Council Meeting: 10/16/2012
Agenda: Study Session - Revised
Item #: 3. a.

CITY OF KIRKLAND
Planning and Community Development Department
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MEMORANDUM

Date: October 4, 2012

To: Kurt Triplett, City Manager

From: Deb Powers, Urban Forester
Paul Stewart, Deputy Planning Director

Subject: **DRAFT URBAN FOREST STRATEGIC MANAGEMENT PLAN**

RECOMMENDATION:

The City Council receives the Draft Urban Forest Strategic Management Plan (Plan) (Attachment 1) and provides feedback and direction to staff regarding the following:

- Additional information that the Council would like to see incorporated into the Plan.
- Other strategies the Council would like to see addressed.
- Additional opportunities for public input.
- Direction on the priority strategies to implement the Plan.

Based on Council direction, staff will prepare the final Plan for approval by the Council at a regular Council meeting. In addition, staff will prepare for the Council's concurrence an annual work plan on the priority implementation strategies.

BACKGROUND DISCUSSION:

Introduction

As noted in the 20-Year Forest Restoration Plan, "The people of Kirkland care about their forests." The urban forest includes the trees in parks, natural areas, along streets, shorelines and stream corridors and on privately-owned property. Urban forestry management is about making space for, planting and maintaining trees while accommodating population growth and protecting the resource for the benefit of future generations and quality of life.

The urban forest is a valuable community asset and a key component of Kirkland's 'green infrastructure,' providing essential services with environmental, social and economic benefits. Trees make important contributions to the City's health and livability by reducing stormwater runoff and flooding (Attachment 2), improving water and air quality, providing fish and wildlife habitat and making Kirkland a more desirable place to live, work and recreate.

A well-maintained urban forest provides the residents, businesses and visitors of a community a healthy, safe and pleasant environment by maximizing the benefits of its trees. The wide range of benefits provides a strong justification to support better management of tree canopy cover in urban areas. A recent analysis on Seattle's urban forest estimated the value of carbon benefits and pollution removal that Seattle's urban forest provides at over $16 million annually.

Urban forest management involves considerable forethought and vision. Serving as a 'road map' for the City Council, community leaders, volunteers, and City staff, this Plan is intended to provide long-term, consistent guidance to Kirkland's city-wide urban forestry operations and programs over the next twenty years.

However, in reality, this can be very challenging. Protection of existing trees and planting new trees in suitable locations, particularly in denser areas, requires careful planning. Furthermore, tree protection and planting should be balanced with, not at the expense of, urban intensification and 'grey infrastructure' elements that are also intended to support communities.

This challenge is why many other cities, including Lake Forest Park, Bainbridge Island, Renton, and Seattle have adopted forestry management plans, recognizing that proactive management is needed to sustain an urban forest while balancing other urban priorities such as accommodating population and employment growth and development. The U.S. Conference of Mayors recognizes that urban forests are an integral part of urban infrastructure and acknowledge that communities can be improved through an expansion of community tree programs (Attachment 3).

Similar to the "Fire Strategic Plan" reviewed recently by the City Council, this Plan is an organizational study which evaluates the efficiency and performance of the City's urban forestry efforts. However, the Draft Urban Forest Plan involves multiple departments (e.g. Parks, Public Works and Planning). It also addresses community involvement and volunteer efforts (Green Kirkland Partnership), CIP and operations and maintenance (Parks, Streets and Surface Water), guiding documents, codes and ordinances (Kirkland Comprehensive Plan, Zoning Code) and related programs (Tree City USA).

In addition, the Plan incorporates feedback about Kirkland's urban forest from a public survey and focus group meetings. It is important to note that the community has considerable interest in this topic. In September 2012, an on-line survey was posted for community response. We were expecting 100-200 responses. To our surprise, over **660 people** completed the questionnaire and submitted hundreds of comments. The survey results are summarized in Section 3.2 and included in the Draft Plan in Appendix C.

