Urban Tree Conservation: a White Paper on Local Ordinance Approaches

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COMMITTEE

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I. INTRODUCTION (return to menu)

This paper is a discussion of various approaches to conservation of urban forests on private property. It represents a collection of examples from ordinances from cities and counties around the United States, relevant scientific and policy information, and analysis and conclusions. Localities have created a broad range of methods for regulating private trees, with names including tree cutting ordinance, tree permitting ordinance, and tree conservation ordinance. This report considers all approaches that aim to manage trees on private property. In addition, tree conservation ordinances are only one type of tree regulation that municipalities and counties commonly adopt. Thus, relevant aspects of related ordinances and planning strategies are also discussed in this paper.

Tree conservation and urban forest preservation ordinances are land use ordinances and have biodiversity implications. Land use ordinances can play a role in preserving biodiversity, ecosystem services, and quality of life. A successful ordinance will reflect the goals and perspective of the community. It will also be part of a comprehensive management strategy and will account for the need to reevaluate goals and conditions.

a. Conservation and Biodiversity Considerations

The Environmental Law Institute has established eight guidelines that serve as underlying principles to ensure conservation considerations are included in land use decisions, such as those which arise when designing a tree conservation ordinance.[1] These are:

1. Maintain large areas of contiguous habitat and avoid fragmenting these areas.
2. Maintain meaningful connections between habitat areas.
3. Protect rare landscape elements, sensitive areas, and associated species.
4. Allow natural patterns of disturbance to continue in order to maintain diversity and resilience of habitat types.
5. Minimize the introduction and spread of non-native species and favor native plants and animals.
6. Minimize human introduction of nutrients, chemicals, and pollutants.
7. Avoid land uses that deplete natural resources over a broad area.
8. Compensate for adverse affects of development on natural processes.

Tree conservation ordinances are also a type of vegetative control. Vegetative controls determine the types of vegetation planted or removed from an area. They can be used to promote and maintain native species and discourage the introduction and proliferation of

[1] Nature Friendly Ordinances: Local Measures to Conserve Biodiversity, Jim McElfish, Jr. (ELI, 2004), p. 10.

invasive non-native plant species. They can specify the types of vegetation that must be maintained in greenways and wildlife corridors and can be used to create a transition from undeveloped to developed areas.[2] Drafters of ordinances must take care to avoid creating vegetative controls that are adverse to native plants and biodiversity, such as weed ordinances that lead to prohibitions on natural forms of vegetation.[3] On the contrary, such ordinances or provisions are the opportunity to encourage or require the use of native and local species to prohibit the introduction and spread of noxious invasive species.[4]

Six key elements for drafters of vegetative controls to consider in order protecting biodiversity have been proposed by the Environmental Law Institute.[5]

1. The ordinance should define the basis for vegetative regulation. The ordinance should link the requirements to habitat function, water conservation, ecosystem health, and avoidance of nuisance species.
2. Where vegetative protection ordinances are enacted, the ordinance should specify that existing native vegetation adequately protected by the developer will count toward the satisfaction of the applicable minimum landscaping requirements of the zoning code.
3. The ordinance should prohibit the introduction of invasive exotics by land developers during the permit process.
4. The ordinance should provide for removal of state-listed invasive plants by landowners as authorized by state law, including procedures for securing abatement as a nuisance.
5. The ordinance should set a standard for public works and municipally owned lands so that native species are preferred or required in government supported projects and lands.
6. If the local government has a weed ordinance or property maintenance standards ordinance, the standards should be reviewed with the state's natural heritage program to identify provisions that unnecessarily inhibit reasonable uses of native plants by landowners.[6]

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[2] Zoning—Tree Protection and vegetative management, Christopher J. Duerksen, R. Matthew Goebel, Donald L. Elliot, and Heidi Anderson; Rathkopf's The Law of Zoning and Planning Database (updated June 2006) § 21:57, Edward H. Ziegler, Jr., Arden H. Rathkopf, and Daren A. Rathkopf.

[3] Nature Friendly Ordinances: Local Measures to Conserve Biodiversity, Jim McElfish, Jr. (ELI, 2004), p. 129.

[4] Nature Friendly Ordinances: Local Measures to Conserve Biodiversity, Jim McElfish, Jr. (ELI, 2004), p. 129.

[5] Nature Friendly Ordinances: Local Measures to Conserve Biodiversity, Jim McElfish, Jr. (ELI, 2004), p. 129-130.

[6] *See* Clallam County Washington's Weed Board (Wash. Rev. Code § 17.10 (Noxious Weeds – Control Boards).

Local governments in the United States use many different approaches to conserving trees and forest cover. Some are carried out by direction from a state law, for example in Maryland, New Jersey, and Oregon. Many other laws come from local concern about biodiversity, quality of life, and ecosystem services, such as the water quality benefits of forest canopy. It has been firmly established that comprehensive ordinances requiring tree retention and forest conservation in the context of development are not a taking of property rights but rather an exercise of a local government's appropriate authority.[7]

The Environmental Law Institute has developed key elements for designing forest conservation ordinances that support biodiversity.[8]

1. The ordinance should define requirements for minimizing the amount of forest cover removed in connection with development. The ordinance should establish priorities for retention of undisturbed forest in particular areas that have value for biodiversity, including riparian areas, wetlands areas, and areas connecting other forested areas.
2. The ordinance should require submission of a forest delineation in connection with the submission of any subdivision or land development plan.
3. The ordinance should contain provisions that reach back for a period of years to prevent forest removal under the guise of commercial logging that is actually part of site preparation for development. This can be done through notice provisions or through the application of delineation and mitigation requirements to development applications that are filed within a certain number of years following a substantial removal of forest cover.
4. Forest cover and reforestation objectives should be spelled out explicitly by formula so that it is clear what should be retained or reforested.
5. The ordinance should provide for compensatory mitigation on-site where possible and, where forest retention or reforestation cannot be fully accomplished on-sight, in preferred areas such as off-site riparian areas.

b. Legal Considerations

While tree conservation ordinances are increasingly included in local codes, the transformation of the conception of trees from private property to public good that can be regulated by the government has not been without controversy. Drafters of tree conservation ordinances must be aware of several legal issues to make sure their ordinance can survive any legal challenge. There are four main legal issues that can affect tree conservation efforts on private property: (1) legislative authority; (2) designation and review standards; (3) takings; and (4) rational nexus.

Legislative authority. The purpose and objectives of ordinances must be aligned with legal authority to enact legislation to accomplish those objectives. Traditionally,

[7] Greater Atlanta Homebuilders Ass'n v. DeKalb County, 588 S.E. 2d 694 (Ga. 2003).
[8] Nature Friendly Ordinances: Local Measures to Conserve Biodiversity, Jim McElfish, Jr. (ELI, 2004), p. 127.

tree ordinances that regulated private trees were based on police power or the common law of nuisance and applied only to trees that posed a risk such as those that were dead or diseased.[9] Ordinances that extend beyond these traditional authorities must be firmly supported by state zoning authority or some other authority, otherwise they will be susceptible to legal challenges.[10] Whether state law authorizes an ordinance can depend on either its effect or its intent. For example, tree protection for the purpose of controlling erosion or stormwater runoff is more likely to be supported by state law than an ordinance solely for beautification purposes. One locality that bases its tree protection ordinance on a broader state environmental law is Fairfax County, Virginia. Fairfax led the state to broad authorization for tree replacement ordinances by adopting an erosion and sediment control ordinance, which was used to support an extensive tree protection program. Subsequently, the Virginia General Assembly passed legislation allowing tree replacement ordinances in certain localities.[11]

All states grant planning authority to counties and municipalities.[12] Some states specifically direct localities to adopt procedures and policies for regulating trees on private property as part of larger environmental policy acts or otherwise.[13]

Designation and review standards. While flexibility is important for the success of an ordinance that creates a permitting scheme, such requirements and standards must be clear enough to avoid a constitutional challenge for "vagueness." Designation of the resources that the ordinance applies to must be clear, as must the standard for issuing the permit, such that a person of reasonable intelligence understands what it means. While courts have historically been supportive of localities' authority to set and apply environmental regulatory or design standards, terms should be defined with as much precision as possible to avoid challenges.[14] Standards should be numeric and

[9] Whose Tree is It Anyway? A Case of First Impression, Ruthmarie Shea (77 U. Det. Mercy L. Rev. 579, 580, 2000) (The article further postulates that nuisance law could be used as a basis for requiring protection of trees; *Id.* at 588).

[10] *Dunbar v. City of Spartansburg, South Carolina*, 221 S.E. 2d 848 (S.C. 1976). (The South Carolina Supreme Court struck down the Spartansburg ordinance which required developers to maintain a specified percentage of trees because it was not supported by state law.)

[11] Planning Advisory Service Report Number 446: Tree Conservation Ordinances, Christopher J. Duerksen with Suzanne Richman (American Planning Association & Scenic America, 1993), 20.

[12] McKinstry, Jr., Robert B., Coreen Ripp, and Emily Lisy, eds. Biodiversity Conservation Handbook: State, Local, and Private Protection of Biological Diversity (ELI, 2006).

[13] Lynnwood, Wash., Code § 17.02.010.

[14] See *Watson v. City of St. Peterburg*, 489 S.2d 138 (Fla. App. 2 Dist. 1986); *Town of Freeport v. Brickyard Cove Associates*, 594 A.2d 556 (Me. 1991); *Oswego Properties v. City of Lake Oswego*, 814 P.2d 530 (Or. App. 1991).

precise, such as protecting specimen trees defined as a certain diameter at breast height, and not conceptual such as requiring harmony of design.[15]

Reasonable ordinance provisions can be struck down by courts if they are not clear enough. Terms such as "minimal disturbance to the natural topography," "protection of the maximum number of mature trees," and "minimized to the greatest degree possible under the particular circumstances" have been struck down for being too subjective.[16] This concern, however, should not lead to an ordinance draft with too much technical detail. Such specifics can change quickly and should be included in a management strategy or plan that is more easily modified without having to go through the legislative process.

The Taking Issue. The Fifth Amendment of the U.S. Constitution prevents taking property for public use without just compensation; state and local power is similarly limited by the Fourteenth Amendment. Many state constitutions contain similar prohibitions.[17] Part of the takings analysis depends on whether the thing being regulated is property. Whether trees are property and what type of ownership they are held in are further issues that can differ under various states' laws.[18] Any regulation that denies a property owner reasonable economic use of property or significantly interferes with distinct, investment-backed expectations, may be recognized as a taking. The three tests for establishing the validity of land-use regulation are whether the regulation promotes a valid police power objective, the economic impact on the property owner, and the character of the government action.[19] This highlights the tension with ordinances that extend beyond traditional police powers such as protecting the public from nuisance trees. While ordinances with broader goals and impacts can be supported by other sources of state or constitutional law, they can run afoul of the constitutional prohibition on takings.

Tree conservation ordinances meet valid police power purposes when they benefit the environment, aesthetics, and economic benefits of the community.[20] Unless regulations deprive the owner of all or virtually all of the property value and leave no economically viable use, or prevent an investment-backed use, they will not be struck down due to

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[15] See *Morristown Associates v. Borough of Bernardsville*, 394 A.2d 157 (N.J. Super 1978).

[16] A Fulton County judge struck down relevant portions of Atlanta's ordinance for vagueness in 1999; Phytosphere Research, *Planning for an Ordinance,* available at www.phytosphere.com/treeord/ordprt1b.htm (last visited September 4, 2007).

[17] See Mich. Const. art X, § 2.

[18] Whose Tree is it Anyway? A Case of First Impression (77 U. Det. Mercy L. Rev. 579, 587, 2000).

[19] See *Lucas v. South Carolina Coastal Council*, 505 U.S. 1003 (1992).

[20] Portland, Oregon's tree cutting ordinance is expressly adopted pursuant to the city's policy power and is expressly not a land use regulation. Portland, Or., Code § 20.42.030.

economic impact. Finally the character of tree preservation ordinances is likely to allow a challenge only where the public is benefiting from private resources without payment.[21]

Tree conservation ordinances should never be adopted as a substitute for a public acquisition program. In order to minimize the chances of judicial intervention, the standards should have some flexibility, such as in the form of variance procedures, and provide procedures for administrative relief such as an appeal process. Offering incentives, such as allowing the transfer of development rights or reductions in taxes, can be successful alternatives to harsh limits on development. In order to avoid being found to be resulting in a taking, ordinances can contain procedures to determine the impact on project proponents. These can take the form of evidence of purchase price, taxes, or attempts to sell.[22]

The rational nexus test. Ordinances that require afforestation or other exactions are susceptible to a challenge on whether the conditions imposed on the development are reasonably related to the need created by it. For example, fees for development permits that are used to pay the costs of the locality that result from the development are valid. However, using such fees to pay for schools or libraries may be susceptible to a challenge.[23]

In order to avoid such challenges, on-site or off-site replacement or in-lieu-fee requirements should be linked to the number, type, and size of the trees removed. Any funds should be set aside in an exclusive fund and used in a timely manner. Reforestation requirements are suspect unless they show that the impact of that specific project or preexisting environmental problems on the site justifies remediation.[24]

c. Beyond the Law

In addition to an effective legal framework, a successful urban forestry program will incorporate a planning component that will reflect the legal framework and give direction to actions to be taken within the urban forestry program for the time reflected in the plan. An effective plan must consider elements including the actions directed at the trees themselves, a management framework for the tools brought to bear on the trees, and a

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[21] Planning Advisory Service Report Number 446: Tree Conservation Ordinances, Christopher J. Duerksen with Suzanne Richman (American Planning Association & Scenic America, 1993), 25.
[22] Planning Advisory Service Report Number 446: Tree Conservation Ordinances, Christopher J. Duerksen with Suzanne Richman (American Planning Association & Scenic America, 1993), 27.
[23] Planning Advisory Service Report Number 446: Tree Conservation Ordinances, Christopher J. Duerksen with Suzanne Richman (American Planning Association & Scenic America, 1993), 29.
[24] Planning Advisory Service Report Number 446: Tree Conservation Ordinances, Christopher J. Duerksen with Suzanne Richman (American Planning Association & Scenic America, 1993), 30.

community framework to engage citizens in the urban forestry program.[25] Community involvement is especially important because such a large portion of urban trees are on private property.

