

**FINAL REPORT**  
**FOREST SERVICE GRANT NO. G-5-99-20-079**

Period covered by this report: July 22, 1999 through October 31, 2001

**NOTE: Please review the following information and revise/complete as necessary.**

**Issued to:**Phytosphere Research  
Address: 1 027 Davis Street, Vacaville, CA 95687

**Congressional District Number: 1**

**Project Name:**Guidelines for Developing and Evaluating Tree Ordinances on the Web

**Contact Person/Principal Investigator:**

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**Date of Award:** July 22, 1999

**Grant Modifications:** Mod. 1: No cost time extension from July 31, 2001 to October 31, 2001

**Date of Expiration:** October 31, 2001

**Funding: Federal Share:** \$24,250 plus **Grantee Share:** \$24,250 = **Total Project:** \$48,500

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**Please provide an abstract on your project and its results (approximately 200 words or less):**

Through this project, we established a free website ( <http://www.isa-arbor.com/tree-ord/>) based on the publication *Guidelines for Developing and Evaluating Tree Ordinances*, a publication originally produced for the California Department of Forestry and Fire Protection Urban Forest Program. The website is designed to assist citizens and local governments with the process of developing, revising, and evaluating the effectiveness of tree ordinances. The site describes how to integrate tree ordinances with a community tree management program. It provides detailed descriptions of methods used to monitor community tree resources, tree management activities, and community attitudes. Rather than using a "model ordinance" approach, the website provides an extensive list of annotated examples of effective tree ordinance provisions, drawn from tree ordinances in use in communities throughout the country. These

examples and accompanying commentary provide a useful reference point for anyone attempting to draft or modify a tree ordinance. The *Guidelines* website encourages local innovation over the use of static models and serves as a forum for quickly disseminating improved or novel approaches throughout the country. Response to the website has been favorable, based on use statistics, unsolicited comments, and responses to a survey of potential site users.

### **Project objectives:**

Overall project objectives as defined in our contract are summarized below. Subtasks are listed below each objective in italics.

1. Initial site establishment on International Society of Arboriculture server.
2. Consult with advisory committee and solicit input on site content.
3. Advertise site availability.
4. Update and expand the section on Drafting an Ordinance.
  - Review* additional ordinance provisions.
  - Compose* descriptive text.
5. Update and expand the section on Evaluating Ordinance Performance.
  - Conduct review of evaluation methods.*
  - Locate and/or test* example applications of evaluation methods.
  - Edit* evaluations section, adding new text and examples as required.
6. General editing and updating of website pages, and website format.
  - Enhance* formatting and site organization to improve ease of navigation through the website.
  - Produce* a downloadable version of the site content for printing.
  - Add and maintain* links to other useful related websites.
  - Add* user comment form.
7. Evaluate site use and impact.

### **Objectives met successfully:**

**I. Initial site establishment on International Society of Arboriculture server.** The site was initially established on the ISA server on 9/9/99, but internal links were not completely functional because of filename problems on the ISA's UNIX server. We encouraged users to use the mirror site (<http://phytosphere.com/treeord/ordintro.htm>) until 10/1/99 when the ISA site was completely functional. ISA had concurrently changed to an in-house LINUX server, which added to the delay. After the initial establishment phase, we were able to modify and upload web pages to the ISA server via FTP, so that changes and updates were not delayed by having to be processed by ISA staff. The website address on the ISA server is <http://www.isa-arbor.com/treeord/>.

2. Consult with advisory committee and solicit input on site content.. We repeatedly contacted all members of the advisory committee via email to solicit input. We received direct comments on site content from Cheryl Kollin (American Forests) and also discussed aspects of the site with Greg McPherson (WCUFRE) and Martha Ozonoff (California ReLeaf ). We also requested input through the URBNRNET and CalPoly UFEI urban forestry listservers and received unsolicited comments from site user. These contacts have generated requests for information on topics including:

definitions for urban forest ordinance terms (e.g., grove)  
how to nominate trees for heritage tree status  
use of in-lieu fees  
"tree banks"  
penalties  
individual tree conservation easements  
tree preservation  
the overturn of a portion of Atlanta's tree ordinance  
comments on draft ordinances  
topping  
tree care worker licensing  
pruning standards  
an urban heat island ordinance  
developing tree ordinances for rural areas  
use of tree tags  
tree condition rating scales.