Purpose of the Draft Plan

The purpose of the Draft Urban Forest Strategic Management Plan (Plan) is to identify the challenges to better urban forestry management in Kirkland and to provide a guide for efficient urban forestry operations, policies and programs. It was developed in response to significant changes in Kirkland including a major land annexation and the prior achievement of goals established in previous management documents.

Managing the urban forest includes tree maintenance, policy development, public education, and budgetary decisions. The Plan examines all of these by conducting a gap analysis resulting in a 'report card' on the City's efforts thus far and identifying goals and strategies based on the City's vision, priorities and resources. Identifying Kirkland's challenges and opportunities for better urban forestry management supports the City Council's Operational Values towards efficiency, greater accountability and development of performance measures.

The risk of not having a management plan in place is greater liability, increased costs, inconsistent or lower levels of service, and not achieving the goals and vision of the community. A strategic plan promotes greater coordination and cooperation among the appropriate city departments and enables the City to track and monitor its activities and to engage and inform the community on a regular basis.

History

In response to the recommendations in an American Forests' Ecosystem Analysis for the Puget Sound Metropolitan area (Attachment 4) and the City's own estimated canopy coverage, the City's Comprehensive Plan was revised in 2005 to incorporate a goal to increase canopy coverage city-wide:

> *In 2003, Kirkland's overall tree cover was estimated to be 32 percent. Significant improvements in storm water management and air quality could be realized if the average tree cover were to be increased to 40 percent. To approach measurable economic and ecologic benefits, Kirkland's regulations, programs, and public outreach should aim toward increasing the City's tree canopy long term…"* (Policy NE-3.1)

More recently, the City Council adopted a goal statement on the Environment to:

> *"Protect and enhance our natural environment for current residents and future generations. We are committed to the protection of the natural environment through an integrated natural management system."*

This commitment is evident in that the City has taken many proactive steps to manage its urban forest resource, making laudable progress in the last decade. In 2001, the City conducted a Tree Management Review and has engaged the community in support of restoring Kirkland's native forest areas. The City hired an Urban Forester and a Field Arborist and has maintained its Tree City USA status for ten consecutive years. Additional accomplishments include:

- Adopting Kirkland's Natural Resource Management Plan (2003)
- Completing the first Street Tree Inventory (2004)
- Instituting the Green Kirkland Partnership (2005)
- Adopting comprehensive tree protection codes (2006)
- Approving the 20-Year Forest Restoration Plan (2008)
- Certified as Community Wildlife Habitat by the National Wildlife Federation (2009)
- Receiving two Growth Awards from the National Arbor Day Foundation (2007, 2010)
- Conducting Kirkland's Urban Tree Canopy Assessment (2011)

Kirkland's efforts became apparent with the 2011 Tree Canopy Assessment: unlike any city in the region that has conducted benchmark canopy assessments, Kirkland's canopy coverage had increased over the last decade, and, combined with the canopy in the new neighborhoods following annexation, the City has met its 40% canopy cover goal established in the Comprehensive Plan.

Having met these goals and attained many of the milestones established in previous management documents, the questions to consider for the future are:

> *How will Kirkland maintain its canopy cover over time as growth occurs? How can we better manage our urban forest resource?*

It became apparent that the City is in need of a *sustainable* guide for efficient urban forestry management for the future. The City had not undergone a review of its forestry program in over ten years. In addition, this project provided an opportunity to poll the community and stakeholder groups to ensure that the City's efforts are aligned with the community regarding its management of the urban forest resource.

Process

In late 2010, under the guidance of the City's Urban Forester Deb Powers and Paul Stewart, Deputy Planning Director, an interdepartmental team was formed to identify the project purpose, scope, methodology, timeline, and funding sources. The Team includes Sharon Rodman and Jason Filan, Parks and Community Services; and Jenny Gaus and Mark Padgett from Public Works.