A study conducted in 1993 found that effective tree ordinances have: (1) clearly stated goals; (2) designated responsibility with commensurate authority; (3) basic performance standards; (4) flexibility; (5) specified enforcement methods; (6) are part of a comprehensive management strategy; and (7) are developed with community support.[26] The study further found that the majority of surveyed communities with existing tree ordinances believed their ordinance needed revision.[27]

II. GOALS AND PURPOSES (return to menu)

Localities have a wide range of objectives for preserving tree cover or urban forests. It is crucial that the purpose of the ordinance is supported by traditionally acknowledged legal powers of cities and counties such as the police power or the enabling authority of state law because the purpose of the law is key to whether the ordinance is constitutional. Thus, environmental protection purposes are often more advisable than purely aesthetic ones. The following is a list of legislative reasons that can be employed in a combination appropriate for the context of the locality.

a. Tree preservation

Lynnwood, Washington proposes a set of purposes for its tree regulation ordinance, some of which simply reflect the intent to preserve trees. For example, Lynnwood lists the purpose of the regulation to include "(A) Preserve the maximum of trees that are determined to be appropriate for preservation in the Lynnwood urban environment and that have a reasonable chance of long-term survival; (B) Lessen the impact of tree removal by requiring that trees are replaced at an appropriate and sustainable level for the Lynwood environment; (C) Assure that newly planted trees are an appropriate species for the given environment."[28]

Portland, Oregon's Tree Cutting ordinance's purpose is, "to regulate the cutting of trees in order to help preserve the wooded character of the City of Portland and protect the urban forest. It is not the intent of this Chapter to regulate the cutting of trees on any single-family lot, which cannot further be divided, upon which a single-family residence already exists…."[29] Tampa, Florida gave its Landscaping, Tree Removal, and Site Clearing ordinance the simple purpose of "to protect trees, wetlands, and natural

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[25] Seattle, Washington, Urban Forest Management Plan, 2, (April 2007), available at http://www.seattle.gov/environment/documents/Final_UFMP.pdf.
[26] Phytosphere Research, *Planning for an Ordinance*, available at www.phytosphere.com/treeord/ordprt1b.htm (last visited September 4, 2007).
[27] Phytosphere Research, *Planning for an Ordinance*, available at www.phytosphere.com/treeord/ordprt1b.htm (last visited September 4, 2007).
[28] Lynnwood, Wash., Code § 17.15.030.
[29] Portland, Or., Code § 20.42.010.

resources by regulating the trimming or removing of trees, site clearing, landscaping, tree planting, and irrigation in the city."[30]

b. Ecosystem Services

Ecosystem services are a complex interplay of natural cycles powered by solar energy and operating across a wide range of space and time scales that provide services that are generally not traded in economic markets and would be extremely difficult to duplicate artificially. They are the processes by which the environment produces resources such as clean water, timber, habitat for fisheries and pollination of native and agricultural plants. They provide services including moderation of weather extremes and impacts; seed dispersal; drought and flood mitigation; protecting people from harmful effects of the sun; cycle and move nutrients; protect stream and river channels and coastal shores from erosion; detoxify and compose wastes; control agricultural pests; maintain biodiversity; generate and preserve soils and renew their fertility; contribute to climate stability; purify the air and water; regulate disease carrying organisms; and pollinate crops and natural vegetation.[31] Historically, the nature and value of these systems have not been appreciated until they were lost, for example the understanding of the role forests play in regulating the water cycle is not recognized until trees are removed by deforestation.[32]

Ecosystem services are threatened by land use changes, disruption of biogeochemical cycles, invasive species, pollution, and climate change.[33]

i. Air Quality

Trees remove carbon dioxide and other pollutant gases from the air, and release oxygen, which further dilutes pollution. Their role in reducing temperatures reduces the formation of smog. They remove airborne particles by trapping them and by increasing humidity, which washes particles out of the air.[34] The role of trees in improving air

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[30] Tampa, Fla. Code § 13-2.
[31] Ecological Society of America, *Ecosystem Services*, (2000) *available at* www.esa.org.
[32] Gretchen C. Daily; Alexander, Susan; Ehrlich, Paul R.; Goulder, Larry; Lubchenco, Jane; Matson, Pamela A.; Mooney, Harold A.; Postel, Sandra; Schneider, Stephen H.; Tilman, David; and Woodwell, George M., *Ecosystem Services: Benefits Supplied to Human Societies by Natural Ecosystems*, 1 (Ecological Society of America, No. 2, Spring 1997).
[33] Gretchen C. Daily; Alexander, Susan; Ehrlich, Paul R.; Goulder, Larry; Lubchenco, Jane; Matson, Pamela A.; Mooney, Harold A.; Postel, Sandra; Schneider, Stephen H.; Tilman, David; and Woodwell, George M., *Ecosystem Services: Benefits Supplied to Human Societies by Natural Ecosystems*, 1 (Ecological Society of America, No. 2, Spring 1997).
[34] Planning Advisory Service Report Number 446: Tree Conservation Ordinances, Christopher J. Duerksen with Suzanne Richman (American Planning Association & Scenic America, 1993), 10-11.

quality in urban areas is increasingly being recognized.[35] Tree cover in urban areas can contribute to a reduction in respiratory diseases, less employee illness, fewer workdays lost, lower burden on health insurance system. Purposes that reflect the intention to improve air quality include "Aid in the removal of carbon dioxide and generation of oxygen in the atmosphere."[36]

ii. Water Quality, Quantity, and Erosion Control

Trees play a critical role in slowing stormwater runoff by slowing the surface movement of water and stabilizing the soil with their roots. Trees absorb the first 30% of most precipitation through their leaf systems and up to another 30% of precipitation is absorbed into the ground and captured by the roots, which brings it back into the air through transpiration.[37] This prevents carrying pollutants into surface water bodies, prevents the washing away of soil, and allows water to percolate into the soil, increasing its productivity.[38] Thus, trees and vegetation are effective and efficient methods for meeting the U.S. EPA's standards for water quality from nonpoint sources such as streets, parking lots, and storm sewers.

Prior to 1989, Virginia law did not authorize tree replacement ordinances as such, so Fairfax County passed an ordinance with the purpose of:

> To Conserve and protect the land, water, and air, vegetation, and other natural resources of Fairfax County; to alleviate erosion, siltation, and other harmful effects of land-disturbing activities on the neighboring land and streams by ensuring that the owner of the property on which land-disturbing activities are to be carried out provides adequate controls on erosion and sedimentation, and takes necessary measures to preserve and protect trees and other vegetation, during all phases of any land-disturbing activity.[39]

Another example of a tree conservation purpose founded on erosion and stormwater control is from Columbia, Missouri:

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[35] Bobby Caina Calvin, *The EPA is Urged to Turn Over a New Leaf* (Sacramento Bee, May 18, 2007) available at http://www.fs.fed.us/psw/programs/cufr/products/11/psw_cufr692_NewLeafEPA.pdf.
[36] Lynnwood, Wash., Code § 17.10.030(F).
[37] Dan Burden, *Benefits of Urban Street Trees,* (Glatting Jackson and Walkable Communities, Inc; May, 2006).
[38] Planning Advisory Service Report Number 446: Tree Conservation Ordinances, Christopher J. Duerksen with Suzanne Richman (American Planning Association & Scenic America, 1993), 11.
[39] Fairfax County, Virginia, Erosion and Sedimentation Control and Conservation Ordinance, Part 3, Chapter 104-1-1.

> Protect the health, safety and property of the people of Columbia by regulating the disturbance of land source areas by preserving trees, preventing erosion on disturbed areas, and controlling stormwater drainage….[40]

Another version of this purpose is "Aid in the stabilization of soil by the prevention of erosion and the enhancement of sedimentation" from Lynnwood, Washington, which also adds "Reduce stormwater runoff and the costs associated therewith and replenish water supplies…" and "Aid in the control of drainage and restoration of denuded soil subsequent to construction or grading."[41]

Ordinance drafters who intend to prevent erosions and runoff should include provisions to protect all existing vegetation on steep slopes. Maintaining trees in riparian zones is especially important. If preventing soil erosion and runoff into water bodies is a goal, the ordinance should make special provisions for prioritizing tree maintenance and replacement in riparian zones. Some birds and mammals preferentially rely on riparian forests.[42]

iii. Temperature Moderation and Energy Conservation

Trees can reduce the temperature of urban areas by seven or more degrees.[43] They similarly shelter structures from the wind and contribute to moderating temperatures in the winter. Even planting three trees near a house can have significant impacts on the costs of energy for temperature control.[44] Thus, urban trees result in a reduction in energy bills, and contribute to affordable housing. This moderation effect of urban trees is increasingly being recognized as important in light of predicted climate change.[45] Local Governments for Sustainability, along with the City of Seattle, and the U.S. Conference of Mayors recognize urban tree planting and preservation as a key action and tool for climate protection.[46] This is just one of the ways that sustainable urban forestry practices can contribute to effective adaptation to climate change.

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[40] Columbia, Missouri, Code § 12A-2.
[41] Lynnwood, Wash., Code §§ 17.15.030(D), (E), (I).
[42] DeGraaf, Richard M., and Mariko Yamasaki. "Bird and Mammal Habitat in Riparian Areas." *Riparian Management in Forests of the Continental Eastern United States.* Verry, Elon S., James W. Hornbeck, and C. Andrew Dolloff, eds. (CRC Press, 2000). 139.
[43] Planning Advisory Service Report Number 446: Tree Conservation Ordinances, Christopher J. Duerksen with Suzanne Richman (American Planning Association & Scenic America, 1993), 12.
[44] *Id*.
[45] Seattle, Washington's Office of Sustainability and Environment has adopted sustainable urban forests as a part of the city's climate protection strategy. See http://www.seattle.gov/environment/climate_protection.htm.
[46] U.S. Mayors' Climate Protection Agreement, Climate Protection Handbook, p. 11, available at http://www.seattle.gov/climate/docs/ClimateActionHandbook.pdf.

If drafters propose energy conservation as a goal, the ordinance should provide for maximizing tree canopy, particularly near buildings. This can be accomplished by making steeper penalties for removing trees that will be close to structures or by prioritizing replacement of trees near structures. The latter may be preferable because of the challenges in protecting trees that are close to the construction site during the construction process, though there are methods that can be used to protect trees successfully during construction.

c. Economic Development and Livability

As described above, trees can reduce energy costs and the costs of managing stormwater. They contribute to a positive image of a community and are viewed as a factor in the quality of life of a city. "Harmony with nature" and "livable built environments" are two of the core values of sustainable development reflected in successfully local development regimes.[47] Purposes of tree conservation ordinances intended for economic development or livability of cities can be specific about how the ordinances will accomplish these goals, or can be more broad: "Generally protect and enhance the quality of life and the general welfare of the city."[48] The value of an urban street tree has been calculated to be a return of $90,000 in direct benefits in the lifetime of the tree.[49] While private trees do not play an identical role, many benefits are similar and thus this economic value can be used as a rough estimate.

i. Visual and Aesthetic Values

Trees contribute to the beauty and attractiveness of communities. They make communities more livable by reducing the distortions of height and space created by tall buildings; they form a protective and psychological barrier between pedestrians and car traffic; they contribute to the unique identity of the community.[50] Further, they are also often protected because of their contributions to the character of a city, particularly to areas such as historic zones. One example of such a purpose is "Conserve and enhance the city's physical and aesthetic environment."[51]

ii. Property Values

Trees are traditionally appraised at a significant value in an urban setting and studies have shown that people are willing to pay more for lots with trees. Protecting trees also

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[47] Environmental Law Institute, *Lasting Landscapes: Reflections on the Role of Conservation Science in Land Use Planning*, (ELI, 2007).
[48] Lynnwood, Wash., Code § 17.15.030(L).
[49] Dan Burden, *Benefits of Urban Street Trees*, (Glatting Jackson and Walkable Communities, Inc; May, 2006).
[50] Planning Advisory Service Report Number 446: Tree Conservation Ordinances, Christopher J. Duerksen with Suzanne Richman (American Planning Association & Scenic America, 1993), 9-10.
[51] Lynnwood, Wash. § 17.15.030(K).

reduces developers' costs for stormwater detention and landscaping.[52] Shade encourages more commerce, which supports local business and increases the tax revenues for the community. Businesses on treed streets have been found to have 20% higher income streams than those without trees.[53]

iii. Livability Factors

Trees can muffle sound, making an area behind a tree buffer more comfortable than one exposed directly to street sounds. One example of this goal is: "Provide a visual buffer and screen against traffic and some buffer against noise pollution."[54] Trees also improve air quality as described above and also have been found to have positive mental health effects. Further, shade from trees protects people's skin for harmful rays of the sun. Lynnwood, Washington also includes the purpose of, "Provide protection against severe weather."[55]

d. Ecosystem Preservation

Localities may choose to preserve trees and urban forest in recognition that their development decreases the availability of natural areas. Urban trees can provide habitat for nesting migratory birds, a variety of mammals, insects, and other wildlife. The Ecological Society of America has developed a list of eight guidelines to evaluate the potential impact of land use decisions on natural systems. They include: (1) examine the impacts of local decisions in a regional context; (2) plan for long-term change and unexpected events; (3) preserve rare landscape elements and associated species; (4) avoid land uses that deplete natural resources over a broad area; (5) retain large contiguous or connected areas that contain critical habitats; (6) minimize the introduction and spread of non-native species; (7) avoid or compensate for effects of development on ecological processes; and (8) implement land use and land management practices that are compatible with the natural potential of the area.[56]

Applying conservation biology concepts to local planning protection is complicated by the fact that they exist in different scales of time and space. One approach to making local decisions that support important conservation priorities is to consider the spatial

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[52] Planning Advisory Service Report Number 446: Tree Conservation Ordinances, Christopher J. Duerksen with Suzanne Richman (American Planning Association & Scenic America, 1993), 15-16.
[53] Dan Burden, *Benefits of Urban Street Trees,* (Glatting Jackson and Walkable Communities, Inc; May, 2006).
[54] Lynnwood, Wash., Code § 17.15.030(G).
[55] Lynnwood, Wash., Code § 17.15.030(H).
[56] Dale, V., S. Brown, R. Haeuber, N. Hobbs, N. Huntly, R. Naiman, W. Riesbsame, M. Turner, and T. Valone. 2000. Ecological Society of America report: Ecological principles and guidelines for managing the use of land. Ecological Applications 10:639-670.

impact that the administrative unit can have on the species region-wide.[57] If, for example, an endangered species exists in municipality A but is found in a healthy population in municipality B, municipality A would be free to find a more important priority. In such a calculation, however, it is important to consider cumulative impacts on a scale appropriate for the objective species.[58] For example, if small populations of a species of concern were found in counties across the region but none chose to prioritize protection of the species because it was found elsewhere and wasn't a particularly robust population in each place, the cumulative effects could be devastating to the viability of the species.

In order to frame a tree conservation ordinance around biological preservation, drafters must establish priorities for conservation and associated targets in order to determine which ecological thresholds, such as patch size or riparian habitat, to emphasize.[59]

The protection of endangered species on private land has great potential to contribute significantly to ecological goals. More than 90% of the 1,260 species that were on the federal endangered species list in 1996 occur on private land and one half of them occur exclusively on non-federal land.[60] In contrast, only 3% of species that occur only on private land are considered to be improving in status and declining species outnumber improving species by a ratio of 9:1.[61] (As opposed to those on federal land for which the ratio of declining species to improving species is approximately 1.5:1.[62]) Thus protection of endangered species on private property stands to make an impact in the fate of these creatures.

