

In single-family residential areas, all Chapel Hill has is a street tree ordinance. What it needs is a real tree protection ordinance, one that protects specimen and rare trees on private property—not just when the house is built, but after the developer walks away.

Trees may be on my lot or your lot, but taken as a whole they form the fabric of our community. The section of the Comprehensive Plan on the financing of town initiatives observes that, given the current stage of the town's evolution (given that it is largely built out), "what is needed is a new paradigm, one that shifts the emphasis from 'spending' to 'investment.'" (Sec. 12B.) "To fail to make necessary investments" to preserve Chapel Hill's "special community character," it goes on to say, "would reflect a failure of strategy to match vision."

I'm handing up for your review some excerpts from the "Guidelines for Developing and Evaluating Tree Ordinances" published by the USDA Forest Service through the National Urban and Community Forestry Advisory Council and other groups, including the American Planning Association. There, you will find a strategy for the vision: examples of ordinances other cities are using to protect trees on private property, as well as to protect whole stands of urban forest.

What this document outlines is an entire system of community forest management. Such a system, which would start with assessing the trees as a resource, and then would go on to establish goals, identify ways to achieve them, etc., would be a serious investment indeed, one that perhaps, given our current and we hope temporary financial crisis, is not fully achievable just now. Let's put it on the table, though. It should be part of a larger set of land use management tools that Milton Heath emphasizes in his wish, which I support, to change the very name of the Development Ordinance to the "Land Use Management" ordinance.

Meanwhile, right now: at a minimum, ask Mr. White for language that would protect (a) specimen and rare trees on private residential property and (b) whole stands of urban forest.

I've heard two objections:

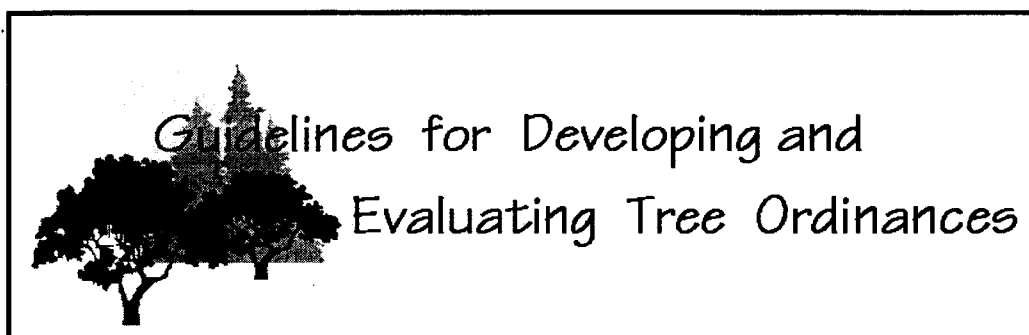
1. Whoa! You're trespassing on somebody's private property.

Response: Nothing in this plan would prohibit a landowner's reasonable use of her property—for a house, a deck, a swimming pool. What it would prohibit is indiscriminate cutting. "A mature tree is a significant community resource that required many years to develop and can provide community benefits for generations, but can be destroyed in as little as a few minutes." ("Basic ordinance provisions," sec. 31; see attachment.) The span of your life or mine will fit easily within the lifetime of one of these trees: that thought alone ought to prompt a certain respect, even humility. We're not just talking about our own generation of private property owners.

2. Enforcement will be too hard.

Response: Granted, this type of regulation has no hope without widespread community support. I am convinced it has that. To make that support even stronger, the regulation can be combined with education programs and even incentive programs for tree protection. Fines can be steep. Community members would certainly help monitor compliance; I think they'd be glad to. Citizens would be happy to know that the Town is their partner in this campaign.

(95)

[Next>](#)

Guidelines for Developing and Evaluating Tree Ordinances

<http://www.isa-arbor.com/tree-ord/>

Site Map

Major funding for this web site is provided by the USDA Forest Service through the National Urban and Community Forestry Advisory Council and the International Society of Arboriculture.

Download Adobe Acrobat PDF version of this site (version date 10/31/01 - 1690 KB)
 This document will display best using [Adobe Acrobat Reader 5.0](#)

Site search

About this site

How to use this site

Part 1. Planning for an ordinance

- Types of ordinances
- Effectiveness of existing ordinances
- Developing a community forest management strategy
 - How to develop a management strategy
 - What do you have?
 - Step A. Assess the tree resource
 - Step B. Review tree management practices
 - What do you want?
 - Step C. Identify needs
 - Step D. Establish goals
 - How do you get what you want?
 - Step E. Select tools and formulate the management strategy
 - Step F. Implement the management strategy
 - Are you getting what you want?
 - Step G. Evaluate and revise
- Goals for community forest programs

Part 2. Drafting an ordinance

(96)

- Basic ordinance provisions
- Ordinance provisions for specific goals
- View or solar access ordinance provisions

Part 3. Evaluating the urban forest and ordinance performance

Methods for evaluating tree ordinances and the urban forest ecosystem

- Sampling from populations
 - Statistical bias
 - Random sampling and random numbers
 - Stratified sampling
 - Sample size
 - Links to sample size calculators
- Photogrammetry and remote sensing techniques
 - Uses
 - Materials needed
 - Notes
 - Sampling considerations for photogrammetry
 - Estimating tree canopy cover from aerial images
 - Visual (ocular) method for estimating canopy cover
 - Dot grid method of canopy estimation
 - Determining sample size for dot grid estimates
 - Evaluation example: *Overall canopy estimates in permanent plots*
 - Line intercept or transect method
 - Digital image analysis methods
 - Comparison of image analysis and dot grids for calculating tree canopy cover
 - Other resources
- Ground survey
 - Uses
 - Materials needed
 - Notes
 - Sampling considerations for ground surveys
 - The windshield survey
 - Evaluation example: *Windshield survey for tree topping incidence*
 - The foot survey
 - Tree size
 - Evaluation example: Measurement of canopy cover at the edge of pavement
 - Evaluation example: Evaluating parking lot shading
 - Simplified guide to measuring DBH
 - Tree condition/health
 - Proximity to infrastructure and hardscape damage
 - Rating scales
- Photo points
 - Uses
 - Materials needed
 - Notes
 - Ground level photo point
 - Aerial photo points
- Record keeping and analysis
 - Uses
 - Materials needed
 - Notes

- Geographic Information Systems (GIS) (99)
 - Evaluation example: *Creating a forest/tree GIS*
 - Evaluation example: *CITYgreen software for ArcView GIS*
- Tree inventory systems
 - Additional resources
 - Evaluation example: *Street tree inventory as part of a citywide GIS*
 - Evaluation example: *Street tree management*
- Inventorying regulated private trees
- Public polling
 - Uses
 - Materials needed
 - Notes
 - Interviews
 - Self-completed questionnaires
 - Survey design considerations
 - Sampling considerations for public polling
 - Evaluation example: *Homeowner attitudes toward trees*

Special Topics:

Defining special trees: heritage, historic, and landmark trees

Definitions: Tree banks and tree banking

Concepts: Mitigating for tree loss

Literature Cited

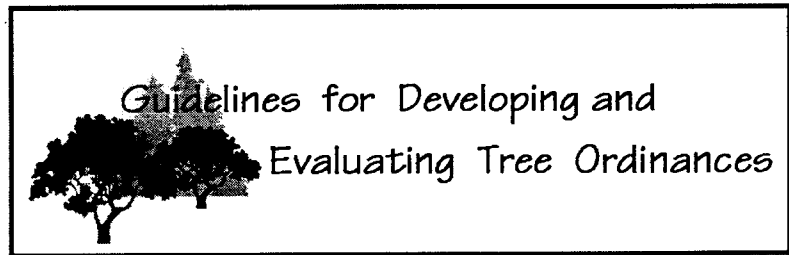
Additional References

- General
- Dot grid estimation
- Public Polling

Next >

ISA home page | Submit comments or suggestions

98

[<Previous](#) | [Next >](#)

Part 1. Planning for an ordinance

More and more communities are beginning to recognize the very tangible benefits that trees provide in the urban environment. Healthy trees reduce air and noise pollution, provide energy-saving shade and cooling, furnish habitat for wildlife, enhance aesthetics and property values, and are an important contributor to community image, pride, and quality of life. Furthermore, many communities have realized that in order to protect and enhance their valuable tree resources, it is useful to view and manage their trees as a cohesive unit, the *community* or *urban forest*.

Tree ordinances are among the tools used by communities striving to attain a healthy, vigorous, and well-managed community forest. By themselves, however, tree ordinances cannot assure that the trees in and around our communities will be improved or even maintained. Tree ordinances simply provide the authorization and standards for management activities. If these activities are not integrated into an overall management strategy, problems are likely to arise. Without an overall strategy, management will be haphazard, inefficient, and ineffective, and the community forest will suffer.

This larger management view is commonly lacking when ordinances are developed. Local ordinances are often developed in response to public outcry over specific perceived problems. This "band-aid" approach frequently leads to ordinances that are not consistent with sound community forest management, and may in fact thwart good management efforts. For example, public outcry has led to the development of many ordinances designed to protect old "heritage" trees. Unfortunately, most of these same ordinances allow the routine destruction of younger trees. The end result may be an unsustainable community forest, short on young trees and long on old, declining trees. By focusing too narrowly on individual trees, such ordinances may contribute to the degradation of the community forest over the long term.

A tree ordinance is not a panacea for poor or inadequate municipal tree management. Nor is it a replacement for a comprehensive community forestry program that is fully supported by the local government and community residents. Properly applied, tree ordinances can facilitate good management of community tree resources. Improperly applied, ordinances can legitimize counterproductive practices and undermine the long term success of the community forest.

Types of ordinances

In 1990, we conducted a study of city and county tree ordinances in California (Bernhardt and Swiecki 1991). We reviewed 159 enacted city tree ordinances and 9 enacted county ordinances in addition to a small number of proposed ordinances. This sample represented about 50% of the city tree ordinances and 80% of the county tree ordinances in effect in California at that time.

For the purposes of our review, we grouped tree ordinances into three basic categories:

- **Street tree ordinances** primarily cover the planting and removal of trees within public rights-

(99)

of-way. They often contain provisions governing maintenance or removal of private trees which pose a hazard to the traveling public. Also included in this category are ordinances with tree planting requirements, such as those requiring tree planting in parking lots.

- **Tree protection ordinances** are primarily directed at providing protection for native trees or trees with historical significance. They usually require that a permit be obtained before protected trees can be removed, encroached upon, or in some cases, pruned.
- **View ordinances** are designed to help resolve conflicts between property owners that result when trees block views or sunlight.

Among California cities, street tree ordinances were more common than tree protection ordinances, although many city ordinances include elements of both. County tree ordinances were most commonly tree protection ordinances, and most of these regulated tree removal on private property. View ordinances were relatively uncommon. We received view ordinances from only four cities and one county. Most of these were "self-enforcing", that is, they set forth a procedure through which private parties could resolve conflicts without direct intervention by the city or county.

Although other types of ordinances, such as grading ordinances, may be related to trees and other vegetation, our discussion will be limited to these three categories, which encompass the overwhelming majority of all tree-related local ordinances.

Effectiveness of existing ordinances

The effectiveness of a tree ordinance can be influenced by many factors. Do the residents support or oppose various ordinance provisions, or are they even aware of them? Is the ordinance enforced adequately? Does the ordinance account for environmental limitations that affect tree health, growth, and survival? Does the local government have the financial resources to fulfill ordinance requirements? Since the answers to these questions will vary from place to place, even very similar ordinances can have quite different outcomes in different communities.

In our 1992 survey of city and county tree programs in California (Bernhardt and Swiecki 1993), we asked tree program managers about the effectiveness of their existing ordinances. The majority of respondents from cities and counties with existing ordinances believed that their current tree ordinance was in need of revision. In some cases, respondents from different programs within the same city had widely divergent opinions on the effectiveness of their existing ordinance. Enforcement was not the only issue affecting effectiveness ratings - 52% of the city respondents felt that tree ordinance enforcement was adequate. (A note of caution here: many of these respondents were probably responsible for ordinance enforcement in their cities.)

As we discuss in Part 3, Evaluating the urban forest and ordinance performance, it is possible to objectively assess the performance of a tree ordinance. This assessment requires both an evaluation of the ordinance and related regulations and evaluation of the urban forest itself. In our analysis of California tree ordinances, we looked to see whether each ordinance had the structural elements necessary for effectiveness. Although ordinances may vary widely in form, content, and complexity, an effective tree ordinance should meet the following criteria:

1. **Goals** should be clearly stated and ordinance provisions should address the stated goals.
2. **Responsibility** should be designated, and authority granted commensurate with responsibility.
3. **Basic performance standards** should be set.
4. **Flexibility** should be designed into the ordinance.

100

5. **Enforcement** methods should be specified.
6. The ordinance should be developed as part of a **comprehensive management strategy**.
7. The ordinance should be developed with **community support**.

The first five criteria are key features of the ordinance itself. The last two criteria reflect the background in which the ordinance is developed. Although an ordinance meeting these criteria is not guaranteed success, ordinances lacking one or more of these elements will definitely be handicapped. In our review of city and county tree ordinances, we looked for evidence that the first six of these basic criteria were met.

Goals

A clear statement of goals is essential, since goals provide the basis for interpreting the ordinance and evaluating its effectiveness. However, only 52% (88) of the ordinances we reviewed began with a stated purpose which can be interpreted as the goal of the ordinance. Goals were most commonly lacking in street tree ordinances. Among street tree ordinances that did list a goal, it was often of the form, *"to establish rules and regulations governing tree planting, maintenance and removal on the public right of way"*. This type of goal suggests that the ordinance is seen as an end in itself, rather than as a tool to help achieve certain community forestry goals. Some street tree ordinances do show a clear link with a wider management strategy, as indicated by a goal such as *"to create a master plan governing tree planting, maintenance, and removal"*.

Tree protection ordinances nearly always begin with a stated goal, such as *"to prevent wanton destruction of trees"*, or *"to preserve as many trees as possible during the development process"*. However, goals such as these may be too general to allow for meaningful evaluation. How many are "as many as possible"? The lack of clear, specific goals is a common shortcoming of many tree ordinances.

