hosted by City of Aberdeen.

Scenic Communities of Mississippi



5. Urban Forest Council Sustainable Practices

Donna Yowell
601-672-0755

If the governing body of a small community is to be sustainable, it must increase its tax base by providing job opportunities to its citizens living within its corporate limits. Sustainable practices can provide the framework to create opportunities for growth in the job market, increased tourism, and provide for a safe and healthy environment.

Manufactured goods and services flowing into a community and cash flowing out, weakens a community, leading to poverty and a decay of environmental services. Cycling goods and services within a community keeps the cash flow within the community's economy, giving citizens control of their own destiny and lessening the effects of outside economic fluctuations.

To jump start this, you must maximize the use of your greatest resources, the imagination and skills of the people (think out of the box) in the community, and make wise choices in regard to the earth's resources, such as, soil, water, fauna and flora.

Sustainable practices can provide for a higher quality of life as well as a healthier environment, but always consider; how can you use this to create jobs and recycle cash flow in your economy?

The following list of sustainable practices should provide a framework for a richer and more diverse community experience.

Recycling

The establishment of a business opportunity- by collecting, recycling and dispersing used debris.

- Sell metal debris that is not restorable or reusable as scrap metal.
- Sell glass, aluminum, plastic, paper, wood and other materials to recycling centers.
- Restore and reuse construction debris, such as, debris of historical significance, hardwood floors, old beams, mantles, rebar and old bricks.
- Create garden art from scrap metal for sale at the First Annual Garden Art and Plant Festival in early spring, at the central lawn by a new farmers market.

Recycle Toxins

- The city should host a citizens hazardous materials recycling day to recycle toxins such as, paint, antifreeze, batteries, oil, pesticides, fuels and other toxic substances and then sell collected materials to recycling centers. Unsalable materials must be disposed of in a safe and legal manner. Consult with the Mississippi Department of Environmental Quality.

Recycle Books

- Book and magazine recycling could take place in a public building (e.g. your local library) to provide free reading material to children and other citizens.

Recycle Vegetative Debris

- Create a business opportunity for the collecting and composting of organic material, and also producing soil amendments and mixes for sale to home owners, the city, and landscape companies.
- After establishing an opportunity for citizens to sell their yard debris the city should develop an ordinance requiring private property owners to keep their yards free of such debris, for the public's health, safety and welfare.

Plant Industry

The following opportunities exist to create an industry around growing, using, and marketing of plant materials.

- Construct a plant nursery – which would entail producing container grown native trees, shrubs and perennials for restoration and landscaping. The production of herbs, vegetables and cut flowers can be produced for retail growers.
- Construct a distribution and production facility which will grow organic vegetables, herbs, and cut flowers. The facility will grow part of their produce and contract grow the other items with local residents, such as, the grandmother growing cut flowers in her front yard.
- Make available products that can be marketed to restaurants, hotels, casinos, and schools.
- Construct a farmers market as an outlet for businesses, the backyard grower and the craftsmen, such as, scrap metal artists.

Storm-water

Storm water collection, storage, use, and discharge provide opportunities for the following:

- Flood control
- A diverse wildlife habitat
- Creation of a diverse visual environment
- Facilitation of higher property values
- Passive recreation, such as, bird watching
- Increased residential development
- Improved water quality
- Irrigation Usage
- Backup water sources for fire departments

The use of rain gardens, bio-swales and green parking lots reduce run-off and allow reductions in the size of storm water structures.

A storm water ordinance will be needed for new construction and renovations.

Native Plant Species

Planting native species reduces the need for chemicals and water and decreases maintenance time providing a much more sustainable landscape.

Bio-fuels

A new practice is the use of vegetation to generate energy for utilities for small public spaces, such as city hall. Small systems are available for this use. For more information:

http://www.cleanenergystates.org/Publications/NREL_Biomass_Gasification_Mkt_Assessment_46190.pdf

Wind and Ice Resistant Plant Material

Planting with storm resistant, native varieties of trees and shrubs have the added benefit of providing wind buffers to protect homes and reduce energy consumption. This practice also protects utilities and structures during storm events.

Low Landscape maintenance

Using native varieties of grasses, shrubs, and trees and reducing grassed areas will decrease maintenance time and costs.

Greenways

Greenways exist in every community in varying degrees. Most communities have town centers or floodway/riparian along streams and other water/drainage courses. It is important that each community identify these areas and use them to the greatest natural capacity as possible. Connecting greenways for multiple benefits such as wildlife habitat, storm-water management and recreation purposes increase the benefit to the community for a multitude of social, economic and environmental benefits.

Forest Canopy

Target tree canopies for most communities should be around 40% of surface space. This will provide maximum benefits derived from shade, water, air, and many other resources.

Ordinance Development

Sustainability plans should include a variety of policies in regard to storm-water management, land development, street and yard maintenance, tree and landscape ordinances, conservation easements, land use zoning for green areas, many other facets of green community development.

Local Citizen's Teams and Resources

During this time of limited resources most communities find it necessary to rely on citizens to become a key part of the improvement strategy for their communities. After all, it's the citizen that truly benefits from the improvements. Organizing volunteers in efforts to promote and implement sustainable community practices is key to a successful program.

6. Urban Forestry Management Plans and Recommendations

Chapter 1 - Guidelines for Sustainable Community Forest Management

1. Conducting a Community Resource Inventory.

Every community possesses an array of resources and qualities that give it unique character and a sense of pride. These resources are vital to the well-being and long-term success of the community and must be protected. Communities desiring to embark on a resource-based planning process, with an ultimate goal of sustainable development, are well-advised to conduct an inventory of the community's resources.

The City of Pass Christian in partnership with the Mississippi Urban Forest Council (MUFC) held planning sessions with the community leaders and local citizens. These sessions provided an opportunity to inventory and develop a list of amenities to include in the plan. Not only were the natural aspects of community planning included, but also included were the social and economic inventories and assessments such as natural resources, historic resources, people resources, churches, parks, schools, public lands, public buildings, business opportunities, community festivals and activities and other amenities. Recommendations suggested by citizens to enhance the community were developed based on both need and opportunity. The list below includes some of the activities suggested for revitalization through community forestry and are to be included in a "Green infrastructure" plan.

Our approach included Street Tree Inventories, local training, recommendations from local citizens, a professional arborist and an urban planner.

Sample inventories provide information needed for a community to make informed and rational decisions about future plantings and development of green spaces.

1. Assemble a small working group of knowledgeable citizens. This group should acknowledge the responsibility of other civic boards and commissions for the creation and maintenance of the inventories.
2. Determine the study area of the inventory. The inventory process is fundamentally the same, no matter the scale (e.g., site, town, watershed, or region.) The best scale for a community to use is that which best suits its needs.
3. Review existing documents that were previously completed by the community. These documents may include conservation and development plans, resource inventories, and special studies or plans. Work of adjacent jurisdictions and/or the help of a regional planning agency may also be helpful.

4. Assemble maps and information from local and state sources. Maps are available from a variety of different sources. When assembling the maps, caution should be taken to *not* get overwhelmed by details. Remember to gather only that information which will help the community make better land use decisions.
5. Write a draft report. The report should include both a map and sources, along with a narrative that describes that map and how it may or may not be used.
6. Publicize and solicit information to both the town's boards and commissions and to its citizens. Use all available resources to publicize the importance of this information to the community. Solicit input from citizens and incorporate constructive and improved information into the inventory. Information from the CRI can be incorporated into nearly all planning decisions that affect the community, from open space to economic development. If the CRI information is to be effective, commissions assigned the responsibility for the inventory must keep it up to-date. The inventory should be revisited to ensure that the most current information available is provided to the community's decision makers.

2. Natural Resource-Based Planning

When community planning and decision-making revolve around natural resources, a thorough and correct natural resource inventory is essential. The inventory should first be conducted at the landscape-level by an interdisciplinary team comprised of individuals from natural resource professions, civic, federal, state and local governments, concerned community organizations and nonprofit organizations. The inventory should include a woodland survey and resource assessment and should produce a Comprehensive Landscape Resource Map, containing all pertinent survey and assessment information. Following the inventory, communities can begin developing an open space plan that is sensitive to the area's unique sense of place and its natural resources. Open space can best be categorized by the functions that it achieves.

Six functional types of open space include:

1. natural resource protection areas, (e.g., animal and vegetative habitat, stream corridors, and rock ridges);
2. outdoor recreation; active, (e.g., parks, pocket parks, playgrounds, beaches, and trails); and passive, (e.g., plazas, sitting areas, arboretums);
3. resource management, (e.g., forests, fisheries, and farmland);
4. protection of public health and safety (e.g., floodplains, wetlands, in unbuildable areas, or areas with limitations for development);
5. areas that shape community character or design (e.g., buffer strips, front, back, and side yards, urban plazas, greenways, open space dedications);
6. historic or archeological sites (e.g., battlegrounds, historic structures and their grounds, historic districts, town greens).

No matter what the intended function for open space, it is important that a community possess a unifying game plan to address new development with a directive, rather than reactive approach. The desires and needs of the community regarding any new development should be communicated clearly and frequently so that irreversible, harmful mistakes are not made. After the open space plan has been developed, a more thorough plan of conservation and development can be created. This plan consists of designating areas of no new development, limited development, and suitable future development. Examples of areas not to be developed include existing developments, committed open spaces, and regulated wetland areas. These areas can be permanently protected through conservation easements. Areas with limited development include those with little net buildable area or those with large lots. These areas can be designed with conservation in mind, making shorter, narrower roads and creating new open space. Areas suitable for future development are those areas considered “growth areas” by communities (e.g., shopping centers, new subdivisions). Whenever possible, areas of limited or new development should be viewed in a regional perspective and possibly linked to form greenways. Additionally, any new developments or alterations to existing developments should incorporate native natural vegetation and trees.

Question 1 - What do you have?

Step A - Assess the tree resource.

An assessment of tree resources is advisable for the city. The assessment will provide the basic information necessary for making management decisions and provides a baseline against which change can be measured. Ideally, this assessment should include all tree resources within the planning area of the municipality. Tree resource assessments are based on various inventory methods, most of which require some type of survey.

Sample survey method would use the iStreets platform and would be carried out by a registered forester familiar with the software. A more complete sample of the town could be performed, but will be more costly and require permission from private landowners. This type of survey would show a more complete representation of the forest as a whole. Again, the sample inventory should not exceed 6% of the total*.

Step B. Review tree management practices.

Understanding the status of the urban or community forest requires knowing how it has been previously managed. Some information that should be collected on past and current management methods and actions include:

1. municipal tree care cycles, practices, including planting, maintenance, and removal,

2. existing ordinances, and level of enforcement practiced (i.e., numbers of violations, permits and citations issued, penalties and fines collected),
3. planning regulations and guidelines pertaining to trees, and numbers of tree-related permits granted, modified, or denied, and
4. activities of municipal departments and public utilities that impact trees.

The purpose of reviewing past and current tree management practices is to identify all activities affecting trees in the community, especially those falling under municipal control. For instance, seemingly unrelated ordinances and planning regulations may directly or indirectly impact forest resources and, therefore, must be taken into account.

Question 2 - What do you want (i.e., goal setting)?

Step C - Identify Needs.

Once information on the status of tree resources and tree management is in hand, a community can assess its urban forestry needs. Urban and community forestry needs can be grouped into three broad categories, with some needs falling into more than one category.

Biological needs (i.e., related to the tree resource itself):

1. increase species and age diversity to provide long-term forest stability,
2. provide sufficient tree planting to keep pace with urban growth and offset tree removal,
3. increase proportion of large-stature trees in the forest for greater canopy effects, and guarantee proper compatibility between trees and planting sites to reduce sidewalk damage and conflicts with overhead utilities that lead to premature tree removal.

Management needs (i.e., needs of those involved with the short and long-term care and maintenance of the urban forest):

1. develop adequate long-term planning to guarantee the sustainability of the urban forest,
2. optimize the use of limited financial and personnel resources, increase training and education for tree program employees to ensure high quality tree care, and coordinate tree-related activities of municipal departments.

Community needs (i.e., those that relate to how the public perceives and interacts with the urban forest and the local urban forest management program):

1. increase public awareness of values and benefits associated with trees,
2. promote private tree care through better public understanding of the biological needs of trees,
3. foster community support for the urban forest management program, and promote conservation of the urban forest by focusing public attention on all tree age classes, not just large heritage trees.

Although the needs listed above are common in many communities, specific needs of each community will vary, and may include others not noted here.

List of Community Forestry Needs for the City

1. Maintenance and Training Needs:

- Planting replacement trees to avoid sidewalk damage
- Utility Pruning (High Need)
- Local Value of Trees and Boulevards
- Small Business Out reach
- Housing and other low income audience education

2. **Green Campaign Development:** Develop a local campaign that includes business, chamber, low income neighborhoods and MDOT. Be sure that the retirement community is involved or leading.... Include city's colorful history in the campaign. Another opportunity is to include high school students in communicating and participating in an active "Green Campaign" to include a series of sustainable activities.

3. **Private Participation:** Many of the green spaces along the highways and other access roads to the city are on private property. Develop a Right Tree, Right Place campaign and a local tree nursery could provide free trees to those property owners. Use the CanVis program to help citizens visualize and understand the benefits associated with a "greener community." Develop a method for home and business owners to plant trees in private green spaces to assist in canopy development. Inventory possible places to plant trees.

4. **City Activities:** The City already does a good job in planting and planning, continue this effort and strive to increase local citizen participation to conduct part of the work.

Other Needs:

- Continued community tree planting programs, education and involvement would be beneficial
- Increased green infrastructure, such as; recycling, bio-swales, rain gardens, pocket parks downtown, green materials and home vegetable and flower gardens.

Step D - Establish Goals and Recommendations.

With information on resources and needs collected, goals to address local urban forestry needs can be set and a management strategy formed. To establish realistic goals, it is important to consider limitations posed by the level of community support, economic realities, and environmental constraints. Limitations on resources may make immediate addressing of all identified needs impractical and, in this case, it will be necessary to prioritize goals. Community involvement and support are critical in the establishment of goals since most urban and community forestry ordinances rely heavily upon voluntary compliance by the public, and compliance will only occur if the public supports the goals set. Involving the public in the goal-setting process allows them to reflect on the values of their community as well as educate themselves on how urban forest management affects their community.

Since goals are tangible ends that the management strategy seeks to achieve, it is important to set goals which are quantifiable, so that progress toward achieving these goals can be monitored. Typical tree program goals, as well as corresponding ordinance provisions for each goal, consistent with good urban forest management are discussed in detail in Appendix B.

Question 3 - How do you get what you want?**Step E - Select tools and formulate the management strategy.**

This step develops a management strategy addressing specific goals. It is important to remember there are many approaches that can be used to address each goal and the pros and cons of each approach should be considered. Feasibility, practicality, legality and economics should be considered in selecting appropriate management tools.

Some typical tools include:

1. public education programs,
2. assistance and incentive programs,
3. voluntary planting programs,

4. mitigation guidelines,
5. planning regulations and guidelines, including the general plan and specific plans, and
6. ordinances.

Community involvement and support continues to be important in this phase of the process; if management approaches and tools are unacceptable to the community, they are unlikely to succeed. Your assessment of current and past management practices should provide ideas about the effectiveness of various methods used in your community and public input and comment should be sought for any new approaches being contemplated or developed. The role of an ordinance becomes apparent at this stage, when it may become necessary to establish new positions, require development and implementation of a community forest master plan, mandate a program of public education, or outlaw destructive practices. Any provisions placed in ordinances should be directly related to the goals your community has established for its community forest, and all ordinances should include all of the essential components previously listed.

Step F - Implement the management strategy.

No matter how ideal a plan may appear on paper, it cannot achieve its goals until it is implemented. Implementation of the management strategy requires several steps, which may differ between communities and include:

1. passing an ordinance,
2. budgeting necessary funds,
3. hiring a municipal forester or arborist,
4. appointing a citizen tree advisor board,
5. formulating a master tree management plan, and
6. developing public education programs.

The above steps need not require funding if a volunteer tree board can be formed and ordinances are in place. Cities can implement a management strategy without funding; planting and conserving many trees. It is often useful to map out an implementation schedule to accomplish the steps involved in your community's management strategy. The schedule should show the steps involved and the time frame within which they should be completed. Additionally, progress checks in the form of required progress reports to the city council or county board of supervisors should be built into the schedule to make certain that delays or problems are detected and addressed. Maintaining a high profile for the management program during implementation will help foster public interest and maintain the commitment of local government.