For example, Woodbury, Minnesota's Protection of Woodlands Ordinance has the purpose of: (1) protection and preservation of the environment and natural beauty of the city; (2) minimize tree and habitat loss; (3) evaluation of the impacts to trees within wooded areas it minimize tree and habitat loss; and (4) establishment of minimum standards for tree preservation and the mitigation of environmental impacts resulting from tree removal.[63]

Some cities specify their ecological goals such as, "Provide a haven for birds, which in turn assist in the control of insects."[64] Communities that want to promote habitat

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[57] Environmental Law Institute, *Lasting Landscapes: Reflections on the Role of Conservation Science in Land Use Planning*, 18 (ELI, 2007).
[58] Lasting Landscapes, 19.
[59] Environmental Law Institute, *Conservation Thresholds for Land Use Planners*, 3 (Environmental Law Institute, 2003).
[60] Melinda E. Taylor, *Moving Away from Command and Control: The Evolution of Incentives to Conserve Endangered Species on Private Lands*, Biodiversity Handbook, 441 (ELI, 2006, McKinstry, Robert B. Jr., Coreen Ripp, and Emily Lisy, eds.).
[61] *Id.*
[62] *Id.*
[63] Woodbury, Minn., Code § 27-8.
[64] Lynnwood, Wash., Code § 17.15.030(J).

preservation should prioritize protection of larger stands of trees through permitting and mitigation requirements.

III. DEFINITIONS (return to menu)

Clear definitions are necessary for the success of the ordinance, both so that the regulated community will know how to comply, and so that the ordinance will survive any legal challenge of vagueness. It should not escape the notice of ordinance drafters that the basic jurisdiction of the law depends on the definition of the word *tree*, and thus the term must be defined in the ordinance. The following is a list of terms specific to tree conservation ordinances or permitting programs that are commonly defined in law, and sample definitions from existing ordinances and other relevant sources.

- ***Arborist***: a tree professional certified by the International Society of Arboriculture or the National Arborist Association. (Lynnwood, WA.)[65]
- ***Afforestation***: to convert open land into a forest
- ***Biodiversity*** (biological diversity): The variety, distribution and abundance of living organisms in an ecosystem. Maintaining biodiversity is believed to promote stability, sustainability and resilience of ecosystems. (Alachua County, FL) [66]
- ***Buffer***: linear bands of permanent vegetation, preferably consisting of native and locally adapted species, located between aquatic resources and adjacent areas subject to human alternation.[67]
- ***Caliper***: standard measure of tree size for trees to be newly planted. The measurement is taken 6 inches above the ground for trees 4 inches in diameter or less and 12 inches above the ground for trees over 4 inches in diameter. (Monmouth, NJ Model Tree Protection Ordinance)
- ***Canopy***: the top layer or crown of mature trees. (Monmouth, NJ Model Tree Protection Ordinance)
- ***Clear-cutting***: the cutting of more than seventy-five percent (75%) of the trees four (4) inches DBH or greater (St. Johns County, FL)
- ***Cutting***: the felling or removal of a tree, or any procedure in which the natural result will lead to the death or substantial destruction of a tree. Such acts include but are not limited to the severe cutting back of limbs to stubs larger than three inches in diameter; and damage inflicted upon the root system of the tree. Cutting does not include normal pruning within the bounds of accepted arboricultural practice. (Portland, OR)[68]
- ***Damage (or abuse)***: any action or inaction which does not follow good arboricultural practices as established by the National Arborist Association. Abuse also includes damage inflicted upon roots by machinery, changing the

[65] Lynnwood, Wash., Code § 17.15.040(B).
[66] Alachua County, Fla., Code § 410.01 art III.
[67] Environmental Law Institute, *Conservation Thresholds for Land Use Planners*, 4 (ELI, 2003).
[68] Portland, Or., Code § 20.42.020.

natural grade above the root system or around the trunk, destruction of the natural shape or any action which causes infection, infestation, or decay. (Tampa, FL)

- ***DBH***: diameter at breast height; commonly measured at 4 ½ feet above the ground. A common measurement for tree protection standards and other tree regulations.[69] (Alachua County, FL)
    - ***Circumference*:** (a variation on the DBH concept) the distance around the periphery of a tree at four and one-half feet above existing grade. (Tampa, FL)
- ***Developed single-family lot***: a legally platted lot of less than 16,000 square feet upon which a single-family habitable dwelling exists. (Lynnwood, WA)
- ***Development***: the performance of any building or mining operation, the making of any material change in the use or appearance of any structure or land, the division of land into two or more parcels, and the creation or termination of rights of access or riparian rights… [including] demolition of a structure or removal of trees. (American Law Institute)[70]
- ***Development activity***: any construction, development, earth movement, clearing or site disturbance activity, which requires a permit, and/or an approval, and/or authorization from the city of Lynnwood. (Lynnwood, WA)
- ***Diseased tree***: any tree with a combination of structural defect and/or a health condition, which makes it subject to a high probability of failure. (Lynnwood, WA)
- ***Dripline***: an imaginary perpendicular line that extends downward from the outermost branches of a tree to the ground. (Tampa, FL)
- ***Ecosystem functions***: the biophysical processes that take place within an ecosystem, apart from any human context.[71]
- ***Ecosystem services***: the ecosystem goods and services that provide benefit, directly or indirectly, to humans.[72]
- ***Grand tree***: a tree that meets a given standard for circumference, height, and crown measurements such that the total number of points given for those characteristics equal or exceed a minimum number of points for a particular species. (Tampa, FL)
- ***Heritage Tree***: Any tree that because of its age, size, unique type, or historical association is of special importance to the city. (Lynnwood, WA)
- ***Private tree***: any tree not located on property owned or controlled by the city. (Lynnwood, WA)[73]

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[69] *See also*, Lynnwood, Wash., Code § 17.15.040(D) (diameter at breast height, which is the diameter of a tree, outside of the bark, at a point four and one-half feet above grade); Portland, Or., Code § 20.42.020(B).

[70] American Law Institute, Model Land Development Code.

[71] Environmental Law Institute, *Conservation Thresholds for Land Use Planners*, 4 (Environmental Law Institute, 2003).

[72] *Id*.

[73] *C.f.* Public Tree: any tree located on property owned or controlled by the city. Lynnwood, Wash., § 17.15.040(O).

- ***Remnant patch***: habitat patches that escape disturbance and are left remaining from an earlier more extensive span of habitat.[74]
- ***Removal***: the actual removal or causing the effective removal through damaging, poisoning, or other direct or indirect actions resulting of the death of a tree. (Lynnwood, WA)
- ***Invasive, nonnative vegetation***: Any plant not indigenous to Florida, which exhibits, or has the potential to exhibit, noncontrolled growth and invasion or alteration of the natural qualities and functions of any native habitat. (Alachua County, FL)
- ***Native species***:
    - ***Native plant community***: those plant communities naturally occurring in north and central Florida. (Tampa, FL)
    - ***Native plant material*:** any plant material indigenous to central Florida and which is naturally grown or commercially propagated or cultivated for the nursery or landscaping industry. (Tampa, FL)
    - ***Native tree***: *a*ny tree indigenous to central Florida or the city and which is naturally grown or commercially propagated or cultivated for the nursery or landscaping industry. (Tampa, FL)
- ***Protective Root Zone***: the entire surface and subsurface soil area encompassed by prescribed radius for protected and grand trees (per the technical manual). (Tampa, FL)
- ***Recommended Tree***: a tree of 2 inches or greater in diameter as measured 6 inches above grade, which is included in the recommended tree list for as Schedule E. (Tampa, FL)
- ***Significant tree***: any tree that is at least six inches in D.B.H., and not include on the [list of exceptions]. A tree growing with multiple stems shall be considered significant if at least one of the stems, measured at a point six inches from the point where the stems digress from the main trunk, is at least four inches in diameter. (Lynnwood, WA)
    - ***Nonsignificant tree***: any tree under six inches or those included on the following list, regardless of size:
        1. Black locust (Robinia pseudoacacia);
        2. Cottonwood (Populous freemontii);
        3. Native alder (Native Alnus only);
        4. Native willow (Native Salix only)
        5. Lombardy popular (Populous nigra)[75] (Lynnwood, Wa)
- ***Specimen tree***: Individual trees which are healthy which have a diameter at breast height of 24 inches or greater, or which otherwise are noteworthy because of species, age, size, or any other exceptional quality, such as, uniqueness, rarity, or status as a landmark or species specimen. (Montgomery County, MD)
- ***Suitable habitat***: habitat that meets the survival and reproductive needs of a species, allowing for a stable or growing population over time.[76]

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[74] Environmental Law Institute, *Conservation Thresholds for Land Use Planners*, 4 (Environmental Law Institute, 2003).
[75] Lynnwood, Wash., Code § 17.15.080.

- ***Tree***:
  - any self-supporting wooding plant together with its root system, growing upon the earth with one trunk of at least three inches in diameter at a height of four and one-half feet above the ground, or a multi-stemmed trunk system with a definitely formed crown. This excludes any ornamental shrubs.[77] (Lynnwood, WA)
  - any self-supporting single-and multi-stem woody plant of a species which grows to at least a height of fifteen (15) feet in the environs of the city and, in addition, all species of Rhizophora mangle (red mangrove), Aguncularia racemosa (white mangrove), Avicennia aerminans (black mangrove) and Conocarpus erecta (buttonwood mangrove), regardless of diameter. (Tampa, FL)
- ***Tree canopy***: The area of the property that contains coverage by trees and consists of the total crown spreads or drip-lines of all trees existing on-site. (Alachua County, FL)
- ***Woodland***:
  - A mature woodland is an area or stand of trees whose total combined canopy covers an area of one acre or more and at least 50 percent of which is composed of canopies of trees having a DBH of at least 10", or any grove consisting of eight or more individual trees have a DBH of at least 12" whose combined canopies cover at least 50 percent of the area encompassed by the grove.
  - A young woodland is one that does not meet those specifications. (Lake County, IL).

IV. APPLICABILITY (return to menu)

Tree protection ordinances can be designed with a variety of applications. Trees on public property are often regulated under a separate ordinance so tree conservation ordinances apply exclusively to private property. Additionally, ordinances differ in terms of what trees they regulate within the types of land use to which they apply. Finally, they can regulate the actions of various categories of people.

In some cases, the applicability of the ordinances is further detailed in required regulations. For example, Lynnwood, Washington allows the director of public works to promulgate regulations which must include: (A) The species of trees recommended and preferred to be planted, preserved, replaced or replanted on the streets and public properties of the city; (B) The procedures for preserving significant trees during development; (C) The procedures and criteria for applying and approving tree fund grants; (D) Any other tree preservation, protection, and planting procedures that the

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[76] Environmental Law Institute, *Conservation Thresholds for Land Use Planners*, 4 (ELI, 2003).

[77] *See also* Portland, Or., Code § 20.42.020(F) (any woody plant having a least 12" DBH or any tree planted as a mitigation requirement. Tree does not include any plant on the nuisance plant list.

director deems necessary."[78] This is a good approach for successful ordinance drafting. While tree conservation strategies should contain specific objectives, they must also be flexible so that implementation can be adjusted according to outcomes and changing circumstances. Thus, these details should be in regulations or planning instruments, not ordinances which can only be altered through the legislative process.

Some tree conservation ordinances apply generally. Tampa, Florida's ordinance applies to all buildings, development, improvements and land within the corporate limits of the city, unless expressly exempted by law.[79]

a. Land Uses

Application of a tree conservation ordinance can be specified according to how land is being used. Some are particular to current land use or lot size, while others depend on a new proposal for the property.

i. New Development

Tree conservation ordinances that apply to new development projects often require approval by city or county officials before development may commence or certificate of occupancy issued. Maryland's 1991 Forest Conservation Act requires local governments to develop forest conservation programs. It applies to "any public or private subdivision plan or application for a grading or sediment control permit on areas 40,000 square feet or greater."[80] Woodbury, Minnesota similarly requires a tree preservation plan for: (1) new development in any zoning district; (2) new building construction in any zoning district; (3) expansion of any existing commercial, industrial or institutional building or impervious surface by ten percent or greater, where an approved tree preservation is not on file with the city; (4) any project for which a city land disturbance permit is required; removal of any healthy Specimen Tree on any parcel.

ii. Commercial or Residential Property

Lynnwood, Washington has two classes of tree removal permits, one for single-family residential lots smaller than 16,000 square feet and one for all other properties, regardless of the type of project proposed. Lynnwood makes permitting procedures, fees, and replacement requirements more onerous for properties other than single-family residential lots.

iii. Protections for Historic Areas

[78] Lynnwood, Wash., § 17.15.060.
[79] Tampa, Fla., Code § 13-3.
[80] Md. Code Ann. Nat. Res. §§5-1602.

Some jurisdictions have provided specific tree protection requirements for historic zones in recognition of the role that trees play in the character of historic areas. Pensacola, Florida protects specified trees within the boundaries of the Pensacola Historic District.[81]

b. Trees Regulated

Ordinances have different approaches to determining which trees in the regulated area are protected. Some regulate by various measures of size, others by local significance such as association with an historical event. Some regulate the specified trees in certain areas, while others regulate the specified trees wherever they occur within the locality. Some examples include:

i. Regulation by Size

Localities that have adopted measures to regulate individual trees commonly define the projected trees by their size. Frequently, size is defined by DBH. The range of common sizes that are protected is 6"-12" DBH with protection for 6" DBH trees frequent.[82] Ordinances also create categories of trees based on species that have different size standards for qualifying for protection. For example, a locality may protect all trees of 6" and larger for most tree species and trees of 4" DBH and larger for highly valued tree species.

Fairhope, Alabama defines trees of 24" DBH as a "Significant Tree." Gainesville, FL uses the term "Heritage Tree, " defining it as 20" for most species and 30" for some less desirable and non-native species. Lynnwood, Washington uses both the terms "Heritage Tree," defining it broadly to include age, size, unique type, or historical association, [83] and "Significant Tree" which includes trees bigger than 6" DBH, excluding enumerated species.[84] In contrast, Alachua County, Florida protects trees of 20" or larger as "Heritage Trees," but most common tree species are essentially exempt from protection. Austin, Texas regulates "protected trees" as any that are 60" DBH. In contrast, Thousand Oaks, California regulates oak trees that are 2" DBH.

As an alternative to using the diameter, some localities choose to base their measurements on the circumference. Others chose to measure by height, such as Tampa, Florida, using it as part of the formula for calculating state champion trees. St Lucie County, Florida protects palms that are taller than 10'.[85]

Some localities require the tree to be designated as meeting the special category before legal protections apply. For example, Lynnwood, Washington provides a procedure for

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[81] Pensacola, Fla. Code.
[82] *See*, St. Johns County, Fla. Land Development Code S3.06.10(c)(1) (no healthy trees of 8" or DBH or larger can be removed without approval).
[83] Lynnwood, Wash., Code § 17.15.070.
[84] Lynnwood, Wash., Code § 17.15.080.
[85] St. Lucie, Fla. Code.

submitting written requests for designating heritage trees to the public works department, which includes a requirement that the land owner approve of the declaration, a site map, details about the tree, and an explanation of the request.[86] The owner of private property on which a candidate tree stands must consent and if the tree is on city-owned property, the mayor must consent; an arborist must evaluate the health of the tree.[87] The decision about the designation is ultimately made by the parks and recreation board at a public hearing.[88] When a tree is designated as a heritage tree in Lynnwood, it is identified with a plaque and a notice in the land records.[89] Once a tree is designated a heritage tree, it is illegal to remove, damage, or defile it, or any protective measures and any maintenance must be with the approval of the public works department, unless the designation has been removed based on an analysis by the public works department that find the tree to be of poor health or dead, to have become a hazard tree, no longer meets the criteria for designation, will be impacted by the location of proposed improvements or structures, or the desire of the landowner to remove the designation.[90]

1. Percentage of Local Standard

Another way to judge the appropriate trees for protection is by establishing a local standard based on existing trees. This requires keeping records to establish the standard by which all other trees must be regulated. For example, the standard is often 75% of the diameter of the current state or county Champion Tree.[91]

City officials would adopt a list of the size thresholds, probably rounded to the nearest inch, and update it from time to time. The size thresholds could also serve as a rough guide in designating the sizes, but, not be legally binding in the ordinance.