Responsibility and authority

Of the ordinances reviewed, 54% (91) designated a single position responsible for enforcing the ordinance and carrying out the urban forest program. In the remainder of the ordinances, responsibility was split between two or more positions, or worse yet, was not designated.

In most cases, the most efficient way to manage the urban forest is to have a single person responsible for overseeing all tree-related activities. This allows for better coordination of management activities and reduces conflicts between departments. However, in small communities, it may not be possible to have a single central tree authority. Responsibility may be split between a tree commission, which sets policy and has administrative duties, and city staff, which is responsible for operations and enforcement.

The tree program manager should be vested with the authority necessary to carry out his or her responsibilities. A reasonably clear link between responsibility and authority is found in many tree ordinances. However, in some ordinances, responsibility appears to exceed authority, whereas in others, authority is granted, but specific responsibilities are not stated. The management of the urban forest is likely to suffer when responsibilities are ill-defined or the authority to act is not granted.

Basic performance standards

(10)

Many tree ordinances focus on setting specific standards that pertain to trees. A tree ordinance should indicate which practices and conditions are acceptable and which are not. For example, damaging public trees is unacceptable in most communities and is addressed in many tree ordinances. Some communities find that damage to or removal of oaks and other native trees without cause is unacceptable, and address this in their ordinances.

Besides stating what is regulated, an ordinance should set basic standards for performance. Many older ordinances are deficient in this regard. For instance, many ordinances require tree planting in conjunction with new construction. However, relatively few ordinances set standards for the eventual amount of canopy cover or shading that is to be provided, or the level of species diversity to be achieved. Similarly, many ordinances require an extensive permit process before native trees can be removed, but few set a standard for the maximum amount of canopy that can be removed overall. If basic standards for performance are not set, it is possible that all individual actions taken will conform with the ordinance, but that the overall goals of the ordinance are never achieved. Effective performance standards address the urban forest as a whole rather than focusing exclusively on individual trees.

Excessively vague standards (e.g., "as much as possible") may not only be unenforceable, but may not survive a legal challenge. In 1999, a Fulton County Superior Court Judge ruled in favor of developer against the City of Atlanta because a section of the city's tree ordinance lacked sufficient objective standards. The section in question included the following language (underlined sections are our emphasis):

...the city arborist shall require that improvements be located so as to result in minimal disturbance to the natural topography of the site and the protection of the maximum number of mature trees on the site. It is the specific intent of this section to require that damage to mature trees located within setback and required yard areas and to trees located on abutting properties owned by others be minimized to the greatest degree possible under the particular circumstances, as determined by the city arborist in the city arborist's discretion.

[Atlanta, GA: 1999 Code of Ordinances Part II, Ch. 158, Art. II, Div. 2, Sec. 158-104]

Although the concept advanced in this provision may be reasonable, additional language is needed to more clearly define what constitutes "minimum disturbance" or the "maximum number". For example, tree retention standards based on a percentage of the existing tree density or canopy cover (see Provision 32. Conservation of forest and woodland resources during development) could provide a sufficiently objective standard for assessing whether a project complies with the ordinance.

While avoiding the pitfall of vagueness, an ordinance should also avoid slipping into the abyss of excessive technical detail. Many ordinances have focused on very detailed implementation standards instead of setting basic performance standards. For example, many ordinances include lists of species that are allowed or prohibited for use as street trees. Others specify the size of planting stock to be used in plantings. Implementation standards such as these change as new methods and materials are developed and old ones fall out of favor, and as a result, ordinances with these details can quickly become outdated. If detailed specifications are needed, they are more appropriately placed in the urban forest management plan, which can and should be updated frequently.

Flexibility

While ordinances should set basic performance standards, it is important that they allow for flexibility. If the tree ordinance sets objective performance standards, it can also direct the

(102)

community arborist or forester to implement the standards by making decisions on a case-by-case basis. This can reduce the need for overly detailed implementation standards and allows for the flexibility to make decisions based on site-specific physical and biological factors. Even if a community does not have personnel with the necessary expertise on staff, the ordinance can allow for the input of qualified professionals on specific issues. For example, many tree protection ordinances require a report by a qualified consultant as a part of the permit process. Outside technical consultants should work for and be responsible for representing the interests of the community, not clients that may have a financial interest tied to tree removal or damage (e.g., a property owner or developer).

About three-quarters of the ordinances have a process for appealing decisions. The appeal process provides a degree of flexibility, in that it serves as a check against the authority of the tree program manager. Ideally, this helps to ensure that decisions are based on all pertinent information, and that they stand on technical merit. Unfortunately, appeals may also serve to undermine good urban forest management if they routinely allow political pressure to override the decisions of competent tree specialists.

Enforcement

Enforcement is an important aspect of every ordinance. Only slightly more than half of the ordinances we received contain an enforcement element. Although 48% (81) of the ordinances specified penalties for violations, only 24% (41) designated a position or positions responsible for enforcement. Thus, many tree ordinance provisions may not be enforced because nobody is specifically charged with this duty.

In ordinances with enforcement provisions, many kinds of penalties are employed. Fines, jail terms, and forfeiture of performance bonds are among the penalties invoked in both street tree and tree protection ordinances. Many jurisdictions also require specific replacement plantings as penalties. In some street tree ordinances, occupancy permits are withheld until required trees and landscaping are satisfactorily installed. Many of the penalties available appear to be sufficient to help deter offenders, but only if consistent enforcement makes it likely that violators will be cited and penalized.

Comprehensive management strategy

Few existing ordinances have been developed as part of an integrated tree management strategy. Only 6% (10) of the Californian ordinances we reviewed showed clear evidence that they were an element of a comprehensive management strategy. Without this underlying strategy to guide the process, inappropriate provisions may be included, or necessary provisions may be omitted. Furthermore, local governments may unsuccessfully use a tree ordinance to pursue goals that are more readily achieved through other means. The tree ordinance is often seen as an end in itself, rather than as one of a number of tools which must be used to attain a healthy, vigorous, and well-managed community forest. The lack of integration between urban forest management and tree ordinances is probably the most prevalent and serious problem with tree ordinances overall.

An ordinance is not a panacea for poor or inadequate management of community tree resources. Properly applied, an ordinance can help facilitate good management. Improperly applied, ordinances can legitimize counterproductive practices, provide disincentives for tree conservation, and undermine the long-term sustainability of the urban forest. By focusing on community forest management, rather than simply regulation, communities can determine whether an ordinance is necessary, and what its role should be. By following the process we present, **Developing a Community Forest Management Strategy**, communities can develop effective ordinances that are uniquely suited to meet their specific needs.

It seems that relatively few communities have followed this approach in developing their tree ordinances. Far more commonly, tree ordinances are drafted after reviewing a few existing

(103)

ordinances or "model" ordinances. As a result, we found that many California tree ordinances were very similar to one another. In several instances, two or more communities had identical ordinances. Certain frequently-copied provisions are found unchanged in many ordinances, often complete with dated terms or concepts. Although it is possible to construct an ordinance using a "cookie cutter" approach, such an ordinance is unlikely to be well integrated with a comprehensive urban forest management strategy.

Community support and ordinance success

Community support is critical to ordinance effectiveness, but community support cannot be legislated into an ordinance. Rather, the ordinance must be developed within the context of community values and priorities if it is to enjoy public support. Even a technically correct tree ordinance is apt to be ineffective without public support.

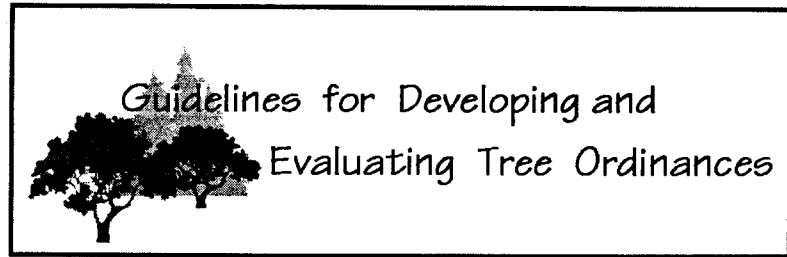
Passing a highly restrictive ordinance in a nonsupportive community is not only politically difficult, but may be counterproductive. Rossi (1990) described such a situation that occurred after the passage of a tree protection ordinance. Local citizens attempted to circumvent the ordinance by cutting down trees before they attained the diameter specified for protection in the ordinance.

As a practical matter, most tree ordinances rely heavily on voluntary compliance. Few communities would support the concept of a patrolling "tree cop" that seeks out violations. However, citizens in many communities are willing to voluntarily comply with restrictions they perceive as reasonable, and report obvious violations to protect their local tree resources. To be successful, tree ordinances should not impose regulations that most local citizens are unwilling to support.

[<Previous](#) | [Tree ordinance web site map](#) | [Next >](#)

[ISA home page](#) | [Submit comments or suggestions](#)

(104)

[<Previous](#) | [Next >](#)

Part 2. Drafting an ordinance

After working through the steps outlined in [Developing a Community Forest Management Strategy](#), your community may find that a tree ordinance is necessary to further its urban forestry goals. This section is designed to assist you in drafting an ordinance that addresses your specific goals. Tree ordinances are typically made up of provisions that can roughly be separated into two categories, namely *basic provisions* and *provisions for specific goals*. You can produce a draft ordinance by combining the necessary [basic provisions](#) with the appropriate [goal-oriented provisions](#). You may also decide to develop other provisions to address goals unique to your community.

We recommend that simple prose be used in the initial draft ordinance. The draft ordinance should then be submitted to municipal legal staff for review. We have provided an explanation of the purpose of each ordinance provision, a list of its key elements, and notes on its use and implications, and example text from existing ordinances. Many of the existing examples are from the California communities (Bernhardt and Swiecki 1991), but we will be adding additional examples from throughout the country as this web site is developed further. For a few provisions, we have not yet found good existing examples and have composed example text. We have sometimes omitted (shown by ...) or added (shown by brackets []) code where we deemed it appropriate.

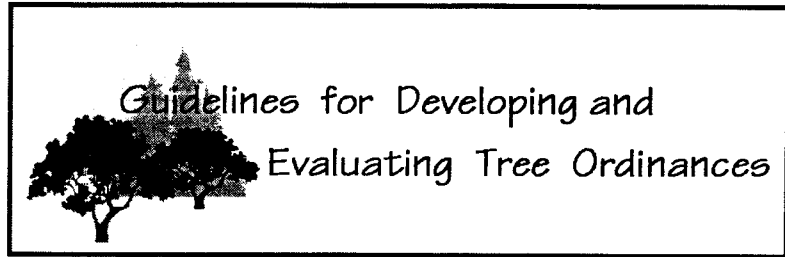
All example provisions are provided for illustration, and are not necessarily "model" provisions. We recommend that you use the examples, key elements, and notes as a starting point for developing language that is suited to meet your local needs. We realize that the 37 provisions described here may not cover every situation. If you are aware of specific provisions that are regionally important or particularly exemplary that you would like to have included here, please contact us using the link below.

[<Previous](#) | [Tree ordinance web site map](#) | [Next >](#)

[ISA home page](#) | [Submit comments or suggestions](#)

105

<Previous | Next >



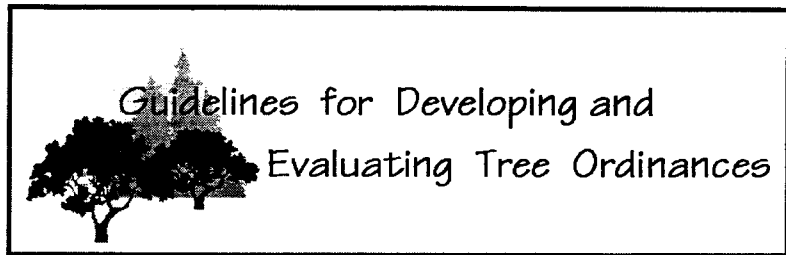
Basic ordinance provisions (Provisions 1-15)

Basic Ordinance Provisions are typically found in most ordinances, regardless of their purpose. Most of these are basic structural elements necessary for an ordinance to function. You should review all of these basic provisions to determine which should be incorporated into your tree ordinance. The minimum provisions listed in table below should be included in virtually any tree ordinance. In deciding whether to include other basic provisions, you should consider whether they would be appropriate and useful in your community. Municipal legal staff should also be consulted for an opinion on the legal ramifications of including or omitting any of these basic provisions.

Number	Provision	Minimum
1.	Title	
2.	Findings	
3.	Purpose and intent	yes
4.	Definitions	yes
5.	Determination of definitions	
6.	Jurisdiction	
7.	Policies regarding trees	
8.	Local government disclaims liability	
9.	Interference with planting, maintenance, and removal unlawful	
10.	Appeals	yes
11.	Penalty for violation	yes
12.	Enforcement	yes
13.	Performance evaluation of ordinance	yes
14.	Severability	yes
15.	Designate administrative responsibilities	yes

1. Title

106

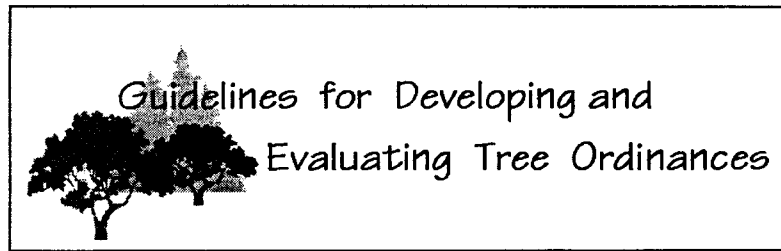
[<Previous](#) | [Next >](#)

Ordinance provisions for specific goals (Provisions 16-25)

Provisions from this category should be selected on the basis of whether they are appropriate to your community and consistent with your management goals. It is neither necessary nor desirable that every community adopt each of these provisions. In assembling your ordinance, you should consider those provisions that correspond to the specific goals you have established. The goal-oriented provisions are numbered 15 through 37 in the table below. Each of these provisions is related to one or more the nine management goals discussed under [Goals for Community Forest Programs](#) and can be accessed from the links on that page. Many of these management goals are interrelated, so some provisions are referenced to several different goals. Many of the [basic provisions](#) (e.g., Provision 15, Designate administrative responsibilities) are directly related to many of the listed goals and should be included in most ordinances.