In June 2011, the City secured grant funding from the Washington Department of Natural Resources and the USDA Forest Service for the project, and in early 2012, the Project Team selected Davey Resource Group (DRG) as the forestry consultant to assist in the preparation of the management plan. The Plan would develop and identify:

- Over-arching goals that support the sustainability of Kirkland's urban forest
- Strategies to increase program efficiency and cost-effectiveness
- Recommendations for actions towards attaining goals

To review the City's current forestry-related management practices, DRG identified individuals from the Planning, Public Works, and Human Resources, Information Technology/GIS and Parks and Community Services departments as having urban forestry-related activities. These individuals were interviewed by DRG and the information was compiled along with notes from research into City codes, documents and policies. The City looked at other municipal plans and programs, consulted with industry professionals and conducted a literature review. Throughout the development of the Plan, the Project Team provided direction and feedback; as did the respective department directors.

Four focus areas emerged that define the environmental, economic, and social components of Kirkland's urban forest management. These were identified as:

- **Kirkland's Urban Forest Asset** – the individual and collective tree resource and the current level of knowledge about the structure, condition, and benefits of the asset
- **The City's Guiding Policies and Regulatory Framework** - the official documents, policies and codes that outline the vision, goals and strategies guiding the urban forestry program.
- **The Municipal Urban Forestry Program** - the organization of municipal staff and financial resources dedicated to the care, preservation, and management of the urban forest.
- **Municipal-Community Interaction** - a review of groups and individuals outside the general management structure of the City who are aware and engaged in urban forest sustainability, advocacy, volunteerism, and partnerships.

Organization of Plan

The Plan is organized by these four focus areas, using the guidelines in *A Framework for Strategic Urban Forest Management Planning* (Attachment 5). A gap analysis evaluates Kirkland's program performance using criteria and indicators from *A Model of Urban Forest Sustainability* (Attachment 6), a business model approach using detailed performance measures. Ratings for Kirkland's performance in urban forestry management are expressed as low, moderate, high, or optimal performance.

The Plan is formatted by the following sections:

Section 1: Executive Summary and Introduction (pp 1-15)
Section 2: Review of Current Practices (pp 16 -58)
Section 3: Community Outreach Results (pp 59-63)
Section 4: Goals, Objectives and Recommendations (pp 64-84)
Section 5: References (pp 85-88)

In addition, the Plan includes 4 appendices with supporting material: the urban forest model Performance Measures (A), a summary of focus group comments prepared by Forterra (B), the on-line Survey Results (C) and departmental Organizational Charts (D).

Community Outreach Efforts

Community outreach and involvement are essential both in the preparation of the draft plan and its acceptance and implementation. Over the course of the plan development, the City undertook a number of steps to gather input and engage the community. An early draft was presented to the Parks Board for review and comment. In August and September, as the plan was being developed further, the City issued a press release and began posting information on webpages.

An online questionnaire was posted and announcements sent out to a variety of listserv groups. This was picked up by *Kirkland Patch* with a heading "Hey Kirkland, How Do We Feel About Our Trees?" *Kirkland Views* posted information about the survey and the *Kirkland Reporter* included an article in their September 6 edition. The draft plan and survey questionnaire were mentioned at the September KAN meeting. In addition, an article was published in the September *City Update Newsletter* and a segment on "Currently Kirkland" has been aired.

Widespread distribution of information on the survey questionnaire exceeded our expectations with over 660 responses and hundreds of additional written comments. The draft plan contains a summary of the survey. The comments are far-ranging and it is worth reviewing the individual comments in Appendix C to see the extent of the community's concerns, issues and perspectives.

In partnership with Forterra (formerly Cascade Land Conservancy), three focus group discussions were held in late September. One group consisted of residents, property owners and forest stewards; a second group of urban forestry professionals (i.e. arborists); and a third group of developers, builders and business representatives. Forterra facilitated the group discussion and provided a summary of the participant comments in Section 3.1 and Appendix B. One major reoccurring issue from the survey results and focus group meetings is the need for more education and outreach on city requirements, standards and practices.

Key Findings, Goals and Recommendations

In summary, Kirkland's overall urban forest performance based on the program review, criteria and indicators gap analysis and comparison to best management practices (BMPs) is low to moderate. Although the City is performing well by several indicators, there are more criteria rated below a 'moderate' performance rating. Three indicators cannot be evaluated due to a lack of available data. These gaps are significant barriers to the potential sustainability of the City's urban forest management.