2. Analysis of Size Approach

The protection of individual trees has the advantage of being straightforward to apply, requiring a simple measurement of the diameter of the tree, to determine applicability, but the approach also has drawbacks. A tree's age and life expectancy cannot always be assumed by its diameter as trees grow at different rates depending on species and conditions; also, not all trunks are circular so diameter measurements can vary.

In addition to the fact that size is not always a direct indicator of the value of a tree, preserving only the oldest trees is not a sustainable strategy. Roots of large trees are more likely to sustain construction damage and are less adaptable to grade changes. Older trees may die soon. It may not make sense to design a development around trees that soon will not be there anyway.

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[86] Lynnwood, Wash., Code § 17.15.070(A).
[87] Lynnwood, Wash., Code § 17.15.070(B).
[88] Lynnwood, Wash., Code § 17.15.070(C).
[89] Lynnwood, Wash., Code § 17.15.070(D).
[90] Lynnwood, Wash., Code § 17.15.070.
[91] Md. Code Ann. Nat. Res. §§ 5-1607.

ii. Regulation by Species

Drafters of ordinances may chose to protect individual trees based on species in order to protect species that are rare or provide other specific shade or ecological benefits to the community. This approach is also necessary to protect slower-growing species that may never reach larger size thresholds. Dogwood trees, for example, rarely grow large enough to meet the protected standard of 6" DBH most ordinances. Some communities even go so far as to only regulate one species, such as, in the case of Thousand Oaks, California, oak trees.

1. Specified List of Species

Alachua County, Florida maintains a list of special species – classified as "specimen trees." In contrast, many localities expressly exclude invasive species from protection. Lynnwood Washington lists six species that are not protected by the tree permitting ordinance. It makes more sense to maintain such lists as regulations or part of strategic plans rather than in the enacted ordinance.

2. Protecting Native Species

In recognition of the high value of native trees for supporting intact ecosystems, some localities have focused their preservation efforts on native trees. One such town is Sanibel Island, Florida. Islands are often more susceptible to invasive species because native systems develop without having to fend off invaders. Sanibel Island requires protection of all native vegetation outside a specified area. Further, any native tree that is removed must be replaced by native vegetation and any new landscaping must be done with native species.[92]

iii. Combined Approach: Size and Species

A successful formula for capturing the values communities want to reflect in their tree protection ordinances often requires combining size and species requirements to determine which trees to protect. Localities may chose to combine regulation by size with regulation by species for a more targeted system.

For fast growing, very common, or undesirable species, the ordinance must provide an exemption or require a higher size threshold. Gainesville, FL uses two different size thresholds for heritage status: 20 inches for most trees, 30 inches for more common/ less desirable trees like loblolly pines.

An effective approach is to adopt two size thresholds based on diameter– 20" or 24" for heritage tree status, and 6", 8", or 10" for other regulated trees. Lower size thresholds for

[92] Sanibel, Fla. Code.

both heritage and regulated status should be considered for smaller species like dogwoods. Invasive species should be exempt from protection.

A good example of this combined approach is from Fulton County, Georgia. Fulton County defines specimen trees in three categories. Large hardwoods include oaks and hickories and are regulated at 30" DBH; large softwoods include pines and cedars and are regulated at 36" DBH; small hardwoods include dogwoods and redbuds and are protected once they reach 12" DBH. The ordinance leaves discretion to the permit authority to protect specimen trees that don't reach the regulated size if they are rare or unusual, of exceptional quality, or of historical significance.[93]

A more nuanced approach is represented by Prince George's County, Maryland. The County has a list of specimen trees with a specific DBH standard for each species.[94] Other localities have chosen to measure more than just one physical attribute.

1. Analysis of Combined Approach

While a combination of size and species does a better job of advancing specific tree protection goals, such an approach still fails to capture how the trees fit into the landscape. It gives no greater value to larger stands of trees or trees in certain geographic areas where they are of higher value, for example on a steep slope or in a riparian zone.

c. Exemptions to Applicability

Many localities choose to exempt certain categories of trees or land uses from regulation. Most ordinances exempt some types of properties from tree permit requirements. Common exemptions include for commercial nurseries of various types; trees on public rights-of-way; trees that pose a hazard to public utility lines; diseased or dead trees; trees posing a hazard to life or property.[95] Weather emergencies are also often reason for suspending ordinance requirements.[96]

i. Administrative Convenience

Localities often chose to provide for exemptions to prevent city officials from being burdened with numerous requests, each for removal of a small number of trees. While this is attractive reasoning, drafters should be careful to consider the potential cumulative impacts of exemptions. While they might make sense on a case-by-case basis, the overall impact can be significant.

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[93] Fulton County, Ga. Code.
[94] Prince George's County, Md. Code.
[95] Lynnwood, Wash., Code § 17.15.150 (trees found to be killed deliberately or due to negligence during construction activity are not exempted from permit requirements in order to avoid creating a loophole that gives developers the incentive to kill or neglect trees).
[96] Lynnwood, Wash., Code § 17.15.180.

Examples of categories that might be exempted because regulating them is not an efficient use of the local government resources include: existing residential lots under specified size; single or two-family dwellings on less than a certain amount of land; projects on low-density parcels below certain standards; detached single family lots and any other parcel 1 acre or less where residential units will be constructed, provided that permits are obtained for removal of trees > 24 inch diameter;[97] mitigation requirements for such trees may be waived for lots < ½ acre where tree removal required to make reasonable use of such parcel.[98]

ii. Amount of Trees Removed

Another type of exemption allows the removal of a certain amount of trees. Greensboro, North Carolina allows the clearing of up to 3000 sq ft of property.[99] Gibbsboro, New Jersey allows owners of individual lots to remove up to two trees at a time, up to a limit of six in a year.[100]

An exemption by lot size of the proposed development could allow circumvention of the ordinance by simply subdividing the property before developing.

iii. Certain Trees

Exemptions for diseased or hazardous trees are commonplace and when applied reasonably, are entirely appropriate. La Habra, California classifies trees that cause harm to the public or public infrastructure as public nuisances.[101] Sacramento similarly outlaws trees that cause harm to other trees such as those that have contagious infections.[102] Lynnwood Washington specifies five species of tree that are not protected regardless of size.

iv. Incompatible Land Uses

For some land uses that may exist within certain localities regulating tree conservation is unnecessary or inappropriate. Nonetheless, urban forestry authorities will do well to include these areas in their regulatory system in some form to prevent claiming an area as one of these incompatible land uses, in order to avoid the requirements of this law when they do in fact plan to develop the property. This issue is described further below in the discussion of notice (VIII, p. 50). Some examples of land uses categorized as incompatible with tree conservation are: agriculture and forestry; existing uses or zoning

[97] Fairhope, Ala. Code.
[98] St. Lucie County, Fla., Code § 6.00.04(G).
[99] Greensboro, N.C. Code.
[100] Gibbsboro, N.J. Code.
[101] La Habra, Cal. Code § 12.20.100A.
[102] Sacramento, Cal. Code § 45.102.

(comprehensive ordinances include all zonings such as commercial, residential, and industrial);[103] central business district;[104] trees deliberately planted by owner that are not required mitigation or by other applicable law (intended to avoid deterring owner from planting trees, particularly fast growing "temporary" trees); cemeteries;[105] trees on public land or utility rights-of-way;[106] roads and streets approved in town layout or subdivisions;[107] non-commercial fuel cutting, as long as it isn't clear-cutting;[108] mining activities;[109] recreation areas; retention ponds; utility easements of 25-feet or more; and on-site septic systems.

v. Analysis of Exemptions

Drafters must choose exemptions in tree conservation ordinances carefully. The need for most exemptions can be avoided through flexible permitting and mitigation measures. Alternatively, exemptions can be combined with tree-specific requirement such as specimen tree protection that can mitigate impacts. Excessive exemptions can undermine the purposes of the ordinance.

Cemeteries do not require special treatment. The large amount of open space should make it easier for cemeteries to preserve trees or mitigate on site than for many other regulated land uses. Exemptions for trees that were deliberately planted by a land owner not pursuant to a mitigation requirement or by other applicable law is intended to avoid deterring property owners from planting trees, particularly fast growing "temporary" trees. Nonetheless, including such new trees in the regulatory scheme should not be so onerous that it actually causes property owners to choose not to plant trees. Additionally, exemptions for public trees are also ill-advised. Public trees should be regulated in order to set good example for private property owners and for the public benefits of the public trees. Finally, there is also no reason for utility companies should to get a blanket exemption from compliance with a tree protection ordinance.

Road and right-of-way trees do not need to be exempted because they can be dealt with through canopy requirements or through mitigation, in the absence of an exception. Finally the mining exemption is also superfluous because mitigation can be required upon completion of the mining activity, when site restoration is already required under other authorities.

Limited agriculture and forestry exemptions may be necessary to avoid a constitutional challenge as a regulatory taking as explained above. In addition, a few states may have legislation that limits regulation of agriculture (Florida has a relatively new "Right to

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[103] Monmouth N.J., Model Ordinance.
[104] Fairhope, Ala.
[105] Monmouth, N.J. Model Ordinance.
[106] *Id.;* Cape Code, Mass.
[107] Cape Cod, Mass., Code § 16- 2.2(A)(5).
[108] Cape Cod, Mass., Code.
[109] St. Lucie County, Fla.

Farm" law.) In order to allow these exemptions without defeating the ordinance, notice requirements must be established. Require at a minimum the person requesting the exemption to notify the city prior to starting. Require a tree survey of the property. If the property is developed within a certain period (e.g. 5 years), require mitigation for trees removed under this exemption to minimize "preemptive" clearing.

A limited exemption for non-heritage trees on small (e.g. < 1 acre) single-family lots may be advisable for political reasons and administrative convenience. Some residents may oppose government regulation of what trees they can remove. Most such requests will be for only a few trees.

The other exemptions are not recommended as they undermine the goals of tree ordinances. Intense urban land uses which have difficulty preserving or mitigating onsite for trees may do so offsite or pay into a mitigation fund. The expense of doing so encourages preservation of larger or more important trees. These alternatives are described further below in the section on mitigation (VII p. 44).

d. What Activities are Regulated

An effective urban forestry program will apply to a broad range of activities in order to capture the range of activities that can impact the urban trees. This means that there should be a low threshold for when the tree permit requirements come into effect. For example, Fulton County, Georgia requires a land disturbance permit for any clearing, grading, trenching or similar land-disturbing activities. This requires submitting a tree conservation plan as part of the land disturbance permit process. Further, any application for a rezoning or special use permit triggers the arborist review process and application of tree protection standards.[110]

Other jurisdictions have chosen to base their tree protection requirements on activities that cannot be conducted without a tree permit. Chapel Hill, North Carolina, and Lynnwood, Washington, have adopted this method.[111] Chapel Hill prohibits removal, pruning, or harming any tree, clearing of vegetation from a site, or beginning any excavation, removing soil, or placing fill on a site until the town manager has issued a permit.[112]

i. Timing

It is crucial that tree protection standards apply in a time scale that comprehends the actions that can be taken to impact urban trees. This means making sure that standards apply before any qualifying development actions are taken. It is also advisable to make the requirements retroactive to prevent efforts to circumvent the purposes of the ordinance.

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[110] Fulton County, Ga. Code § 26-396 et seq.
[111] Lynnwood, Wash., Code § 17.15.100.
[112] Chapel Hill, N.C. Code.

Another concern related to timing arises from the fact that new owners often buy a property and clear trees, sometimes as part of a desire to signify the property as their own or because they are not used to tree canopy. To prevent this resulting in rash applications for tree removals, drafters can limit tree removal permits for new owners for an interim period to allow new owner to get used to trees and appreciate how they function in landscape.

e. Who Must Comply

Ordinances can be designed to regulate the actions of different actors according to community goals.

i. Public utilities

State laws differ about whether localities have the authority to regulate public utilities. Localities may chose to regulate either development activities carried out by utilities, or practices such as pruning methodology. Localities have adopted standards that utilities must comply with in their pruning activities, though some only apply on public rights-of-way.[113] These communities have expressed the decision against allowing utilities to adopt some common but unnecessary and unappealing practices such as topping. Communities seeking to have sustainable urban forests must also consider utility construction practices because activities related to underground sewer, water, and electrical lines can gravely interfere with the root systems of trees. As with regulating activities of private companies, ordinance drafters must ensure that the locality can influence the construction activity early in the process to avoid conflict and make sure that the regulatory power is effective. A simple way of doing this is to explicitly include utilities in general development permit requirements.

Structuring the law to require consultation and negotiation can prove especially fruitful when it comes to influencing the activities of public utilities or other government agencies. Tree advocates have managed in some cases to draft laws that allow the priority of trees to trump other considerations, with the discretion of the appropriate official. For example, Austin, Texas requires city officials to consider whether a standard or rule could be modified without posing any "serious and imminent" adverse effect when application of the standard threatens a protected tree.[114] Prince George's County, Maryland also allows for flexibility in infrastructure standards. Prince George's development ordinance allows for steeper grades, reduction in building setbacks, islands in cul-de-sacs, a reduction in street widths, and grassy swales instead of curbs in some subdivisions to preserve existing trees.