Number	Provision	Goals
16	Establish a tree board or commission	6,8
17	Specify cooperation between departments and agencies	6,7
18	Develop a comprehensive management plan	1,2,3,4,5,7
19	Resolution of conflicts between trees and structures	1,2,4
20	Exemption from Solar Shade Control Act (California)	1
21	Responsibilities of property owners	5
22	Help for citizens performing tree maintenance	2,8
23	Topping prohibited	2
24	Permit required for planting trees in the public right-of-way	5
25	Planting requirements	1,2,3,4,5
	Situations which are declared to be public nuisances	2
	Abatement of hazards and public nuisances	2
	Licensing of private tree care firms	2
	Harming public trees forbidden	2
	Permit required for activities that may damage city owned trees	1,2,4,5
	Permit required for activities that may damage protected private trees	1,2,4
	Conservation of forest and woodland resources during development	1,3,4
	Procedures to be followed in resolving tree disputes	9
	Standards for resolution of tree disputes	9
	Apportionment of tree dispute resolution costs	9
	Recording for notification of future owners	9
	Enforcement of tree dispute resolutions	9

107

[<Previous](#) | [Next >](#)

Ordinance provisions for specific goals (Provisions 26-32)

Number	Provision	Goals
	Establish a tree board or commission	6,8
	Specify cooperation between departments and agencies	6,7
	Develop a comprehensive management plan	1,2,3,4,5,7
	Resolution of conflicts between trees and structures	1,2,4
	Exemption from Solar Shade Control Act (California)	1
	Responsibilities of property owners	5
	Help for citizens performing tree maintenance	2,8
	Topping prohibited	2
	Permit required for planting trees in the public right-of-way	5
	Planting requirements	1,2,3,4,5
26	Situations which are declared to be public nuisances	2
27	Abatement of hazards and public nuisances	2
28	Licensing of private tree care firms	2
29	Harming public trees forbidden	2
30	Permit required for activities that may damage city owned trees	1,2,4,5
31	Permit required for activities that may damage protected private trees	1,2,4
32	Conservation of forest and woodland resources during development	1,3,4
	Procedures to be followed in resolving tree disputes	9
	Standards for resolution of tree disputes	9
	Apportionment of tree dispute resolution costs	9
	Recording for notification of future owners	9
	Enforcement of tree dispute resolutions	9

26. Situations which are declared to be public nuisances

Purpose: To define unacceptable situations which are subject to abatement by the local government.

Notes: Conditions and situations that jeopardize public health and safety are most commonly declared to be public nuisances. Hazardous trees and trees which obstruct travel or line of sight may fall into this category. Situations that threaten the health of the urban forest or are contrary to the community forest management strategy may also be declared nuisances. This second category includes trees which harbor diseases or insect infestations that may readily spread to adjacent trees

(100)

1. *The person or at least one person on the staff of a business must be designated as a Qualified Arborist by the city. To be designated as a Qualified Arborist, a tree service employee shall demonstrate a knowledge of proper arboricultural techniques by providing documentation of professional certification, education, and/or experience acceptable to the city arborist.*
2. *The licensee must sign an affidavit to certify that all tree work will be performed under the direct supervision of the Qualified Arborist and will comply with all city standards and ordinances.*

The city arborist is authorized to suspend or revoke the tree care license of any person or business that performs work which does not comply with tree care standards as specified in this chapter and in the comprehensive tree management plan. License suspensions and revocations may be appealed to the city tree commission within 10 days of notification. The decision of the city tree commission shall be final and is not subject to appeal.

The city arborist may reissue any tree care business license previously revoked subject to the above minimum requirements and any additional requirements as may be prescribed by the city arborist and approved by the city tree commission.

[Example code by the authors]

29. Harming public trees forbidden

Purpose: To prohibit negligent or intentional damage to trees and other plants growing in the public right of way.

Key elements:

- Designation of which trees and other plants are protected
- Prohibited activities and actions

Notes: This is one of the most common provisions in street tree ordinances. It is primarily targeted at preventing vandalism and negligent damage. Some ordinances have elaborate lists of many different ways which trees can be harmed. Others include prohibitions against fastening animals to trees and allowing animals to browse trees. Some ordinances extend protection to tree guards or supports as well as to trees. If damage is properly defined in the definitions section (see provision 4), it may be possible to cover all types of damage rather simply, and avoid long (and often incomplete) litanies of damaging practices. Legal staff should be consulted in this regard.

It shall be a violation of the provisions of this Chapter for any person to abuse, destroy or mutilate any tree, plant or shrub in a public parking strip or any other public place, or to attach or place any rope, wire (other than one used to support a young or broken tree), sign, poster, handbill or other things to or on any tree growing in a public place, or to cause or permit any wire charged with electricity to be placed or attached to any such tree, or allow any gaseous, liquid or solid substance which [is] harmful to such trees to come in contact with their roots, [trunks,] or leaves.

[Corcoran, CA: City Code Section 2-4-9]

(109)

30. Permit required for activities that may damage city owned trees

Purpose: To provide for municipal review and approval of any activity which could be detrimental to public trees.

Key elements:

- Activities that require a permit
- Position with authority to issue permits (if not noted in provision 15 - Designate administrative responsibilities)
- Guidelines for approving or denying permits, including conditions that may be required to prevent or compensate for damage
- Permit application and appeal procedures, including time limits

Notes: In order to safeguard the public investment in street trees and other public trees, many local governments reserve the right to regulate a variety of potentially damaging activities. The authority to approve regulated activities should normally be vested with the tree program manager. Each community needs to decide what activities it will regulate. Some of the activities that might require a permit include:

- tree removal,
- pruning,
- grading or trenching near trees,
- installation of pavement over tree rootzones,
- transport of buildings or other large items which could break city street tree branches.

To prevent a net loss of trees, all trees removed should be replaced in a manner consistent with the overall tree management plan. If a community's goals include conservation of tree resources and establishment of maximum canopy cover, guidelines for approving tree removal permits should clearly establish the precedence of trees over hardscape or turf (see also provision 19 - Resolution of conflicts between trees and structures).

A. No person, unless expressly authorized hereunder, shall plant, remove, cut, trim, or prune, any street tree or any tree, plant, or shrub in a city park or other public place without a permit issued by the Director of Public Works. Such permit application shall be made at least 2 working days before the intended activity. The Director of Public Works may grant the permit or grant a permit on conditions when such is consistent with the provisions of this chapter, the Master Street Tree Plan, and other applicable laws and public policy. No such permit shall be valid for a period greater than 30 days after the date of its issuance.

B. In the case of moving a building along a street, such permit conditions may include rerouting, segmenting of such structure, and payment by applicant of attendant costs attributed to trimming or cutting authorized under such permit.

[Pasadena, CA: Municipal Code Section 8.52.080]

(a) The director shall issue permits to property owners to perform

110

maintenance on or to remove city street trees, only if the following conditions are met:

- (1) The property owner has established, to the director's satisfaction, that there is need for the proposed work on the tree; and*
- (2) The property owner has established, to the director's satisfaction, that the persons who are to perform the work are qualified to do so; and*
- (3) The director, in his sole discretion, has determined that any potential detriment to the city street tree population entailed by the proposed work, is justified in the individual case. In making this determination, the director shall consider factors such as the probability that the proposed work will destroy or seriously injure the tree, the tree's health, the desirability of that species as a street tree, whether the tree's condition and size threaten serious damage to property, the condition and number of other city street trees in the vicinity, whether there are other less onerous means of accomplishing the applicant's goals, and other related criteria.*

(b) All work performed on city street trees pursuant to a permit issued by the director under this section shall be done within a sixty day period from the issuance of said permit, or within such longer period as the director shall specify.

(c) The director shall condition any permit granted pursuant to this section for the removal of a city street tree, on the permittee removing, and where the director determines to it be appropriate, replacing the tree. In such case, the full cost of removal and replacement shall be borne by the owner and such service shall not be provided by the city.

(d) The director may condition any permit granted pursuant to this section on any such conditions as the director determines to be necessary.

(e) The provisions of Sec. 45.12 shall be complied with whenever a property owner seeks a permit to remove or trim a city street tree to facilitate moving any building or other structure.

[Sacramento, CA: City Code Section 45.7]

As part of the procedure for granting tree removal permits, some communities require that a notice be posted or published in the newspaper.

The city shall post a sign notifying the public of the date and description of a proposed tree removal. The sign shall be posted in a prominent location, visible from a public street, for a period not less than five days before either staff consideration of a tree removal permit or a public hearing on a related development.

[San Luis Obispo, CA: Code Municipal Code Section 12.24.180F]

In some communities, local public utilities may be given a yearly permit that allows them to prune public street trees. In such cases, the local government should set minimum pruning standards and provide for inspection to enforce these standards.



When maintaining street trees, a public utility must observe good arboricultural practices, as specified by the International Society of Arboriculture Western Chapter Pruning Standards and the City of San Luis Obispo Safety Pruning Specifications.

[San Luis Obispo, CA: Municipal Code Section 12.24.140]

...Public utility companies subject to the jurisdiction of the California Public Utilities Commission may perform such pruning as is necessary to comply with the safety regulations of said commission and to maintain a safe operation of their facilities without a permit. However, they shall notify the planning department at least three working days (except in emergencies) prior to taking any action. The planning director shall cause such pruning work to be inspected, when appropriate, to insure that good pruning practices previously referenced are followed. The planning director shall have the authority to stop any tree-pruning performed by a utility if such practices are not being followed...

[Corte Madera, CA: City Code Section 15.50.040]

31. Permit required for activities that may damage protected private trees

Purpose: To protect designated individual trees on private property from indiscriminate removal and damage.

Key elements:

- Classes of trees protected
- Activities subject to regulation
- Criteria and standards for approving regulated activities
- Permit process, including requirements, fees, time limits, and appeals
- Conditions or compensation required to mitigate for adverse impacts
- Monitoring of protected trees and mitigation areas

Notes: This type of provision is typically known as a heritage or landmark tree protection provision. It is best suited to protecting conspicuous individual trees that are of unique historical, ecological, or aesthetic value, and therefore constitute an important community resource. A mature tree is a significant community resource that required many years to develop and can provide community benefits for generations, but can be destroyed in as little as a few minutes. This is the main reason that trees may be provided a higher level of legal protection than is usually afforded to other plants in the urban landscape.

Although trees can be long-lived, the life spans of individual trees are still limited, especially in the urban environment. Hence, this type of provision may not address the long-term sustainability of the urban forest. Furthermore, because of its focus on individual trees, this type of provision may not be appropriate or effective for protecting woodlands and forests. Woodland or forest conservation is addressed in provision 32 (Conservation of forest and woodland resources during development).

Provisions that regulate private trees are unlikely to be effective without community support. Unless residents strongly support tree protection, it is probably advisable to link tree protection with some sort of benefit or incentive to balance the additional burden imposed by the provision. The local government might provide tree care assistance, consulting, reduce certain assessments, or institute a recognition program to provide a tangible benefit to owners of protected private trees. Education and incentive programs are needed to ensure that protected trees are seen as an asset rather than a liability.

(112)

If your community is interested in preserving native trees, you may want to consider options beyond limiting tree removal on private property. For example, you might consider a policy which calls for planting native trees in public places (see provisions: 7 - Policies regarding trees, 24 - Permit required for planting trees in the public right-of-way, and 25 - Planting requirements).

Classes of trees protected. Private tree protection regulations are commonly directed toward desirable, long-lived locally native trees and/or trees of historical significance. Most commonly, protected trees are designated by species, size, and/or location, although other criteria may also be used (see Defining special trees: heritage, historic, and landmark trees). These criteria should take into account differences between species and the influence of local environmental conditions on tree growth rates.

One disadvantage of using a size criterion is that some property owners may elect to remove trees before they grow large enough to come under the protection of the ordinance. This is obviously a counterproductive situation, since it has the effect of destroying future tree resources. Unfortunately, this behavior has been observed in various communities. If the goal of the community is to protect woodlands or forests, rather than individual trees, a forest/woodland protection provision (see provision 32) may be more appropriate. In some communities, both types of provisions may be needed to address the range of situations involved. If both individual tree and woodland protection provisions are used in the same ordinance, ordinance language must be clear as to which provision applies to a given tree or group of trees.

Some communities apply tree protection provisions only to commercial properties by exempting single-family residential parcels. This may greatly limit the impact of the provision because most of a community's trees are typically located on residential parcels. On the other hand, if tree loss and poor tree care in commercial districts are serious problems in a community, focusing the provision on those problem areas may be appropriate.

In the following example, the various classes of protected trees are clearly stated. Another example is included on the Defining special trees: heritage, historic, and landmark trees page. It is important to grant protected status to trees planted or retained in compliance with the ordinance to establish a basis for long-term protection of tree canopy.

The city hereby declares that the following are protected trees:

- (1) Trees planted or retained to meet the Landscape Ordinance (Section 910) requirements;*
- (2) Wax Myrtles (Myrica cerifera) and Crape-Myrtles (Lagerstroemia indica) designated as "tree forms" or used to fulfill tree requirements on approved landscape plans or greater than 10 feet in height;*
- (3) Any tree over 3" caliper located on city-owned property including any public right-of-way;*
- (4) Any Sycamore (Plantanus occidentalis) and Sweet-Gum (Liquidambar styraciflua) with a 12" DBH or greater;*
- (5) Any Pine (Pinus) with a 18" dbh or greater (except Japanese Black Pine with a caliper of 2" or more);*
- (6) Indigenous trees, as defined in 903.3(12); and*
- (7) All other species of trees that are 5" or more in caliper.*

[Myrtle Beach, SC: Municipal Code Section 903.5]

Especially in urbanized areas, established trees are commonly threatened whenever property ownership changes. New property owners often do not understand or appreciate how trees on the property function in the landscape. In their zeal to make their mark on their newly-acquired properties, new landowners may quickly remove or inappropriately prune trees, or undertake

113

landscape renovation projects that seriously damage tree roots and lead to the decline of established trees. If trees on only a few parcels each year are impacted by zealous but uniformed new owners, the cumulative effect on the community's mature tree population can be substantial.