Over the life of the project, we sent about 170 e-mail messages to inform people or organizations about the site, request ordinance-related information, and to respond to queries related to tree ordinances. We have also had extended telephone conversations with people from various parts of the country on tree ordinance issues.

3. Advertise site availability. We have advertised site availability to the following cooperating organizations:

International Society of Arboriculture (ISA)  
USDA-FS Center for Urban Forest Research (CUFR)  
American Forests  
Alliance for Community Trees (ACT)  
California ReLeaf  
Society of Municipal Arborists (SMA)  
International City/County Management Association (ICMA)  
National Association of State Foresters (NASF)  
Local Government Environmental Assistance Network (LGEAN)  
American Planning Association (APA).

Most of these organizations have added a link to our site and articles have appeared in several regional (e.g., California Trees, Western Arborist) and national (e.g., Arborist News) publications describing the site. We have also requested and/or obtained links from TreeLink, Cyburbia, CERES California Environmental Information catalog, Citizen Planner Training Collaborative (MA), Municipal Research and Services Center (WA), and state urban forestry sites for MN and NC. We have also submitted our site URL to various internet search engines, including AltaVista/Raging Search, Northern Light, Google, LookSmart, Yahoo, Snap, [dmoz.org](http://dmoz.org), Excite, Alltheweb, HotBot, Netscape, Magellan, [About.com](http://About.com), Askieeves, [about.com](http://about.com), Webcrawler, Lycos, Galaxy, [search.w3.org](http://search.w3.org), Infospace, Starting point, and others.

On October 5, 2000, Ted Swiecki and Elizabeth Bernhardt presented an invited talk on tree ordinances and the *Guidelines* website in Costa Mesa, CA at the Southern California Turf and Landscape Expo on the website. The talk was well-received although attendance at the session was lighter than anticipated.

Ted Swiecki was interviewed for the Winter 2001 issue of Wood Notes Quarterly magazine on the Treelink (<http://treelink.org>) site and discussed the tree ordinance website and other urban forestry issues.

Finally, we presented a one-day course on tree ordinances for University Extension at the University of California, Davis on November 7, 2001, just after the end of the grant period. The website content was a focus of this class. The University Extension mailings advertising the class resulted in additional publicity for the website.

**4. Update and expand the section on Drafting an Ordinance.** We have added new ordinance provision examples and additional content to many different pages, including new code in the basic ordinance provisions ([ordprt2b.htm](#)), a discussion of the legal problems associated with one section of the Atlanta tree ordinance ([ordprtla.htm](#)), and a major revision of the section dealing with heritage tree protection (provision 31, [ordprt2d.htm](#)). In conjunction with the heritage tree revision, we added three additional pages to the site dealing with definitions of special status trees ([heritage.htm](#)), the concepts related to the term "tree bank" ([treebank.htm](#)), and mitigating for tree loss ([mitigation.htm](#)). We have also completed a major revision and expansion of the section on woodland/forest protection (provision 32). In response to a query on the subject, we also expanded our coverage of the use of fees paid in lieu of replacement plantings in provisions 31 and 32. After reviewing code from several sources and research results provided by Dr. Greg McPherson, we drafted a revision of the code and a new page related to parking lot tree shade ordinances.

**5. Update and expand the section on "Evaluating the Urban Forest and Ordinance Performance".** We updated and expanded the portions of the evaluation section dealing with sample size. We expanded the sample size discussion and added links to several resource sites. We also upgraded our discussion of sample size calculation for using the dot grid technique for assessing canopy cover and added a new page discussing the relationship between sample size and power when estimating proportions ([dotgridsamplesize.htm](#)). This page includes several graphs we developed to illustrate this rather complex concept.