But even if the political will is not strong enough for such flexibility, a simple consultation requirement can give officials from different agencies the opportunity to find mutually beneficial solutions. Modesto, California, for example, requires the public

[113] Alachua County, Fla. Code § 91-14-5; Chapel Hill, N.C. Code § 11.4.4.
[114] Austin, Tex., Code § 13-2A-5187.

works department to notify the parks and recreation department of applications for projects that might harm trees.[115]

f. Miscellaneous Provisions

Lynnwood, Washington makes a point of stating that its tree permitting ordinance does not impose liability on the city or relieve private property owners from the duty to keep trees and shrubs in safe condition.[116]

V. PERMIT REQUIREMENTS (return to menu)

A successful permit program must specify responsibility and corresponding authority, permit application and approval criteria, mitigation requirements, appeals process, and enforcement mechanisms. As part of the permitting process, communities can require delineations of forests on development sites, set goals or requirements for forest retention or reforestation, establish requirements for connectivity of open space and forest areas on development sites, and require suitable mitigation consistent with the purposes of the development.[117] In order to ensure that information used to make decisions is current, permits must have expiration dates.

a. Authority

The choice of who should administer tree conservation programs is very context-specific. The factors in choosing an agency or specific official are: the requisite expertise and sympathy for the ordinance's goals; the availability and support of staff; the structure of the ordinance; and the ordinances objectives. [118] Some cities give tree conservation authority to a municipal employee such as an urban forester or a town manager. Others give it to a body either of volunteers or a committee of government officials such as a Tree Commission.[119] Some combine the two. The success of a tree protection regime, especially a more complex one, will hinge on the skill and knowledge of the administrator of the program. It is crucial for the administrator to understand land use controls, the development procedure, and especially arboricultural practices. Further, the authority must have sufficient resources to adequately administer the program. If feasible, investing a single person with responsibility for overseeing all tree-related activities for the locality is the most effective approach.[120]

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[115] Modesto, Cal. Code § 15-5.08.
[116] Lynnwood, Wash., Code § 17.15.190.
[117] Nature Friendly Ordinances: Local Measures to Conserve Biodiversity, Jim McElfish, Jr. (ELI, 2004), p. 126.
[118] Planning Advisory Service Report Number 446: Tree Conservation Ordinances, Christopher J. Duerksen with Suzanne Richman (American Planning Association & Scenic America, 1993), 47.
[119] Fairhope, AL Ordinance NO. 1193 (2003).
[120] Phytosphere Research, *Planning for an Ordinance,* available at www.phytosphere.com/treeord/ordprt1b.htm (last visited September 4, 2007).

Examples of different structures include investing authority in the municipal or county department of:

- **Planning and Zoning** (Chapel Hill, NC; Park City, UT; Prince George's County, MD; Sanibel Island, FL)
- **Parks and Recreation** (Austin, TX; Tampa, FL)
- **Public Works** (Columbia, MO; Fulton County, GA; Lynnwood, WA; Piscataway, NJ; Pasadena, CA)
- **Environmental Resources** (Fairfax County, VA)

Increasingly, localities are placing tree protection authority with planning and zoning departments. As ordinances become more sophisticated and more entwined with the broader development process, it is increasingly effective to designate the planning and zoning department to consider the trees as part of the broader picture.

i. Citizen Review Bodies

Citizens can participate in the administration of tree protection regimes by setting policy or ordinance administration, with decision-making authority or in an advisory role. Some localities have incorporated this system into an existing citizen body such as a planning commission or board. Such citizen participation contributes expertise, advocates for the program, and extra time and energy.

Localities with bigger and more involved citizen bodies sometimes choose to have government staff support the citizens groups. The structures of citizen bodies involved in tree protection include:

- **Tree commission.** A large tree commission consisting of experts and ex-officio members from other government agencies that serves to advise the board of supervisors evaluates the tree protection program annually, disseminates technical information and educates the public, and assists the staff in development of technical standards. (Fairfax County, VA)
- **Vegetation committee.** Appointed by the city council, the committee actively participates in administration of the ordinance by conducting on-site inspections, making recommendations to developers on limits of disturbance and replanting plans. The committee meets monthly, and conducts inspects twice a week or more if necessary. (Sanibel, FL)
- **Tree board of review.** A board with designated slots for an arborist; a horticulturist; an attorney or architect; a building contractor, developer, or engineer; and two members of the general public. The board can review any order or decision made by any administrative official regarding enforcement of the tree ordinance, and may grant variances. (Tampa, FL)
- **Urban Forestry Advisory Board.** A board whose duty it shall be to advise the director on the establishment of appropriate urban forestry programs, regulations, and the planning, promotion and guidance of the urban forestry program; it is composed of nine members; six members shall be appointed by the city manager to serve without compensation, and shall be residents of the city who have

demonstrated their interest in conservation of natural resources; two of such members shall be engaged in the field of arboriculture, forestry, horticulture or landscape architecture, two in the field of business management, law, or public relations, and two shall be selected from the community at large. The director of city planning, the director of public works and the city engineer or their designee shall serve as permanent members. The board meets at least bi-monthly, elects its officers and adopts its own operating procedures consistent with city practice and policy. (Cincinnati, OH.)

- **Environmental Commission.** The Commission is an advisory Board appointed by the Mayor that may have 5 members, one of whom is a liaison from the Commission to the Gibbsboro Planning Board. All members are volunteers who have expressed an interest in various environmental issues. The Commission is an advisory Commission to both the Planning Board and the Zoning Board. The Commission reviews applications that are presented to the Planning and Zoning Boards for environmental impacts and provides comments and recommendations to those Boards. Environmental impacts include issues concerning planned land use, waste management, air and water quality, and light and noise pollution. The Commission meets once a month and meetings are open to the public. The Gibbsboro Environmental Commission is a member of the Association of New Jersey Environmental Commissions (ANJEC). (Gibbsboro, NJ)
- **Planning Commission.** Established by the city charter, the 9-member citizen panel appointed by the city council advises and assists the council with long-range planning. The commission makes recommendations on neighborhood and master plans; amendments to the comprehensive plan; amendments to the land development code; zoning, subdivision, and site plan cases within neighborhood planning areas; and the capital improvements program. The commission has eighteen specific goals centered on the quality of life, sustainability, and growth management. (Austin, TX)

b. Requirements for Regulated Activities During Development Projects

Different application procedures exist. Many require some kind of standard form for land disturbance or tree removal. Typically, the information required includes information about the applicant, the nature of the project, and a site tree survey or inventory. Many localities require forest stand delineations and a forest conservation plan, which meets some standard for forest retention and mitigation. They also may prioritize which forested areas of a tract should be retained to satisfy numeric goals.

i. Tree Survey

In order to understand the baseline conditions at the proposed site site, to determine if it is regulated, how to regulate, and to ensure subsequent compliance, the locality must understand the existing vegetative patterns and other conditions. Many localities require surveys or arborist reports at a minimum or as part of more involved development plans

or site plans, prior to development. Lynnwood, Washington states simply that the city may require an arborist's report, at the applicant's expense.[121]

Having the information at the outset allows all related decisions to be made in a coherent way. A comprehensive survey provides information that also contributes to advancing broader ecosystem objectives such as habitat protection and environmental functions. Some communities fund community-wide surveys as a first step in enacting an ordinance. Others maintain records only of especially big or otherwise special trees. In cases where the locality requires the applicant to submit a tree survey, the regulating authority generally conducts a field check to confirm the accuracy of the information supplied and to make refinements based on field data.

1. Plan Requirements

Montgomery County, Maryland has incorporated tree conservation requirements into its subdivision plan process. Applicants are required to submit a natural inventory map that shows natural tree cover, delineating groups of trees of similar type or species along the dripline of the individual trees. The map must show the range of height and caliper of the trees in the group and the appearance of the trees as an indicator of health.[122] The ordinance further requires the notation of specimen trees on the map.

Similarly, St. John's County, Florida, requires as part of its Construction Plan Review process, that prior to the issuance of a land clearing or construction permit, the applicant supply a detailed landscape plan which includes a tree survey showing all specimen, historic, and protected trees within the site.[123] The County requires marking which trees are proposed for removal and planting, the sizes, locations, species, and spacing of trees, certified by a registered land surveyor, registered engineer, registered landscape architect or certified arborist.[124] The County has a similar requirement for rezoning applications.[125]

Prince George's County, Maryland's tree survey requirements is a paragon.[126] The County has mapped Conservation Evaluation Areas (CEAs) throughout its jurisdiction. CEAs are any parcel of over 40,000 square feet that contains 10,000 square feet or more of tree cover. If a CEA is present on a property, the developer must conduct a Forest State Delineation. This delineation includes detailed information about woody vegetation

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[121] Lynnwood, Wash., § 17.15.100(A).
[122] Montgomery County, Md., Code.
[123] St. Johns County, Fla. Land Development Code S3.06.10(A).
[124] St. Johns County, Fla. Land Development Code S3.06.1(B).
[125] St. Johns County, Fla. Land Development Code S3.07.10.
[126] Planning Advisory Service Report Number 446: Tree Conservation Ordinances, Christopher J. Duerksen with Suzanne Richman (American Planning Association & Scenic America, 1993), 37.

on the site, which helps serve the ordinance goal of protecting wooded or forested areas as opposed to all trees exceeding certain threshold size.

PG County's Forest Stand Delineation process is flexible but includes detailed requirements, including mapping slopes of a certain steepness at a certain scale, a soil survey overlay, specific vegetative features, a separate map showing topographic features, a combination of the two maps to show distinctly differentiated wooded areas, a site visit by county staff, with field sampling. Other climatic and environmental data is added to produce a comprehensive environmental baseline study used for any development design considerations. The County further requires preconstruction conference.[127]

Cape Cod, Massachusetts requires a detailed profile of property showing major upland communities, size and height of trees, rare and endangered species, and contours.

A tree survey should be required along with other documents for all proposed developments. Drafters should require the survey to be submitted prior to performing any activities that are exempt, including agriculture and forestry operations, to ensure any non-exempt trees are not cut and to allow recapture of lost trees in the event the property is developed soon afterwards. Drafters should consider requiring the applicant to pay the city for the survey, and have the city hire a contractor to perform the survey to minimize the surveyor's potential conflict of interest. Otherwise, surveyors that get a reputation for finding fewer trees may get more business.

2. Exceptions to Survey or Plan Requirements

If developers do not plan to disturb any regulated trees, they can be exempt from tree survey and mapping requirements. For example, St. Johns County Florida waives the tree survey requirement if the applicants demonstrates the ability to accomplish the proposed project without any removal of trees 8" DBH or larger.[128]

ii. Retention Requirements

The starting point for regulating tree removal activities is a standard for what must be retained, or what must be mitigated for. Localities define these standards in a range of ways.

1. Stand Retention

Protecting trees in groups is the most effective way to comprehensively protect trees and the services they provide. While laws that require such significant set-asides can be vulnerable to judicial challenges, they are also often the only way to accomplish the community's goals for tree protection. Such broad protections are becoming increasingly

[127] Prince Georges County, M.D. Code.
[128] St. Johns County, Fla. Code § 3.06.10(C)(4).

common.[129] The standard for this type of ordinance was initially set by Lake County, Illinois. Lake County protects 70 percent of mature woodlands and 40 percent of young woodlands on a site. At the other end of the spectrum of canopy retention requirements, Alachua County, Florida, requires retention of 15 percent.[130]

Lynnwood, Washington has two kinds of tree removal permits which are expressed in terms of what can be cut rather than what must be retained. They are for projects on single-family residential lots and for all other kinds of properties. Permits for residential lots, known as Class I, automatically allow removal of either two significant trees or 40 percent of the significant trees on the property within a calendar year, as long as no other significant trees were removed within six months and the trees proposed for removal are not from a previous mitigation requirement.[131] For applications to remove more trees or to remove replacement trees, the city must inspect the site and evaluate the trees for disease, insect attack, danger of falling, proximity to existing or proposed structures, and interference with utility services.[132] Nonetheless, the ordinance still weights the evaluation in favor of tree removal by providing that the city shall approve the removal of trees unless removal could damage adjacent properties.[133] Class I permit holders are not required to compensate for removal of trees not classified as significant.

Lynnwood's second category of permits is known as Class II. These are required for all trees removed from sites other than single-family residential lots.[134] This provision also provides for the case where required replacement trees cannot reasonably be sustained by the site. In this case, the extra trees are considered "unreplaceable" and the applicant must pay an "unreplaceable tree fee" according to the number of trees in this category.[135]

Lynnwood lays out criteria for significant tree removal Class II permit decisions for sites other than single-family residential lots less than 16,000 square feet.[136] The city is required to consider whether the tree has a reasonable chance of survival once the site is developed and whether it will pose a threat to life or property; whether it has a uniform canopy and well-tapered trunk (as opposed to those prone to wind failure and not good candidates for retention); the condition regarding disease, insect attack, or danger of falling; the proximity to existing or proposed structures and utility services; the necessity of removing the tree in order to construct the proposed improvements and achieve the density yield allowed under the zoning code; the effect of removal on erosion, soil moisture retention, or flow of surface waters; whether tree removal would affect the

[129] Planning Advisory Service Report Number 446: Tree Conservation Ordinances, Christopher J. Duerksen with Suzanne Richman (American Planning Association & Scenic America, 1993), 40.
[130] Alachua County, Fla. Code.
[131] Lynnwood, Wash., Code § 17.15.110(A).
[132] Lynnwood, Wash., Code § 17.15.110(B).
[133] Lynnwood, Wash., Code § 17.15.110(B).
[134] Lynnwood, Wash., Code § 17.15.120.
[135] Lynnwood, Wash., Code § 17.15.120 (D).
[136] Lynnwood, Wash., Code § 17.15.130(A).

water quality and aquifer recharge by reducing the natural assimilation of nutrients, chemical pollutants, heavy metals, and other substances from ground and surface waters during the movement of water towards an aquifer or natural stream; whether removal would affect noise pollution to the point of resulting in a public nuisance or violation of the noise control ordinance; the need for visual screening; the timeframe proposed for the removal; and whether any associated development activity is pending or forthcoming.[137] While these are meaningful criteria, the ordinance does not lay out the standards to be applied or how the relevant factors are to be calculated.

Lynnwood's required considerations for removal of nonsignficant trees on all properties other than the enumerated single-family residential lots are simpler. The ordinance requires approval of all applications for removal of nonsignficant trees except where the site is undeveloped or is subdividable and the trees proposes for removal are on the area of the site that is substantially undeveloped and where no development activity is pending city approval.[138]

Other jurisdictions have adopted more nuanced approaches by incorporating sliding scales into their retention requirements. For example, Fairfax County, Virginia, requires a minimum of 10 percent retention in commercial and industrial districts, 15 percent in high-density residential areas, and 20 percent in lower-density residential.[139]

While stand requirements such as these have the advantage of flexibility, the failure to prescribe the location where the stands must be retained pose both legal and ecological concerns. From a legal standpoint, uncertainty about which trees or which part of the stand of trees should be preserved can be challenged as vague. From an ecological and environmental standpoint, such requirements fail to direct project proponents to act in consideration of habitat considerations or to consider which portion of the trees are most important for soil retention or other ecological services.