Section 4 provides a number of recommendations for each goal and strategy; only the key recommendations are provided with the findings, goals and strategies in each of the four focus areas below:

I. KIRKLAND'S URBAN FOREST ASSET - Current tree planting in the City is somewhat ad hoc. The Green Kirkland Partnership has been very successful in planting the natural areas in parks. Trees are planted as part of capital projects and there are requirements for some tree establishment coming from City development code requirements. However, there is no formal tree planting program. In addition, the outdated street tree inventory does not include the recently annexed area, and no inventory exists for trees in formally-landscaped parks. Only partial and outdated information exists on the quality, condition, structure and risk potential of public trees in Kirkland.

Although the City's 20-Year Forest Restoration Plan provides an assessment of the quality and health of native trees and vegetation located in parks and open space, it does not include the significant acreage of open space in the annexation area under the current jurisdiction of Kirkland. Although a very comprehensive tree canopy assessment has been completed recently, the information is not usable by all departments.

GOAL: Ensure the sustainability of Kirkland's urban forest resource
STRATEGY: Obtain a greater understanding of the structure, function and benefits of the urban forest resource in order to improve the quality and sustainability of the resource
KEY RECOMMENDATIONS:

1. *Establish dedicated resources for public tree planting and maintenance*
2. *Update public tree inventory*
3. *Analyze urban forest benefits, functions and value*

II. THE CITY'S GUIDING POLICIES AND REGULATORY FRAMEWORK – The City's Comprehensive Plan provides a clear vision for Kirkland's future urban forest by establishing a target canopy goal. Recognizing that over 50 percent of the City's canopy is on private property, the adoption of code requirements for tree retention sought to achieve the city-wide 40 percent canopy goal. Kirkland Zoning Code Chapter 95 provides for tree protection and requires a permit to remove trees and a review process for trees impacted by development. This code, while comprehensive and somewhat complex, provides adequate flexibility to accommodate various development scenarios. As a program asset, Kirkland's regulatory framework and code enforcement has played a role in canopy preservation and expansion over the previous decade.

GOAL: Use effective measures to protect and enhance the urban forest resource
STRATEGY: Balance regulatory approach with education/outreach, partnerships and incentives
KEY RECOMMENDATIONS:

1. *Increase public outreach/education on tree protection regulations (training, handouts, brochures, etc.)*
2. *Update codes and ordinances to simplify and provide clarity*
3. *Draft Vegetation Management Plans for utility corridors*

III. THE MUNICIPAL URBAN FORESTRY PROGRAM – Tree management involves many departments within the City of Kirkland. Staff priorities for urban forestry operations are currently driven by reactive management tactics due to budgetary constraints. This limits the City's ability to realize efficiency gains from proactive management. There is no centralized urban forestry program or division. Some operations involve a moderate level of informal, intra-departmental cooperation and communication. This lack of more formalized

organizational structure results in a general disconnect between staff's understanding of the City's urban forestry policies and the public's understanding and application of them.

GOAL: Build an urban forest program commensurate to the community's vision and goals
STRATEGY: Develop efficiency and increase collaboration between City departments. Develop policies that promote formalized tree management strategies for public trees.

KEY RECOMMENDATIONS:

1. *Establish a Formally-Recognized Forestry Program*
2. *Generate Program Funding*
3. *Prepare an annual report and develop Annual Work Plans*

IV. MUNICIPAL-COMMUNITY INTERACTION - Residents, community groups, developers and other organizations that can influence and support urban forest management efforts are an important community resource. As evidenced by the success of the Green Kirkland Partnership, the City has active neighborhood associations, volunteer groups and business interests that support natural resource stewardship. A recurring concern observed during this analysis was the lack of resources available to educate and engage the community on urban forestry issues. A greater emphasis on community outreach can help generate the support and community vision necessary for a sustainable and successful urban forestry program.