Question 4 - Are you getting what you want?

Step G - Evaluate and revise.

Monitoring of your implemented management strategy is essential to make certain that progress is being made and standards are being met. Evaluation provides feedback on the effectiveness of the strategy, it also provides opportunities to reassess the needs and goals of the community and it allows readjustments and changes to goals before a crisis develops.

Question 1 - What do you have?

Step A - Assess the tree resource.

A sample tree inventory was undertaken to ecologically and environmentally assessed areas including street tree resources. The aim of the sample inventory was to provide a quick estimation of street tree species, diversity, ecological and environmental benefits. A more complete survey is highly advised.

Step B - Review tree management practices.

Data collected during the sample inventory facilitates assessment of structural components and management practices (i.e., canopy coverage, conditions, distribution, pruning needs) as well as other conflicts associated with public safety for city street trees. This assessment can be categorized by ward and zone type to show where management is needed most to improve street tree health and sustainability and to show how investing in a management program has provided benefits through maintenance of street trees.

Question 2 - What do you want (i.e. goal-setting)?

Step C - Identify Needs.

Calculations of overall canopy cover, condition of street trees, street tree distribution by land use and pruning and maintenance needs aided the city in an assessment of overall management needs. Canopy cover is the driving force behind an urban forest's ability to produce benefits in the community. As canopy cover increases, so also do the benefits afforded by increased leaf area (e.g., greater rainfall interception, shade, cooling, CO₂ reduction, pollutant uptake, aesthetics). Residents pay the city to manage street trees for the benefit of the community and to realize the maximum return on this investment. A city should strive to maintain present canopy cover in a way that promotes annual increases. The recommended canopy cover of an area is 40%

(*Green Infrastructure*, Benedict and McMahon, 2006). Increasing canopy cover now can be a tremendous investment in the future health of the urban forest, especially canopy cover. Unfortunately, budget constraints of municipal tree programs often dictate the length of pruning cycles and maintenance regimes rather than the needs of the urban forest and its constituent components. In fact, many cities do not have a programmed pruning plan, but maintain trees under “request” and “crisis” mode, finding them further and further behind every year. Programmed pruning, under a reasonable timeline, can improve public safety by eliminating conflicts, reducing costs by improving program efficiency and increasing benefits by improving tree health and condition. Any short-term dollar savings realized by cities deferring pruning only do so at the expense of lost tree value.

Step D - Establish Goals.

Guidelines for Effective Urban and Community Forest Management

The city’s first tree board, along with a professional urban forester should provide oversight and guidance in establishing a community forestry program and influence decision-makers to pass the second tree-related ordinance. This ordinance could provide for a broader spectrum of professional expertise on the board (i.e., an arborist, a landscape architect, a horticulturist) and more community involvement by expanding the board to seven members. Part of the work of the board is securing much needed funding through grants.

Question 3 - How do you get what you want?

Steps E and F - Select Tools, Formulate and Implement the Management Strategy.

With respect to street trees; plan goals and objectives by outlining what any city would be proud to achieve: “Main Goal – protect existing trees and increase tree cover in the city.” City street trees and trees within public facilities are to be maintained in a healthy, vigorous condition to provide numerous benefits including shade, wind barriers, improved air quality, and visual relief. The city’s comprehensive urban tree management plan selected tools such as ecologically and horticulturally sound pest and disease control; a high standard of pruning; proper planting and establishment methods; and a timely response to complaints and safety concerns to implement their management strategy. In other words, the city sought to maintain a functional municipal forest that is both healthy and safe, with street tree populations that yield numerous benefits without compromising environmental quality or the well-being of the citizens who live, work, and play there. Ultimately, the city should “get what it wants” by accomplishing their objectives of maintaining mature trees, tree planting, establishing a tree nursery, supplying trees to residents, maintaining young trees and improving tree ordinances. These ordinances can apply to any city wanting to protect, maintain and restore its trees and are, in fact, a good set of objectives and goals for which to strive.

Question 4 - Are you getting what you want?

Step G - Evaluate and Revise.

Although street tree inventories can and do occur as a precursor to new community forest management plans, they can also be helpful in evaluating and revising management plans already in place. As discussed above, this tool was used to evaluate the city's management plan and will, no doubt, be used to make any necessary revisions for the future. As part of the natural resource based plan or overall urban forest management strategy, municipal officials, committees, tree boards and commissions and other affiliated parties must determine and carefully examine any codes, regulations, ordinances, or laws that may affect, however remotely, the plan or strategy. Any and all codes, regulations, ordinances or laws must then be addressed and the plan or strategy altered, prior to approving or initiating any activities.

Some examples of codes, regulations, ordinances or laws that may be in place in Mississippi communities include:

1. subdivision ordinances, (exercise power in subdivision design, including physical layout, street standards, utility service, and open space);
2. zoning regulations, (control land use by dividing the land into different use districts and setting standards for development, including parcel use, lot size, density, street and property line setbacks, and structure size);
3. building codes, (dictate to what standards structures must adhere, including fire resistance, capacity, size and height, and appearance);
4. vegetation ordinances, (address undesirable plants, municipal trees, and arborist certification and licensing);
5. tree protection ordinances, (protect existing trees and other vegetation during development and regulate tree removal by establishing definitions, procedures, penalties and appeals necessary for enforcement);
6. special tree, species, and ecosystem regulations and laws, (often require specific guidelines for their maintenance and protection);
7. landscape ordinances, (require submission and approval of landscape plans, tree location plans, or new tree planting for new developments or development rehabilitation);
8. screening ordinances, (set standards for structural and/or vegetation screening on lot peripheries and vegetated islands within the lot); and
9. energy conservation regulations, (reduce wind speed, mitigate urban heat islands, and reduce overall energy use and waste).

Although not all of the above codes, regulations, ordinances or laws will be in effect in or applicable to, all communities or situations, many will apply and can affect plans or strategies. Communities should take steps to ensure that the review of all

future development includes checking the plan against their Community Forest Management Strategy. Careful examination and attention to detail can help avoid potential conflicts of interest and ensure plan success.

The City Tree Ordinance was reviewed and recommendations were made to be included in this plan.

Tree Ordinance Recommendations:

Revision and Addition Suggestions

Revisions:

- Refine Master Tree List of species

Additions:

- Add Section “Authority, Intent, and Purpose” of Tree Board for public awareness of intentions
- Expand by adding sections to include forester/arborist duties and authority
- Form a solid Community Tree Plan along with a registered forester and include for implementation
- Review adding Section “Enforcement, Penalties, and Appeals”
- Require Permits for certain tree/shrub work? If so, add Section “Permits”
- Protection for public trees and tree abuse?
- Yearly review

Air and water quality remain two of the most critical issues in sustainable environmental planning. Concern over the effects of carbon accumulation in the environment and the potential for long-term climate change have prompted many municipalities to increase their enforcement of urban forestry and landscape ordinances. “Green Laws,” as they are commonly called have taken on a new significance at both the state and local level, as communities strive to maintain and improve the quality of life for their residents and visitors. Standardizing and strengthening these types of guidelines has the obvious potential to enhance the aesthetics and economic property value of an area but may also generate additional economic returns in the form of lower maintenance costs and improved public health.

Along with tree ordinances, Green Laws may be crafted in the form of landscape laws and other codes or regulations designed to address land usage, development and post construction issues. While they are developed with similar purposes and expected outcomes in mind, agencies responsible for each level of responsibility may vary considerably depending upon a community’s size

and funding capability. Some of the most comprehensive examples and strategies for implementing rural Green Laws can be found at the Louisiana State University Web site.

Chapter 2: Guidelines for Conserving Wooded Areas

Conserving Wooded Areas

Best Management Practices (BMPs) to Conserve Wooded Areas at the Landscape Level

Conservation of wooded areas should be an essential part of any land development project.

Conserving and incorporating trees into existing neighborhoods, new developments, and the watershed can lead to more livable communities that retain the integrity and benefits of natural resources and are ultimately more sustainable. Community planners can more easily conserve wooded areas by adopting and following a step-by-step land-use approach that consists of defining goals, conducting an inventory and assessing resources, creating a conservation plan and identifying and selecting land protection options.

Define Goals

Goals to conserve wooded areas across the landscape should include:

- protection and/or restoration of ecological integrity and functions,
- protection and promotion of connectivity and continuity of wooded areas across the landscape and political boundaries,
- establishment or creation of networks of forest communities as open space,
- definition of neighborhood and community boundaries,
- concealment of unsightly or incompatible land-use practices, and
- protection of wildlife habitat and corridors.

Inventory and Assessment of the Resource

A landscape-level resource inventory that includes a woodland survey, resource assessment and produces a Comprehensive Landscape Resource Map should be conducted. The woodland survey and resource assessment consists of:

- delineating tree stands,
- identifying and classifying wooded areas by type and condition,

- assessing ecological functions as well as conservation values of wooded areas within the jurisdiction and adjacent jurisdictions,
- identifying, classifying, and assessing other natural resources (i.e., wetlands, farmlands, areas occupied by rare plant and animal species, and projected green spaces), and
- identifying watershed, drainage, topography, soil types, existing infrastructures, and areas of significant historical and cultural values.

Following the woodland survey and resource assessment, a Comprehensive Landscape Resource Map, containing all pertinent survey and assessment information, can be created.

Creating a Conservation Plan

A conservation plan, based on the resource inventory and assessment data and Comprehensive Landscape Resource Map should be created by:

- identifying and locating wooded areas,
- identifying and locating sites for main transportation systems and utility infrastructure,
- selecting wooded areas to conserve, including:
 - larger tracts or remnant wooded areas,
 - wooded areas that have potential to be connected to others,
 - wooded areas with significant ecological functions and conservation values,
 - wooded areas occupied by rare plant and animal species,
 - areas with reforestation and restoration potential.
- identifying developable areas.

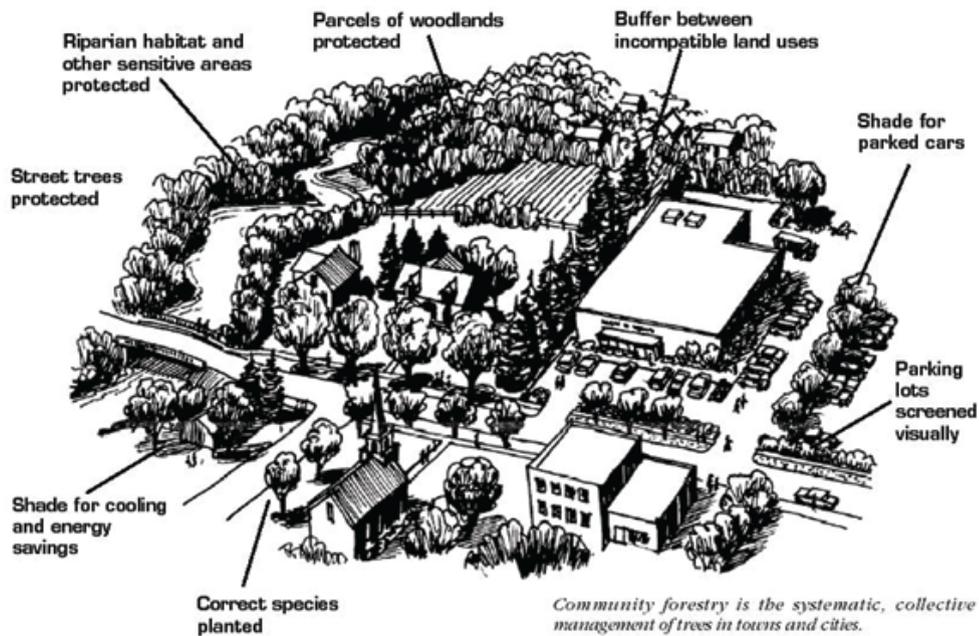


Figure 3-1. Examples of methods to incorporate trees into existing neighborhoods, new developments, and watersheds. Source: Fazio 2003

Management Manual

Once all of the above areas have been identified and recorded on the Comprehensive Landscape Resource Map, the map should be entered in a Geographic Information System (GIS) and shared with other local and regional units of government, developers, builders, and private organizations to promote continuity and connectivity of wooded areas across the landscape and enhance coordination and partnerships among all stakeholders. Developers and builders should also be included in this process and be informed of conservation goals and wooded areas set aside for conservation.

Identify and Select Land Protection Strategies

Following the development of a Comprehensive Landscape Resource Map and identification of wooded areas to conserve, appropriate land-protection options should be selected. Options available to local and regional units of government include use of zoning and subdivision ordinances and consideration of other conservation and protection options.

When drafting ordinances to promote conservation of wooded areas:

- gather input from developers, builders, and citizen organizations,
 - integrate conservation values in zoning codes and policies,
 - identify developable subdivisions and conservation zoning districts in the comprehensive plans,
 - determine the type of development to be allowed using information contained in the Comprehensive Landscape Resource Map,
 - promote flexible subdivision ordinances that encourage variable lot sizes and configurations, street width and setbacks according to traffic, utility types and easements and creative development plans,
 - draft local woodland and tree-protection ordinances for both public and private property,
 - provide incentives to reduce impervious surfaces (including reduced road width, setbacks, parking lots or provision of additional lots, tax incentives and public recognition or awards),
 - promote the use of joint utility easements and trenches for underground utilities and rights of way for overhead lines,
 - create a local natural resource advisory board to foster participation of community organizations including citizens, nonprofit organizations, developers, builders, and contractors,
 - create conservation overlay districts in the jurisdiction using comprehensive plans and zoning ordinances and determine urban growth boundaries for infrastructure (i.e., new water and sewer lines),
 - provide incentives to promote or mandate implementation of conservation designs such as conservation zoning designs, open space designs, conservation subdivision designs, and cluster development designs.
-
- set up conservation standards based on sound protection options of wooded areas (e.g., promotion of the conservation of 50 to 70% of wooded areas in residential zoning districts as natural wooded open space),
 - promote new and flexible approaches to conservation (e.g., dedicate 15 acres of land for park, playground, and public open space for every 1,000 residents or prohibit development on wooded areas of 10 acres or larger) and
 - provide a management strategy to maintain and enhance the quality of protected wooded areas (the strategy should have an education component for the public and include frequent assessments of tree and forest health, fire hazards, and wood utilization).

Other conservation and land protection options that have been developed to assist landowner and local units of government include:

- conservation easements,
- land-retirement programs,
- property tax-relief programs,
- restoration cost-share programs,

- registry programs,
- land transfers,
- deed restrictions,
- mutual covenants,
- management agreements,
- land donations,
- land sales to conservation buyers,
- land exchanges, and
- transfer of development rights.

BMP's to Conserve Wooded Areas at the Subdivision Level

Define goals

Goals to consider in land development should include:

- conservation of green corridors,
- conservation of wooded areas as natural open space or a conservancy area, and
- protection of individual trees.