Thus it is advantageous for localities to provide criteria to determine not only how much of the stand to preserve, but which part of it. Prince George's County, Maryland answers this concern by prescribing area to prioritize for stand retention, including the 100-year floodplains, wooded nontidal wetlands, wooded stream corridors, and wooded slopes.[140]

A more flexible variation on this type of requirement involves allowing retention or replacement by prescribing the resulting amount of vegetative cover to be provided after development of the site. An example of this policy comes from Fulton County, Georgia. Fulton County requires a minimum tree density of 15 units per acre that can be met by retaining existing trees or planting new ones. This ordinance gives the county arborist

[137] Lynnwood, Wash., Code § 17.15.130(A).
[138] Lynnwood, Wash., Code § 17.15.140(A).
[139] Fairfax County, Va. Code.
[140] Prince Georges County, Md. Code.

the discretion to regulate the location for replacement trees and their species, according to criteria prescribed by the ordinance.[141]

a. Buffers

Some jurisdictions have prioritized protection of trees along roadways. One example of this is Austin, Texas which requires maintaining vegetation within 100 feet of a roadway.[142] St. Johns County, Florida only requires a 20 feet buffer along roadways, but requires the developer to plant trees if they are not already in place, and specifies the type of tree, the size, and layout specifications.[143] Similarly, other jurisdictions require all protection of trees within a certain distance of buildings.[144] Others have combined these two requirements.[145]

While distance or buffer requirements are straightforward, and therefore relatively easy to apply, they apply after the development has been laid out. The decision of which trees to preserve is based on the design of the development and not on ecological or environmental factors.

b. Specific Areas

Maryland requires retention of sensitive areas, areas of contiguous forest that provide connectivity with other tracts, larger trees, and trees that are rare, threatened or endangered, or associated with historic structures.[146]

Some jurisdictions have selected certain portions of their territories for special consideration. Properties singled out for this special consideration based on considerations including aesthetics, ecological, and historic value. Examples of the types of areas that are singled out include parkways, rivers, coastal zones, and other unique natural areas. Often these protections are enacted as separate ordinances, but they nonetheless contribute to effective urban forest management.

Localities that want their tree protection regime to serve an ecological or habitat preservation function can design their ordinance to address the special features of their geographic area. If these are the goals of ordinance drafters, they would be well served by consulting ecologists familiar with the area in choosing what ecosystems or particular places to give special protection. State Natural Heritage Programs are good resources for information on imperiled species or ecosystems and consultation with a Natural Heritage

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[141] Fulton County, Ga, *Tree Preservation Administrative Guidelines*, 47-48.
[142] Austin, Texas Hill Country Roadway Ordinance.
[143] St. Johns County, Fla. Land Development Code S3.06.10(B)(7)(a).
[144] Gibbsboro, N.J. Code § 166-11.
[145] Piscataway, N.J. Code § 5.9.6.
[146] Md. Code Ann. Nat. Res. §5-1607.

biologist can result in an ordinance that reflects priorities for protection or restoration.[147] Fulton County, Georgia protects the area 35 feet on either side of the banks of all flowing tributaries of the Chattahoochee River by requiring tree protection and replanting with indigenous vegetation if the buffer is disturbed.[148]

Another unique feature that is protected by targeted tree ordinances is beach zones. Sanibel, Florida prohibits the removal of native vegetation that contributes to beach stability seaward of a coastal construction control line.[149] The law specifies requirements for trimming vegetation and removal of stumps.[150]

Such specific requirements have several advantages. They can be combined with any other general requirements that make sense in the context of the locality. Further, they often garner political support because they focus on areas with unique qualities that serve particular purposes.

In contrast to Alachua County's minimal canopy retention retirement, the county has designated special protections for a designated sensitive environmental area. In the Cross Creek area, the county allows only one unit per five acres and requires that development be clustered so that four acres are left undisturbed.[151]

2. Tree Retention

Some ordinances regulate trees on an individual basis, for example calling for regulation and mitigation only for heritage trees. Preserving individual, particular trees does not provide for the shade benefits that come from preserving many smaller trees that may not qualify for heritage status and may not be part of specific forest patches. For example, much of the energy conservation benefits of trees come from stands close to buildings providing shade in late morning and early afternoon, so preserving stands has extra benefits. Protecting only individual trees also does not take into account their relative value based on their location on the property, their proximity to other trees, to buildings (for shade), and to adjacent woodlands or riverine habitats. Where ordinances specify the protection of certain trees, some further specify measures necessary to protect these regulated trees.[152]

3. Canopy Retention

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[147] For example, in Montgomery, Alabama, Black Belt Prairie is a globally imperiled natural plant association that includes globally and regionally rare trees and shrubs, such as the three-flowered hawthorn, nutmeg hickory, and bur oak. Mature bottomland forests are also rare and deserving of extra protection. Personal communication with Alfred Schotz, Botanist/Ecologist, Alabama Natural Heritage Program (Mar. 19, 2007).
[148] Fulton County, Georgia, Chattahoochee River Corridor Tributary Protection Act.
[149] Sanibel Island, Fla., Code.
[150] Sanibel Island, Fla., Code.
[151] Alachua County, Fla., Code.
[152] St. Johns County, Fla., Code § 3.06.10(C)(7).

For calculating tree retention requirements based on canopy, often the standard is the mature canopy size. This is the minimum required canopy after development based on a percentage of the pre-development canopy or an absolute percentage irrespective of pre-development conditions. An alternative approach is to calculate the requirement based on the existing canopy. For example, 40% of existing canopy. One ordinance provides that no more than 60% of canopy on development site may be removed.[153] Another provides that no more than 35% to 50% canopy may be removed based on land use.[154] It goes on to stay that forested areas shall be preserved if associated with significant forest communities; wetlands, waterbodies, and their buffers; critical wildlife habitat; or slopes over 25%.[155] Another ordinance requires replacement if more than 10% of the trees over 10" DBH are removed from the development site.[156]

Canopy retention requirements are also calculated as an absolute percentage requirement. For example, 10 to 20% depending on zoning, after eliminating area used for public street right of ways (for single family residential), or after eliminating area used for building and parking footprint or most other improvements (retention areas, absorption fields, athletic fields); development must either preserve enough existing trees or plant new ones to meet tree cover requirements.[157]

4. Retention Recommendations

Many ordinances contain broad language prohibiting unnecessary tree and/or vegetation removal during and after development. Ordinance drafters must decide what extent to require preservation of all desirable trees when physically possible. Part of this analysis is the cost of tree preservation as compared to the value of the tree. One approach is only to allow removal of trees that must be removed because they are on the site of the proposed improvements.[158] Another actually places the burden on the applicant to demonstrate that he has minimized site alteration and land clearing.[159] Another provides that every effort must be made to retain trees during development.[160] Others extend similar absolute protection but only to certain categories of trees, such as protected trees.[161] Ordinance drafters must consider the costs to developers of time, money, and redesign of plans when determining the protection standard.

A successful formula might use both protection based on minimum canopy and individual, existing trees. For canopy, a combination requirement using both existing

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[153] Monmouth, N.J. Model Tree Preservation Ordinance.
[154] Cape Cod, Mass., Code § 07.12. (Residential – 35, Institutional, Commercial, Industrial – 40, Agriculture – 50.)
[155] Cape Cod, Mass., Code § 07.1.9.
[156] Monmouth, N.J. Model Ordinance.
[157] Hoover, Ala., Code § 2.9.
[158] Monmouth, N.J. Model Ordinance.
[159] Cape Code, Mass., Code.
[160] Fairhope, Ala., Code.
[161] St. Lucie County, Fla., Code § 600.06(D).

canopy and some absolute minimum should be combined. For example, 40% of existing canopy with an absolute minimum of 20% may be suitable.

iii. Afforestation

While requirements to retain certain trees are commonplace, some localities actually require developers to increase the overall vegetative cover, similar to landscape requirements. Maryland's law requires afforestation of nonforested development areas in certain cases where exiting forest cover is minimal.[162] Maryland allows off-site afforestation if necessary, and if that is not feasible, allows the option of payment into the state Forest Conservation Fund.[163] Other jurisdictions also require afforestation by expressing requirements in terms of a percentage of tree cover that must be present.[164]

c. Requirements for Regulatory Activities Not Associated With Development

Visalia, California allows removal of trees depending on tree condition; necessity of removal; topography of land, soil, and drainage; number of similar trees in area.[165] Roswell, Georgia prohibits tree removal if it will cause soil erosion or runoff problems; if specimen trees are located on the site and cannot be protected; if it will cause degradation of neighboring property values. [166] Removal is allowed if needed for improvement and tree cannot be relocated, tree is diseased or structurally unsound.[167]

i. Parking Lots

Tree conservation ordinances frequently address parking lots specifically. Canopy requirements are common. Oroville, CA requires that within 10 years of the installation of the parking lot, there is tree canopy of 50% of paved area.[168] Sacramento, California has a similar requirement.[169] Lewisville, Texas requires that a minimum percentage of each parking lot must be devoted to landscaping.[170] The town requires a landscaped area ranging from 5 to 10% for parking lots 25 to 50,000 sq ft and above.[171]

d. Surety

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[162] Md. Code Ann. Nat. Res. §§5-1606.
[163] Md. Code Ann.
[164] See, Fairfax County, VA; MD; Austin, TX.
[165] Visalia, Cal., Code § 2342.
[166] Roswell, Ga., Code § 1900.13.
[167] Roswell, Ga., Code § 1900.13.
[168] Oroville, Cal., Code § 26-49.k.10.
[169] Sacramento, Cal., Code § 17.64.030.H.
[170] Lewisville, Tex., Code § 6-103.
[171] See also USDA Forest Service Center for Urban Forest Research, http://www.fs.fed.us/psw/programs/cufr/.

Successful ordinances require confirmation that applicable tree protection and mitigation are in place prior to final project approval (e.g. certificate of occupancy). In the alternative, localities may choose to require a performance bond since damage to roots may not be apparent immediately after development. An alternative is to exempt a project from the bond requirement if a sufficient number of extra trees are preserved.[172] Lynnwood, Washington allows the permitting authority to require a bond for applicants for permits for projects other than on single-family residential lots below a certain size.[173] The ordinance provides that that the applicant can be required to post a bond or cash escrow in an amount not less than 125 percent of the actual replacement cost for a period of not less than three years.[174]

e. Preconstruction Conference

In order to ensure that requirements are clear and to provide the opportunity for questions to be raised, some localities require that the developers meet with representative from the local tree authority. This service to decrease delays once the process begins and thus is in the interest of the both the regulated community and the government.

For example, Chapel Hill, North Carolina requires:

> Prior to the issuance of a Building Permit for development activities covered by this Section, a preconstruction conference shall take place to review procedures for protection and management of all protected landscape elements identified in the Landscape Protection Plan and to designate one or more persons as Landscape Protection Supervisor(s)….[175]

Alachua County, Florida has a similar requirement.[176]

f. Appeals

Due process considerations require a procedure for consideration of challenges to a permitting or enforcement decision. Most localities simply provide for appeal of tree permitting decisions through a broader administrative appeals process provided for in some other portion of the code.[177] Drafters should take measures to avoid allowing the appeals process to undermine the ordinance by allowing political pressure to override the decisions of a competent tree professional.[178] Most appeals will likely come from permit applicants and numerous appeals can overburden the system, putting undue pressure on the permitting authority to make decisions that applicants like. However, an appeals

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[172] Dania, Fla., Code § 26-25.
[173] Lynnwood, Wash., Code § 17.15.120(F).
[174] Lynnwood, Wash., Code § 17.15.120(F).
[175] Chapel Hill, N.C., Code.
[176] Alachua County, Fla., Code.
[177] Lynnwood, Wash., § 17.15.100(E).
[178] Phytosphere Research, *Planning for an Ordinance,* available at www.phytosphere.com/treeord/ordprt1b.htm (last visited September 4, 2007).

procedure will likely be necessary to win approval of the ordinance, can save money by keeping cases out of court, and is required for the constitutionality of the ordinance.

g. Expiration

Permits must have time limits. Permits must have expiration dates in order to ensure that the factors that contribute to the initial permitting decision are still true throughout the permit period. Some localities make tree removal permits valid for a certain period of time, such as a year. Others make the period of validity dependent on the time it takes to complete the project. Lynnwood, Washington takes the permissive approach of applying either one, depending on which is longer.[179] The Monmouth, NJ model tree preservation ordinance provides that construction-related tree permits expire when building permits expire. (For minor subdivisions, 1 year from when subdivision permit granted; for permits not related to construction, also 1 year.)

h. Performance Standards

A successful permitting regime will specify detailed compliance requirements and will require administration beyond the scope of a permit during construction.

i. During Construction

Lynnwood, Washington requires that a protective barrier be placed around protected trees prior to land preparation or construction activities, to remain in place until construction activity is terminated.[180] No equipment, chemicals, soil or construction materials may be placed within the barrier and any subsequent landscaping activities must be done with light machinery or by hand.[181] Tree protection barriers must be at least four feet high, constructed of chain link, polyethylene laminar safety fencing or similar material, subject to city approval. [182] The director of public works has the authority to require any measures necessary to protect significant trees during construction.[183]

Planting standards may reference professional standards. Where tree planting is required by ordinance or serves as required mitigation, the ordinance should require planting to be performed prior to issuing the certificate of occupancy for the project. The ordinance should require a performance bond to ensure trees live at least a few years. Jacksonville, Florida specifies technical standards for the protection of existing trees from construction damage.[184] Other ordinances specify such details as a requirement for "snow fencing" or other "durable material" for duration of construction; chain length fence required if tree

[179] Lynnwood, Wash., Code § 17.15.100(C).
[180] Lynnwood, Wash., Code § 17.15.160(B)(1).
[181] Lynnwood, Wash., Code § 17.15.160(B)(1).
[182] Lynnwood, Wash., Code § 17.15.160(B)(2).
[183] Lynnwood, Wash., Code § 17.15.160(B)(3).
[184] Jacksonville, Fla., Code § 656.1207a.

of special rarity.[185] Another example is a prohibition of raising or lowering of grade more than 6" within the greater of the tree drip line or 6' of tree; all clearing within this distance must be done by hand.[186] St. Johns County, Florida requires that when six inches of fill is used where there are specimen or historic trees, tree wells be constructed within the dripline.[187]

ii. Ongoing Requirements

The value of trees is in the services they provide over time. Thus any effective urban forestry program will ensure that measures are effective over time. Maintenance and protection measures can apply to trees or properties subject to a permit or to trees generally. Some ordinances require trees to live more than 1 year, and require the applicant to replace those that don't. Some require periodic monitoring and evaluation of ordinance and how well it's achieving its goals.[188]

Some localities provide general tree protection measures for all trees. Lynnwood, Washington prohibits attaching signs or any objects to trees in such a way that could harm the tree; prohibits pouring anything near that tree that could harm it; fire or burning near the a tree; piling material that injures the tree; toping conifers; pruning that kills the tree or removes its usefulness as a buffer.[189]

i. Program Evaluation

A successful program will adapt to changing conditions and outcomes. In order to do so the regulating authority must have information about how the program is functioning. The kinds of information that should be considered include the number of applications subject to chapter; the amount of acres or trees removed, preserved, and planted; payments into a tree replacement fund, expenditures from fund, amount remaining; frequency of non-compliance, citations issued, fines collected; some measure of the public attitude towards program.

VI. MITIGATION (return to menu)

It will be impossible for all regulated trees to be preserved even under the most rigorous of tree conservation laws. An effective system will include provisions for mitigation. In order to be successful the mitigation must not be so harsh that it deters compliance, but it also must support the goals of the ordinance and maintain the urban trees in spite of land use or other changes. Forest conservation in developed areas is important to maintain

[185] Monmouth, NJ model tree protection ordinance.
[186] Monmouth, NJ model tree protection ordinance.
[187] St. Johns County, Fla., Code § 3.06.10(C)(7).
[188] Maryland Forest Conservation Act (1991).
[189] Lynnwood, Wash., Code § 17.15.160(C).

intact habitat tracts and connectivity of forest habitat.[190] When forest retention is not possible, mitigation provides a way to ensure that biodiversity values are not lost and in some cases allows them to be preserved in more valuable areas, such as streamside zones.