The tree protection provision could be used to help reduce unnecessary tree damage by new property owners. The ordinance could extend protected tree status to virtually all trees on a property that has just changed ownership for a limited period, preferably at least one full year. By living with a tree for a full year and seeing how it functions in the landscape, property owners can make better decisions about managing the trees that have been passed down to them by previous owners. Furthermore, establishing a temporary moratorium on tree removal and other damaging activities provides a window of time during which the local government or a community tree group could try to educate new owners about tree values and proper tree care.

Protected trees shall include...

All trees with a caliper of one inch or greater (measured 4.5 feet above grade) on properties for which a change in ownership has been recorded within the previous 15 months.

[Example code by the authors]

Many tree protection provisions also provide specific exceptions that are not covered by the ordinance, as in the following example.

b) Exemptions. A permit is not required to cut or remove a tree(s) under the following circumstances:

(1) Trees that do not exceed two inches (2") in diameter when measured at a point four and a half feet (4.5') above the tree's natural grade.

(2) Trees damaged by thunderstorms, windstorms, floods, earthquakes, fires or other natural disasters and determined to be dangerous by a peace officer, fireman, civil defense official or code enforcement officer in their official capacity. The Department of Planning and Community Development shall be promptly notified of the nature of the emergency and action taken.

(3) When removal is determined necessary by fire department personnel actively engaged in fighting a fire.

(4) Trees planted, grown and/or held for sale as part of a licensed nursery business. This exemption is limited to trees with main trunks under ten inches (10") in diameter.

[Thousand Oaks, CA: Municipal Code Section 5-14.04]

A potentially adverse impact of a rigorous tree protection provision is that property owners may be discouraged from planting "temporary" trees for fear that they will later be restricted from removing these trees. "Temporary" trees may be used in the landscape for several legitimate reasons. For example, fast-growing, less desirable trees may be planted to provide shade or visual screening over the short term while more desirable, slower-growing "permanent" trees are developing. Also, areas may be overplanted to achieve more rapid screening or cover. Extra trees in such dense plantings often require thinning at some point to reduce competition between trees and promote good growth. In order to encourage tree planting on private property, it is reasonable to allow an owner to remove any tree on their property that they had planted of their own volition.

114

Any trees that exceed two inches in diameter when measured at a point four and a half feet above the tree's natural grade shall be exempt from the protection requirements of this ordinance (Section...) under the following circumstances:

(1) The property owner provides evidence acceptable to the Director that the tree has been planted by the owner during the period of his or her ownership of the property, and that the planting was not required by the city under Sections.... Evidence may consist of dated photographs, dated receipts, and/or other documentation acceptable to the Director. At the Director's discretion, the Director or authorized agent may inspect the tree to verify information provided by the property owner.

[Example text by the authors]

Activities subject to regulation. In many jurisdictions, protection of trees on private property is limited to situations involving development or construction on a parcel. In these situations, tree protection is tied to the issuance of construction-related permits, a process over which the local government can readily exercise some control. However, if protection is provided only during construction, long-term tree survival may not be guaranteed. In many instances, considerable efforts have been made to protect trees during the development process, including project redesign, only to have "protected" trees removed or seriously damaged by the subsequent property owner.

To avoid this pitfall, some communities extend protection generally to certain classes of trees whether or not construction permits are involved. In the following example, a permit is required to perform any activity that may damage protected trees. Relatively few local governments actually allocate the resources necessary to monitor and cite violators that illegally damage or remove trees on private properties. More commonly, such provisions rely on education of the public and are largely enforced on a complaint basis. Hence, such provisions normally require a high level of community support and voluntary compliance to be successful.

a) No person shall cut, remove, encroach in the protected zone, or relocate any oak tree on any public or private property within the City unless a valid oak tree permit has been issued by the City pursuant to the provisions of this chapter and the Oak Tree Preservation and Protection Guidelines. The status of limbs or trees as deadwood or dead trees must be confirmed by the City's Oak Tree Preservation Consultant.

[Thousand Oaks, CA: Municipal Code Section 5-14.04]

For the example above, the intended meanings of words such as "cut", "remove", "encroach", "protected zone" and "oak tree", should be defined in the definitions section (see [provision 4](#)). In this example, "cut" includes pruning. Poor pruning practices such as topping (a.k.a. "hatracking") may also be addressed in a separate provision (see [provision 23](#)).

Rather than requiring a permit for pruning, the city of Visalia, CA, requires filing of an "intent to prune notice". The purpose of this provision is to avert improper pruning of oak trees (see also [provision 22 - Help for citizens performing tree maintenance](#)):

(115)

Except in cases of emergencies as described in Section 2344, no person shall prune or cause to be pruned any Oak Tree limb of a diameter of 2" or greater within the City of Visalia without first submitting a completed Oak Tree Intent To Prune Notice with the Director, as provided herein.

[Visalia, CA: Ordinance Code Section 2345]

Criteria and standards for approving regulated activities. The criteria for approving tree removal or damage will vary somewhat between locations, due to the predominant tree species present or other site-specific details. The example below is typical of criteria used in many ordinances.

The intended decision of the Director shall be based upon reasonable standards, including, but not limited to, the following:

(a) The condition of the Oak Tree with respect to its general health, damage, status as a public nuisance, danger of falling, proximity to existing or proposed structures, interface with utility services, and its status as host for [parasitic] plant[s], pest[s], or disease[s] endangering other species of trees or plants with infection or infestations.

(b) The necessity of the requested action to allow construction of improvements or otherwise allow economic or other reasonable enjoyment of property.

(c) The topography of the land and the effect of the requested action on soil retention, water retention, and diversion or increased flow of surface water

(d) The number, species, size and location of existing trees in the area and the effect of the requested action on shade areas, air pollution, historic values, scenic beauty, and the general welfare of the City as a whole. (e) Good forestry practices such as, but not limited to, the number of healthy trees a given parcel of land will support.

[Visalia, CA: Ordinance Code Section 2342]

In the example above, the permitting authority essentially weighs various tree-related factors, such as tree health and growing conditions, potential hazard, and local environmental impacts, against the needs or desires of the property owner. Unfortunately, this can easily become a contest to see who has more clout - the property owner or the tree. More often than not, the tree loses the contest, largely because the tangible economic interests of the property owner (e.g., potential income, value of property improvements) are pitted against the less tangible and/or poorly quantified community-wide values provided by the tree (e.g., aesthetics, erosion protection, heat island mitigation).

Most heritage or landmark tree provisions set criteria for approving regulated activities such as tree removal, but few actually set minimum performance standards for approval. Although the criteria for approving regulated activities may be similar in many communities, appropriate performance standards will vary between jurisdictions. Standards should take into account factors such as the number and type of trees that are regulated by the ordinance, characteristics of the local community forest, and the amount of community support for tree protection. The following example sets standards for disallowing tree removal, but the use of terms such as "substantially alter", "reasonable accommodations", and "significant adverse effect" are vague and subject to diverse interpretations. Explicit minimum standards (e.g., "loss of more than 2.5% in property values") would be preferable.

(116)

*Removal of trees - Conditions and exceptions**(1) Tree removal shall be disallowed in the following circumstances:*

- (a) Soil erosion or runoff problems will result due to topography, soil type,*
- (b) Specimen trees are located on site and cannot be adequately protected*
- (c) Property degradation -- the removal will have a significant adverse effect*

(2) Exceptions. Tree removal from a site may be allowed if:

- (a) The tree is located in an area where a structure or improvement will be*
- (b) The tree is diseased or structurally unsound...*

[Roswell, GA: Municipal code Article XIX, Section 1900.13]

Standards do not necessarily have to pose absolute limits on tree removal. They could serve to establish a set of thresholds; as each threshold is exceeded, permit requirements would become more stringent. A tiered system could provide an incentive for landowners to minimize the removal of protected trees. The example below illustrates how such standards might be established and related to the community benefits that trees provide. Minimum standards are explicitly stated in the example.

Requests for removal of protected trees shall be subject to the additional permit and mitigation requirements:

(1) Tree removal would result in more than a 25 percent reduction of the tree canopy cover on the subject property.

(2) The ground slope within the drip line of the protected tree exceeds:

~~15~~

percent for soils with a soil K value of 0.3 or greater:

~~20~~

percent for soils with a soil K value less than 0.3.

(3) Tree removal would remove midsummer shade (as defined in Section ...) from more than 700 square feet.

The standards may also be listed in a separate document which is referenced in the ordinance as in the following example.

(17)

Notwithstanding any of the other requirements of these regulations, it shall be unlawful to remove a specimen tree without the express written permission of the County Arborist or authorized agent(s). [The decision of the the County Arborist or authorized agent(s) shall be consistent with the] Administrative standards [that] have been established by the Director of the Department of Environment and Community Development for the identification, preservation and protection of specimen trees.

[Fulton Co, GA: Tree Preservation Ordinance Sec. I.V.C]

Most individual tree protection provisions are poorly suited to protecting groups or stands of trees because they lack performance standards that adequately account for the cumulative effect of tree loss. Evaluations are normally made on a tree-by-tree basis in individual tree protection provisions. If we look at any single tree closely enough, it is usually possible to find some reason to permit its removal - it may be relatively small, or in less than perfect condition, or located in an inconvenient portion of the parcel. By focusing on each individual tree, a heritage tree provision can allow a landowner or developer to "divide and conquer" a stand of trees, sometimes reducing a functional stand to one or two token heritage trees. Better protection of tree resources in wooded or forested areas can generally be achieved by utilizing strategies discussed under [provision 32](#).

Permit process requirements. Permit applicants are normally required to provide the information necessary to decide if the proposed action meets the established standards for approval. Depending upon the criteria used to judge tree removal applications, this may include plot maps, data on tree size and condition, and the anticipated visual or environmental effects of removal. As a general rule, the information required should be limited to that which is needed to determine whether the permit should be granted and what mitigation (if any) should be required to offset the impacts of a permitted action. Many cities have standard forms listing the types of information to be submitted. Some communities exempt their municipal departments from the permit process, although this is not the case in the following example. Requiring city departments to meet the same requirements as private property owners assures more uniform implementation, and may provide beneficial public relations value as well.

Any person desiring to cut, move or remove a tree or protected tree within the city of Belmont shall apply to the Superintendent for a permit. A permit is not required for pruning as herein defined. The application for the permit shall be made on the form provided by the Superintendent for this purpose and shall include the number, location and type(s) of the tree (s) to be cut, moved or removed and the reason for such action. The applicant may submit an arborist's report or other expert evidence for consideration. The application shall be accompanied by any required fee to cover the cost of processing as set in the current City fee schedule. Fees shall be waived for applications made by a department of the City of Belmont on its own behalf.

[Belmont, CA: City Code Section 25-5]

While permit fees are normally collected from developers, some communities do not charge fees to homeowners who are required to get permits for pruning or removing private trees. This may help boost voluntary compliance, since homeowners may incur various costs simply to meet requirements for the permit application.

Many provisions that regulate tree removal during development require a report by a qualified professional on the condition of the trees. The professional may either be the city arborist or a qualified outside consultant. Because the applicant typically has a vested interest in removing trees that may conflict with development plans, a clear conflict of interest exists whenever an arborist or other consultant is retained by the applicant. The city or county can essentially eliminate such

118

conflicts of interest by contracting for the services of any outside consultants that may be needed. The consultant is then responsible to and paid by the local government, which in turn recovers the charges from the applicant.

The permitting authority may also require the applicant to submit a tree condition report prepared by a qualified tree expert selected and retained by the City. The applicant shall reimburse the City for all costs related to the preparation of the report.

[Example text by the authors]

Some communities also include in this section a requirement that prior to removal, the tree be posted with a notice stating that the tree will be removed within a specified time, and describing the appeals process. Others require public notification before a permit is granted.

1. Tree Removal Notice Required. Except only as provided in Paragraph 10-11-4F5 of this Chapter, no Person shall cause or undertake any activity that anticipates or involves the actual or reasonably likely Damage or Removal of any Tree on a Lot that has a DBH greater than or equal to 10 inches without first having (a) been issued a valid Tree Removal Notice by the Village Forester pursuant to the requirements of Paragraph 10-11-4F2 and Paragraph 10-11-4F3 of this Chapter, and (b) displayed the Tree Removal Notice pursuant to the requirements of Paragraph 10-11-4F4 of this Chapter.

2. Tree Removal Notice Application. Any Person desiring, or required to obtain, a Tree Removal Notice shall submit to the Village Forester a Tree Removal Notice Application on a form provided by the Village.

3. Action on Tree Removal Notice Application. Within 72 hours after receipt of a Tree Removal Notice Application, the Village Forester shall approve the Tree Removal Notice Application and issue a Tree Removal Notice if the Village Forester determines that all of the information required by the Tree Removal Notice Application is true and correct. The Village Forester shall not approve or issue a Tree Removal Notice, if the Village Forester determines that the proposed activity constitutes a Regulated Activity. In such event, the regulations of this Chapter applicable to Regulated Activities shall apply in lieu of the regulations of this Subsection 10-11-4F.

4. Form and Display of Tree Removal Notice. At least 48 hours immediately prior to undertaking the activity for which a Tree Removal Notice is sought, the Tree Removal Notice shall be posted on the Lot on which the proposed activity is to take place in a manner so as to be clearly and prominently visible from at least one Public Right-of-way abutting such Lot.

[Lake Bluff, IL: Village Code Section 10-11-4F]

In the case of removal of any heritage tree...the director shall not act on such an application until a hearing is held thereon. Notice of the time and place of the hearing shall be posted in a conspicuous place on the real property upon which the heritage tree is located and shall be mailed to the applicant and all owners of real property within a five hundred (500) foot radius of the real property upon which the heritage tree is located...

[Sacramento, CA: City Code Section 45.217]

119

Conditions required for approval. Trees that are nominally "preserved" in the project design process can be lethally damaged during the construction phases of a project. Trees in constructed areas can be seriously damaged by alterations in the rootzone that destroy roots directly (e.g., trenching, lowering of soil grade) or indirectly kill roots by creating adverse soil conditions (e.g., addition of fill soil, soil compaction, impermeable pavement). Many publications have described how trees are damaged in the construction process and techniques for avoiding or minimizing damage through proper planning and construction techniques (e.g., Coder 1996a,b; Harris et al 1999, Johnson 1999, Matheny and Clark 1998, Schrock 1996, Sydnor, Sydnor and Heiligmann, WFC and Morgan 1989b).