Inventory and Assessment of the Resource

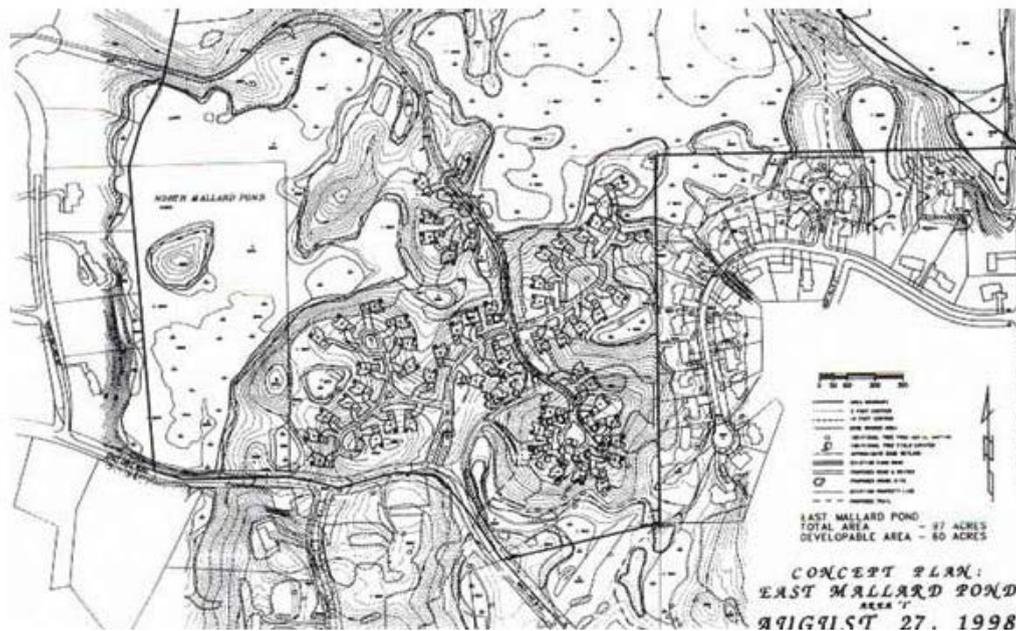
Resource inventory and assessment at the subdivision level should follow the same steps as those conducted at the landscape level but at the smaller scale of the subdivision. Generally, the resource inventory and assessment for a subdivision is accomplished in three steps:

1. evaluate existing resource information (obtained from larger scale resource inventory and assessments, including any local zone and tree preservation ordinances),
2. conduct site review and survey trees (including identification and location of wooded areas and other natural resources, and delineation of potential wooded areas to protect).

The site review and tree survey is conducted by:

- obtaining aerial photography (available through tax assessor),
- incorporating remote sensing data,

- identifying and locating wooded areas and other land types, and
 - delineating potential wooded areas to protect, such as:
 - wooded areas protected or identified by local, state, and federal laws, policies, and/or regulations (i.e., wetlands, greenways, and natural areas),
 - wooded flood plains, wooded stream corridors, steep wooded slopes, and buffer zones, and
 - remnant tracts of wooded areas at least one acre in size with healthy trees.
3. create a Comprehensive Landscape Resource Map for the subdivision that will be used as the basic tool from which all decisions related to the development will be made.



Create a Wooded Area Protection Plan

Using the subdivision Comprehensive Landscape Resource Map, develop a protection plan which includes:

- selection and delineation of wooded areas to protect, considering the following steps:
 - record location of wooded areas to be protected based on the goals and information provided on the resource map,
 - record all areas likely to be adversely impacted during construction,
 - record areas that can be used for reforestation and/or restoration, and
 - locate and delineate developable and buildable sites, and
- submission of development plan for approval which should be collectively reviewed by the developer and the county, city, or township planner.

Select a Protection Method

Once the development plan is approved, the developer and/or builder should select the protection method that consists of several steps:

- determine the protected root zone, which is:
 - off limits to all construction activities, and
 - should be determined and protected prior to construction.
- mark the protected root zone,
- determine the grading area and method,
- define reforestation plan and method (should select suitable tree species planting design to meet intended goals), and
- record trees to be transplanted to other locations.

Monitor and Evaluate the Conservation Plan

If a conservation plan is to succeed, participation and commitment of all parties involved in the development project is essential.

Plan monitoring and evaluation should include:

- education of those involved regarding goals and tree protection measures,
- site inspection which includes frequent visits to the site to check for violations of tree protection plans, and
- financial penalties for violations (may be monetary or replacement of trees).

BMPs to Protect Trees at the Lot Level: New Construction, Remodeling, and Redevelopment Recommended Practices

Proactive planning and use of appropriate approaches and tools can guarantee greater protection and conservation of wooded areas and trees during construction.

To achieve protection goals, the following steps should be taken:

- Define goals, including:
 - protection of wooded areas and trees from construction damage,
 - compliance with zoning regulations, conservation easements, and
 - maintenance and enhancement of community aesthetics and property values.
- Inventory and assess trees by:
 - obtaining or drawing a boundary map of the lot,
 - recording the location of all trees and wooded areas,
 - conducting a tree survey and health assessment, including:
 - tree species and age class, and
 - health condition (i.e., trunk form, crown form, and overall condition), and
 - recording tree survey and health assessment information on the Comprehensive Landscape Resource Map.
- Select trees or groups of trees to protect, using these criteria:
 - select trees or groups of trees as needed to comply with any local tree preservation ordinances,
 - select trees and wooded areas found within conservation easements or covenants,
 - select trees that are suitable to the site conditions (e.g., native species and trees with desirable growth characteristics),
 - select trees that provide direct benefits (e.g., wildlife habitat, shade, windbreak, screening, privacy, etc.)

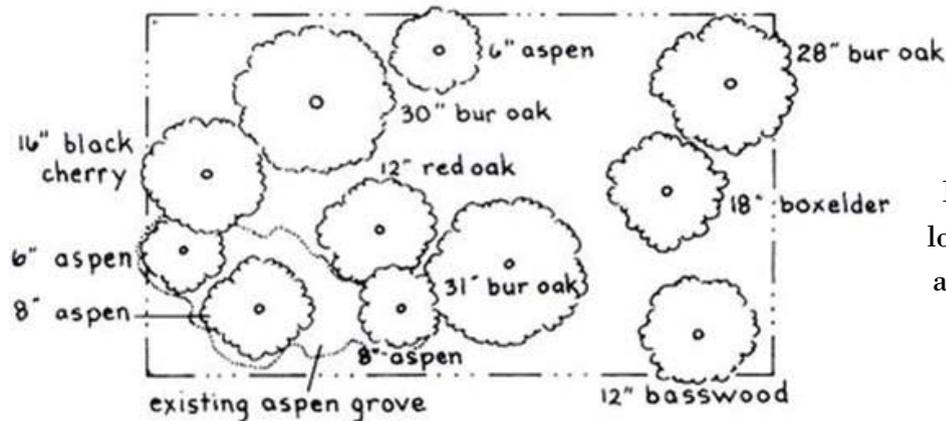


Figure 3-3. A resource map at the individual lot level shows the location of the wooded area and individual trees, species composition, and diameter of trees at breast height.

- select trees that are connected to other trees (e.g., groups or lines of trees) on adjoining property to achieve connectivity,
- pay particular attention to younger trees that may have greater tolerance for site disturbance during construction,
- identify protected trees with colored ribbon, and
- record location of tree and species name on the Comprehensive Landscape Resource Map.
- Select building sites and construction zones and identify other areas such as setbacks, easements, and areas dedicated to conservation.
- Create a tree protection plan by determining and delineating the protected root zone.
- Select and implement tree protection method, and
- Monitor and evaluate by:
 - visiting the building site to check for any disturbance or violation of the tree protection plan,
 - calling for a tree survival and replacement plan to be extended from two to five years following construction,
 - imposing financial penalties, and
 - making referrals to other clients for builders or contractors who do an exceptional job of protecting trees during construction.

Chapter 3: Guidelines for Protecting Urban and Community Streams Protecting Urban and Community Streams

Areas containing community streams must be given special consideration because development in these areas can have a profound impact on stream hydrology, morphology, water quality and biodiversity. Because development is often a gradual process spanning decades and wide regions of the landscape, stream protection strategies must address the comprehensive protection of stream quality throughout the entire development process.

A local urban stream protection strategy has six primary components roughly corresponding to each stage of a normal development cycle from zoning, planning, site design, construction, stabilization, to final occupancy. These components are watershed-based zoning or land use planning, protection of sensitive areas, establishment of buffer networks, reduction of impervious cover in site design, limitations on erosion during construction, quantity and quality treatment of storm-water runoff and maintenance of stream protection measures.

Watershed-based Zoning or Land Use Planning

To a large extent, the future quality of a stream is determined by community land use decisions. Therefore, careful consideration must be given to these streams during the zoning planning process.

The underlying premise of watershed-based zoning holds that impervious cover, not population density, is a superior measure of growth impact. Based upon the variable of impervious cover, it is possible to classify and manage streams within a community using the sequence of steps involved in watershed-based zoning below.

- Step 1 Conduct a comprehensive physical, chemical, and biological stream inventory to assess the current quality of the community streams.
- Step 2 Refine/verify impervious cover/ stream quality relationships and identify sensitive stream systems.
- Step 3 Measure and map existing and future impervious cover at the sub-watershed level and, if possible, project future impervious cover growth based on the build-out of existing zoning.
- Step 4 Designate sub-watersheds into one of three stream quality categories (sensitive, degrading, non-supporting), based on growth patterns and attainable stream quality under existing environmental conditions and the ultimate level of impervious cover.
- Step 5 Modify the existing master plan to meet sub-watershed targets and assure that future growth and impervious cover is compatible with the designated stream classification for each sub-watershed.
- Step 6 Adopt specific stream protection strategies for each sub-watershed (including, but not limited to, watershed or site limits on impervious cover, BMP selection criteria, stream buffers, land acquisition or other protection measures).
- Step 7 Incorporate any management priorities that may arise from larger watershed planning efforts (e.g., at the scale of watershed, sub-basin, or basin).
- Step 8 Implement long-term monitoring and enforcement programs to provide management feedback and assess whether the stream management strategies are achieving stream quality goals set for each sub-watershed. Specific examples of stream protection strategies from watershed-based zoning.

Protection of Sensitive Areas

Sensitive areas such as wetlands, flood plains, steep slopes, critical habitats, shorelines and mature forests can and should be protected through the development, adoption and enforcement of ordinances that prevent development in these areas. Ordinances should describe how each area will be delineated onsite and what protective measures will be taken during all stages of any development process. Additionally, it is a good idea to establish a set of performance criteria to protect these areas.

Establishment of Buffer Networks

There are a number of reasons for creating urban riparian forests or urban stream buffers. In both residential and commercial areas, runoff can contain fertilizers, herbicides, pesticides and other pollutants that can be filtered out by plant roots and broken down by microorganisms and ultimately help add and maintain biodiversity in the urban and community environment.

Benefits of Urban and Community Riparian Forests and Stream Buffers

The buffer's primary value is physical protection of the stream channel from future disturbance or encroachment. A network of buffers acts as a right-of-way for a stream and functions as an integral part of the stream ecosystem but also provides many additional benefits. Benefits are amplified when the streamside management zone is kept in a forested condition. One of the most important benefits of urban and community streamside buffers is their potential ability to remove harmful pollutants from urban storm-water runoff. On the basis of performance data from related vegetative systems, it is possible to estimate the pollutant removal capacity of an urban riparian or stream buffer. A three zone buffer system like the one described below has the potential to achieve the following pollutant removal rates:

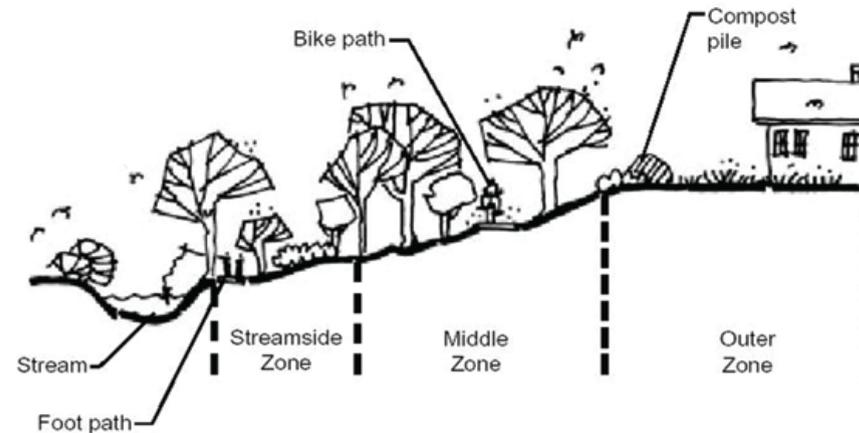
- sediment – 75%,
- total nitrogen – 40%,
- total phosphorus – 50%,
- trace metals – 60 to 70%, and
- hydrocarbons – 75%.

The ability of a particular buffer to remove pollutants, however, depends on many site specific factors. In the case of storm-water runoff treatment, stream buffer use should be restricted to those conditions where site-specific factors assure reliable pollutant removal.

Performance Criteria for Stream Buffers

Planning, design and maintenance of buffers largely affects the ability of a buffer to realize its many benefits. Examples of practical performance criteria are listed below to govern buffer size, management, crossings and storm-water treatment. The 10 example criteria include:

1. Minimum total buffer width—According to a national survey, urban stream buffer sizes range from 20 to 200 ft. in width, with a median of 100 ft. In general, a minimum base width of at least 100 ft. (e.g., 3 to 5 mature trees wide on each side of the channel) is recommended for adequate stream protection.
2. Three-zone buffer system—Riparian or stream buffers are typically broken up into three zones; the Undisturbed Forest or Streamside Zone (Zone 1). Three zone urban buffer system. Source: MDEQ 1994 . The Managed Forest or Middle Zone (Zone 2) and the Runoff Control or Outer Zone (Zone 3), each of which performs a different function, has a different width, vegetative target, and management scheme (Figure 4-1)



Prescriptions are usually based on climatic zone, soil types, soil drainage characteristics, and available and desired tree and shrub species. As an example, on a poorly drained site in the South, recommendations may call for:

- Zone 1 river birch and black willow for bank stabilization,
- Zone 2 cherrybark oak and loblolly pine as filtering mechanisms, and
- Zone 3 maidencane and gray dogwood for grass and shrub runoff control.

For prescriptions on various soil types and drainage capacities and planting recommendations for urban riparian forests in the South see Appendix C.

3. Pre-development vegetative target – Generally, the vegetative target should be based on the natural vegetative community present in the floodplain, as determined from reference riparian zones.
4. Buffer expansion and contraction–The average width of Zone 2 can be expanded to include:
 - the full extent of the 100-year floodplain,
 - all undeveloped steep slopes (greater than 25%),
 - four additional feet of buffer for each 1% increment of slope above 5%, and
 - any adjacent delineated wetlands or critical habitats.

The buffer can also be contracted to accommodate unusual or historical development patterns, shallow lots, stream crossings, or storm-water ponds.

5. Buffer delineation – Three key decisions must be made when delineating buffer boundaries.
 - At what mapping scale will streams be defined? The traditional scale is the blue lines present on the United States Geological Service (USGS) 7.5 minute quadrangle maps 1:24,000 (1in=2,000 ft.).
 - Where does the stream begin and the buffer end? Generally, the stream origin is the point where an intermittent stream forms a distinct channel.
 - From what point should the inner edge of the buffer be measured? Inner edge can be measured from the centerline of small first- or second-order streams and from the top of each stream bank for third and higher order streams.
6. Buffer crossings – Provisions must be made for linear forms of development that must cross the stream or buffer such as roads, bridges, fairways, underground utilities, enclosed storm drains, or outfall channels. Performance criteria such as crossing width, crossing angle, crossing frequency and crossing elevation should be used to minimize impact to the continuity of the buffer network and fish passage.
7. Storm-water runoff – Buffers can be an important component of the storm-water treatment system at a development site. This role is discussed later in the Section “Treatment of Storm-water Runoff.”
8. Buffers during plan review and construction – During each stage of the development process, limits and uses of stream buffer systems should be well-defined.

9. Buffer education and enforcement – Creating high buffer visibility and encouraging greater buffer awareness and stewardship among adjacent residents will help protect the integrity of a buffer system. Steps that will aid in increasing visibility and awareness include:
 - marking buffer boundaries with permanent signs that describe allowable uses,
 - educating buffer owners about benefits and uses of buffers with pamphlets, stream-walks, and meetings with homeowners associations,
 - ensuring that new owners are fully informed about buffer limits/uses when property is sold or transferred,
 - engaging residents in a buffer stewardship program that includes reforestation and backyard “buffer-scaping” programs, and
 - conducting annual buffer-walks to check on encroachment.

10. Buffer flexibility–Incorporating several simple measures into buffer ordinances, such as maintaining buffers in private ownership, buffer averaging and density compensation, variances and conservation easements will help alleviate concerns that buffer requirements could represent an uncompensated taking of private property.

Ordinances for Stream Buffers

To better utilize stream buffers as specific planning tools to protect stream quality and aquatic habitat, ordinances specifying the size and management of the stream buffer should be drafted. The model ordinance provided in Appendix C includes 10 sections that provide suggested language or technical guidance to create the most effective stream buffer zones possible. While much of the model is based on Baltimore County, Maryland’s regulations for the water quality, stream, wetland and floodplain protection, additional features and language have been added in certain sections to enhance the protective functions of the proposed stream buffer.