GOAL: Build stronger community engagement and public participation in urban forest stewardship for a sustainable and successful urban forestry program.
STRATEGY: Emphasize community outreach and incentives to generate program support
KEY RECOMMENDATIONS:

1. *Dedicate funding for Green Kirkland Partnership*
2. *Maintain Tree City USA Status and strive to earn Growth Awards*
3. *Engage Community Groups, Neighborhood Associations, and Green Industry Businesses*

Summary and Next Steps

Strategic planning results in greater efficiency, reduced costs and greater accountability of municipal operations. The risk of not having a management plan in place is greater liability, inconsistent or lower levels of service, and not achieving the goals and vision of the community. The intent of this Plan is to ensure the sustainability of Kirkland's urban forest in order to optimize the benefits provided by trees city-wide.

This Draft Plan identifies performance measures and establishes priorities in context to short and long-term goals. The findings from DRG's review, Kirkland's performance ratings, comparisons to best management practices and other municipal forestry programs and public outreach efforts were used to develop broad, long-term goals.

The draft plan is the initial blueprint for future efforts. Based on the discussion at the study meeting and direction of the Council, staff will bring back the final plan for Council's consideration.

The Council should determine if additional outreach efforts should occur prior to bringing the Plan back to the Council. At a minimum, the City should post a press release and send out an announcement to all the listserv groups informing them of the draft plan and welcoming additional comments. Additional opportunities for involvement include hosting a community forum, an expert

panel presentation, or speaker series. Staff would also bring back an annual work plan that identifies priority action items, timing, resources and departmental focus.

Attachments

1_Draft Urban Forest Strategic Management Plan
2_How Trees Can Retain Stormwater Runoff
3_Protecting and Developing the Urban Tree Canopy
4_Regional Ecosystem Analysis, Puget Sound Metropolitan Area
5_Plan Framework
6_Urban Forest Sustainability Model

City of Kirkland

Urban Forestry Strategic Management Plan

[DRAFT]

September 2012

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Acknowledgments

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Executive Summary

A well-maintained urban forest provides the residents, businesses and visitors of a community a healthy, safe and pleasant environment by maximizing the benefits of its trees. The wide range of benefits provides a strong justification to support better management of trees in urban areas. The intent of this Plan is to ensure the sustainability of Kirkland's urban forest in order to optimize the benefits provided by trees city-wide.

The purpose of this Urban Forest Strategic Management Plan (Plan) is to identify the challenges to better urban forestry management in Kirkland and provide a guide for efficient urban forestry operations, policies and programs. It was developed in response to significant changes in Kirkland including a major land annexation and the prior achievement of goals established in previous management documents.

The City has taken proactive steps to protect and manage its urban forest resource by establishing a community vision related to trees and ecological benefits in the City's Comprehensive Plan and the City Council goals. Kirkland drafted its first Tree Management Review in 2001, engaged the community as stewards to restore Kirkland's native forest areas, hired an Urban Forester and a Field Arborist and has maintained its Tree City USA status for ten consecutive years. Additional accomplishments include:

Adopting Kirkland's Natural Resource Management Plan (2003)
Adopting comprehensive tree protection codes (2006)
Approving the 20-Year Forest Restoration Plan (2008)
Receiving two Growth Awards from the National Arbor Day Foundation (2007, 2010)
Conducting Kirkland's Urban Tree Canopy Assessment (2011)

Kirkland's efforts are apparent in that canopy coverage increased 4.4% between 2002 and 2010, prior to a 2011 annexation. As a result of annexation, the City has met its 40% canopy cover goal established in the Comprehensive Plan and as recommended by American Forests' Ecosystem Analysis for the Puget Sound Metropolitan area (American Forests, 1998).

Davey Resource Group (DRG) was contracted to review and the City's urban forestry program, analyze its performance, and conduct a public survey. Four focus areas emerged that define the environmental, economic, and social components of Kirkland's urban forest management. The following are key findings in each of the four focus areas:

Key Findings

Kirkland's Urban Forest Asset – *This is the individual and collective tree resource and the current level of knowledge about the structure, condition, and benefits of the resource.* Current tree planting in the City is ad hoc; the only formal directive for new tree establishment is from development code requirements. The outdated street tree inventory does not include the recently annexed area, and no inventory exists for trees in formally-landscaped parks. Only partial and outdated information exists on the quality, condition, structure and risk potential of public trees in Kirkland. Although the City's 20-Year Forest Restoration Plan provides an assessment of the quality and health of native trees and vegetation located in park open space, it does not include the significant acreage of open space in the annexation area under the current jurisdiction of Kirkland. Although a very comprehensive tree canopy assessment has been completed recently, the information is not usable by all departments.