We conducted several analyses to compare the use of image analysis software with dot grid counts in the determination of canopy cover from aerial imagery. The methodology used for image analysis is presented on a new web page ([imageanalysis.htm](#)). This page also includes a comparison with dot grid counts using the same photo used in the image analysis example.

As an evaluation example related to the use of ground survey techniques, we resurveyed two street sections to determine canopy cover at edge of pavement (CCEP) for revisions and expansion of the pages related to that topic. The street sections were last surveyed in 1991, so the new data allowed us to show changes in street tree canopy cover over an additional 10 year

period. We also added new pages based on Dr. Greg McPherson's evaluation of parking lot shade ordinances (parkinglots.htm), and a guide to measuring DBH (measuringdbh.htm). We also modified the page describing the use of photopoints (ordprt3e.htm) and added an example illustration.

In preparation for the revision of the sections pertaining to GIS and the use of remote sensing tools, Ted completed online training classes on ESRI's ArcView GIS basics and ArcView Spatial Analyst extensions. We tested a number of practical applications of this GIS software. We tested the CITYgreen software provided by American Forests and added a page which discusses the use of this software (gis.htm). We also added examples of other programs that have incorporated GIS into record keeping and analysis systems. We have received input on the Evaluating Ordinance Performance section from C. Kollin of American Forests and Greg McPherson (USFS).

**6. General editing and updating of website pages and website format.** We substantially reformatted the website prior to the time that it was uploaded to the ISA server. Enhancements included navigation links at the top and bottom of each page; a link to submit comments and a common title graphic on each page; tables containing links to the ordinance provisions; and reformatting of the site introduction pages. We have also added relevant links to other sites to various pages and added site search capabilities via a third-party search engine.

Over the course of the project, we received numerous requests for a printed version of the site content. At the end of October 2001, after finishing revisions to website content, we produced an Adobe Acrobat downloadable PDF version of the entire site. This PDF document allows a user to easily produce a printed copy of the entire site content, although this document is not as highly formatted as a dedicated print publication would be. Using the free Acrobat Reader software (available from <http://www.adobe.com/acrobat>) and the downloaded PDF document, users can also view the entire site offline. A nice feature of the PDF document is that the internal hyperlinks within the document are maintained, so a user can navigate through the PDF document offline in much in the same manner as one navigates through the website online. We included a download link to the Adobe Acrobat PDF document on the website's homepage. As noted below, the PDF file has been extensively downloaded since it was posted on 10/31/01.

**7. Evaluate site use and impact.** Site statistics provided by ISA staff have allowed us to track usage of the site. We examined not only the total number of individual page accesses ("hits"), but also the pattern of usage to see how the site is used. We have used the highest number of hits on a page other than the home page as an estimate of the unique users that access the site, although this number likely underestimates the number of unique users. Our monitoring period began 10/13/99. Because the last report we received covered a period that overlapped with the previous interval but did not start at the same date as that interval, we cannot exactly calculate usage between 6/11/01 and the end of the extended grant period (10/31/01). We are also lacking site use statistics for the period from 5/18/00 through 7/22/00 (65 days).

Site use statistics for the grant period are summarized in the table below.

Reporting period	Length (days)	Total hits	Hits per week	Estimated users/week
10/13/99 to 5/17/00	217	12,757	303	25
7/23/00 to 12/5/00	135	14,321	559	36
12/5/00 to 6/11/01	188	21,425	610	42
Entire final year				
12/19/00 to 1/16/02	393	32,403	399	26

These site use statistics, coupled with activity reports on the site search page indicate that the use of the site rose steadily through the first half of 2001. The latest report indicates that the total number of page accesses has dropped off in the latter half of 2001. This may in part be due to saturation of the market for this information, i.e., most people currently interested in this information have already found the site. Another major factor contributing to the reduced overall site activity is our posting of the Adobe Acrobat PDF version of the site, as noted above. Site use statistics indicate that this document was downloaded 1,449 times between the time it was posted (10/31/01) and 1/16/02. This represents an average of 132 downloads per week over this interval. Heavy use of the PDF version of the site would be expected to reduce visits to other site pages, since users could refer to the site information offline using the PDF version on their own computer or in printed form.