To address this issue, some tree protection ordinances include specifics on how trees are to be protected during construction. However, details of tree protection in construction sites are highly technical and subject to revision and modification based on both local experience and new research. Site-specific tree protection specifications developed by a qualified professional are likely to be more effective than general "cookbook" standards. Hence, it is preferable to set a performance standard for tree protection in the ordinance but to avoid including the actual technical specifications. The provision should authorize the tree program manager to prepare, enforce, evaluate, and revise the actual specifications for tree protection. Although some communities have developed quite extensive tree protection guidelines which are separate from the ordinance itself, even highly detailed guidelines cannot substitute for a case-by-case analysis by a qualified professional.

...Tree protection shall comply with the guidelines in the Tree Protection Guide for Builders and Developers by the Florida Division of Forestry and any other reasonable requirements deemed appropriate by the Chief to implement this part.

[Jacksonville, FL:City Ordinance Sec.656.1207a]

Unless a site is carefully monitored throughout the entire construction period, damage inflicted to tree roots may not be apparent. Furthermore, aboveground symptoms related to root damage may not become obvious for a number of years after the damage is done. Some communities require developers to post performance bonds for trees that are to be retained so that the developer can be held accountable for tree damage that occurs during construction. A relatively long bonding period, preferably 5 years or more, should be used so that the impacts of construction on tree health can be adequately evaluated. The fact that a retained tree is still alive is not an adequate performance standard; performance bonds should not be released if retained trees show any decline in vigor or condition. In order to document changes in tree condition, tree ratings should be made prior to construction and shortly before the end of the bonding period.

Bonds, as required by this section, shall be in the form of letters of credit, certificates of deposit, cash bond, bonds issued by an insurance company legally doing business in the State of Florida, or other acceptable means agreeable to the city attorney. The letters of credit and certificates of deposit shall be drawn upon banks or savings and loans legally and actually doing business in Florida. Such bonds must meet the approval of the city attorney's office. This bond shall be in addition to any other bond required by any other governmental entity.

(1) Bonds shall be required for licenses involving the replacement of ten (10) or more trees, or the relocation of five (5) or more trees, or the relocation of any tree with a DBH of ten (10) inches or greater.

(2) Calculation for the amount of bonds shall be computed based upon the equivalent canopy replacement criteria applied to each street to be

120

relocated or replaced, as provided in section 26-20 and upon the cost of installation and maintenance. The fair market value of the cost of trees that would be required to compensate for the canopy to be [relocated] or replaced shall be posted. The bond period shall be for the tree replacement performance period, as stated in the license or as extended or released, plus an additional sixty (60) days. The form of security shall be reviewed by the city attorney's office for legal sufficiency and may not be accepted until approved.

(3) Release of bonds:

a. Upon successful tree relocation and replacement as determined by this article and written approval by the city bonds required for tree relocation and replacement shall be released. Where possible, bonds shall be partially released for partially successful relocation/replacement projects, with the amount retained equal to the value of the additional replacement trees required, plus installation and maintenance.

b. Bonds may be released by the city when fee simple title is transferred. The city may condition the release of the bond upon the establishment of a new bond by the new owner in fee simple.

(4) Where the licensee plants fifty (50) percent more than the required number of replacement trees and establishes a suitable maintenance plan to ensure the viability of the replacement trees, the city may recognize the additional replacement trees as suitable security in lieu of a bond.

[Dania, FL:City Ordinance Sec. 26-25]

Compensation required for approval. The highest priority for a heritage tree provision is avoiding or preventing damage to or removal of protected trees. However, adverse impacts cannot be avoided, a local government may permit tree damage or removal under the condition that the applicant mitigates for the loss or damage. Mitigation generally comes down to the four basic options as shown below.

Mitigation method	Location
1. Protect existing trees	A. On-site
	B. Off-site
2. Plant new trees	A. On-site
	B. Off-site

The mitigation may be carried out directly by the applicant as a condition of approval, or the applicant may be required to pay fees to the city or county in lieu of mitigating directly. In-lieu fees normally paid into a special account used for mitigation planting or protection and the local government becomes responsible for carrying out the mitigation. Some communities refer to the use of in-lieu fees or off-site mitigation in general as tree banking.

Mitigation may appear to be a simple process, but as with many things, the devil is in the details. We explore a number of the options and issues in a separate mitigation page. If tree loss associated with urban development or other discretionary projects is substantial, the mitigation techniques used can have far-reaching consequences on the condition and form of the community forest. Hence, the

(121)

community's long-term goals for its urban forest should be considered before determining how to structure the mitigation portion of this provision.

In many ordinances, a formula or standard is provided for calculating the amount of compensation that will be required for trees that are removed or injured. If planting of new trees is the mitigation method used, several different standards are commonly used to determine the amount of replanting that may be required. Common replanting standards include:

- ratios based on the number of trees removed (e.g., one or more new trees for each tree removed)
- ratios based on the diameter or cross-sectional area (or basal area) of trees removed (e.g., one inch of replacement tree caliper for each inch of diameter of removed trees)
- planting standards based on overall canopy cover, density, or basal area standards for a given land use category (e.g., a residential zoning has a standard of 35% canopy cover, replacement planting must be sufficient to provide 35% canopy cover for the parcel within 10 years)

In some instances, it may be appropriate to use the value of the removed trees, as calculated from published tree appraisal standards (e.g., Guide for Plant Appraisal) as the replacement standard.

Typically, replacement plantings are required to be composed of the same species as those removed if native species are removed. For nonnative protected tree species, replacements must usually be selected from a list of approved species (or be approved by the city or county arborist or urban forester). In general, replacements are required to have the same mature size as the trees that have been removed, although the city/county arborist should have some discretion in this area to ensure that selected trees are compatible with the planting site.

Trunk caliper (diameter) is used as the standard in the following example, and mitigation standards are more stringent for removal of native live oaks.

(h) Protected trees identified for removal on the site clearing or tree removal permit application shall be replaced with new planted trees, unprotected trees or transplanted trees. Protected live oaks (Quercus virginiana) removed shall be replaced only with live oaks. The total caliper inches of replacement live oaks shall equal the total caliper inches of protected live oaks removed; for other removed protected trees, the total caliper inches of replacement trees shall equal one-third the total caliper inches removed, unless otherwise approved by the Chief. When there is significant loss of mature tree canopy or specimen trees on a particular site, the size [and/or number] of replacement trees may be increased by up to twice the minimum...by the Chief in order to compensate for that loss. If multi-trunked trees are used as replacement trees, then the total caliper of the four largest trunks shall equal the replacement caliper. New palms may be used only to replace protected palms removed. Replacement species used shall be approved by the Chief...

(1) New replacement trees shall meet the minimum standards for landscape materials established by [the administrative standards].

(2) Existing trees, two inch caliper or greater, which are not protected trees but which are preserved or transplanted, except those trees located in preserve areas, may be utilized to satisfy tree replacement requirements, subject to the conditions stated in ss. 656.1207 and 656.1213(b) and (d).

[Jacksonville, FL: City Code Section 656.1206]

122

The following example uses basal area as the replacement standard, and allows for the use of in-lieu fees if all required trees cannot be planted at the applicant's site.

(1) All protected trees removed in accordance with 903.8(1)c. through 903.8(1)h. shall be replaced in accordance with the following criteria. The replacement standards shall be listed on the permit...

(2) Any tree removed without a permit must be replaced with trees (not necessarily the same species) whose total basal area equals the basal area of the tree removed. All replacement trees shall be...considered required trees as part of a required landscape plan. As many trees as possible will be replaced [on the project site]. The tree(s) must be ... maintained in good health.

(3) When replacement of trees [on the project site] is not possible, the equivalent value of the tree as well as projected costs for installation and maintenance will be assessed by the Zoning Administrator and cash received from the property owner will be placed in the City of Myrtle Beach Tree Preservation Account for planting trees on public property.
[Myrtle Beach, SC: Municipal Code Section 903.10]

The example code below lays out a number of options for mitigating tree loss, including the use of in-lieu fees. These options provide the approving authority a high degree of flexibility in selecting appropriate mitigation.

Prior to any tree removal, the applicant shall demonstrate through a Tree Protection and Replacement Plan, Sensitive Area Mitigation Plan or other plans acceptable to the Administrator that tree replacement will meet the minimum standards of this section.

*(1) **Replacement Required.** A significant tree to be removed shall be replaced by one new tree in accordance with subsection (5)...*

*(2) **On-Site Replacement.** Replacement trees shall be planted on the site from which significant trees are removed unless the Administrator accepts one or more of the alternatives set forth in subsection (3).*

*(3) **Alternatives to On-Site Replacement:** When on-site replacement cannot be achieved, the Administrator may consider the following alternatives:*

(a) Off-Site Tree Replacement.

(i) The number of replacement trees shall be the same as described in section 20D.80.20-080(1), Replacement Required. Replacement costs (material plus labor) shall be at the applicant's expense.

(ii) Allowable sites for receiving off-site replacement plantings

(A) City owned properties identified on...[list of maps]:

(B) Other City or County-owned open space areas, native growth protection areas (NGPA), or river and stream corridors within Redmond

City Limits, or lands controlled by the City;

(C) Private open space which is permanently protected and maintained, such as a native growth protection area (NGPA).

(iii) All trees to be replaced off-site shall meet the replacement standards of this section.

(b) Tree Replacement Fee. A fee in lieu of tree replacement may be allowed, subject to approval by the Administrator after careful consideration of all other options. A tree replacement fee shall be required for each replacement tree required but not planted on the application site.

(i) The amount of the fee shall be the Tree Base Fee times the number of trees necessary to satisfy the tree replacement requirements of section 20D.80.20-080. The Tree Base Fee shall cover the cost of a tree, installation (labor and equipment), maintenance for two years, and fund administration.

(ii) The fee shall be paid to the City prior to the issuance of a Tree Removal Permit.

(iii) A separate account shall be established by the City for fees collected. Tree Replacement fee receipts shall be earmarked specifically for this account. Funds withdrawn from this account shall be expended only for the planting of new trees in City owned parks, open spaces or rights-of way.

(c) Landscape Restoration. Where appropriate, the Administrator may consider other measures designed to mitigate the loss of trees by restoring all or parts of the forest landscape and its associated benefits. Measures may include, but are not limited to:

(i) Creation of wildlife snags from trees which would otherwise be removed;

(ii) Replacement of certain ornamental trees with native shrubs and groundcover;

(iii) Replacement of hazardous or short-lived trees with healthy new trees more likely to survive;

(iv) "Daylighting" and restoration of stream corridors with native vegetation;

(v) Protection of non-significant trees to provide for the successional stages of forest development.

[Redmond, WA: Municipal Code Section 20D.80.20-080]

(124)

Monitoring of protected trees and mitigation areas. A shortcoming that exists in almost every tree protection ordinance that we have reviewed to date is the lack of a long-term monitoring element. In general, after construction is completed or after a short bonding period (usually two years or less), no further follow-up is required for protected trees or new plantings. The city or county may have no further recourse if protected trees or replacements subsequently decline and die as a result of inadequate protection measures during construction, poor maintenance during or after the bonding period, or removal by new owners. Without continuing efforts to monitor protected trees, a community can continue to lose tree canopy over time even though many trees have nominally been protected or replaced.

We have recommended that all tree ordinances contain a provision to require that ordinance performance be assessed regularly (see provision 13). However, an additional monitoring provision may be necessary as part of the tree protection code to ensure that the applicant can be assigned a fair share of cost of monitoring long-term compliance. In-lieu fees and other permit approval fees should be sufficient to offset long-term monitoring costs. Monitoring methods are described and discussed in part 3.

INSPECTIONS: The Village Forester shall, on a regular basis, conduct such inspections and surveys as are necessary to monitor the Trees in the Village and to determine the existence, nature, and extent of violations of this Chapter.

[Lake Bluff, IL: Village Code Section 10-11-15]

32. Conservation of forest and woodland resources during development

Purpose: To promote the conservation of functional forests and woodlands during development.

Key elements:

- Types of woodland or forest land subject to regulation
- Activities regulated on lands covered with woodlands or forests
- Criteria and standards for approving regulated activities, including mitigation requirements
- Permit process, including requirements, fees, time limits, and appeals
- Monitoring

Notes: The purpose of this provision is to establish a process for conserving woodland and forest resources that is invoked when land use is intensified to the degree that a discretionary permit is required. A provision that seeks to conserve functional forest or woodland systems must at minimum include the following features:

- natural stands or groups of trees are given priority over individual specimens;
- activities that fragment the woodland into small units are minimized;
- meaningful standards for tree canopy retention and reforestation are set;
- provisions are made to allow for natural regeneration of woodland/forest species;
- components of forests and woodlands other than trees are taken into consideration.

Relatively few local governments have implemented woodland protection provisions to date, but interest in this approach has been increasing in recent years. Some communities have attempted to use individual tree protection provisions (see provision 31) to protect woodlands, primarily by lowering the minimum diameter for tree protection. However, these tree protection provisions usually lack the necessary features noted above, and as a result, they often do not provide for satisfactory

woodland or forest conservation.

125

The state of Maryland has one of the most progressive forest protection ordinances, the Maryland Forest Conservation Act (Natural Resources Article Section Title 5, Subtitle 16) passed in 1992. The Act requires local governments with planning and zoning authority to develop a local forest conservation ordinance and program which is at least as stringent as that spelled out in state law. This allows for a certain degree of program alteration to suit the particular needs and desires of a community. Local programs are audited every two years for compliance with the standards and requirements of the state law. Failure to comply results in administration of the local program by the Maryland Department of Natural Resources until such time as deficiencies in the local program are corrected. According to Galvin et al, in the first 5 years after its enactment, the Forest Conservation Act was responsible for 22,508 acres of forest retention and 4,314 acres of reforestation compared with 12,210 acres of forest cleared as a result of development.