Mitigation requirements should allow for the full range of mitigation options (on and offsite, protection and planting, in-lieu fees) to provide flexibility to deal with a range of different permit situations. In addition, the permitting authority should have the option to select and/or approve appropriate mitigation options (including a combination of tactics) based on the local government's management goals and priorities, and the particular circumstances of each project.[191]

Laws also prescribe where reforestation should take place, so that reforestation activities are aligned with community biodiversity conservation or other goals. Maryland prioritizes reforestation of riparian buffers, forest corridors, floodplains, and contiguous forests.[192] Maryland's reforestation requirement is linked to a conservation threshold. The threshold is defined based on land use. For development in agricultural and resource areas, reforestation must be set at 50% of the net tract area. For medium density residential development, the threshold is 25%. For high density residential or institutional, the threshold is 20% and for commercial, industrial, mixed use, and planned unit developments, it is 15%.[193] Maryland further requires that for every acre cleared on the net tract above the applicable threshold, the tract must be reforested at a ratio of one-fourth acre planted per acre removed.[194] For every acre cleared below the threshold standard, the area of forest removed must be reforested at a ratio of two acres planted for every one acre removed.[195] Finally, the law credits against the total number of acres required to be reforested each acre of forest retained above the applicable conservation threshold.[196] This requirements rewards forest retention by valuing it more than the reforestation of cleared areas.[197]

a. Replacement

While communities with the goal of preserving urban forests will prioritize tree conservation, replacement of trees can be an effective way to adapt to new land uses without completely forsaking the benefits of trees. However, it is very important to remember that mitigation is seldom as effective as preservation, and that replacement can fail to provide the hoped-for benefits if not managed carefully. Tree conservation

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[190] Nature Friendly Ordinances: Local Measures to Conserve Biodiversity, Jim McElfish, Jr. (ELI, 2004), p. 126.
[191] Phytosphere, *Concepts: Mitigating for Tree Loss*, available at http://phytosphere.com/treeord/mitigation.htm.
[192] Md. Code Ann. Nat. Res. § 5-1607.
[193] Md. Code Ann. Nat. Res. § 5-1606.
[194] Md. Code Ann. Nat. Res. § 5-1606.
[195] Md. Code Ann. Nat. Res. § 5-1606.
[196] Md. Code Ann. Nat. Res. § 5-1606.
[197] Nature Friendly Ordinances: Local Measures to Conserve Biodiversity, Jim McElfish, Jr. (ELI, 2004), p. 128.

ordinances or regulations should be very specific about how replacement is to be accomplished. If landowners will carry out the replacement, the locality should provide specific guidance to citizens on everything from which trees to plant and where to plant them, to how to correctly plant and maintain a new tree. If feasible given the resources of the locality, inspection by a city representative is well-advised.

Possible management objectives for designing tree replacement requirements include:

1. the prevention of loss of tree canopy or a certain forest type
2. maintaining mature tree canopy
3. maintaining aesthetics associated with existing trees
4. maintaining habitat values
5. maintaining species diversity
6. maintaining age diversity
7. conserving local genetic resources[198]

Compared with calculating with trees to preserve, localities have created a much broader range of methods for calculating replacement for mitigation requirements. Generally, these requirements fit into two categories. Some compensatory mitigation requirements are calculated based on a tree per tree formula, while others are calculated based on all of the trees removed. Many provide for flexibility based on some set of criteria subject to the approval of the permitting entity. Some examples include:

Tree-per-tree replacement. Some mitigation requirements are articulated with a simple tree-per-tree requirement. Lynnwood, Washington requires such a tree-per-tree replacement for significant trees removed above a certain limit, though it allows for a payment alternative.[199] The tree replacement requirement is limited by the vague standard of "up to the amount that land can reasonably sustain."[200] This requirement is vague for the further reason that the tree that can be used for the replacement is defined only as having to be at least four feet tall.[201] Lynnwood specifies the size of replacement trees according to whether the tree removed is deciduous or a conifer for development projects.[202] Developers must plant deciduous replacement trees that are at least two and one-half inches in diameter and conifers must be at least eight feet tall.[203]

Inch-per-inch ratio. Jacksonville, Florida, requires an inch-per-inch replacement area for heritage trees including live oaks.[204] This is a very stringent requirement.

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[198] Phytosphere, *Concepts: Mitigating for Tree Loss*, available at http://phytosphere.com/treeord/mitigation.htm.
[199] Lynnwood, Wash., Code § 17.15.110(C).
[200] Lynnwood, Wash., Code § 17.15.110(C).
[201] Lynnwood, Wash., Code § 17.15.110(C).
[202] Lynnwood, Wash., Code § 17.15.120(C).
[203] Lynnwood, Wash., Code § 17.15.120(C).
[204] Jacksonville, Fla., Code § 656.1206; *c.f.* Monmouth, NJ model tree protection ordinance.

Jacksonville's standards for smaller and faster growing species, 1" per 3"removed is less rigorous. Gibbsboro, New Jersey's is an even weaker 1:4 ratio for trees >30 inches or in tree protection zones.

Greater than inch-per-inch. Some localities so prize their trees that their mitigation ratios require a greater amount of replacement than what has been lost. Lake County, Illinois, for example, requires reforestation of another part of the project site at a ratio 1.2 times the area disturbed.[205]

Sliding scale. A mitigation scale that requires a higher mitigation ratio for larger trees reflecting their increased ecosystem and other values and slower growth rate is an effective approach to make mitigation requirements meaningful. Lynnwood, Washington provides four categories of replacement requirements, based on the size of the significant tree that was removed.[206] The permittee must calculate the average size of the significant trees removed. If the average diameter (or only one diameter, if only one tree is removed) is 6" – 10" DBH, each significant tree removed must be replaced by one tree. If the average is 10.1" – 18" DBH, each must be replaced by two trees. For trees 18.1" – 36", three; and for trees > 36", four trees must be planted in replacement. On the other hand, for nonsignificant trees removed from certain properties, Lynnwood only requires replacement of one tree for every nonsignificant tree removed.[207] Annapolis, MD uses a sliding scale ranging from 1:4 to 3:1 inches mitigation per inch removed, based on tree sizes from 5 inches to > 24 inches. In spite of such scales providing appropriate higher protection for larger and older trees, there is a concern that prioritizing only such larger and older trees is risky because the can be more susceptible to root damage during development.

Equal basal area. This system places a higher value on larger trees since area is proportional to diameter squared.[208] An equal basal area replacement requirement would result in more replacement trees. A 10 inch diameter tree would be replaced with 25 2-inch diameter trees instead of 5, as would be required under inch-per-inch. A smaller ratio could be used to compensate for using area instead. Using area instead of diameter thus also places a higher priority on protecting large trees.

Among the approaches to calculating replacement requirements, the tree-per-tree requirement is a much weaker standard. It does not place increased value on larger trees offering more canopy. A tiered mitigation structure can be an effective way to meet conservation goals and reflect community priorities. A tiered approach could require mitigation on an inch-per-inch basis for heritage trees and mitigation at a lower ratio for smaller regulated trees. Lower size thresholds for smaller or rare tree species will ensure appropriate mitigation for them.

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[205] Lake County, Ill. Performance Zoning Code, Section 4400(F).
[206] Lynnwood, Wash., Code § 17.15.190.
[207] Lynnwood, Wash., Code § 17.15.140(B).
[208] Myrtle Beach, S.C., Code § 903.10.

b. Trees Used for Replacement

Permit mitigation conditions must be specific about the type, quality, and health conditions of trees required for replacement. Localities common specify that trees must be of a certain size, such as 2" or 3" DBH.[209] The Monmouth, New Jersey model tree preservation tree protection ordinance specifies that replacement tree(s) shall be of nursery grade quality, balled and burlapped and located on site. The locality can direct that the same species be used to replace the tree that was removed, that native species be used, or direct that trees from certain sources be used for replacement. Some municipalities go so far as to state that replacement should preserve local genetic resources by using seeds or other propagation materials from local trees. Such policy decisions should be in harmony with community goals found through the tree conservation planning process.

c. Location of Replacement

Trees planted as mitigation for trees removed can be planted on site or off site. On the site, there is the choice of whether to require site design to provide a certain area for the replacement of trees or to allow landowners to choose the location for replacement trees. These choices stem, again, from the priorities of the community. If the community has expressed a preference for preserving a certain ecosystem time such as riparian areas, the ordinance should show a preference for off-site mitigation in a riparian conservation area. On the other hand, if the community wants to preserve trees for quality of life purposes or energy conservation, the ordinance should require replacement on site near buildings.

d. **Payment in Lieu of Compliance** (return to menu)

Policies that allow payment instead of replacement are challenging because determining the monetary value of trees removed is not workable since most large trees can't be bought and planted. A payment in lieu of compliance policy is more suitable for small vegetation than for trees. Nonetheless, some localities have adopted such policies.

One approach is to allow the applicant to pay the tax value of the property to the city, for the purchase of other tree conservation property, instead of complying with the planning and conservation requirements.[210] In Lynnwood, Washington, if an applicant chooses not to plant the number of required replacement trees that the site can sustain, he or she can pay the tree replacement fee which is three times the tree replacement option fee.[211]

Localities have also made different choices about what to do with the funds collected in lieu of tree replacement. Lynnwood, Washington allows for a fee to be paid to the tree

[209] Alachua County, Fla., Code; Jacksonville, Fla., Code; Monmouth N.J. Model Ordinance.
[210] Raleigh, N.C., Code § 10-2082.14(g).
[211] Lynnwood, Wash., Code § 17.15.120(E).

replacement fund.[212] The fund can be used for heritage tree designation; grants for growing, purchasing, and growing trees; paying for services of a tree professional; acquiring, maintaining and preserving wooded areas within the city; purchasing materials for the city's observance of Arbor Day; and other tree purposes determined by the city.[213] Tree funds may be used to purchase mitigation trees for projects on single-family residential lots only and cannot be used to benefit the grantee.[214]

Another approach is to require payment to a fund for trees in the city right of way or habitat replacement for the value of removed trees.[215]

i. Calculating the Value of the Trees

Localities have a wide range of methodologies for valuing the trees that are lost and thus the amount that must be paid in lieu of replacement. Some ordinances adopt a standard charge per inch of mitigation required; most base it on the wholesale cost. Since wholesale cost varies per each species and changes from year to year, it may be time consuming to recalculate the tree payment costs regularly. Alternatively, once figures are adopted, they could be automatically adjusted each year based on inflation, and only recalculated occasionally. A guide to calculating tree replacement costs based on wholesale prices is found at: http://www.dot.state.fl.us/emo/beauty/Determining%20Mitigation%20Values%20ISA.pdf.[216]

Myrtle Beach, South Carolina calculates the wholesale value of replacing that tree that was going to be lost and adds in the amount it would cost to install a replacement tree.[217] St. Lucie County, Florida charges a direct fee depending on the size of the tree being removed: $200 per each inch DBH required to mitigate.[218] Other localities base the fee in lieu of replacement on the type of permit, according to the type of project the property is on. Lynnwood, Washington charges $60 in lieu of replacing a significant tree on a single-family residential lot, $150 for significant trees on other types of property (the value is tripled when the applicant chooses not to replace the tree and it could have been replaced on the site), and $85 for unreplaceable trees (when the site cannot reasonably

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[212] Lynnwood, Wash., Code § 3.102.030.
[213] Lynnwood, Wash., Code § 3.102.040.
[214] Lynnwood, Wash., Code § 3.102.040. (The mayor is authorized to approve fund dispersal in an amount not to exceed $5,000. Dispersal of funds exceeding $5,000 shall have prior city council approval.)
[215] Redmond, Wash., § 20D.80.20-080.
[216] Joseph R. Samnik, *Determining the Value of Roadside Vegetation* (Florida Chapter of the International Society of Arboriculture, May 31, 200) available at http://www.dot.state.fl.us/emo/beauty/Determining%20Mitigation%20Values%20ISA.pdf (last visited September 4, 2007).
[217] Myrtle Beach, S.C. § 903.10.
[218] St. Lucie County, Fla. Code § 600.06(D)(6).

sustain the number of trees required for replacement) on properties other than single-family residential lots.[219]

c. Tree mitigation banking

Tree mitigation banking is the preservation of existing trees to serve as mitigation credits or as a type of off-site mitigation. It is used to protect existing trees that are not otherwise protected by ordinance and would not otherwise be protected. For example, such a mitigation requirement can contribute to a larger restoration project. Hoover, Alabama requires applications to show existing trees over 2 caliper inches within tree save area on Tree Conservation Plan. The existing trees are worth a credit of 1.25 X the dripline area of the tree on property. This policy shows a slight preference for preserving existing trees instead of replanting. Fairhope, Alabama allows use of existing trees to meet landscape requirements if they are bigger than 8 caliper inches. St. Lucie County, Florida allows preservation of trees on site to be used for mitigation if they are in excess of landscaping requirement. Another ordinance states that where replacement trees are required but not suitable for the particular site prescribed due to the size of the site, the municipality shall deposit the trees into a community tree bank. Trees deposited into the community tree bank shall be utilized for planting on public lands.[220]

VII. NOTICE (return to menu)

Notice is a fundamental requirement in many aspects of administrative decisionmaking. Public participation will be a fundamental part of strategic tree management planning but should also be included in other significant decisions related to tree management. For example, localities could consider requiring a hearing with public notice on applications to remove large amounts of trees. An opportunity for a hearing will be a necessary part of any appeals process. Finally, some localities require notification when a tree is going to be removed.

a. Public Notification and Hearing

Lake Bluff, IL requires that notice of a permitted tree removal be posted at least 48 hrs in advance.[221] For removal of heritage trees, Sacramento requires posted notice, mailed notice to property owners within 500 ft, and a hearing.[222]

b. Reach-back provisions

In order to avoid having developers circumvent the requirements of the tree conservation ordinance by clearing land in advance, with the later intent for a development, some localities have ordinances that reach back for a period of years. This can be done through

[219] Lynnwood, Wash. § 3.104.010.
[220] Monmouth, N.J. Model Tree Protection Ordinance.
[221] Lake Bluff, Ill., Code § 10-11-4F.
[222] Lake Bluff, Ill., Code § 10-11-4F.

a notice provision or through the application of mitigation requirements to development applications that are filed within a certain number of years following substantial removal of forest cover.