Site use statistics clearly show that many people have been making use of the website. Nonetheless, tree ordinance development and evaluation is not a constant activity in any community. Rather, it is a need that surfaces periodically in a large number of communities. Given this dynamic, it makes sense that site use would cycle downward at times as the potential market for the information provided by the site becomes saturated. However, we expect that the site will continue to experience moderate use over time. Although use and distribution of the PDF site version will tend to depress overall site use numbers, this mode of distribution actually increases the outreach potential of the site.

Near the conclusion of the project, we conducted a survey of likely users of the website via an e-mail survey. The survey was sent out 10/10/01 to members of the Urbnrnet and urbanforestry listservers. Eric Oldar (California Dept. of Forestry and Fire Protection) also kindly forwarded the survey to his list of California urban forest program managers. We received 40 survey responses. Most respondents were city or state urban foresters or tree program staffers. Other respondents included tree board members, planners, arborists, and foresters. A copy of the survey instrument is included as an appendix at the end of this report. Responses to the survey questions are tabulated under each question. Survey respondents reviewed the website favorably and felt strongly that having such resources freely available on the web was important.

**Objectives not met:**

We have met all the project objectives.

**List the major research or policy findings of your project**

The website itself is the major result of the project. It represents a compilation of state-of-the-art knowledge about tree ordinances and evaluation processes that are integral to the maintenance of the urban forest. Although no single community is constantly involved in ordinance development and evaluation, across the nation a number of communities are addressing such issues on virtually any given day. Partly because the need for information on tree ordinances arises in many scattered locations on an ongoing basis, the website provides a valuable resource for addressing this need.

**If not apparent in the above, or if your project did not involve research, how did the project increase the knowledge we have about urban forestry? How did (will) the public benefit?**

Tree ordinances are one of the most common urban forestry management tools. The advance of new concepts and improved use of tree ordinances has been hampered by the traditional methods that ordinances have been developed, i.e., through the use of static "model ordinances" which are revised infrequently or the circulation of a few example ordinances from a limited geographic area. The *Guidelines* website encourages local innovation over the use of static models and serves as a forum for quickly disseminating improved or novel approaches throughout the country.

The *Guidelines* site serves as a free, "one-stop shopping" site for citizens and local governments that are interested in developing or improving a tree ordinance. In addition, our site emphasizes urban forest management and the evaluation of urban forest resources and programs rather than strictly regulatory approaches. We believe that this will help increase awareness of the need for holistic management of the community forest among site users. This will result in not only better ordinances, but also better management of the urban forest. The website provides information about methods used to evaluate the urban forest, which serves as a resource for communities that are not currently involved in tree ordinance development or revision but are interested in effectively managing their urban forests.

**What recommendations might you make for community foresters or others who might benefit from your project?**

As our website notes, a tree ordinance is simply one of many different tools that are used in the management of the urban forest. It is critical to have an overall strategic plan for managing the urban forest that presents a clear picture of the desired outcomes for the forest resource. Tree ordinances exist to facilitate tree management by addressing how people interact with trees in the community. We recommend that every community evaluate their urban forest ordinances and other portions of the urban forest program on a regular basis. This allows the community to determine if the resources being spent on regulatory, maintenance, planting, and other efforts are helping the community achieve its urban forestry goals, or whether changes need to be made.

**Attach copies of reports, publications, or videos. If your work has been published (journals, popular press, etc.), provide where they have been published or reported and how copies can be obtained.**

The home page of the website is <http://www.isa-arbor.com/tree-ord>. An Adobe Acrobat PDF version of the entire website content, suitable for printing, can also be downloaded from that page.