Regulated lands: There are three basic approaches that can be used in developing woodland conservation ordinances. Ordinances may use one approach or a combination of these approaches to determine what areas should be subject to conservation and reforestation or afforestation standards.

Existing forest resources. In the first approach, only lands with existing woodland or forest resources are subject to the ordinance. This approach is most applicable in areas where current forest cover is at or near historical or potential levels. Establishing the resource baseline is a potential source of problems for this approach. Unscrupulous individuals may destroy or alter much of the resource prior to development in an attempt to avoid conservation requirements that would be invoked upon application for a discretionary permit. To encourage good resource stewardship prior to development, historical aerial photos can be used to establish the forest resource baseline.

Potential forest resources. In the second approach, regulated lands include all those that have current forest cover as well as those that historically supported forests or woodlands. This approach is especially applicable in areas where current tree cover is well below former levels and the community has the goal of restoring lost or degraded woodlands and forests. In areas where the historic vegetative cover includes both forest and non-forest vegetation cover types, a delineation of potential or historical woodlands and forests should be prepared. A technical assessment of soils, historical records and photos, and local vegetation types should be conducted to establish a base map of areas that did or could support woodland or forest cover. These non-forested areas and areas with existing forest cover would then be subject to reforestation and afforestation standards. This approach allows for conservation of both existing resources and restoration of lost or degraded resources while taking into account the different capabilities of lands to support forest cover. Minimum afforestation standards could vary by area to reflect the differing capabilities of lands to support tree cover. The use of both current forest baseline data and minimum afforestation standards discourages landowners from clearing lands prior to initiating the development process.

Universal application. In the third approach, regulations apply to all lands irrespective of current forest cover. In the Maryland Forest Conservation Act, all landowners seeking to intensify land use on nonurbanized lands are responsible for a given level of woodland or forest canopy whether or not their lands are currently forested. This approach is appropriate in areas where forest canopy cover was historically fairly uniform before being cleared due to logging or clearing for agricultural use or urban development. It may also be appropriate in areas with historically low levels of forest cover if the afforestation standards are set at levels that are readily attainable for virtually any parcel. Minimum afforestation standards included in this approach can provide a disincentive to clear land prior to development.

Regardless of the approach used, existing forests and woodlands should generally be subject to higher conservation standards than potential forest land because existing forests generally have much greater ecological value than a newly planted stand. The following examples are provisions that define what is considered to be current or potential forest or woodland. Forest or woodland types of special local

(126)

concern may be specifically noted in this section.

This provision shall apply to all lands within the jurisdiction for which approval for a discretionary project is requested and for which any of the following conditions apply:

A. All areas with native trees and associated woody vegetation covering 10% or more of the ground surface as of (month/year), as determined from baseline aerial photography dated (date) on file with the Planning Division.

B. Areas that formerly supported native trees or other woody vegetation as shown on base maps on file with the Planning Division. Areas designated as former woodlands shall include lands used for agricultural crops or pasture and urbanized areas covered by structures or pavement at the time of the aforementioned baseline aerial photography for the purposes of this ordinance.

C. All areas within 100 feet of a perennial or intermittent stream as shown on base maps on file with the Planning Division.

The approving authority shall be authorized to determine whether the provisions of this ordinance apply to any portion of a specific parcel. The burden of proof that the provision should not be applied to a specific parcel shall be on the property owner.

[Example code by the authors]

(k) Forest. --

(1) "Forest" means a biological community dominated by trees and other woody plants covering a land area of 10,000 square feet or greater.

(2) "Forest" includes (i) areas that have at least 100 trees per acre with at least 50% of those having a two-inch or greater diameter at 4.5 feet above the ground and larger, and (ii) forest areas that have been cut but not cleared.

(3) Forest does not include orchards.

[Annotated Code of Maryland Sec 5-1601]

Regulated activities: Activities regulated through the permit process should include any that could potentially degrade the woodland. This would include activities such as clearing the understory, or altering watercourses.

Except as provided for herein, no person or corporation shall destroy or significantly alter any forest or woodland through tree damage or removal, clearing, grading, tilling, burning, application of chemicals, or any other means unless they possess a valid Woodland Alteration Permit. No person or corporation shall be granted a permit for subdivision, grading, building, or the construction of any improvement on wooded or forested lands unless they possess a valid Woodland Alteration Permit. Any alteration of wooded or forested lands shall conform to the conditions

(127)

and specifications of the Woodland Alteration Permit.

[Example code by the authors]

On tracts of commercial timberland, state forestry regulations may apply and often take precedence over local ordinances. In California, for example, the Forest Practice Act (California Public Resources Code Section 4511 et seq.) may apply to parcels of commercial forest land larger than three acres. As amended, this act does not allow individual counties to adopt rules or regulations that are stricter than those provided for by the act. However, counties may recommend that the State Board of Forestry adopt additional rules and regulations to account for local needs.

The Maryland Forest Conservation Act applies to any public or private subdivision plan or application for a grading or sediment control permit by any person, local government, or State government unit on areas 40,000 square feet or greater. Exceptions to the Act are specified, and include commercial timber harvesting operations and agricultural uses, as long as they satisfy certain requirements spelled out in the exemptions.

Criteria and standards for approving regulated activities. Standards for tree retention and reforestation will vary with the type of woodlands or forests involved. Canopy cover and/or stocking rates (trees per unit area) are probably the most widely applicable ways of expressing these standards. In general, any type of development will result in more canopy loss on parcels with high levels of canopy cover than on parcels with low canopy cover. Therefore, it may be desirable to establish standards for canopy retention that vary with the baseline level of canopy. Foresters or other resource professionals familiar with local conditions should be consulted to help establish meaningful and appropriate standards.

The canopy cover baseline can be used to set both retention and reforestation standards. Parcels showing an increase in tree cover beyond the baseline could be allowed greater flexibility when developed. Parcels showing a loss in tree cover could be required to restock the woodland to acceptable levels before development could occur. This strategy helps to provide a strong disincentive for clearing prior to development. Property owners would protect their future options best by maintaining or increasing tree cover on their lands.

In the first example below, viable stands of trees are given priority over individual trees. However, protection for individual trees of special concern could also be obtained through provisions of a landmark tree provision (provision 31). If properly constructed, tree protection and woodland conservation provisions can complement each other to provide for more complete management of existing tree resources.

Canopy retention standards. The following table shall be used to determine the minimum amounts of woodland canopy that must be retained during development on wooded lands:

Canopy retention standard shall be the greater of Column A or Column B:

<i>Baseline canopy cover</i>	<i>Column A</i>	<i>Column B</i>
<i>80-100%</i>	<i>.5 x baseline canopy cover</i>	<i>65% canopy cover</i>
<i>60-79%</i>	<i>.80 x baseline canopy cover</i>	<i>51% canopy cover</i>
<i>40-59%</i>	<i>.85 x baseline canopy cover</i>	<i>36% canopy cover</i>
<i>20-39%</i>	<i>.90 x baseline canopy cover</i>	<i>19% canopy cover</i>
<i>19% or less</i>	<i>1.0 x baseline canopy cover</i>	<i>--</i>

Example: For 50% baseline canopy, the minimum allowable canopy after

128

development would be the greater of Column A, (.85 x 50% = 42.5% canopy) or Column B. (36% canopy). In this case the minimum allowable canopy after development would be 42.5%.

Retention standards shall be applied to retain stands of trees and undisturbed woodlands in priority over individual specimen trees which will be incorporated into the development. No more than 10% of the canopy retention standard may be met by individual trees not included within designated woodlands.

Reforestation standards. *In areas where tree removal, clearing, fire, or any other intentional or accidental canopy reduction has resulted in canopy levels below the baseline level, the standard for reforestation shall be set at 100% of baseline levels, except that no reforestation standard shall exceed 85% nor be less than 15% canopy cover.*

[Example code by the authors]

In the preceding example, two standards (Columns A and B) are used to provide a smooth transition between the required retention levels. For example, the top baseline canopy class (80-100% canopy) requires 75% retention of existing canopy, the second baseline canopy class (60-79% canopy) has a slightly higher retention standard of 80%. With these ranges, a potential problem arises when the low end of one canopy class is compared to the high end of the adjacent class. The retention standard according to Column A for 80% baseline canopy is 60% canopy cover (.75 x 80%), but the standard for 79% baseline canopy (the next lower class) would be greater at 63% canopy cover (.8 x 79%). When Column B is used, this inconsistency doesn't arise and the percent canopy cover retained steps down as you drop in baseline canopy cover between classes (80% baseline = 65% canopy cover retained, 79% baseline = 63% canopy cover retained).

The Maryland Forest Conservation Act and local ordinances based on it establish standards for both retention of existing forests and for the afforestation or reforestation of lands in connection with development and certain other land use changes. For both situations, canopy cover standards vary by the land use classification rather than preexisting levels of canopy cover. The example code below establishes forest conservation thresholds by land use category. If tree removal exceeds the set threshold levels, more stringent mitigation requirements apply. This serves to provide an incentive to project planners to conserve canopy cover to at least the threshold level.

A. There is a forest conservation threshold established for all land use categories, as provided in Subsection B... The forest conservation threshold [is] the percentage of the net tract area at which the reforestation requirement changes from a ratio of 1/4 acre planted for each acre removed above the threshold to a ratio of 2 acres planted for each acre removed below the threshold.

B. After reasonable efforts to minimize cutting or clearing of trees and other woody plants have been exhausted in the development of a subdivision or project plan...the forest conservation plan shall provide for reforestation, purchase of credits from a forest mitigation bank, or payment into the forest conservation fund according to ... the following forest conservation thresholds for the applicable land use category:

Category of Use	Threshold Percentage
(1) Agricultural and resource areas	50 percent;
(2) Medium density residential areas	25 percent;
(3) Institutional development areas	20 percent;
(4) High density residential areas	20 percent;

129

- (5) *Mixed use and planned unit development areas* 15 percent:
 (6) *Commercial and industrial use areas* 15 percent.

[Annotated Code of Maryland 08.19.03.01 Article VIII. Sec. 8.1]

Under this system, a parcel being developed for commercial use with 100% forest cover could remove 85% of the existing canopy cover (15% canopy cover remaining) and would remain above the threshold. In contrast, a parcel with only 20% forest cover could remove no more than one quarter of the existing cover to remain above the threshold of 15% canopy cover. Reforestation requirements would apply to both parcels. In this hypothetical example, if we assume both parcels to be 100 acres, the reforestation requirement would be 21.25 acres for the fully canopied site (1/4 x 85 acres of forest removed) compared to 1.25 acres for the site with 20% forest cover (1/4 x 5 acres of forest removed).

If areas with high levels of canopy cover or other sensitive resource areas are to be protected adequately, additional restrictions or modifications of the threshold limits may be imposed in certain areas. In the example below, different woodland or forest clearing threshold values apply in "limited development areas" and "resource conservation areas".

...c) For the alteration of forest and developed woodland in limited development areas and resource conservation areas, the following criteria shall be met:

- (1) (i) Up to 20% of any forest or developed woodland may be cleared for development provided it is replaced on at least an equal area basis;
 (ii) an additional 10% up to a total of 30% of the forest or developed woodland may be cleared if approved by the Office of Planning and Zoning, and if it is replaced, by at least one and one-half times the total area of disturbed forest or developed woodland;
 (iii) all remaining forest or developed woodland shall be maintained through restrictive covenants or similar instruments that are recorded in the land records of Anne Arundel County; and
 (iv) when an area for reforestation is not available on the site, the developer shall either select an alternative off-site location or shall pay a fee as provided in subsection (d) of this section:*

*...
 (3) if there is no established forest on a development site, the site shall be planted to provide a forest or developed woodland cover of at least 15%:*

(4) replanted or afforested areas shall be maintained as forest cover through easements, restrictive covenants, or similar protective instruments: ...

[Anne Arundel County, MD: Ord 66-99 section 2-314.]

On a more local scale, higher retention or reforestation standards may be applied to sensitive areas or critical resource areas within a parcel. Areas such as floodplains, streams and associated buffer areas, steep slopes or other highly erodible areas, and critical wildlife habitats may be slated for higher levels of protection than is provided for other forested areas.

(130)

(c) Priority for retention and protection.- The following trees, shrubs, plants, and specific areas shall be considered priority for retention and protection, and they shall be left in an undisturbed condition unless the applicant has demonstrated, to the satisfaction of the State or local authority that reasonable efforts have been made to protect them and the plan cannot reasonably be altered:

(1) Trees, shrubs, and plants located in sensitive areas including 100-year floodplains, intermittent and perennial streams and their buffers, coastal bays and their buffers, steep slopes, and critical habitats;

(2) contiguous forest that connects the largest undeveloped or most vegetated tracts of land within and adjacent to the site,

(3) Trees, shrubs, or plants identified on the list of rare, threatened, and endangered species of the U.S. Fish and Wildlife Service or the Department;

(4) Trees that are part of a historic site or associated with a historic structure or designated by the Department or local authority as a national, state, or local Champion Tree; and

(5) Trees having a diameter measured at 4.5 ft above the ground of

(i) 30 inches; or

(ii) 75% of the diameter, measured 4.5 ft above the ground, of the current State Champion Tree of the species as designated by the department.

[Annotated Code of Maryland Sec 5-1607]

Afforestation standards are set by the Maryland Forest Conservation Act and local ordinances based on it. Parcels that have less than the set minimum amount forest cover must be afforested to minimum levels if they are developed. Landowners that plan to develop in the future have an incentive to establish tree canopy on portions of their property that would not be affected by a future development. Section (d) in the example below provides an additional disincentive for "preemptive" clearing.

(a) The amount of afforestation required under this subtitle shall be determined according to the amount of existing forest cover as provided in this section.

(b) A site that has less than 20% of its net tract area in existing forest cover shall be afforested up to at least 20% of the net tract area for:

(1) agricultural or resource uses; and

(2) medium density residential uses.

(c) A site that has less than 15% of its net tract area in existing forest cover shall be afforested up to at least 15% of the net tract area for:

(1) institutional development uses;

(2) high density residential uses;

(3) mixed use or planned unit development uses; and

(4) commercial or industrial uses.

(d) If existing forest cover is cut or cleared on a site that is below the afforestation levels set forth in this section, the site shall be reforested at a ratio of two acres planted for every acre cut or cleared, and this reforestation shall be in addition to the afforestation required by this section.