The language in the sample model ordinance is only intended to provide suggestions for possible wording of a community’s own buffer regulation; it is not meant to be adopted word-for-word. Local situations and concerns will dictate what modifications of the ordinance language will be required. In areas with coastal and estuarine habitats, location- and vegetation specific language should be added. Coastal and estuarine areas will also want to address important offshore features such as shellfish beds and migratory bird nesting areas that are influenced by nutrient and pollutant runoff. Additionally, regions may adjust buffer width sizes according to rain fall amounts or other climatic variables. Finally, political situations within a community may also influence the final choice of buffer width standards, making flexibility in stream buffer zone establishment very important.

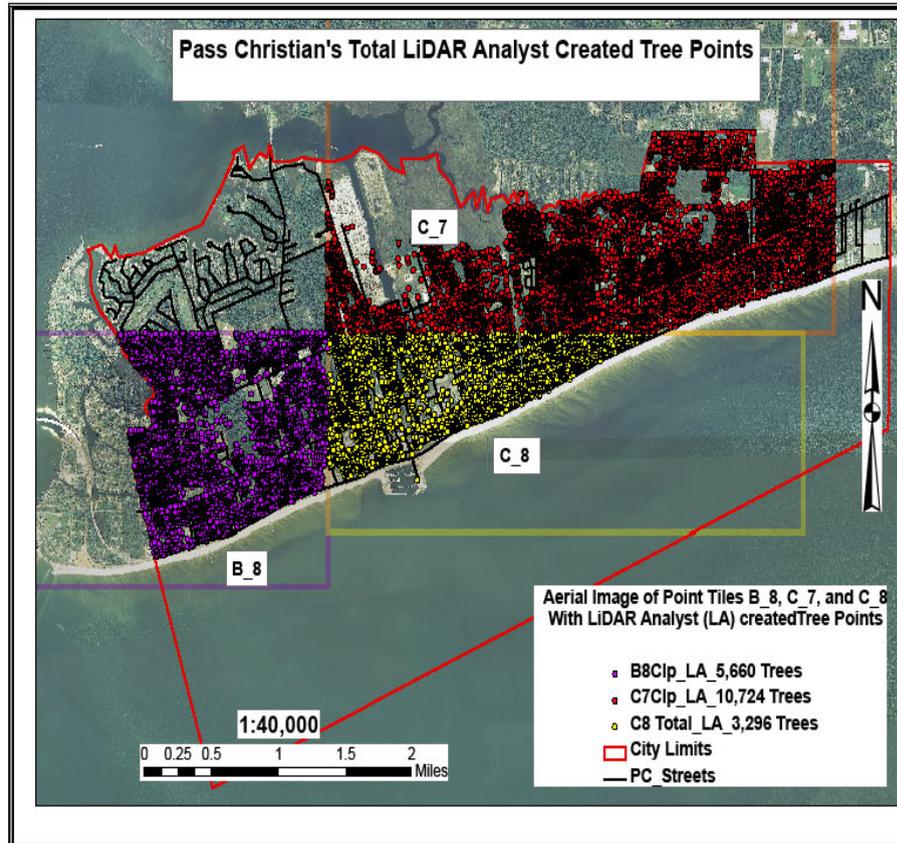
While the wording of buffer regulations is flexible, several features were determined to be integral in developing the most effective ordinance possible:

- The establishment of a minimum stream buffer width. A width of at least 100 feet is recommended to recognize all the benefits that the stream buffer can provide.
- The creation of a three-zone buffer system with the functions, widths, vegetative targets, and management schemes for each zone explained in detail.
- Language that creates the ability to expand the buffer to include the 100-year floodplain, steep slopes and any adjacent delineated wetlands or critical habitats.
- A thorough explanation of the limits and uses of the stream buffer system and requirements expected for any development plan during the entire development process—from initial plan review through construction.
- A system to permanently mark the buffer, both physically on-site, and in the land records, should be enacted.
- A designated management system for the buffer, detailing permitted and restricted uses within the buffer and an educational program that guarantees future residents know about the buffer.
- Any waivers or variances which may be granted regarding the buffer should be explained in detail to avoid legal challenges.
- Maintenance guidelines and enforcement procedures for buffer violations should be included. A strong buffer ordinance is only the first step to preserving stream buffers. Communities will also need an effective buffer program that includes the stream buffer performance criteria previously discussed to manage buffers and enforce buffer regulations. Additionally, during the construction phase, communities must make sure that the clearing and grading permit is well integrated with the forest buffer application. Following construction, programs educating citizens about the importance of the buffer and how to manage it, can help preserve the buffer's integrity.

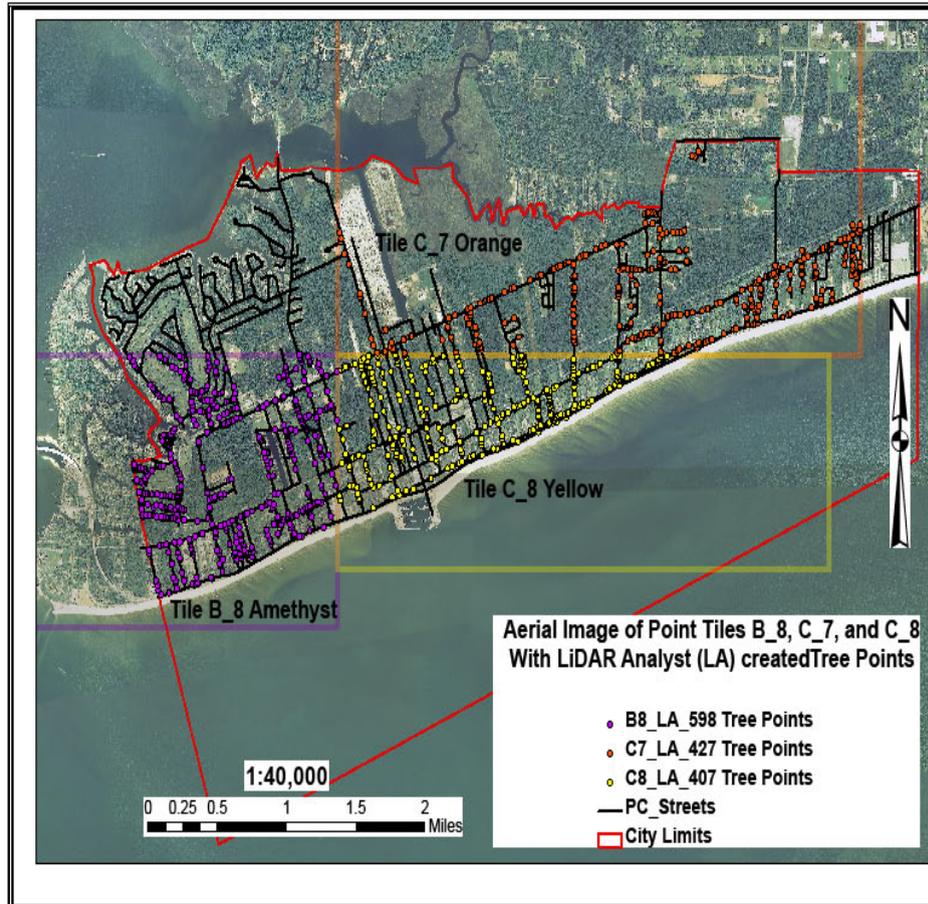
7. Pass Christian's Street Tree Population and the Benefits they Produce

a. Aerial Images Created Tree Points

Pass Christian's LiDAR Analyst created tree points (LATP) that were created across its 3 point tiles is illustrated below.

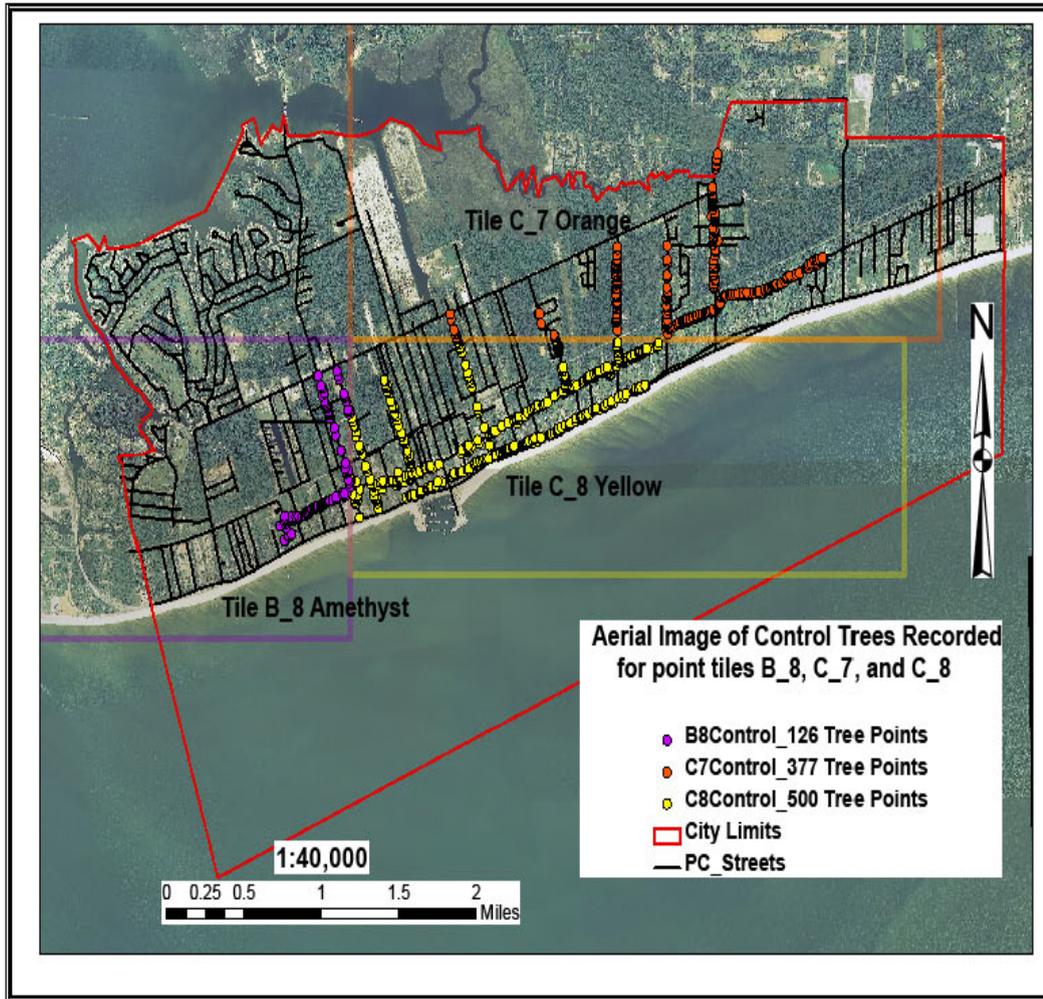


Aerial image of all LATP created across point tiles B_8, C_7, C_8.
Pass Christian's 3 point tiles B_8, C_7, C_8 consist of 61 total miles with 1,432 LATP (i.e. 598 TP B_8, 427TP C_7, 407TP C_8) occurring 30 feet from street edges that were used to model for missing LATP is illustrated below.



Aerial image of Pass Christian's LiDAR Analyst created tree points occurring 30 feet from street edges across three point tiles.

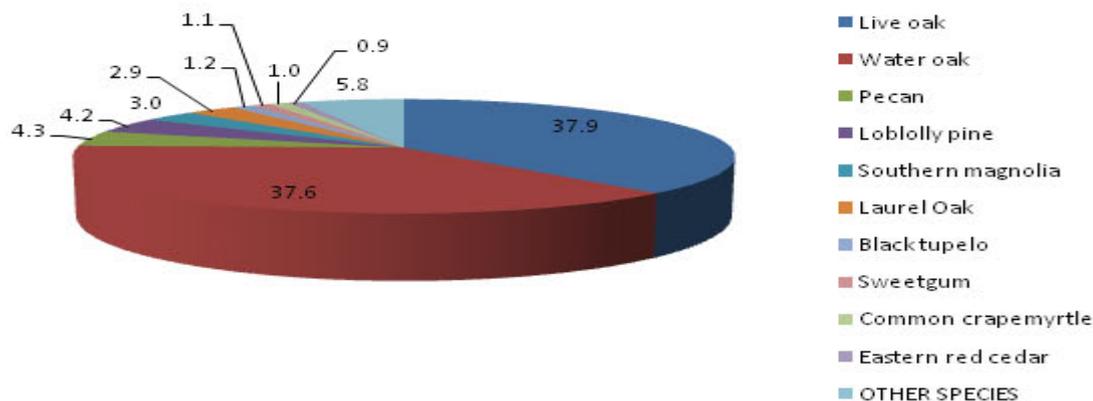
The model used an 11.2 mile sample of 1003 control trees occurring 30 feet from street edges. Control trees inventoried used for comparison occurred along streets from 2 miles in B_8 (127TP), 3.5 miles in C_7 (377TP), and 5.6 miles in C_8 (500TP) are illustrated below. Control tree data was collected during the summer of 2008 and was used as a basis for Pass Christian's structural analysis of its street trees.



Aerial image of control tree occurring 30 feet from street edge across three point tiles.

Data collected during the sample inventory facilitated assessment of structural components (e.g., specie distribution, age distribution, height dispersion, canopy coverage, importance values), environmental benefits, increased property tax base from aesthetic added value, and the overall BCR for the city's street tree management. Pass Christian's specie distribution is illustrated below.

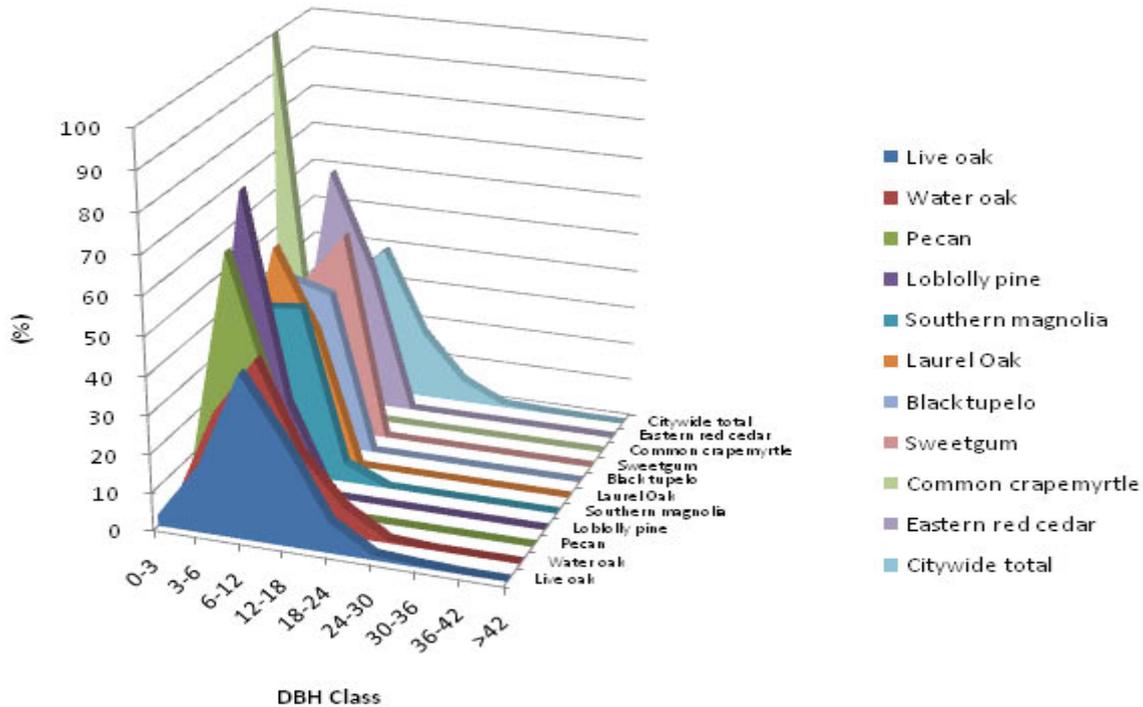
b. Tree Distribution Percentages



Pass Christian's street tree distribution by percentages for the whole city.