**How were your results disseminated to the public?**

The website is currently available to anyone who has access to the Internet, which includes a large and ever-increasing portion of the public. To increase the chances that an interested person can locate the site, we have used both electronic links on the Internet (search engines, links on organizational websites) and print media (organizational newsletters, magazines, and other publications) to advertise site availability. We also made a presentation at a green industry meeting in Southern California in October 2000 to discuss the site and tree ordinances and presented a class on the topic in November 2001. Other efforts to make the site available have been discussed above in item 3 under the topic heading "Objectives met successfully" (page 3).

**List the active partners (key individuals or organizations) involved in the project:**

The International Society of Arboriculture (ISA) hosts the website, has provided technical support in establishing and maintaining the site on their server, and has provided matching funds in support of the project. USDA-FS Center for Urban Forest Research has shared research results which form an important contribution to the Evaluations section of the website. American Forests provided an in-kind contribution of CITYgreen software and provided some feedback on site content. ESRI, Inc., provided a very generous in-kind contribution of GIS software and training that was critical to our update and expansion of the evaluation section. The National Association of State Foresters (NASF) also provided an in-kind contribution of time in support of the project. TreeLink, the Local Government Environmental Assistance Network (LGEAN), California ReLeaf, and other organizations have provided publicity for the site by including links at their websites and by featuring the website in newsletter articles.

**Photo or Illustration: If possible, please provide a photo or illustration for our use that summarizes or represents the project. Indicate how this illustration should be credited.**



The above image is the logo banner used throughout the website.

**If a no-cost time extension was granted for this project, why was it needed?**

We requested a 3 month time extension to ensure that we had sufficient time to complete our remaining project objectives with a high degree of quality in the final work product. Available time to complete the project as originally scheduled became limited due to time commitments to other projects that required extensive fieldwork during the summer of 2001. We did not anticipate these time conflicts when we developed the website project time schedule in 1999.

**How would you evaluate the grant process? What changes, if any, would you recommend?**

In general, we have no major complaints about the grant process. The only change we would recommend is doing away with the need to complete federal forms SF-269A and SF-270, which seem to be unnecessarily difficult to understand and take an inordinate amount of time to complete.

**Comments considered of importance but not covered above:**

This project has a significant extension component that we did not fully anticipate. Through the website, we have been in direct contact with people working on local urban forest and tree ordinance issues in various communities throughout the country, including greater Atlanta, GA, Los Angeles County, CA, Excelsior, MN, greater State College, PA, and Lexington, KY, among others. Through our correspondence with people active in tree ordinance development, we were able to provide a useful service to them while at the same time gathering information about issues and approaches that were incorporated into the website.

**This report was prepared by:**

**Name:** Tedmund J. Swiecki

**Title:** Project Leader

**Phone Number:** 707-452-8735

**Date:** 1/15/02

Appendix: E-mail survey instrument and responses

**Subject: Tree ordinance website survey**

The website "Guidelines for developing and evaluating tree ordinances" has been developed and expanded over the past two years under grant funding provided by the USDA Forest Service through the National Urban and Community Forestry Advisory Council (NUCFAC) Challenge Cost-Share Grant Program. Additional funding has been provided by The International Society of Arboriculture, which hosts the "Guidelines" on their website (at <http://www.isa-arbor.com/tree-ord/>), and several other organizations.

We are in the process of making the final changes and additions to the website under this grant, which concludes at the end of October. We have just posted new content related to parking lot shade ordinances and will be uploading new and revised material related to evaluating tree resources and ordinance performance over the next two weeks. We will also produce an Adobe Acrobat PDF version of the entire updated website content for those who would like to have the resource material in hardcopy format.

As part of our assessment of the impact of this project, we would appreciate it if list members would participate in the following short survey. Responses should be sent directly to me at [phytosphere@phytosphere.com](mailto:phytosphere@phytosphere.com) and not to the list. Our 8 survey questions are as follows. If multiple answer apply, please list all that apply. You can return the survey by replying to this message (please be sure that only [phytosphere@phytosphere.com](mailto:phytosphere@phytosphere.com) is in the To: address to avoid cluttering the listserve), and inserting your answers directly in the survey form.