(131)

[Anne Arundel county, MD: Ord 66-99 section 2-304.6]

In the example below, standards for approving regulated activities include provisions related to stand regeneration. Such standards may be necessary in areas where native tree species are not regenerating well under current stand management conditions.

Removal of oak trees in the areas outside of the North County Area Plan, ... shall be allowed only if the following purposes and standards are satisfied...

B. Standards:

1. The current Best Management Practices as promulgated by the University of California... shall be followed to maintain and promote regeneration of oak trees.

2. A representative sample of sizes, ages and species of oaks shall be retained with special emphasis placed on retaining saplings.

....

[Monterey County, CA: Code Section 16.60.050B]

Permit process requirements, conditions and mitigation required. Permit applicants are normally required to provide the information necessary to decide if the proposed action meets the established standards for approval. This section should clearly indicate the general classes of information to be submitted with the permit application. The community forester or approving authority should be authorized to prescribe the specifics of the type and format of required information. Types of information that might be requested include baseline information on the status of the resource before development, and information on the proposed changes and their expected impacts. This should include data on all components of the woodland, including tree resources, understory vegetation, wildlife, soils, and hydrology.

As noted in provision 31, consultants retained by the applicant have a de facto conflict of interest because the applicant typically has a vested interest in removing trees or otherwise minimizing requirements associated with resource protection. The city or county can eliminate the conflict of interest by directly contracting for the services of any outside consultants that may be needed. The consultant is then responsible to and paid by the local government, which in turn recovers the charges from the applicant.

Whenever development occurs around sensitive natural resources, the primary goal should be to avoid adverse impacts through a sensitive development plan. To promote woodland conservation, the plan should strive to maintain groups of trees in contiguous areas that function as a cohesive habitat. Development patterns that cluster development on a portion of the overall project area and leave wooded areas as dedicated open space provide one means for maintaining functional woodlands.

Compensatory mitigation should only be considered after all reasonable efforts have been made to minimize loss. Reforestation on- or off-site is one form of compensation, but a newly-planted forest or woodland does not have the same habitat value or ecological diversity found in a mature stand. Although reforestation should be promoted for long-term resource conservation, suitable mitigation

132

of short-term impacts can best be obtained by requiring that equivalent quantities of developable land be reserved from development. Such woodland reserves should remain undeveloped at least until reforested areas attain the resource and habitat value of woodlands which were lost. It may be desirable to target certain critical areas for acquisition as permanent forest/woodland reserves through this process of "mitigation banking" (see also Mitigation and Tree banking).

1. Removal of more than three protected trees on a lot in a one year shall require a Forest Management Plan and approval of a Use Permit by the Monterey County Planning Commission.

2. The Forest Management Plan shall be prepared by a qualified professional forester, as selected from the county's list of Consulting Foresters. Plan preparation shall be at the applicant's expense.

The Director of Planning and Building Inspection shall prescribe the format and content requirements for the Forest Management Plan and maintain a list of qualified and acceptable foresters to prepare the Forest Management Plan.

[Monterey County, CA: Code Section 16.60.040C]

Requirements for approving Woodland Alteration Permits. Issuance of a Woodland Alteration Permit is contingent upon the following requirements:

1. A Woodland Conservation Plan for the subject property must be approved by the approving authority.

2. The level of canopy removal requested must not exceed that provided for in the Canopy Retention Standards.

3. All reforestation plantings required as a condition of approval must be installed at least one year prior to the issuance of the Woodland Alteration Permit, and must be approved as adequate after inspection by the approving authority.

4. All other requirements pursuant to county ordinances, the California Environmental Quality Act (CEQA), and other applicable local, state, and federal laws and regulations must be fulfilled.

[Example code by the authors]

Woodland Conservation Plan. The purpose of the Woodland Conservation Plan (WCP) is to establish specific methods to conserve existing and potential woodland resources during development. The WCP shall be prepared by a qualified natural resources consultant retained by the county, and the charges of preparing the WCP shall be borne by the applicant.

The WCP shall provide that a project meets the Retention and Reforestation Standards of this provision through any, or a combination, of the following methods or other methods acceptable to the approving authority.

1. Minimizing the extent of the development and siting it to avoid impacts

on existing woodlands.

133

2. *Clustering development on a portion of the project area to retain continuous stands of trees in the nondeveloped portion. Transfers of development density from nondeveloped portions of the project area may be allowed only if nondeveloped portions meet the criteria for developable land.*

3. *Providing for reforestation of equivalent sites within or outside of the project area that will not be subject to future development. Where reforestation is used to replace existing woodlands removed for development, estimated canopy cover 20 years after planting shall be used to calculate the equivalent canopy cover provided.*

4. *Public acquisition of title to or permanent conservation easements on developable lands with equivalent woodland resources located outside of the project area. Total area, canopy cover, woodland type, understory vegetation, wildlife habitat value, and other appropriate resource assessment criteria shall be considered in determining whether off-site resources are equivalent to those of the project site.*

Methods that protect and enhance existing woodlands shall be given precedence over those that restore non-wooded lands. Protection of woodlands within the project area shall be given precedence over off-site acquisition. The location of off-site mitigation areas is subject to the approval of the approving authority.

[Example code by the authors]

As noted under provision 31 and discussed in the mitigation page, ordinances may provide that fees be paid to a special fund that is directly used to pay for woodland/forest restoration. This is the case for the Maryland Forest Conservation Act and local ordinances based on it, as shown in the example below. The provision provides for a fee that is based on the area of plantings that are required as mitigation. The Act provides a time limit for the Department (or local governments) to accomplish the reforestation and afforestation activities that the in-lieu fees are collected to fund. A specific time limit may provide a strong incentive to ensure that the responsible agency actually accomplishes mitigation projects. However, setting an arbitrarily short time limit could be counterproductive if it limits the time available to complete complicated land acquisitions, or forces reforestation to occur during unfavorable conditions (e.g., an extended drought). A flexible time limit may be needed to ensure that funds are spent efficiently. Note in the example below that the use of funds returned to the payer remain restricted, and can only be used for local tree planting projects.

(b) Contribution: rate. - ...if any person subject to this subtitle demonstrates to the satisfaction of the appropriated State or local authority that the requirements for reforestation or afforestation on-site or off-site cannot be reasonably accomplished, the person shall contribute money at a rate of 10 cents per square foot of the area of required planting to the Forest Conservation Fund.

*... (d) Time period for reforestation or afforestation: return of funds. - (1) The Department shall accomplish the reforestation or afforestation for which the money is deposited within 2 years or 3 growing seasons, as appropriate, after the receipt of the money.
(2) Money deposited in the Forest Conservation Fund under subsection (b) of this section shall remain in the fund for a period of 2 years or 3 growing seasons, and at the end of that time period, any portion that has*

134

not been used to meet the afforestation or reforestation requirements shall be returned to the person who provided the money to be used for documented tree planting in the same county or watershed beyond that required by this subtitle or other applicable statutes.

(e) Management of Fund. - (1) Money deposited in the Fund under subsection (b) of this section may only be spent on reforestation and afforestation, including site identification, acquisition, and preparation and may not revert to the General Fund of the State.

[Annotated Code of Maryland Sec 5-1610]

Ordinances modeled on the Maryland Forest Conservation Act require that a forest stand delineation and a forest conservation plan be prepared prior to any approval of forest removal..

(a) A forest stand delineation shall be prepared by a licensed forester, licensed landscape architect, or qualified professional who meets the requirements stated in COMAR, §08.19.06.01B.

(b) Each forest stand delineation shall:

(1) consist of a map and a narrative;

(2) be used to determine the most suitable and practical areas for forest conservation; and

(3) contain or be accompanied by:

(i) a topography map delineating intermittent and perennial streams, and steep slopes over 25%;

(ii) soil mapping units and narrative indicating soils with structural limitations, hydric soils, or soils with a soil K value greater than 0.35 on slopes of 15% or more;

(iii) forest stand data indicating species, location, and size of trees and showing dominant and C.O-dominant forest types;

(iv) location of 100-year floodplains;

(v) information required by the Forest Conservation Technical Manual; and

(vi) any other information required by the Department to assist in its review. ...

[Anne Arundel County, MD: Ord 66-99 section 2-304.2]

(a) A forest conservation plan shall be prepared by a licensed forester, a licensed landscape architect, or a qualified professional who meets the requirements stated in COMAR, §08.19.06.01B.

(b) (1) A forest conservation plan shall:

(i) give priority to retention of existing forest on the site; and

(ii) if there is an insufficient amount of existing forest on the site, provide for afforestation as provided in §2-304.6 of this subtitle.

(2) If retention of existing forest at or above the forest conservation threshold established in §2-304.5 of this subtitle is unfeasible, a subdivider shall demonstrate:

(i) that there are no available methods or techniques to implement forest retention at the forest conservation threshold;

(ii) why priority forests and priority areas, as determined by an evaluation of the forest stand delineation, cannot be retained; and

(iii) where afforestation and reforestation will occur, with preference given to replanting in the priority areas.

(3) If a subdivider demonstrates to the satisfaction of the Department that

retention of existing forest is unfeasible, the forest conservation plan shall provide for:

- (i) reforestation in accordance with the provisions of §-304.4 and 2-304.5 of this subtitle; and*
- (ii) afforestation in accordance with the provisions of §-304.4 and 2-304.6 of this subtitle....*

[Anne Arundel County, MD: Ord 66-99 section 2-304.3]

Invoking state regulations may provide another possible avenue for addressing woodland or forest protection. In California, for example, the local government can trigger the review and mitigation requirements of the California Environmental Quality Act (CEQA) when a project will have a significant impact on sensitive and important natural resources such as woodlands. It may be useful to include provisions that clearly indicate under what circumstances an Environmental Impact Report (EIR) is required. This may require two steps. First, the provision should state under what circumstances tree removal or woodland alteration will be considered a "project" under CEQA and thus subject to review. Second, the provision can set specific thresholds for loss or disturbance of woodlands and forests that would be considered "significant" under CEQA, and therefore require the preparation of an EIR. Requiring the preparation of an EIR above a certain threshold may help dissuade applicants from automatically requesting the maximum amount of clearing provided for in the retention standards.

All tree removal requests coming under this subsection shall be subject to the requirements of the California Environmental Quality Act (CEQA).

[Monterey County Code Section 16.60.040C]

CEQA compliance. *The proposed removal or disturbance of woodlands to the maximum extent allowed under the Retention Standards shall require the preparation of an Environmental Impact Report (EIR). Based upon the specific characteristics of the site under consideration, the approving authority may also determine that lesser amounts of woodland removal or alteration pose a significant adverse impact and require the preparation of an EIR.*

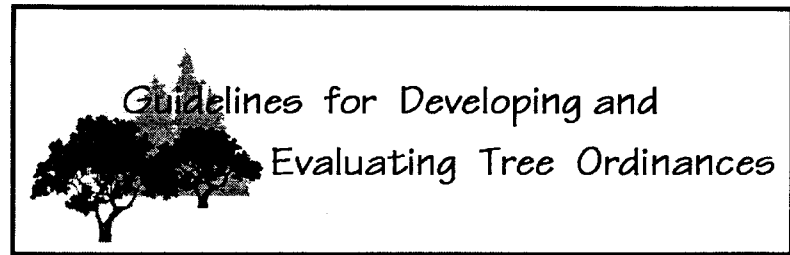
[Example code by the authors]

Monitoring. Monitoring of ordinance effectiveness, the success of required mitigation, and the ongoing status of the resource are especially critical for woodland and forest conservation ordinances. Example monitoring provisions are discussed under [provision 13](#).

[<Previous](#) | [Tree ordinance web site map](#) | [Next >](#)

[ISA home page](#) | [Submit comments or suggestions](#)

136

[<Previous](#) | [Next >](#)

Part 3. Evaluating the urban forest and ordinance performance

As we discussed in Developing a Community Forest Management Strategy, two stages in the urban forest planning process require the use of evaluation methods. To answer the questions "What do you have?" and "Are you getting what you want?", you will need to evaluate tree resources, management activities, and public attitudes. Thus, evaluation methods are important tools for formulating and monitoring tree management strategies. In these pages, we discuss how various methods and techniques can be used to evaluate tree resources and community forest management.

You can access our descriptions and examples of urban forest evaluation methods either from the list below or by following the links from the page on Goals for Community Forest Programs. Included in this section are methods for evaluating tree resources, urban forestry management activities, and public attitudes. Most of the techniques summarized here are well established, although a few new applications and adaptations for urban forestry are included. Where possible, we have provided examples to demonstrate actual applications of the techniques described. Please contact us if you know of other useful links or would like to see additional methods covered.

The key to successful and efficient evaluation lies in focusing on what needs to be evaluated. It is generally not desirable to collect more detailed information than is likely to be used, since cost and effort generally increase with the level of detail. On the other hand, it may be more efficient to collect a variety of data in a single evaluation than to conduct a series of separate evaluations. By following the process described under Developing a Community Forest Management Strategy you should be able to determine what types of data you will need to collect to meet your needs for information.

Methods for evaluating tree ordinances and the urban forest ecosystem

* Sampling from populations. In many cases, it will be more efficient to evaluate a sample of the population under study (trees, parking lots, homeowners) than to evaluate the entire population. Here we discuss how to develop a valid sampling scheme.

* Photogrammetry and remote sensing techniques. Using stock aerial photographs or other aerial imagery, photogrammetric techniques can be used to assess tree canopy cover quickly and cost-effectively. We discuss the uses of photogrammetry and provide some examples of applications to ordinance evaluation.

* Ground survey. For many applications, the ground survey is still the simplest and most accurate means for collecting detailed data on the urban forest. We describe basic ground survey methods and a number of typical applications.

* Photo points. Photographs taken from the ground or the air can provide graphic and obvious evidence of changes in tree condition and cover. We discuss some considerations for establishing effective, repeatable photo points.