Frequency of occurrence and growth category for each tree species found in each point tile was determined from data recorded during inventory for Pass Christian's 1003 street trees. Frequency of species occurrence and their growth categories was used to determine dominance among street trees. Species stratified by DBH classes provide a representation of age distribution throughout the city. This age distribution of species can allow management to concentrate planting in any uneven-aged populations to sustain canopy cover, and height classes for each growth category. DBH classes are illustrated below.

c. Predominant Trees Age Distribution



Pass Christian's predominant trees age distribution by DBH class and percentage.

There was 34 different tree species recorded in Pass Christian, however, only 10 species had an occurrence greater than 1% and 2 species from the Oaks accounted for 75% of all tree species. Out of all the *Quercus* species recorded, evergreen *Quercus virginiana*, Live Oak and deciduous *Quercus nigra*, Water Oak had the greatest frequency of occurrence at 37% each, other significant species were *Carya illinoensis*, Pecan and *Pinus taeda*, Slash Pine each were found to occur 4% of the time. Tree names, species code, number of total trees recorded during inventory and frequency of occurrence are listed below.

	Common Name	Species* Code	Count	Total	Frequency
1	Pecan	CAIL	46	1003	0.05
2	Date Palm	Date Palm	6		0.01
3	Hackberry	CELA	9		0.01
4	Cedar	JUVI	7		0.01
5	Crape Myrtle	LAIN	13		0.01
6	Sweet Gum	LIST	10		0.01
7	Magnolia	MAGR	34		0.03
8	Tupelo Gum	NYSY	11		0.01
9	Pine	PITA	49		0.05
10	Laurel Oak	QULA	39		0.04
11	Water Oak	QUNI	168		0.17
12	Live Oak	QUVI	548		0.55
13	Tallow	SASE	10		0.01
			950		96%
	21 Others	Note**	53		4%

Other trees occurring along Pass Christian's streets that were recorded less than 1% of the time during inventory were red maple, camphor, green ash, bamboo, sweet bay magnolia, mulberry, pear, persimmon, pignut hickory, cherry laurel, cypress, willow and yew.

Pass Christian's overall street tree heights are well dispersed and varied however, there are areas that require pruning, thinning and planting if the city would like to sustain a healthy CC. Management could use tree height classes as a tool on which trees should be targeted for pruning and thinning. As it is very important that young trees 21-30' and 31-40' tall receive the proper developmental pruning so as to mold strong anchors in the landscape. Pass Christian's height classes and their frequency of occurrence are listed below.

Pass Christian's tree height classes, number of trees sampled in each class, and the frequency of occurrence of each height class.

Height Class	Trees/ Height Class	All Trees Sampled	Height Occurrence by Class %
21-30	311	1003	31%
31-40	319		32%
41-50	248		25%
51-60	100		10%
60-90	25		2%

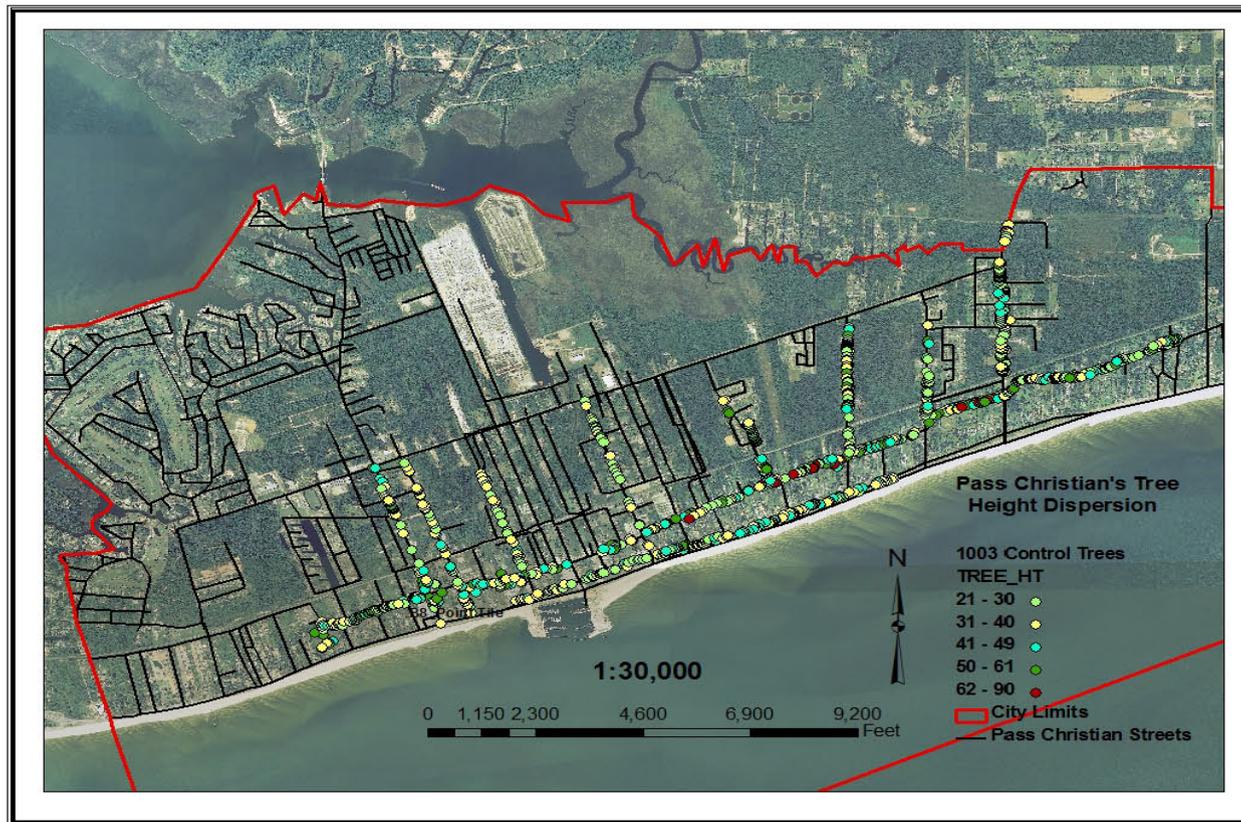
d. Pass Christian Structural Analysis

Pass Christian's structural analysis of its street trees was based on a sample of control trees taken from the total population in three point tiles. This control tree data was collected during the summer of 2008 from a representative sample of Pass Christian's street trees that was determined during a windshield survey. This windshield survey was performed over forty miles of streets that spread out across three LiDAR point tiles B_8 (16.4); C_7 (8.6); and C_8 (15 miles). Ten miles of streets were sampled from tiles B_8 (2.0); C_7 (2.7); and C_8 (6.14 miles) to gather structural attributes for trees that were used as control trees in Pass Christian's three point tiles. Arboreal attributes (e.g., height, DBH, canopy cover) recorded during sample inventory of control trees were used to compare with attributes and locations for LA created trees in each point tile. The total estimated street tree population by growth category that was stratified by DBH class was multiplied by each species resource value which provided a comprehensive dollar value benefit for Pass Christian's street trees. By quantifying and qualifying Pass Christian's street tree structure, this community was able to show, in dollars, the benefits (\$3.23) over costs (\$1) of managing their street trees. This benefit\cost ratio illustrates how investing in a management program could provide monetary benefits greater than the costs.

e. Street Tree Distribution and Species Composition

Frequency of occurrence and growth rate category for each tree species found in each point tile was determined from data recorded for Pass Christian's 1003 street trees. Species occurrence determined dominance among street trees and their growth categories. Growth categories were stratified by DBH classes to estimate CC, and height classes for each growth category. Tree height and canopy cover for all sampled trees and for each individual species were stratified by DBH class into growth categories. For each growth category as an example: tree height was separated into five height classes 21-30ft; 31-40; 41-50; 51-60; and 60-90ft and DBH was separated into seven classes 3-6"; 4-6"; 7-12"; 13-18"; 19-24"; 25-30"; and >31" .

Tree heights varied from street to street with taller classes occurring in older established neighborhoods throughout Pass Christian, however, many of these same areas had an adequate dispersion of young (i.e., 21-30 ft tall) and newly planted trees under 21 feet This dispersion of varying heights is illustrated below.



Pass Christian's tree height dispersion found in inventory.

Importance values determined by i-Tree used specie percentages, leaf area, and canopy cover to determine value listed below.

Species	Number of Trees	% of Total Trees	Leaf Area (ft ²)	% of Total Leaf Area	Canopy Cover (ft ²)	% of Total Canopy Cover	Importance Value
Live oak	1,067	37.9	1,105,276	45.3	722,237	48.3	43.9
Water Oak	1,058	37.6	1,166,135	47.8	650,411	43.5	43.0
Pecan	121	4.3	38,575	1.6	25,486	1.7	2.5
Loblolly Pine	119	4.2	7,281	0.3	18,498	1.2	1.9
Magnolia	85	3.0	37,513	1.5	16,576	1.1	1.9
Laurel Oak	81	2.9	25,283	1.0	16,809	1.1	1.7
Black Tupelo	34	1.2	11,770	0.5	7,577	0.5	0.7
Sweetgum	30	1.1	6,299	0.3	5,889	0.4	0.6
Crapemyrtle	29	1.0	502	0.0	760	0.1	0.4
Other Trees	188	6.7	41,636	1.7	30,008	2.0	3.5
	2,812	100.0	2,440,271	100.0	1,494,252	100.0	100.0

f. Calculating Net Benefits and Benefit Cost Ratio

It is impossible to quantify all the benefits and costs produced by trees. For example, owners of property with large street trees can receive benefits from increased property values, but they may also benefit directly from improved health (e.g., reduced exposure to cancer-causing UV radiation) and greater psychological well-being through visual and direct contact with trees. On the cost side, increased health-care costs may be incurred because of nearby trees, due to allergies and respiratory ailments related to pollen. The values of many of these benefits and costs are difficult to determine. We assume that some of these intangible benefits and costs are reflected in what we term “property value and other benefits.” Other types of benefits we can only describe, such as the social, educational, and employment/training benefits associated with the city’s street tree resource. Research has shown that connecting people with their city trees reduces costs for health care, welfare, crime prevention, and other social service programs.

The following environmental benefits were calculated using i Tree for Pass Christian.

Annual Benefits of all trees by species (\$/tree)						
Species	Energy	CO ₂	Air Quality	Stormwater	Aesthetic/Other	Total (\$)
Live oak	11.84	3.07	0.28	15.69	41.35	72.23
Water Oak	11.83	2.39	0.68	13.40	35.15	63.45
Pecan	4.25	0.87	0.64	3.94	23.76	33.46
Loblolly Pine	2.96	0.59	0.40	2.20	10.24	16.38
Magnolia	3.51	0.63	0.15	5.43	14.24	23.96
Laurel Oak	4.19	0.86	0.63	3.88	23.61	33.17
Tupelo Gum	4.49	0.92	0.68	4.21	24.31	34.61
Sweetgum	4.29	0.82	0.29	3.34	21.01	29.75
Crape Myrtle	0.47	0.05	0.07	0.38	2.87	3.83

Total Annual Benefits, Net Benefits, and Costs for All Street Trees in Pass Christian

Benefits	Total (\$)	\$/tree	\$/capita
Energy	27,540	9.79	4.59
CO ₂	6,285	2.24	1.05
Air Quality	1,322	0.47	0.22
Stormwater	33,261	11.83	5.54
Aesthetic/Other	93,000	33.07	15.50
Total Benefits	161,408	57.40	1.02
Costs			
Planting	0	0.00	0.00
Contract Pruning	0	0.00	0.00
Pest Management	0	0.00	0.00
Irrigation	2,000	0.71	0.33
Removal	33,600	11.95	5.60
Administration	14,400	5.12	2.40
Inspection/Service	0	0.00	0.00
Infrastructure Repairs	0	0.00	0.00
Litter Clean-up	0	0.00	0.00
Liability/Claims	0	0.00	0.00
Other Costs	0	0.00	0.00
Planting	0	0.00	0.00
Contract Pruning	0	0.00	0.00
Pest Management	0	0.00	0.00

Pass Christian tree codes, names, Latin names, and growth categories.

Codes	Common Name	Latin name	DS	DM	DL	ES	EM	EL
ACRU	Red maple	Acer rubra		X				
BAGL	Hedge Bamboo	Bambusa glaucescens				X		
CAGL	Pignut Hickory	Carya glabra			X			
CAIL	Pecan	Carya illinoensis			X			
CICA	Camphor	Cinnamomum camphora					X	
CELA	Hackberry	Celtis laevigata			X			
DIVI	Native Persimmon	Diospyros virginiana		X				
FRPE	Green Ash	Fraxinus pennsylvanica		X				
JUVI	Eastern Red Cedar	Juniperus virginiana					X	
LAIN	Crepe Myrtle	Lagerstroemia indica	X					
LIST	Sweetgum	Liquidambar styraciflua			X			
DIVI	Common Persimmon	Diospyros virginiana		X				
MAGR	Southern Magnolia	Magnolia grandiflora						X
MAPO	Osage Orange	Maclura pomifera		X				
MAVI	Sweet Bay Magnolia	Magnolia virginiana					X	
MOAL	Mulberry	Morus alba		X				
NYSY	Tupelo Blackgum	Nyssa sylvatica		X				
PITA	Short Leaf Pine	Pinus taeda						X
PLOC	American Sycamore	Plantanus occidentalis			X			
PRCA	Cherry Laurel	Prunus caroliniana				X		
PRSE	Wild Black Cherry	Prunus serotina		X				
POMA	Japanese Yew	Podocarpus macrophylla				X		
PYCO	Common Pear	Pyrus communis		X				
PYCOC	Pyracantha	Pyracantha coccinea				X		
QUFA	Southern Red Oak	Quercus falcata			X			
QULA	Laurel Oak	Quercus laurifolia						X
QUNI	Water Oak	Quercus nigra			X			
QUVI	Live Oak	Quercus virginiana						X
SANI	Common Willow	Salix nigra		X				
SAPA	Cabbage Palm	Sabal palmetto					X	
SASE	Chinese Tallow	Sapium sebiferum		X				
TADI	Bald Cypress	Taxodium distichum			X			
ULPA	Lacebark Elm	Ulmus parvifolia		X				

8. Recommended Tree Species

List of environmental characteristics & tolerances for tree species suitable for urban & community forestry environments in the Southeast from the Mississippi Urban & Community Forestry Management Manual by Amanda L. Husak & Dr. Stephen C. Grado.