*1. Prior to this email survey, had you been aware of the "Guidelines for developing and evaluating tree ordinances" website?*

No = **25%**, (if you answered no, please skip to #6)  
Yes = **75%**

[The results for questions 2-5 are based on 30 responses from people who were aware of the website.]

*2. Have you yourself visited the site?*

No = **13%**  
Yes, once = **20%**  
Yes, more than once = **67%**

*3. Have you referred others to the site (including via hyperlinks on web pages you manage)?*

No = **10%**  
Yes, have referred = **77%**  
Yes, I have a hyperlink on a web page = **13%**

*4. Have you used material from the site in conjunction with ordinance development/evaluation or other purposes?*

No = **43%**  
Yes, for ordinance-related purposes = **40%**  
Yes, for other purposes = **17%**

5. If you have viewed or used the site, please indicate how useful you feel the site content is. [on a scale of 1 (not at all useful) to 5 (very useful)]

- 5 = **50%**
- 4 = **23%**
- 3 = **13%**
- 2 = **3%**
- 1 = **0%**
- can't evaluate / no response = **10%**

6. Whether you have used the site or not, please indicate how useful you feel it is to have resource materials related to tree ordinance development/evaluation and urban forest resource assessment methods freely available on the web. [on a scale of 1 (not at all useful) to 5 (very useful)]

- 5 = **80%**
- 4 = **15%**
- 3 = **5%**
- 2 = **0%**
- 1 = **0%**

7. Please indicate your general occupation and employment sector.

[sector: a-public b-nonprofit private c-for profit private]--> \_\_\_\_\_ [job title/position (please list)]--> \_\_\_\_\_

- public = **67.5%**
- nonprofit private = **20%**
- for profit private = **17.5%**

(two responses have 2 sectors listed)

8. Please include any additional comments you have about the website, including suggestions for additional materials or format changes.

Comments received under this item are noted below.

Perhaps a links page (besides the fine collection of References Cited links), containing links to all the relevant formal/technical/practical programs of education available, at all the schools offering such programs for present/future students of Urban Planning/Urban Forestry/Natural Resource Management/Environmental Science.

We need to update both our street tree ordinance and tree preservation ordinance. I will review the site and see how helpful the wording of sections is, and some ideas for improving our protection and management of public and private trees.

Excellent source. Need more information about protecting existing trees versus replanting. Also need some material about other ordinance that affect trees like subdivision ordinances and most important zoning. I would be happy to work with you on such an article.

I am seeking to initiate a proper tree ordinance for the City Of Los Angeles through CFAC and will suggest changes as they are needed. Keep up to good work!

list of potential consultants that can assist with this and tentative costs

It looks great! I particularly like the parking lot/shade section. Thanks for including that.

The PDF format will be very helpful.

Great job!

More is better, get as many examples as possible. Thanks for the good job

Excellent information, format, delivery. Congratulations and thanks for all your hard work.

hotlinks to other related organizations such as California Oak Foundation, Street Tree Seminar, WC Chapter ISA etc.

It may be a long-shot, but organizing components (additionally) in a "decision tree" by relevant categories, e.g. criteria for assessing tree/stand preservation success (requirements of different ordinances). A sort feature by region, population, etc. might also be helpful.

I haven't visited the site yet but assume it has examples of different ordinances. Since 98% of US cities have ordinances already, I think the usefulness of the site will be limited.

I was not aware of the site but can assure you that I will make use of it! No comments at this time. Thank you for the notice!

**KEEP UP THE GOOD WORK. CONTINUALLY UPDATE AS APPLICABLE.**

I'm glad you're still on the tree ordinance improvement quest! I still have the good book you produced years ago.

Your approach to ordinance development is excellent! Invariably the communities I assist are looking for a "model" ordinance for their own use. Your material shows why and how not to, although I think the tendency to adopt model ordinances and other boiler plated approaches will always be there as long as communities fail to address the need for technical competency in their tree management program.

Have recommended ord. language to the communities I work with in SE PA

I haven't used the site much myself, but have made several referrals. Keep up the good work!