137

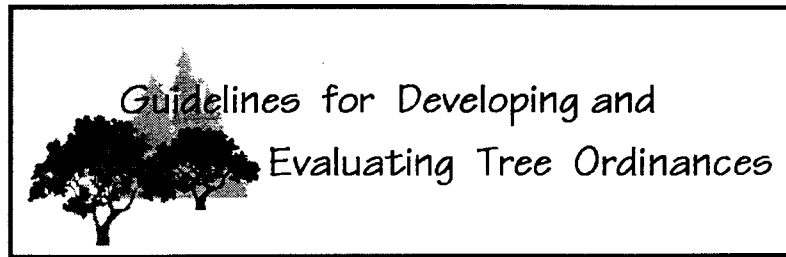
* Record keeping and analysis. Well-maintained records and databases can be analyzed to provide a wealth of information on ordinance performance. We discuss the use of GIS, tree inventories, and other records.

* Public polling. People are an integral part of the urban forest ecosystem. We present a brief overview of methods used to assess the opinions of the proverbial person on the street.

[<Previous](#) | [Tree ordinance web site map](#) | [Next >](#)

[ISA home page](#) | [Submit comments or suggestions](#)

(138)

[<Previous](#) | [Next >](#)

Public polling

Uses:

Evaluating public attitudes and knowledge about trees and urban forest management.

Materials needed:

Varies with the type of survey being conducted. See discussion below.

Notes:

The use of polling or surveying to assess public opinions, attitudes, beliefs, and knowledge is well known to most people. On almost any day, the news media report on the results of a poll or survey on some pressing topic. Polling can be useful in assessing the knowledge and attitudes of the community with respect to urban forestry issues. Properly designed polls can also be used to evaluate whether an ordinance, educational program, or other management activity has brought about changes in knowledge, attitudes, and practices in the community. Information is normally gathered from the public either through interviews or self-completed questionnaires.

Interviews

Compared with questionnaires, interviews generally have greater flexibility, tend to elicit a higher response rate, and allow for more precise selection of respondents. However, persons conducting interviews need to be carefully trained to avoid introducing bias into the data.

Interviews may be conducted either in person or by telephone. Telephone interviews are less expensive to conduct, allow for better sampling designs, and can be used in conjunction with computers. Computer-assisted telephone interviewing (CATI) systems are available and can increase the efficiency of telephone interviews. A CATI system can be used to help the interviewer adjust their questions based on information obtained during the interview, and allows for the direct entry of data as the interview proceeds.

Self-completed questionnaires

Self-completed questionnaires have the advantage of being easier to administer than interviews. Questionnaires are most commonly sent and returned by mail. Respondents have more opportunity to think about questions or look up information for a self-completed questionnaire than in an interview. While it is now possible to set up questionnaires that would be accessed via the Internet, the sample responding to an Internet survey may not be especially representative of the population as a whole or even of the portion of the population that uses the Internet.

139

Typically, prior to the main survey mailing, the questionnaire is pretested on a small sample. Any problems that are identified in the construction of the questionnaire can then be corrected.

Several techniques are commonly employed to boost the return rate for mail surveys. These include the use of advance notification, attractive first-class stamps rather than bulk postage, hand addressing, postage-paid return envelopes, carefully-timed reminder postcards, and repeat mailings of the questionnaire to nonrespondents. Token incentives included with the survey are sometimes used to increase the return rate, but these will also increase survey costs. Incentives may also introduce bias into the returns if they tend to motivate some groups more than others.

Survey design considerations

Much of the difference in cost between the various methods is related to the logistics of data collection, since design and analysis costs will be similar. In-person interviews are generally the most costly and complex surveys to conduct, due to the logistics of traveling door-to-door. The cost of telephone surveys will vary with the length and complexity of the survey and the sample size. Costs of the mail survey vary with the size of the mailing and the number of follow-up mailings used.

Good survey design and sampling technique are critical to the success of sample surveys conducted by any method. Care must also be taken in the data collection and entry process, to avoid introducing errors. Finally, even a well-conducted survey will not yield meaningful results if data analysis and interpretation are flawed. Thus, while the concepts behind public polling are reasonably straightforward, there is a fair amount of art and science involved in conducting a useful study. Gross design and execution errors can lead to meaningless or misleading results. More subtle errors may not completely invalidate survey results, but can decrease the reliability of the study.

If you are interested in conducting a public survey but lack the necessary technical background or resources, there are various sources of assistance available. Survey research units are associated with a number of state college and university campuses. Some of these units can contract with cities or counties to design or conduct surveys. Others may provide information or assist in studies on a cooperative basis. In addition, a number of private firms specialize in conducting public surveys primarily for market research. The scope of services provided and quality of work performed by these or other consulting firms can vary widely, so careful shopping is advised.

Sampling considerations for public polling

For all but the very smallest municipalities, assessments of citizen attitudes and knowledge will be based on polling a representative sample of the total population. While most of the points noted under Sampling from Populations apply, demographic factors also need to be considered to avoid bias in the study design. For instance, Sommer et al (1990) found that compared to younger citizens, older citizens were more likely to have negative opinions about street trees in front of their homes. It may be desirable to account for differences due to age, sex, sociological, or other demographic factors in the survey. Such information may help local governments decide whether education or other programs need to be targeted toward certain segments of the population.

140

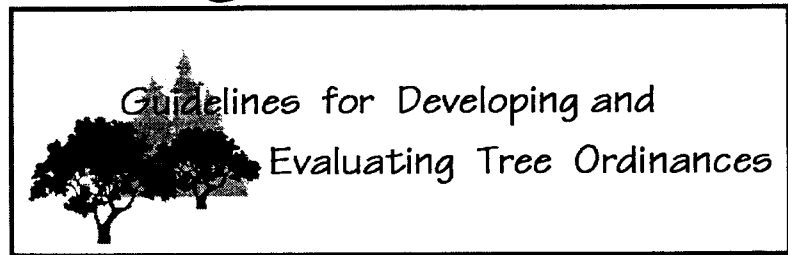
Evaluation example: *Homeowner attitudes toward trees*

Sommer (1989) gives the following example of how information from a mail survey can be used in urban forestry management. European elms are a common street tree in the downtown area of Sacramento, California. These large trees are attacked by elm leaf beetle each summer, and the mess associated with these infestations had drawn numerous complaints. In response, the city had initiated an elm replacement program. This program provoked a public outcry, although not necessarily from neighborhoods directly affected by elm replacement. The city conducted a mail survey of householders in the downtown area and found that the majority of the property owners liked their elm trees, and wanted them retained. This data was then used to revise city policies regarding elms.

[<Previous](#) | [Tree ordinance web site map](#) | [Next >](#)

[ISA home page](#) | [Submit comments or suggestions](#)

[Return to Provision 31](#)



Defining special trees: heritage, historic, and landmark trees

As noted in our discussion of provision 31, individual trees may be considered important community resources because of unique or noteworthy characteristics or values. Such trees have been described in ordinances as heritage, historic, landmark, legacy, special interest, significant, or specimen trees or various permutations of these terms (e.g., heritage oak, exceptional specimen tree). In some ordinances, trees are simply labeled protected trees (i.e., trees afforded protection by the ordinance). Regardless of the term used, the concept is the same: trees with certain characteristics are singled out for special consideration in the ordinance. Most commonly, one or more of the following criteria are used to define a special status tree:

Size - Some component of tree size, most frequently trunk diameter, may be used to define a special status tree. Most commonly, a given diameter at 4.5 ft above grade (i.e., diameter at breast height or DBH) is used as the size standard. Additional rules are typically needed to handle trees that are multi-trunked or branch below 4.5 ft. Because the relationships between DBH and canopy spread or DBH and tree age vary by species, different tree diameter standards may be applied to different species.

Although a tree diameter standard is fairly objective, the threshold diameter is often set more or less arbitrarily. As such, management decisions based solely on a threshold diameter may not be particularly logical. For example, if the threshold diameter for protecting a tree is 24 inches DBH, a tree with a diameter of 23.9 inches would be ignored, even though it might have a greater canopy spread than a tree with a larger DBH. Furthermore, the measurement of DBH with standard equipment such as diameter tapes or calipers is subject to errors related to trunk or bark irregularities and minor shifts in the location of the measuring device. A tree with a DBH measured as 24.2 inches by one observer could be measured at 23.5 inches by another observer. These problems are minimized when small threshold diameters (e.g., 3 inches) are used.

Other components of tree size, such as maximum canopy spread or height, may also be considered independently or in conjunction with tree diameter. The National Register of Big Trees, maintained by American Forests, uses a point system to rate tree size. Points for each tree are calculated by summing trunk circumference (at 4.5 ft) in inches, tree height in feet, and one-quarter of the average crown spread in feet. This system is used to determine "champion" trees for each species. Some ordinances expressly confer special tree status on state or national champion trees. More local "champion" trees could be defined using the same methods.

Species - Special status may be conferred only to certain species of trees. Special status trees are often, but not always, important locally native species or trees that are associated with the character of a community. Certain species that are relatively rare in an area, whether native or not, may also be granted special status. In some cases, species is used to specifically exempt certain trees from special status regardless of size. For instance, weedy trees such as tree-of-heaven (*Ailanthus altissima*) or trees used for commercial purposes (e.g., fruit trees, plantation lumber or pulp trees) may be excluded from consideration as special status trees. Unless interspecific hybrids are present in an area or the taxonomy of a species changes, species is probably the most objective criterion used in defining special status trees.

142

Age - Especially old trees are a link to the past, so many definitions of special status trees include age as a criterion. In practice, tree age is fairly difficult to determine in standing trees unless documentation of tree age exists from historical accounts, photographs, or associations with historical structures. Tree age is sometimes inferred from tree size, especially DBH. However, the relationship between age and DBH varies with species, site quality, management history, and other factors, so DBH is usually only a crude estimator of tree age. Determining age by increment boring is theoretically possible, but is potentially damaging to the tree and is fraught with difficulties if trees are large, have very hard wood, or are decayed in the center.

Historic significance - A tree may be associated with a notable local or regional historical event, person, structure, or landscape. Almost every tree that has been around for a while has some historical significance, whether it is recognized or not. Determining whether the historical significance of a given tree is sufficiently notable is therefore a subjective matter. Historic tree status is typically granted by a governing (e.g., city council) or advisory body (e.g., tree commission). Some ordinances automatically confer historic status on trees designated as historical landmarks by certain other organizations (e.g., historical societies). In addition, ordinances may assign special status to trees dedicated or planted as public memorials.

Ecological value - All trees serve a variety of ecological functions. Certain trees or groups of trees may have especially high ecological value because of their location, size, species, and/or condition. For example, a given tree may be an important roost, nesting site, or food source for certain wildlife species; it may be situated in a site where it plays a critical role in stabilizing soil or providing shade needed by other plant or animal species; it may be an important genetic resource for a local tree population or the species as a whole. Input from trained biologists and ecologists may be necessary to document particular ecological values that may not be obvious to the general public.

Aesthetics - Since beauty is in the eye of the beholder, assigning special status on the basis of aesthetics is always highly subjective. A tree may have special aesthetic value due to its form, whether it is especially perfect and symmetrical or notably craggy and idiosyncratic. Also, the function that a tree serves in a landscape may be sufficient to justify special status; for example, a landmark pair of trees that frame an entrance. In the absence of other noteworthy characteristics, it may be contentious to base special status upon aesthetics alone.

Location - Trees in particular locations may be accorded special status in recognition of the important aesthetic or ecological functions that they serve. Proximity to a thoroughfare can be used to classify a tree as a street tree, which may be accorded special status whether or not it is in the public right-of-way or is under public or private care. Trees located along or within a set distance from watercourses may also be give special status due to their importance in stabilizing streambanks or providing shaded riverine habitat. In some cases, the location of a tree is considered in conjunction with size or species parameters.

Required plantings and retained trees - If trees are have been preserved or planted as a requirement of development, the community has a vested interest to ensure that the trees are protected. The purpose of planting and tree retention is to develop mature tree canopy, and this cannot occur if the subject trees are eliminated, ruined by topping or other poor maintenance practices, or replaced frequently with young trees. By explicitly providing special status to such trees in the ordinance, a jurisdiction may be able to provide a higher level of regulatory protection to such trees and increase the penalties associated with unauthorized damage to or removal of the tree.

Other unique characteristics - This grab-bag term may be added to the list of criteria used to designate special status trees because it is difficult to anticipate all possible situations of significance. For example, a given tree may become a local or regional cultural icon due to an event or apparition that is associated with it. This criterion will again be subjective and typically may be invoked through the approval of a governing body.

143

Because each criterion above has clear limitations and difficulties, most definitions include a combination of criteria. The following definition include examples of many of the criteria discussed above.

Protected tree includes all of the following:

(1) Private protected tree means any tree with a DBH of six inches or more located on any lot within twenty feet of a street right-of-way (including an approved private street or other access easement) or a tree with a DBH of eight inches or more located within ten feet of any other property line, or a tree with a DBH of twelve inches or more located elsewhere on the lot.

(2) Public protected tree means any tree located on lands owned by the city, or other governmental agencies or authorities, or any land upon which easements are imposed for the benefit of the city, or other governmental agencies or authorities, or upon which other ownership control may be exerted by the city, or other governmental agencies or authorities, including rights-of-way, parks, public areas and easements for drainage, sewer, water and other public utilities, with:

(i) A DBH of six inches or more located within a city or other governmental right-of-way, or

(ii) A DBH of six inches or more and located on any lot within twenty feet of a street right-of-way, or

(iii) A DBH of eight inches or more located on any lot within ten feet of any other property line, or

(iv) A DBH of twelve inches or more located elsewhere on the lot.

(3) Exceptional specimen tree means any tree which is determined by the City Council to be of unique and intrinsic value to the general public because of its size, age, historic association or ecological value or any tree designated a Florida State Champion, United States Champion or World Champion by the American Forestry Association. The Chief shall keep a record of all specimen trees so designated and their location.

[Jacksonville, FL: Ordinance code Title XVII, Section 656.1203bb]

As noted in provision 31, special tree status is best targeted at individual trees, typically in areas that do not have natural stands of trees. When stands of trees or patches of forest or woodland are the topic of concern, the approach described in [provision 32](#) (forest and woodland conservation) may be more appropriate.

[Return to Provision 31](#) | [Tree ordinance web site map](#)

[ISA home page](#) | [Submit comments or suggestions](#)