Environmental Characteristics and Tolerances

Common Name	Latin Name	Native Tree to Mississippi	Growth Rate ¹	Average Life Span ²	Net Effect on Air Quality ³	Soil Moisture ⁴	Drought Tolerances ⁵	Preferred Soil pH ⁶	Light Requirement ⁷	Construction Tolerances/ Limitations ⁸	Urban Tolerant Tree ⁹
Ash, Green	<i>Fraxinus pennsylvanica</i>	X	F	M	0.09	W	H	sl ac-sl alk	FS	.	
Ash, White	<i>Fraxinus americana</i>	X	M	M	0.1	M	L	sl ac-sl alk	FS	M/IS	
Bald cypress	<i>Taxodium distichum</i>	X	M	L	0.032	M	H	ac-sl alk	FS	G/	X
Beech, American	<i>Fagus gradifolia</i>	X	S	L	0.16	M	L	acidic	FS	P/A	
Birch, River	<i>Betula nigra</i>	X	F	M	0.117	M	L	acidic	PS	G/	
Birch, River 'Heritage'	<i>Betula nigra 'Heritage'</i>	X	F	M	n/a	M	L	acidic	PS	n/a	
Blackgum (Tupelo)	<i>Nyssa sylvatica</i>	X	S	M	-0.053	M	M	sl ac-sl alk	FS	G/	X
Boxelder	<i>Acer negundo</i>	X	F	S	0.036	W	M	adapt	FS	G/	
Catalpa, Southern	<i>Catalpa bignonioides</i>	X	F	S	0.014	M	M	sl ac-sl alk	FS	G/	
Cherry, Black	<i>Prunus serotina</i>	X	F	M	0.083	M	M	sl ac	FS	M/I	
Cottonwood, Eastern	<i>Populus deltoides</i>	X	F	M	-0.708	M	M	sl ac-sl alk	FS	G/	X
Crapemyrtle, Common	<i>Lagerstroemia indica</i>	X	F	M	0.004	M	H	ac-sl alk	FS	n/a	
Dogwood, Flowering	<i>Cornus florida</i>	X	M	M	0.021	M	L	ac-nu	PS	M/IP	
Dogwood, Flow. Pink	<i>Cornus florida var. rubra</i>	X	M	M	n/a	M	L	n/a	PS	n/a	
Elm, American	<i>Ulmus americana</i>	X	M	M	0.143	M	H	sl ac-sl alk	FS	M/P	
Elm, Slippery	<i>Ulmus rubra</i>	X	F	M	0.086	M	M	sl ac-sl alk	FS	M/P	
Elm, Winged	<i>Ulmus alata</i>	X	M	M	0.034	M	H	sl ac-sl alk	FS	G/	X
Hickory, Bitternut	<i>Carya cordiformis</i>	X	F	L	0.069	M	L	acidic	FS	P/S	
Hickory, Mockernut	<i>Carya tomentosa</i>	X	S	L	0.059	D	H	sl ac	FS	MP/S	
Hickory, Pignut	<i>Carya glabra</i>	X	S	L	0.058	M	H	sl ac	FS	M/S	
Hickory, Shagbark	<i>Carya ovata</i>	X	S	L	0.064	M	M	sl ac	FS	P/S	
Hickory, So. Shagbark	<i>Carya ovata var. australis</i>	X	S	L	n/a	M	M	sl ac	FS	n/a	
Holly, American	<i>Ilex opaca</i>	X	S	L	0.013	M	H	acidic	PS	G/	X
Holly, Deciduous	<i>Ilex decidua</i>	X	M	S	n/a	W	H	ac-alk	PS	G/	
Honeylocust	<i>Gleditsia triacanthos</i>	X	F	S	0.009	M	H	sl ac-sl alk	FS	G/	X
Hophornbeam, Am.	<i>Ostrya virginiana</i>	X	S	M	0.032	M	H	ac-alk	SH	M/S	X
Hornbeam, A.	<i>Carpinus caroliniana</i>	X	S	M	0.009	M	M	sl ac-sl alk	PS	M/SC	
Magnolia, Cucumber	<i>Magnolia acuminata</i>	X	F	M	n/a	M	L	acidic	PS	M/I	
Magnolia, Southern	<i>Magnolia grandiflora</i>	X	M	L	0.002	M	M	acidic	FS	M/I	
Magnolia, So.	<i>Magnolia grandiflora</i>	X	S	M	n/a	M	L	acidic	FS	n/a	
Magnolia, Sweetbay	<i>Magnolia virginiana</i>	X	F	M	n/a	W	L	acidic	PS	G/	
Maple, Red	<i>Acer rubrum</i>	X	F	L	0.084	M	L	sl ac	FS	G/	
Maple, Silver	<i>Acer saccharinum</i>	X	F	S	0.084	M	H	ac	FS	P/A	
Maple, Florida Sugar	<i>Acer barbatum</i>	X	M	M	n/a	M	H	ac	FS	M/IS	X

Environmental Characteristics and Tolerances

Common Name	Latin Name	Native Tree to Mississippi	Growth Rate ¹	Average Life Span ²	Net Effect on Air Quality ³	Soil Moisture ⁴	Drought Tolerances ⁵	Preferred Soil pH ⁶	Light Requirement ⁷	Construction Tolerances/ Limitations ⁸	Urban Tolerant Tree ⁹
Maple, Sugar	<i>Acer saccharum</i>	X	M	L	0.1	M	M	sl ac-sl alk	PS	pm	
Maple, Sugar 'Legacy'	<i>Acer saccharum</i> 'Legacy'	X	F	L	0.1	M	M	sl ac-sl alk	PS	n/a	
Mulberry, Red	<i>Morus rubra</i>	X	F	S	0.099	M	H	sl ac-sl alk	FS	G/	
Oak, Cherrybark	<i>Quercus falcata</i>	X	M	L	n/a	M	M	ac	FS	G/	
Oak, Diamond Leaf	<i>Quercus laurifolia</i>	X	M	L	n/a	M	M	ac-sl alk	FS	G/	
Oak, Northern Red	<i>Quercus rubra</i>	X	F	L	0.503	M	M	ac-sl ac	FS	GM/S	
Oak, Nuttall	<i>Quercus nuttalli</i>	X	M	L	n/a	M	M	ac	FS	n/a	
Oak, Overcup	<i>Quercus lyrata</i>	X	M	L	0.159	W	M	ac-sl alk	FS	G/	
Oak, Post	<i>Quercus stellata</i>	X	M	L	0.327	D	H	ac-sl alk	FS	G/	
Oak, Scarlet	<i>Quercus coccinea</i>	X	M	L	0.592	D	H	sl ac	FS	G/	
Oak, Shumard	<i>Quercus shumardii</i>	X	F	L	0.265	M	H	ac-alk	FS	G/	
Oak, Southern Red	<i>Quercus falcata</i> m	X	M	L	0.576	M	H	ac	FS	G/	
Oak, Swamp Chestnut	<i>Quercus michauxii</i>	X	M	L	0.544	M	M	n/a	FS	G/	
Oak, Water	<i>Quercus nigra</i>	X	F	M	0.451	M	M	ac-sl alk	FS	G/	
Oak, White	<i>Quercus alba</i>	X	S	L	0.348	M	M	acidic	FS	GM/S	
Oak, Willow	<i>Quercus phellos</i>	X	F	L	0.314	M	H	acidic	FS	GM/S	X
Pecan	<i>Carya illinoensis</i>	X	S	M	0.088	M	L	sl ac-sl alk	FS	mg	
Persimmon, Common	<i>Diospyros virginiana</i>	X	M	S	0.058	M	H	ac-alk	FS	G/P	X
Pine, Loblolly	<i>Pinus taeda</i>	X	F	M	0.016	M	M	acidic	FS	G/	
Pine, Longleaf	<i>Pinus palustris</i>	X	M	L	0.01	M	H	ac-sl alk	FS	GM/C	
Pine, Shortleaf	<i>Pinus echinata</i>	X	M	L	0.008	M	H	ac	PS	GM/P	
Pine, Slash	<i>Pinus elliotii</i>	X	F	M	0.01	M	M	ac-sl alk	FS	G/	
Plum, Chickasaw	<i>Prunus angustifolia</i>	X	F	M	-0.415	M	H	sl ac-sl alk	FS	pg	X
Poplar, Yellow	<i>Liriodendron tulipifera</i>	X	F	M	-0.417	M	H	ac-alk	FS	n/a	
Redbud, Eastern	<i>Cercis canadensis</i>	X	M	L	0.171	M	L	sl ac	FS	P/IS	
Redbud, E. White	<i>Cercis canadensis</i> (alba)	X	F	S	0.012	M	M	ac-sl ac	PS	M/S	
Redcedar, Eastern	<i>Juniperus virginiana</i>	X	M	S	n/a	D	H	ac-sl ac	FS	n/a	
Sassafras	<i>Sassafras albidum</i>	X	F	S	0.022	M	M	ac-sl alk	FS	G	
Sourwood	<i>Oxydendrum arboreum</i>	X	M	S	n/a	D	H	sl ac-sl alk	FS	n/a	X
Sweetgum	<i>Liquidambar styraciflua</i>	X	M	M	0.118	M	M	ac	FS	G/l	
Sycamore	<i>Platanus occidentalis</i>	X	M	M	n/a	M	L	ac-sl alk	FS	n/a	
Willow, Black	<i>Salix nigra</i>	X	M	S	n/a	M	M	ac-alk	FS	G/	

Definitions of Environmental Characteristics and Tolerances

1. Typical rate of growth under urban conditions. S = Slow: 1/2 to 1-1/2 feet/year; M = Moderate: 1-1/2 to 2-1/2 feet/year; F = Fast: 2-1/2 to 3+ feet/year.
2. The average life span (useful service life) of the species when growing under average urban conditions. A tree is at the end of its useful service life when its risk of failure becomes unacceptable and cannot be improved or when the tree is no longer an asset due to its appearance or condition. S = Short: less than 25 years useful service life; M = Moderate: 25 to 40 years useful service life; L = Long: 50 years or greater useful service life.
3. The net monetary effects in cents attributable to the species on air quality; listed as a benefit (positive) or cost (negative). This monetary effect includes the species net effect on ozone, sulfur dioxide, nitrogen dioxide, particulate matter (PM₁₀), and carbon monoxide.
4. The typical soil moisture conditions for the species in its native habitat. H = Hydric: wet and may be occasionally flooded for short periods; M = Mesic: moist but moderately well- to well-drained; X = Xeric: dry and very well-drained.
5. Tolerance of the species to infrequent rain, low soil moisture, full sun, and high temperatures. Low = not tolerant to drought; Moderate = tolerant to mild drought; moderately tolerant to severe drought; High = very tolerant to mild, severe, and prolonged drought.
6. Relative soil acidity or alkalinity preferred by the species. In many cases, a range of pH preference is given if it was available. In other cases, a general level is given. A pH of 7.0 is neutral, a pH of less than 7.0 is acidic, and a pH of greater than 7.0 is alkaline. Ac = acidic (5.0 to 6.0); sl ac = slightly acidic (6.0 to 7.0); nu = neutral (7.0); sl al = slightly alkaline (7.0 to 8.0); al = alkaline (8.0 to 8.5); n/a = no information available.
7. The amount of sunlight the species prefers or will tolerate. Trees that are typically found in the understory or are characteristic of late forest succession stages prefer shade or at least partial shade, while trees that typically form the overstory or are characteristic of early succession stages prefer full sun. FS = Full Sun; PS = Partial Shade; SH = Shade.
8. The broad tolerance of the species in its home range to construction damage, and the limitations that constrain a species tolerance to damage. Tolerances: P = Poor; M = Moderate; G = Good; Limitations: I = physical injury, wood compartmentalization and decay; P = pest complications, including chronic and acute attacks; S = soil conditions, including aeration and water availability; C = limited climatic tolerances, including native range, hardiness, and micro-climate change; A = all of the limitations described above.
9. This recommendation is based upon other characteristics and tolerances to urban conditions; and an "X" indicates the species is suitable for planting under "tough" urban conditions.

Species Recommendation by Jim Heinzl, Certified Arborist #SO – 5803A

Please try to not get carried away with the crepe myrtles. While being a great tree for under power wires and also beautiful, there are many other trees that can work well for you.

The American holly, while being a taller and fuller tree, is also an evergreen tree so it offers the green color year around. Redbud is also a very beautiful deciduous tree with pink or white flowers in the spring and turning golden yellow in the fall. The fringe tree would also work under power lines as it grows only to 20' tall. It offers clouds of fragrant white flowers in the fall that turn into clusters of blur-purple fruits in the fall. The fruits are a big hit with the birds. The hawthorn produces sprays of white flowers in early spring. The bees and butterflies love them. In late summer and fall it attracts birds with its small red fruits. Then turns an orange red in the autumn. It grows to about 25'.

I am not trying to overwhelm you but instead I am hoping to show you that you have a variety to choose from. All the trees I have mentioned are relatively small trees.

Jim Heinzl
Certified Arborist #SO-5803A
GreenScapes Property Management LLC
110 Driftwood Drive
Long Beach, MS 39560
228.493.3223
jim@greenscapesms.com

Species Recommendation by Bob Brzuszek

Trees Species List Provided by: RBrzuszek@lalc.msstate.edu

I'd suggest a slight revision in the categories, as our SE species don't grow as tall as the western US ones listed. Also, you may list as a reference Odenwald's Southern Plants for Landscape Design as it contains lists of trees categorized by height. Here are my suggestions:

SHRUBS

Buckeye
Beautyberry
Holly
Viburnum
Azalea

Small Trees

DOGWOOD

Pawpaw
Hawthorn
Sumac
Hornbeam
Redbud

SASSAFRAS

Medium-Large Trees

Post oak
Eastern redcedar
Red maple
River birch

Honey locust

PIN OAK (60')

Green ash
Pecan
Beech
Water oak

WHITE OAK (70'+)

Sycamore
Southern red oak

Flowering

Southern magnolia, golden rain tree, parsley hawthorn, redbud, fringetree
Wet Soils Sweetbay magnolia, bald cypress, swamp red maple, swamp black gum
Drought Tolerant Spruce pine, live oak, ironwood, American holly, winged sumac
Storm Resistant Live oak, bald cypress

Master Plant List

Mississippi

(All Native to the U.S. except common fig (*Ficus carica*))

Trees:

Large (> 60ft):

southern magnolia (*Magnolia grandiflora*)
swamp chestnut oak (*Quercus michauxii*)
white oak (*Quercus alba*)
Kentucky coffeetree (*Gymnocladus dioica*)

yellow poplar (*Liriodendron tulipifera*),
baldecypress (*Taxodium distichum*)
pondecypress (*Taxodium ascendens/Taxodium nutans*) bur oak (*Quercus macrocarpa*)

Medium (30-60 ft):

overcup oak (*Quercus lyrata*)
shumard oak (*Quercus shumardii*)
green ash (*Fraxinus pennsylvanica*)
winged elm (*Ulmus alata*)
Freeman maple (*Acer x freemanii*)
southern catalpa (*Catalpa bignonioides*)

nuttall oak (*Quercus nutallii*)
American holly (*Ilex opaca*)
river birch (*Betula nigra*)
red maple (*Acer rubrum*)
black gum (*Nyssa sylvatica*)
eastern redcedar (*Juniperus virginiana*)

Small (< 30 ft):

eastern hophornbeam (*Ostrya virginiana*)
flowering dogwood (*Cornus florida*)
yaupon holly (*Ilex vomitoria*)
alternate-leaf dogwood (*Cornus alternifolia*),
possumhaw (*Ilex decidua*),
musclewood (*Carpinus caroliniana*)

eastern redbud (*Cercis canadensis*)
red buckeye (*Aesculus pavia*)
sweetbay magnolia (*Magnolia virginiana*),
fringetree (*Chionanthus virginicus*),
American smoketree (*Cotinus obovatus*),

Shrubs:

arrowwood viburnum (*Viburnum dentatum*),
bottlebrush buckeye (*Aesculus parviflora*),
Virginia sweetspire (*Itea virginica*)

American beautyberry (*Callicarpa americana*),
summersweet clethera (*Clethera alnifolia*),

Shade tolerant shrubs: see Small trees

Flowering:

Trees:

eastern redbud (*Cercis canadensis*),
red buckeye (*Aesculus pavia*),
southern magnolia (*Magnolia grandiflora*),
fringetree (*Chionanthus virginicus*),

flowering dogwood (*Cornus florida*),
red maple (*Acer rubrum*),
yellow poplar (*Liriodendron tulipifera*),

Shrubs:

Virginia sweetspire (*Itea virginica*),
bottlebrush buckeye (*Aesculus parviflora*)

summersweet clethera (*Clethera alnifolia*),

Wet sites:

Trees:

baldcypress (*Taxodium distichum*),
green ash (*Fraxinus pennsylvanica*),
swamp chestnut oak (*Quercus michauxii*),
pondecypress (*Taxodium ascendens/Taxodium nutans*)

black gum (*Nyssa sylvatica*),
river birch (*Betula nigra*),
overcup oak (*Quercus lyrata*),

Shrubs:

buttonbush (*Cephalanthus occidentalis*),

Virginia sweetspire (*Itea virginica*)

Good Fall Color:

Trees:

red maple (*Acer rubrum*),
black gum (*Nyssa sylvatica*),

Freeman maple (*Acer x freemanii*),
American smoketree (*Cotinus obovatus*)

Shrubs:

Virginia sweetspire (*Itea virginica*),

summersweet clethera (*Clethera alnifolia*)

Good for Wildlife:

Trees: oaks (*Quercus* spp.),
black gum (*Nyssa sylvatica*),
eastern hophornbeam (*Ostrya virginiana*),
Kentucky coffeetree (*Gymnocladus dioicus*),

American holly (*Ilex opaca*),
possumhaw (*Ilex decidua*),
red maple (*Acer rubrum*),
green ash (*Fraxinus pennsylvanica*)

Shrubs:

buttonbush (*Cephalanthus occidentalis*),
arrowwood viburnum (*Viburnum dentatum*)

American beautyberry (*Callicarpa americana*),

Orchard:

Trees: plum (*Prunus americana*),
common pawpaw (*Asimina triloba*),

black cherry (*Prunus serotina*),
black walnut (*Juglans nigra*)

Shrubs:

common fig (*Ficus carica*),
thornless blackberry (*Rubus* spp. var. *inermis*),

blueberry (*Vaccinium* spp.),
American hazelnut (*Corylus americana*)

Every community forestry plan needs to incorporate storm resistant plants including trees. The MS Delta areas can benefit from trees resistant to wind as well as ice. For reference see the enclosed publications for storm resistant plants from MS State University and the storm preparedness cd.