Such a retrospective protection is especially important if the locality exempts property for certain land uses such as agriculture, silviculture, or nursery purpose. One way to prevent this problem is to require recapture for lands cleared under agriculture and forestry exemptions and then developed within short time period (i.e. 2 years) to prevent persons from using these exemptions to circumvent the ordinance prior to development. As a further protection in the event the property is later developed, localities should consider requiring a tree survey at the time of removal of the trees. Prince George's County Maryland simply prohibits the approval of a development on any site for five years after it was granted a forestry exemption.[223]

Many localities choose to exempt property being used for agriculture or forestry, or related activities such as nurseries and fruit orchards. Such exemptions should require recapture for lands cleared under agriculture and forestry exemptions and then developed within short time period (i.e. 2 years) to prevent people from using these exemptions to circumvent the ordinance prior to development. The ordinance should require a tree survey at time of removal for trees removed under these exemptions in event property is later developed. One ordinance requires that for expanding farmlands, an exemption from the ordinance requirements must be accompanied by an inventory of trees to be removed and tree replacement provisions apply if "expanded farmlands" are not devoted primarily to agriculture for 7 years after tree removal.[224] Another prohibits development on the site for non-agricultural uses for a specified time (2 years if agricultural tax classification and 8 if not) after an agricultural exemption is made.[225] Maryland's Forest Conservation Act applies to operations that are subject to a grading permit for development within five years after the logging or harvesting operation.[226]

VIII. FEES (return to menu)

Some ordinances require an application for tree removal to be accompanied by a certain fee. Fees charged should be sufficient to cover the administrative and maintenance costs involved in monitoring activities during construction and inspecting or conducting mitigation activities. Many provide that permit fees are charged to developers, but not to individual homeowners. One ordinance specifies the fees that must be paid by single-family lot landowners range as $52 when an inspection must be performed.[227] Fees charged to developers for tree removal include $155 for the first 10 significant tree units (defined according to the size of the trees removed) and an additional $6 for each

[223] Prince George's County, M.D. Code.
[224] Monmouth, NJ model tree protection ordinance § 5.
[225] St. Lucie County, Fla. Code § 600.04(E).
[226] Md. Code Ann. Nat. Res. §§ 5-1602.
[227] Lynnwood, Wash., Code §§ 3.104.010, 17.15.110(E).

subsequent significant tree unit removed. One fee charged to developers is $52 for the removal of nonsignificant tree units.[228]

IX. ENFORCEMENT AND PENALTIES (return to menu)

Some localities have elaborate enforcement structures either as part of broader ordinance enforcement mechanisms, or specific to the tree conservation ordinance. Others simply iterate that that the ordinance is a law or that it cannot trump private property rights. For example, "It shall be unlawful for any person to hinder, prevent, delay or interfere with the city while engaged in the lawful execution or enforcement of this chapter. This shall not be construed as an attempt to prohibit the pursuit of any legal or equitable remedy in a court of competent jurisdiction for the protection of personal or property rights by any property owner within the city of Lynnwood."[229] Keys to enforcement include designating the authority responsible for and authorized to enforce the ordinance, some method for discovering violations, and some kind of penalties. A very common provision is that the permitting authority can visit or inspect the site during the permit approval or permit period.[230]

a. Authority for Enforcement

The authority to enforce tree conservation or permitting ordinances must be spelled out in the ordinance.[231]

i. Delegation

A common enforcement challenge is finding the resources to adequately monitor all stages of development projects that can affect trees. Some localities have extended their reach by deputizing or delegating, while others have extended their reach through reporting requirements.

In order to increase compliance during the development process, some localities are choosing to train the developer's employees and designate a person responsible for compliance. Chapel Hill, North Carolina requires the development applicant to designate a "Landscape Protection Supervisor" who must be trained in the ordinance's landscape protection requirements and is responsible for ensuring compliance.[232]

ii. Reporting requirements

Localities that chose to improve their monitoring ability through reporting requirements generally ensure the quality of the information being supplied by setting a standard for the person designated to do the reporting. Such people are often referred to in rigorous

[228] Lynnwood, Wash., Code § 3.104.010.
[229] Lynnwood, Wash., Code § 17.15.050(B).
[230] Lynnwood, Wash., Code § 17.15.090(B).
[231] *See* Lynnwood, Wash., Code § 17.15.170.
[232] Chapel Hill, N.C. Code App. A § 5.7.4(d).

but sufficiently broad terms as "qualified professionals" who can include licensed landscape architects, licensed foresters, and others who meet certain education and experience standards provided by the law.[233]

b. Enforcement Measures

Ordinances commonly provide for a progressive set of measures to respond to various circumstances. Generally the first step is to issue a stop work order when a violation of the ordinance is suspected.[234] Next, the ordinance often specifies suspension of the permit and any other approved permits due to violations of the ordinance or other enumerated transgressions.[235] They will also often withhold the certificate of occupancy until violations corrected and requirement of private owner to remove trees after being notified by public official of tree ordinance violations, within a certain time.[236] Some cities are authorized to remove a nuisance tree or correct a violation if the owner does not respond to an order within the specified time.[237] The owner can be made responsible for the costs.

c. Penalties

Penalty provisions in local ordinances can serve as a deterrent, punishment, and also as a method for supporting the urban forestry program or department. Penalties can take the form of monetary charges or restoration requirements. Localities authorize issuances of penalty determinations through administrative processes, civil, or criminal judicial proceedings.

i. Civil penalties

Some municipalities allow for civil penalties when trees are unlawfully disturbed.[238] Violators can be ordered to replace trees illegally removed; each tree removed can be considered a separate offense.[239] Unlike in the calculation for replacement in permitting decisions, a harsher penalty for violations will not allow averaging tree diameters for the purposes of replacing trees removed illegally.

Fines can be assessed as an alternative to requirement replacement or in cases where the site will not support the number of replacement trees required. The fine should be significantly more than the payment in lieu of replacement would have been initially to avoid giving the regulated community the incentive to simply cut trees and pay later rather than going through the proper procedure outlined in the tree conservation ordinance. For example, the fine should be twice the amount that would have been levied

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[233] See Maryland Forest Conservation Act.
[234] Lynnwood, Wash., Code § 17.15.170(A).
[235] Lynnwood, Wash., Code § 17.15.100(D).
[236] Patterson, Cal., Code § 12.16.120.
[237] Fowler, Cal., Code § 7-1.08.
[238] Lynnwood, Wash., Code § 17.15.170(B); Raleigh, N.C., Code § 10-2082.14 (h) (2005).
[239] Lynnwood, Wash., Code § 17.15.170(B)(1).

during a permitting process.[240] Greensboro, NC levies a fee of $10,000 per acre of Tree Conservation Area destroyed, rounded up to next acre, if done so before permit issued; $800 to $4000 per tree removed depending on DBH after permit issued; $500 per day for tree removal without permit. Fines can be extracted by withholding money from bond posted prior to project and further bonds can be extracted after a violation to ensure compliance with the city's order.[241] Cities can also require fines for continuing violations once an order is issued. Lynnwood, Washington allows a $25 per day fine for failing to comply with an enforcement order; after 30 days, the fine goes up to $100 per day for a maximum of $5,000.[242] Ultimately unpaid civil fines can become a lien against the property where the violation occurred.[243]

ii. Criminal Penalties

Some localities allow for criminal penalties for violations for the ordinances, including tree conservation ordinances. This can include jail time. Fairhope, Alabama allows criminal penalties of up to 6 months in city jail for 1st and 2nd offense. The law provides for a minimum jail term of three days for 2nd offense. It offers the alternative of community service in lieu of jail.

iii. Replacement

Some ordinances require the replacement of any trees removed in violation of the tree conservation ordinance, to the satisfaction of an identified city official. In some cases the replacement requirement is in addition to the penalty requirement.[244]

iv. Recommendation

Adopt civil penalties and stop-work orders. Do not adopt criminal penalties or jail sentences. Austere criminal and jail penalties may deter officials from enforcing these provisions. Increasing the fines for repeat offenders may deter intentional violations. In situations where no tree survey was done, it may not be possible to determine what trees were removed. For those situations, base the fine on the acreage cleared, using aerial photos to determine existence of tree cover. Make the fine high enough so that it would normally exceed the fine for clearing the individual trees, had a survey been done.

X. SUCCESSFUL INTRODUCTION AND IMPLEMENTATION (return to menu)

The values that are supported by a tree conservation ordinance are increasingly becoming important to the general population. With appropriate educational and awareness efforts

[240] Lynnwood, Wash., Code § 17.15.170(B)(3).
[241] Lynnwood, Wash., Code § 17.15.170(B)(4).
[242] Lynnwood, Wash., Code §§ 17.15.170(B)(5), (6) .
[243] Lynnwood, Wash., Code § 17.15.170(B)(8).
[244] Raleigh, NC, Code of Ordinances § 10-2082.14 (h) (2005).

a new ordinance will be received generally with appreciation rather than apprehension or antagonism. Support from the community is necessary for the success of a new ordinance because most compliance with any local ordinance is voluntary. Communities do not have the resources to enforce any but the more extreme violations. There a several steps a local government can take to introduce a new ordinance and build support for it, including holding public meetings, making information available on the Internet, and sponsoring educational campaigns.

a. Role of the Ordinance

Any successful attempt to protect trees must be part of a comprehensive management strategy.[245] A tree conservation ordinance is not likely to meet community goals if it is an isolated effort. The ordinance is simply the legal framework for facilitating the management of the tree resources. Many localities have failed to achieve tree conservation objectives because they created regulatory authorities without a planning structure.[246]

b. Management Strategy

Flexibility is crucial for a tree management strategy because conditions and information are constantly changing and evolving. Adaptive management is an effective way to institutionalize this flexibility in management. An adaptive management approach to urban tree conservation will include a tree resource assessment or inventory, a review of current management practices, an identification of needs, establishing goals, selecting tools and formulating a management strategy, implementing the management strategy, evaluating and revising as necessary.[247]

i. Assessing the Resource

An assessment provides a baseline for measuring the results of management actions. Information that may be useful for management purposes includes: total number of trees classified by species, condition, age, size and location; problems situations, such as sidewalk damage, disease and pest problems, or hazardous trees, preferably linked to the specific tree data; and the amount of canopy cover by location.[248]

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[245] Phytosphere Research, *Developing a community forest management strategy* available at www.phytosphere.com/treeord/ordprt1b.htm (last visited September 4, 2007).
[246] Phytosphere Research, *Developing a community forest management strategy* available at www.phytosphere.com/treeord/ordprt1b.htm (last visited September 4, 2007).
[247] Phytosphere Research, *Developing a community forest management strategy* available at www.phytosphere.com/treeord/ordprt1b.htm (last visited September 4, 2007).
[248] Phytosphere Research, *Developing a community forest management strategy* available at www.phytosphere.com/treeord/ordprt1b.htm (last visited September 4, 2007).

Involving the community in the resource assessment process is a method for educating citizens about the issues related to urban trees and for building support for ultimate decisions.

ii. Reviewing Management

The review of management practices will consider past and current tree-related legal provisions, and level of enforcement (numbers of violations, permits and citations issued, etc.); municipal tree care practices; planning regulations and guidelines that pertain to trees; activities of municipal departments and utilities that impact trees.[249] It is important to gather this information from all available sources such as interviewing municipal staff rather than simply reviewing municipal records.

iii. Identifying Needs

A successful tree conservation strategy will reflect the specific needs, goals, and values of the community. Thus, it is necessary to include the public in the drafting process and create a management strategy and ordinance that are aligned with the perspective of the community. Once the statues of the resource and management are available, the community can consider the biological, management, and community needs for their urban forest.[250] Biological needs include long-term forest stability, off-setting tree removal, improving canopy, and ensuring appropriate species are planted for given sites. Management needs include long-term planning for sustainability, optimizing the use of resources, increasing education to ensure good quality tree care, and coordinating tree-related activities of various departments of the municipality. Community needs include public awareness of the value of trees, promoting good private tree care, fostering community support for the urban forestry program, and promoting conservation of the forest by focusing public attention on all age classes.[251] One tool especially useful for communicating how a new tree conservation ordinance can impact the community is computer simulations. The technology allows the community to view the effect of different policies and to determine which ordinance will create the appearance it prefers.

iv. Establishing Goals

It is possible to have a set of goals that are prioritized so that those that are more feasible can be the initial focus while more challenging objectives are also included. Because of the crucial role of the public in the success of any tree ordinance, it is crucial that public

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[249] Phytosphere Research, *Developing a community forest management strategy* available at www.phytosphere.com/treeord/ordprt1b.htm (last visited September 4, 2007).
[250] Phytosphere Research, *Developing a community forest management strategy* available at www.phytosphere.com/treeord/ordprt1b.htm (last visited September 4, 2007).
[251] Phytosphere Research, *Developing a community forest management strategy* available at www.phytosphere.com/treeord/ordprt1b.htm (last visited September 4, 2007).

goals are reflected in the ultimate strategy. Goals must be tangible so that progress can be measured.[252]

v. Selecting Tools and Formulating the Management Strategy

Typical management tools that can be chosen include public education programs, assistance and incentive programs, voluntary planting programs, mitigation guidelines, planning regulations and guidelines, and ordinances.[253] It is at the stage of choosing objectives that the role of an ordinance will be clarified. Ultimately the ordinance should mirror the goals chosen for the strategy.[254]

vi. Implementing the management strategy

Implementing the strategy typically includes passing an ordinance, budgeting, hiring a municipal forester, appointing a citizen tree advisory board, formulating a master tree management plan, and developing public education programs.[255] A schedule will allow implementation progress to be evaluated.

vii. Evaluate and Revise

The key to successful adaptive management is monitoring and making adjustments according to the results of evaluations. Periodic assessments can also be an opportunity to reevaluate community goals. In order to accurate reflect scientific realities, land use decisions such as tree conservation planning efforts must complete a full cycle of making land use decisions, monitoring the status and trends of land use change (locally, regionally, national), evaluate and assess those changes, and then adapt policies accordingly.[256] The full cycle should be completed on an annual or semi-annual basis to evaluate and respond to trends in a meaningful timeframe, not the common 10 or 20 year master planning cycle timeframe.[257] The tension with an adaptive approach is that it is opposition with predictability, which public participants often want.[258] Two approaches to respond to this tension have been developed.[259]

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[252] Phytosphere Research, *Developing a community forest management strategy* available at www.phytosphere.com/treeord/ordprt1b.htm (last visited September 4, 2007).
[253] Phytosphere Research, *Developing a community forest management strategy* available at www.phytosphere.com/treeord/ordprt1b.htm (last visited September 4, 2007).
[254] Phytosphere Research, *Developing a community forest management strategy* available at www.phytosphere.com/treeord/ordprt1b.htm (last visited September 4, 2007).
[255] Phytosphere Research, *Developing a community forest management strategy* available at www.phytosphere.com/treeord/ordprt1b.htm (last visited September 4, 2007).
[256] Lasting Landscapes, 20.
[257] *Id.*
[258] *Id.*
[259] *Id* (See EPA's Smart Growth Scorecards, www.epa.gov/smartgrowth/scorecards/; and Leed Neighborhood Development Rating system, http://www.usgbc.org/DisplayPage.aspx?CMSPageID=148).

c. Conclusions (return to menu)

As detailed above, community support is crucial to the success of a tree conservation ordinance and it cannot be created by the ordinance drafters. Thus, the ordinance must reflect community standards in order to be successful. Community education and outreach are a first step to raising awareness of the importance of urban forests. After a strategic planning process, an ordinance should be drafted that flows from the strategic plan. The ordinance should be flexible enough to have community support but rigorous and detailed enough to accomplish the goals of urban forestry preservation.

Urban Tree Conservation: a White Paper on Local Ordinance Approaches

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