Storm resistant--For ice: bald cypress, black gum, black walnut, eastern red cedar, white oak

Storm resistant--For wind: bald cypress, eastern hophorn beam, winged elm, yaupon holly

Species Selection in “A Homeowner’s Guide to Coastal Landscapes”

Visit: <http://www.mfc.ms.gov/pdf/Info/forms/A%20Homeowners%20Guide%20for%20Coastal%20Landscapes.pdf>

<u>NAME</u>	<u>SUN</u>	<u>MOISTURE</u>
Ground Covers, Ferns, Low Shrubs		
Bracken	Shade to Partial	Dry to moist, does not tolerate flooding
Dwarf Palmetto, Bush Palmetto	Shade to Partial	Seasonally wet to moist
Herbaceous Plants		
Pineland Hibiscus	Partial to Full	Moist, tolerates winter flooding
Cooper Iris	Partial to Full	Moist, seasonally flooded
Spiderlily	Partial to Full	Shallow fresh water, 0 to 2 feet deep
Climbing Vines		
Crossvine	Partial to Full	Moist to dry, brief flooding tolerated
Passionflower, Maypop	Partial to Full	Moist to dry
Coral Honeysuckle	Partial to Full	Moist, brief flooding tolerated
Small to Medium Shrubs		
American Beautyberry, French Mulberry	Shade to Full	Dry to moist
Sweetshrub	Shade to Partial	Moist, flooding tolerated
Clethra, Sweet Pepperbush	Partial to Full	Wet
Yellow Azalea	Shade to Full	Moist, tolerates seasonal flooding
Arrowwood	Shade to Full	Dry
Large Shrubs, Small Trees		
Wax Myrtle, Southern Bayberry	Partial to Full	Wet to dry
Yaupon Holly	Shade to Full	Moist to dry
Redbud	Partial to Full	Moist to dry
Flowering Dogwood	Partial to Full	Moist to dry
▶ Fringetree, Graybeard	Partial to Full	Moist to dry
Titi, Leatherwood	Shade to Full	Wet to moist, still or running water
Large Trees		
Red Maple	Partial to Full	Wet to dry
American Holly	Shade to Full	Wet to dry
Bald Cypress	Partial to Full	Wet, can be inundated all year
Blackgum, Black Tupelo	Partial to Full	Moist to wet
Live Oak	Full	Moist to dry
Southern Magnolia	Shade to Full	Dry
Sweetbay	Partial to Full	Wet to moist

9. Ordinance Recommendations:

"Guide to Writing a City Tree Ordinance"

Model Tree Ordinances for Southern Communities

[Green Laws Home Page](http://www.greenlaws.lsu.edu) www.greenlaws.lsu.edu

Prepared by
Professor Buck Abbey, ASLA
School of Landscape Architecture
Louisiana State University
Baton Rouge, Louisiana

This project was supported by an America the Beautiful Grant to the Louisiana Nursery And Landscape Association (formerly Louisiana Association of Nurserymen) from the Louisiana Department of Agriculture.

INTRODUCTION

Who is responsible for nature in the city? The answer of course is obvious, we are! But often the subtle importance of nature to city livability is overlooked for seemingly more important urban issues such as employment, city services and economic growth.

Environment, we learn from recent research on the subject, is important to all of the above critical urban issues. In fact, recent scientific study indicates that trees do much to make city life more enjoyable thereby increasing employment opportunities, expanding economic growth potential and reducing the cost of energy consumption or other city services. Managing nature in the city requires new legislation.

This information has been prepared to assist any Mississippi city, town, village, planning board, public agency or citizen's group who desire to establish a community "tree management ordinance." Managing city trees helps to manage nature in the city while at the same time improving the visual quality of the landscape. Tree management reduces urban heat build-up, provides critical space for urban wildlife, helps preserve viable topsoil resources, filters water resources and cleans the air. In addition, the urban tree canopy and associated natural resources can be effectively managed by dedicated citizens who look to the future of the community as a place where their children's children may live in harmony with nature.

Two models of a tree management ordinance are contained within this brochure. The Louisiana Association of Nurserymen hope you will find them useful in making your community a better place to live. Both model tree management ordinances are related and closely parallel each other. One model is designed for larger communities while the other is designed for smaller towns and villages where more informality is the rule. The large community version is somewhat more complex but covers tree management issues in significant detail.

Both model ordinances can be used as a starting point to draft a local ordinance. Text can be added or text can be deleted to serve the purposes of each community. Either ordinance can be used in any community. With a little adjustment to the text, these models can be used in nearby states with similar growing conditions or similar social, political needs.

The models contain three Parts. These parts are based upon the accepted structure of a landscape ordinance contained within the publication "Guide to Writing a Landscape Ordinance," previously published by the Louisiana Association of Nurserymen.

The first part of the model tree ordinance states the "contextual conditions" of the ordinance. What is being drafted and under what circumstances? This section places the ordinance in its proper relationship to the community and to legal codes in effect. Sections one (1) and two (2) are contextual in nature.

The second part of the model tree ordinance consists of the "technical requirements" of this ordinance. These sections create a Commission, establish the town/city arborist and promulgate rules and requirements to manage city trees. Sections three (3) through thirteen (13) set forth the technical requirements of this ordinance.

The final sections of this model, Sections fourteen (14) through eighteen (18) deal with the "administrative components" of the ordinance. In these sections the reader will find text that describes how the ordinance will be administered. Enforcement, penalty, appeals, administrative guidelines, conflicts and effective date of the ordinance are typical administrative aspects which are set forth below.

The outline presented here is based in part upon contemporary provisions and language from tree ordinances and codes collected from throughout the country. Consequently the outline ordinances are comprehensive in scope, but limited, in specific detail and reflects state of the art knowledge in the technical aspects of tree ordinances. Additional detail and specific community needs may be incorporated where necessary.

Any community wishing to use this ordinance as a model may do so. It is suggested that anyone wishing to use these models should consult with local experts such as an attorney, arborist, forester, horticulturist or landscape architect.

Because legal, political and technical aspects of this outline ordinance may vary from community to community, these experts can help adapt the models to local conditions.

Both of the model ordinances follow this general outline. This outline places contextual, technical and administrative components of the tree management ordinances in a proper and suitable order that makes reading and understanding the ordinance a much easier task.

OUTLINE TO THE MODEL TREE ORDINANCE

I Contextual Conditions

Section 1 Short Title

Section 2 Purpose, Intent & Authority

Section 3 Definition

II Technical Requirements

Section 4 Establishment of a Tree Board of Commission

Section 5 Authority of the Tree Board of Commission

Section 6 Appointment & Qualifications Of The Town
Arborist

Section 7 Duties Of The Town Arborist

Section 8 Authority Of The Town Arborist

Section 9 Community Tree Plan

Section 10 Permits Required (Tree Preservation, Protection
and Planting)

Section 11 Trees On Private Property

Section 12 Trees On Public Property

Section 13 Interference With The Town Arborist

Section 14 Protection of Public Trees, Tree Abuse

Section 15 Placing Materials On Public Property

III Administrative Components

Section 16 Enforcement, Penalty And Appeals

Section 17 Administrative Guidelines and Development
Standards

Section 18 Conflicts

Section 19 Severability

Section 20 Effective Date

Model for a Large Community

This version of the Model Tree Management Ordinance is suitable for larger communities that have existing administrative departments such as Planning & Zoning Commissions, Parks Departments, or multi-professional Public Works Departments. This version is more formal in nature and more detailed in extent. This model will work well in urban and suburban areas where government structure is already working to provide for community needs.

This ordinance establishes a larger Tree & Landscape Commission of appointed citizens who are charged with developing policy for managing public trees and communicating to others the importance of trees in the community. The TLC created by this ordinance is largely educational, but some administrative tasks would be assigned by the City Administration in keeping with the chartering ordinance and the Bylaws adopted by the city.

The Commission under this model holds regular town meetings, prepares an annual tree management plan and undertakes programs to improve the town tree canopy. This model calls upon the Commission to develop programs to involve the community, organizations and families in tree preservation, planting and tree care. City Commissions should become prime sponsors of tree planting programs in town parks, school yards, cemeteries and other public places.

A City Forester trained in urban forestry, arboriculture, horticulture, landscape architecture or closely related fields is employed by the community to undertake day to day tree management responsibilities. Written permits for planting, maintenance or removal of trees from public property are obtained through the City Forester's office. This ordinance may be enacted by organizing a tree support group, holding public hearings and a vote of the city or town council. It would also prove useful for any city using this model to also consider the employment of a city landscape architect who could work with the Tree & Landscape Commission to advise them on design and construction as it applies to trees plantings and tree preservation activities within the community.

STANDARD CITY TREE MANAGEMENT ORDINANCE

LARGE COMMUNITY MODEL

CREATION OF A COMMISSION TO REGULATE THE PLANTING, MAINTENANCE, AND REMOVAL OF TREES, SHRUBS AND OTHER LANDSCAPE MATERIALS ON PUBLIC LAND IN THE CITY OF _____, STATE OF MISSISSIPPI.

ORDINANCE NO. _____

AN ORDINANCE TO MANAGE CITY TREE RESOURCES BY REGULATING THE PLANTING, MAINTENANCE, AND REMOVAL OF TREES ALONG PUBLIC STREETS, IN PARKS, AND ON OTHER CITY OWNED PROPERTY: ESTABLISHING A COMMISSION AND CREATING THE OFFICE OF CITY ARBORIST AS THE AGENCY PRESCRIBING REGULATIONS RELATING TO THE PLANTING, MAINTENANCE, AND REMOVAL OF TREES, SHRUBS AND OTHER LANDSCAPE MATERIALS ON PUBLIC LAND: PROVIDING FOR THE ISSUING OF PERMITS FOR THE PLANTING, MAINTENANCE, AND REMOVAL OF TREES ON PUBLIC LAND: PROVIDING FOR THE PRUNING AND REMOVAL OF TREES ON PUBLIC AND PRIVATE PROPERTY WHICH ENDANGER PUBLIC SAFETY: AND PROSCRIBING PENALTIES FOR VIOLATION OF THESE ARTICLES.

BE IT ORDAINED BY THE COUNCIL OF THE CITY OF _____, STATE OF MISSISSIPPI.

Section 1 - Short Title - This Ordinance shall be known and may be cited as the TREE ORDINANCE, for the City of _____.

Section 2 - Purpose, Intent and Authority

- A. The purpose of this Chapter is to set minimum standards to protect, preserve or plant trees to enhance the City's environmental, economic and aesthetic resources consistent with the goals of the *Comprehensive Plan*, and zoning policy thereby promoting the public health, safety and general welfare of the citizens and contributing to the quality of life by encouraging preservation of the urban forest canopy and its various resources to ensure and sustain development practices.
- B. It is the intent of this ordinance to promote sustainable development practices in relation to trees and forested areas in order to properly plan development, use and preserve native plant species, minimize the destruction of wooded wetlands, assist in the management of on-site storm water flows and water quality enhancement, provide beneficial wildlife habitat and meet minimum urban forest canopy requirements as set forth below.
- C. Further, the standards and requirements of this Chapter seek to promote the preservation, protection and enhancement of nature and nature's unique features with particular emphasis on trees, the urban forest canopy and vegetative cover of the land.
- D. These regulations are enacted to protect the health, safety and welfare of citizens in the following ways:
 - a) Maintaining and protecting property values;
 - b) Providing an acceptable degree of transition between abutting uses;
 - c) Providing appropriate barriers, landscape buffers, visual screens and relief from traffic, noise, heat, glare, and the spread of dust and debris;
 - d) Conserving and extending the water supply and natural resources through the implementation of water-efficient sustainable landscape practices;
 - e) Enhancing the visual and aesthetic appearance of the community;
 - f) Preserving terrain native habitat and vegetation where possible;
 - g) Protect and preserve native trees of a certain species and size and mitigate the removal of other native trees over eight (8) inches DBH caliper;
 - h) Minimize energy use with properly located canopy trees;
 - i) Reduce urban pollutant movement to natural water ways by using storm water BMP's.

Section 3 - Definitions.

For the purpose of this Ordinance the following terms, phrases, words, and their derivations shall have the meaning given herein.

Community Tree Plan shall mean a written document that guides the work of the Commission and envisions a long range plan for the preservation and improvement of the community urban forest. The Community Tree Plan may contain such data as deemed necessary by the Commission to carry out its legal mandate.

City is the City, Town, Village, or otherwise designated area or political unit of _____, State of Mississippi.

Tree Department is the department of "Parks and Street Trees", "Parks and Forestry", "Forestry Department", "Street Trees", or other designated department of the municipality under whose jurisdiction park and / or street trees fall.

City Arborist is qualified ISA certified arborist designated official of the city assigned to carry out the enforcement of this Ordinance.

Person is any person, firm, partnership, association, corporation, company, or organization of any kind.

Street or Highway means the entire width of every public way or right-of-way when any part thereof is open to the use of the public, as a matter of right, for purposes of vehicular and pedestrian traffic.

Park shall include all public parks having individual names.

Public Places shall include all grounds owned by the city or other properties owned by State of Federal Government in which the Commission has established a cooperative arrangement for tree care.

Property Line shall mean the outer edge of a street or highway right of way (R.O.W).

Treelawn (R.O.W edge) is that part of a street or highway, not covered by sidewalk or other paving, lying between the property line and that portion of the street or highway usually used for vehicular traffic.

Private Trees are trees of the urban forest growing on private property. Private trees are an important part of the urban forest and within the purview of the City.

Public Trees shall include all shade and ornamental trees now or hereafter growing on any street or on any public land where otherwise indicated.

Large Trees known as Class A trees are designated as those attaining a height of forty-five (45) feet or more with a mature spread of 40 feet or more. This is the normal native canopy tree species of the community.

Medium Trees known as Class B trees are designated as those attaining a height of thirty (30) to forty-five (45) feet with a mature spread of 30 feet or more. These trees are normally used as landscape trees, garden trees or open space trees in private gardens, parks, public places and commercial districts..

Small Trees known as Class C trees are designated as those attaining a height of twenty (20) to thirty (30) feet with a mature spread of 20 feet or more. These are small trees with small root structures for use in areas of high concentration of pavement such as parking lots or pedestrian ways.

Principal Thoroughfare shall mean major cross town streets upon which trucks are permitted.

Property Owner shall mean the person owning such property as shown on the Municipal Plat Maps.

Urban Forest shall mean the collection of trees, shrubs, other vegetation and associated natural features that make up the urban tree canopy and its growing zone.

Section 4 - Establishment of a Tree & Landscape Commission.

There shall be created a commission to be known and designated as "Commission."

The Commission shall be composed of nine (9) knowledgeable citizens, a majority of whom shall be residents of _____. Members shall be knowledgeable citizens including citizens with experience, formal training or knowledge of: tree care, gardening, forestry, landscape architecture, horticulture, public utilities, civil engineering, architecture, contracting, arboriculture or planning.

1. Six (6) voting members shall be appointed by the Mayor with approval of the City Council. The seventh (7th) voting member shall be the City Arborist, the eighth (8th) member shall be the Superintendent of the Department of Parks, and ninth (9th) member shall be the Director of Public Works, The latter two shall all be ex-officio members.

2. The six (6) members initially appointed by the Mayor shall be appointed as follows: two (2) for two (2) years; two (2) for three (3) years, and two (2) for four (4) years, and serve until their successors are duly appointed and approved by the Council.
3. Successors to those members appointed by the Mayor shall, thereafter be appointed for terms of four (4) years. Vacancies caused by death, resignation, or otherwise, shall be filled for the unexpired term in the same manner as original appointments are made.
4. All members of the Commission shall serve without pay.

Section 5 - Authority of the Commission.

The duties of the "Commission" shall be as follows:

- A. To study the urban forest including problems involving the city tree population, determine needs, compose and annually review a Community Tree Plan and seek ways to implement needed work.
- B. To recommend to the proper authority, streetscape landscape designs illustrating type and kind of trees to be planted upon each municipal street or parts of municipal streets or in parks or other public lands as is designated in the Community Tree Plan.
- C. To assist the properly constituted officials of the city as well as citizens and community groups, in the dissemination of news and information regarding the selection, planting, and maintenance of trees within the corporate limits, whether they be on private or public property.
- D. To provide regular and special meetings at which time the subject of the urban forest may be discussed by the members of the Commission, officers and personnel of the city and its several divisions, and all others interested in a community tree program.
- E. Within a reasonable time after the appointment of the Commission, the Commission shall meet and organize by the election of a chairman, vice-chairman, and standing committee chairs. The Commission shall recommend to the Mayor and City Council, who will appoint, a City Arborist who will act as secretary and conduct the daily affairs of the Commission.
- F. A majority of voting members shall constitute a quorum for the transaction of business. Any member who regularly fails to attend scheduled meetings will be subject to removal by the Chairman and will be replaced for the balance of his/her term by the appointing authority.
- G. The Commission shall provide for the adoption of rules and procedures and for the holding of regular and special meetings as said Commission shall deem advisable and necessary in order to perform the duties set forth. A journal of proceedings and activities is to be recorded. The Commission shall adopt Bylaws to manage the public service they are charged with carrying out on behalf of citizens.

- H. The Commission shall meet and hold public hearings at least six times a year at a public place and time of their choosing. The meeting shall be open to the public.
- I. The Commission shall propose such legislation as may be needed to pursue the purposes for which the Commission was created.
- J. The Commission shall review design or construction plans for public or private improvements that may call for the removal or planting of trees.
- K. The Commission may assess fines for the unlawful removal of trees.
- L. The Commission may engage in any other lawful activity in pursuit of the mission of this commission which may benefit the urban forest including such activities as:
 - 1. Apply for Tree City Status with the National Arbor Day Foundation
 - 2. Conduct seminars and public education programs
 - 3. Plan and coordinate an annual Arbor Week Observance
 - 4. Develop a community tree bank
 - 5. Develop of a botanical garden
 - 6. Develop a community forest preserve(s)
 - 7. Provide technical advice and assistance to developers, builders, contractors, public utilities, public agencies, homeowners and community groups in the selection of tree species to be planted or naturally occurring trees to be protected during the development of wooded areas.
 - 8. Organize community tree planting projects.
 - 9. Seek grant money, public funding and private contributions to further the work of the Commission

Section 6 - Appointment & Qualifications of the City Arborist.

A City Arborist shall, where possible, be appointed from a Civil Service roster established by competitive examination and interview by the Commission, or where Civil Service does not exist, by interview given by the Commission.

- 1. He/she shall be a person skilled and trained in the arts and sciences of urban forestry, and shall hold a college degree or its equivalent in urban forestry, landscape architecture, horticulture, forestry, arboriculture; or other closely related field.
- 2. In Mississippi, where there is a Mississippi Horticulture Commission, he/she shall have passed a state examination and hold a valid license as an arborist, landscape architect or landscape contractor. He/she shall have had at least three (3) years experience in municipal shade tree work or its equivalent.

3. Upon satisfactory completion of a six (6) months probationary period he/she shall hold office as long as he/she satisfactorily performs the duties of the office.
4. Salary - The City Arborist shall receive a salary commensurate with his training and experience as full compensation for all services rendered.

Section 7 - Duties of the City Arborist.

The City Arborist shall have the following duties.

- A. The City Arborist shall have the authority to promulgate rules and regulations, including arboricultural specifications governing the planting, maintenance, removal, fertilization, pruning, and bracing of trees on the streets or other public sites in the municipality, and shall direct, regulate, and control the planting, maintenance, and removal of all trees growing now or hereafter in any public area of the municipality.
- B. He/she shall cause the provision of this Ordinance to be enforced. In the absence of the City Arborist these duties shall be the responsibility of a qualified alternate designated by the Commission.
- C. He/she shall review planting plans for all projects on public property that may impact existing vegetation or propose new plantings that may affect public safety.

Section 8 - Authority of the City Arborist.

- A. The City Arborist shall report to the Commission on a monthly basis and shall be in attendance at all regular and special meetings of the Commission, Commission Sub-committees or other community meetings as designated by the Chairman.
- B. The City Arborist shall record all activities of the Commission or subcommittees of the Commission.
- C. The City Arborist shall have the authority and jurisdiction of regulating the planting, maintenance, and removal of trees on streets and other publicly owned property to insure safety or preserve the aesthetics of such public sites.
- D. The City Arborist shall have authority over city tree crews or staff as required to pursue the work of the Commission.
- E. The City Arborist shall advise all other city work crews on matters relating to planting, maintenance, or removal of trees on public lands as requested by the various Department heads.
- F. Supervision. The City Arborist shall have the authority and it shall be his duty to supervise or inspect all work done under a permit issued in accordance with the terms of this Ordinance.
- G. Condition of Permit. The City Arborist shall have the authority to affix reasonable conditions to the granting of a permit in accordance with the terms of this Ordinance.

Section 9 - Community Tree Plan.

Community Tree Plan. The City Arborist shall have the authority to formulate a Community Tree Plan with the advice of consultants, city agencies, public hearings, and approval of a Commission.

- A. The Community Tree Plan shall include but not be limited to the goals and mission of the Commission, an inventory of resources, needed work, associated cost and time schedules for such work and relevant information such as activities of the Commission, standard tree maintenance and planting specifications and permit application procedures.
- B. The Community Tree Plan following review and acceptance by the Commission shall be sent forward to the Mayor and City Council with recommendations for action.
- C. The City Arborist shall consider all existing and future utility, public works and environmental factors when recommending improvement for each street, park and other public lands of the municipality.
- D. The City Arborist, with the approval of the Commission, shall have the authority to amend or add to the Community Tree Plan at any time.

Section 10 - Permits Required.

The following permits are required for activities that effect the growth or health of plants.

- A. Planting Maintenance and Removal Permits
 1. No person shall plant, remove, maintain or disturb any tree or shrub on any street or municipal owned property without filing an application and procuring a permit from the City Arborist.
- B. Planting Permit.
 1. Application Data. When making an application for a planting permit the Applicant shall submit a landscape design which illustrates the number of trees or other plants to be planted; their location, grade, species, or variety of each plant; the method of planting; and such other information as the City Arborist shall find reasonably necessary to a fair determination of whether a permit should be issued.
 2. Proper Planting. Whenever any tree shall be planted on public land it shall be planted, fertilized, staked, watered and mulched in accordance with proper planting specifications issued by the City Arborist. All trees planted on public property under this ordinance must be replaced if they fail to survive three growing seasons.

3. **Improper Planting.** Whenever any tree shall be planted in conflict with the provisions of this section, it shall be lawful for the City Arborist to have removed and the exact cost thereof shall be assessed to the owner as provided by law.

C. Maintenance Permit.

1. **Application Data.** When making an application for a maintenance permit the Applicant shall state the number and kinds of trees to be sprayed, fertilized, pruned or otherwise treated; the composition of the spray material to be applied; and such other information as the City Arborist shall require determining whether a permit should be issued.
2. The City Arborist shall annually issue area permits granting permission to public utilities to trim and maintain vegetation on public places. Non emergency trimming shall be done in accordance with standard arboriculture practices and nearby neighbors must be informed by posted door knob notices at least three weeks in advance.

D. Removal and Replacement Permit.

1. When making application for a tree removal permit the Applicant shall illustrate the number and kinds of trees to be removed, their size, locations, health/age condition and their method of removal and such other information as the City Arborist shall find reasonably necessary to a fair determination of whether a permit should be issued.
2. Wherever it is necessary to remove a public tree or trees from a treelawn (R.O.W edge) in connection with the paving of a sidewalk, or the paving or widening of the portion of an entrance drive from a street or highway used for vehicular traffic, the Applicant shall replant such trees or replace them. If site conditions prevent planting on treelawns, this requirement will be satisfied if any equivalent number of trees of the same size and species are planted in an attractive manner on adjacent public property.
3. The Applicant or property owner shall bear the cost of removal and replacement of all trees removed.

Section 11 - Trees on Private Property.

It shall be the duty of any person or persons owning or occupying real property bordering on any street upon which property there may be trees, to prune such trees in such a manner that they will not obstruct or shade the street lights, obstruct the passage of pedestrians on sidewalks, obstruct vision of traffic signs, or obstruct views of any street or alley intersection.

- The minimum clearance of any overhanging portion thereof shall be ten (10) feet over sidewalks, and twelve (12) feet over all streets except truck thoroughfares which shall have a clearance of sixteen (16) feet.

It shall be the duty of any person owning or occupying real property, bordering on any street, park or other public land, on which there may be trees that are diseased or insect infested, to remove, spray or treat such trees in such a manner that they will not infect or damage nearby public vegetation or cause harm to the community or citizens therein.

- The City Arborist may order trees on private land that cause obstructions, present insect or disease problem or otherwise present a danger to public health or safety be pruned, removed or treated.
- Notice to Prune Should any person owning real property bordering on any street fail to prune, remove or treat trees as herein above provided, the City Arborist shall order such person, within three (10) days after receipt of written notice, to so prune, remove or treat such trees.
- Order Required - The order required herein shall be served by mailing a copy of the order to the last known address of the property owner, by certified mail.
- Failure to Comply When a person to whom an order is directed shall fail to comply within the specified time, it shall be lawful for the municipality to prune, remove or treat such trees, and the exact cost thereof shall be assessed to the owner as provided by law in the case of special assessments.

Section 12 - Abuse of Public Trees.

No person shall intentionally damage, cut, carve, transplant, or remove any tree; attach any rope, wire, nails, advertisements, posters, or other contrivance to any tree, allow any gaseous liquid, or solid substance which is harmful to such trees to come in contact with them; or set fire or permit any fire to burn when such fire or the heat thereof will injure any portion of any tree.

Section 13 - Interference with the City Arborist.

No person shall hinder, prevent, delay, or interfere with the City Arborist or any of his assistants while engaged in carrying out the execution or enforcement of this Ordinance; provided, however, that nothing herein shall be construed as an attempt to prohibit the pursuit of any remedy, legal or equitable, in any court of competent jurisdiction for the protection of property rights by the owner of any property within the municipality.

Section 14 - Protection of Municipal Trees.

All public trees shall be protected during construction.

- All trees on any street or other publicly owned property near any excavation or construction of any building, structure, or street work, shall be guarded with a good substantial fence, frame, or box. The "Construction Tree Guard" shall be not less than four (4) feet high and eight (8) feet square, or at a distance in feet from the tree trunk equal to the diameter of the trunk at breast height (D.B. H.) in inches, whichever is greater. All building material, dirt, or other debris shall be kept outside the Construction Tree Guard.
- No person shall change natural drainage, excavate any ditches, tunnels, trenches, or lay any drive within a radius of ten (10) feet from any public tree without first obtaining a written permit from the City Arborist.

Section 15 - Placing Materials on Public Property.

No person shall deposit, place, store, or maintain upon any public place of the municipality, any stone, brick, sand, concrete, or other materials which may impede the free passage of water, air, fertilizer to the roots of any tree growing therein. Sunlight to any public tree can not be permanently blocked by placement of materials without written authorization of the City Arborist.

Section 16 - Enforcement, Penalty and Appeals.

Any person, firm, or corporation violating or failing to comply with any of the provisions of this Ordinance shall be guilty of a misdemeanor, and upon conviction thereof shall be fined a sum no less than one hundred (\$100.00) dollars, nor more than five thousand (\$5,000.00) dollars, or may be imprisoned for a term not exceeding sixty (60) days, or both.

Section 17 - Administrative Guidelines and Development Standards

Permits may be applied for as set forth below.

- Application for permits must be made at the Office of the City Arborist not less than forty-eight (48) hours in advance of the time the work is to be done.
- Standards of Issuance. The City Arborist shall issue the permit provided for herein if, in his judgment, the proposed work is desirable and the proposed method and workmanship thereof are of a satisfactory nature. Permits shall be void if terms are violated.
- Notice of completion shall be given within five (5) days to the City Arborist for his inspection.
- Arboriculture specifications, horticultural standards and workman's qualifications are available from the City Arborist. These specifications, standards and qualifications are to be followed by any person or firm seeking a permit for tree work on public trees.

- Arboriculture specifications include accepted approved methods for maintenance and tree care including fertilization, feeding, insect control, disease prevention and storm damage preparation and repair.
- Horticultural standards include accepted methods for tree planting, mulching, staking, guying, wrapping, balling, tree relocation, pruning, removal, stump grinding and clean up. Recycling of vegetative parts is also addressed in these standards.
- Workman's qualifications include suggested education and training, practical experience, licensing and insurance requirements for workmen and companies doing tree work in the municipality.

Approved Tree List. The following list constitutes the Official Tree Species for the Municipality of _____.

This list has been extracted from the official Community Tree Plan (See Section 4.A.1.). No other species other than those included in this list may be planted as street trees, park trees or ornamental trees on public property without the written consent of the Commission.

Small Trees

Medium Trees

Large Trees

Figure 1 - Official Tree List for Streets, Parks, Cemeteries and Other Public Places

Development Standards. This section of the Tree Management Ordinance shall be carefully connected to the community Landscape Ordinance under which special development standards for trees is written for both trees on private development as well as public trees. Any of the following standards shall be adopted by ordinance as needed and included within the Zoning Code under the Landscape Ordinance and Tree Management chapter.

1. Street Trees. Street trees on public streets and private streets shall be designed, planted and maintained as set forth in this Part as well as in the community landscape code.
2. Tree Inventory. Trees shall be inventoried at the town scale, neighborhood scale or lot scale as set forth in this Part as well as in the community landscape code.

3. Tree Preservation. Preserving trees, natural habitat and transplanting trees with mechanical tree spades shall be done following the standards as set forth in this Part as well as in the community landscape code.
4. Minimum canopy requirements and replacement plantings of trees for the urban forest shall be as set forth in this Part as well as in the community landscape code shall be per trees per acre, caliper inches per acre, or shade distribution pattern per acre or by other such means that will preserve a minimum canopy standard in this community and within the various zoned land uses of this community.
5. Tree protection standards for trees on development site shall be protected as set forth in this Part as well as in the community landscape code.
6. Standards for the planting and maintenance of trees, shrubs, and ground covers for street yards, side and rear buffers, parking lot screens, parking lot interiors, service areas screening, street wall planting areas and onsite storm water BMPs shall be as set forth in this Part as well as in the community landscape code.
7. Standards for sustainable development as it pertains to trees, landscape or the urban forest shall be as set forth in this part as well as in the community landscape code.
8. Disposal and Recycling of community trees and vegetative matter shall as set forth in this part as well as in the community landscape code.
9. Standards for Special Trees. Standards for official trees, memorial trees, ancient trees, unique trees shall be set forth by ordinance and as set forth in this Part as well as within the community landscape code.

Section 18 - Conflicts.

Should any section, clause, or provisions of this Ordinance be declared by the Courts to be invalid, the same shall not affect the validity of the Ordinance as a whole, or parts thereof, other than the part so declared to be invalid.

Section 19 - Severability.

If any subsection, sentence, clause, provision of part of this Ordinance shall be held invalid for any reason, the remainder of this Ordinance shall not be affected thereby, but shall remain in force and effect.

Section 20 - Effective Date.

This Ordinance is hereby declared to be of immediate necessity for the preservation of public peace, health, and safety, and shall be in full force and effective from and after its passage and publication as provided by law.

Passed this _____ day of _____, 19 ____ .

Signed this _____ day of _____, 19 ____ .

_____, Mayor

Attest: _____, City Clerk

END OF MODEL TREE ORDINANCE

Prepared for educational purposes only for the Mississippi Urban Forestry Council
Shaping Public Policy Toward Trees Workshop
Pass Christian Mississippi – Jackson, Mississippi May 26, 27 & June 23, 24, 2010
Prof. Buck Abbey, ASLA
LSU Green Laws Research Project

© 2010 D.G. Abbey, ASLA

10. Model Planting