The City's Guiding Policies and Regulatory Framework – *These are the official documents, policies and codes that outline the vision, goals and strategies guiding the urban forestry program.*

The City's Comprehensive Plan provides a clear vision for Kirkland's future urban forest by establishing a target canopy goal. Recognizing that over 50 percent of the City's canopy is on private property, the adoption of code requirements for tree retention sought to achieve the city-wide 40 percent canopy goal. Kirkland Zoning Code Chapter 95 provides for tree protection and requires a permit to remove trees and a review process for trees impacted by development. This code, while comprehensive and somewhat complex, provides adequate flexibility to accommodate various development scenarios. As a program asset, Kirkland's regulatory framework and code enforcement has played a role in canopy preservation and expansion over the previous decade.

The Municipal Urban Forestry Program – *This is the organization of municipal staff and financial resources dedicated to the care, preservation, and management of the urban forest*. Tree management involves many departments within the City of Kirkland. Staff priorities for urban forestry operations are currently driven by reactive management tactics due to budgetary constraints. This limits the City's ability to realize efficiency gains from proactive management. There is no centralized urban forestry program or division. Some operations involve a moderate level of informal, intra-departmental cooperation and communication. This lack of more formalized organizational structure results in a general disconnect between staff's understanding of the City's urban forestry policies and the public's understanding and application of them.

Municipal-Community Interaction – *These are the groups and individuals outside the general management structure of the City who are aware and engaged in urban forest sustainability, advocacy, volunteerism, and partnerships.* As evidenced by the success of the Green Kirkland Partnership, the City has active neighborhood associations, volunteer groups and business interests that support natural resource stewardship. A recurring concern observed during this analysis was the lack of resources available to educate and engage the community on urban forestry issues.

Key Goals, Strategies and Recommendations

In September 2012, Forterra facilitated three focus group meetings and was instrumental in obtaining input from key stakeholders. Collectively with DRG's program review, a gap analysis using criteria and indicators, public survey results and comparisons to best management practices (BMPs), this information provides the rationale for the goals, strategies and recommendations proposed in Section 4. The key goals, strategies and recommendations in each of the four focus areas are outlined below:

KIRKLAND'S URBAN FOREST ASSET

Goal: *Ensure the sustainability of Kirkland's urban forest resource*

Strategy: *Obtain a greater understanding of the structure, function and benefits of the urban forest resource in order to improve the quality and sustainability of the resource*

Key Recommendations:

1. *Establish dedicated resources for public tree maintenance*
2. *Update public tree inventory*
3. *Analyze urban forest benefits, functions and value*

THE CITY'S GUIDING POLICIES AND REGULATORY FRAMEWORK

Goal: *Use effective measures to protect and enhance the urban forest resource*

Strategy: *Balance regulatory approach with education/outreach, partnerships and incentives*

Key Recommendations:

1. *Increase public outreach/education on tree protection regulations (training, handouts, brochures, etc.)*

2. *Update codes and ordinances to simplify and provide clarity*
3. *Draft Vegetation Management Plans for utility corridors*

THE MUNICIPAL URBAN FORESTRY PROGRAM

Goal: *Build an urban forest program commensurate to the community's vision and goals*
Strategy: *Develop efficiency and increase collaboration between City departments. Develop policies that promote formalized tree management strategies for public trees.*
Key Recommendations:

1. *Establish a Formally-Recognized Forestry Program*
2. *Generate Program Funding*
3. *Prepare an annual report and develop Annual Work Plans*

MUNICIPAL-COMMUNITY INTERACTION

Goal: *Build stronger community engagement and public participation in urban forest stewardship for a sustainable and successful urban forestry program*
Strategy: *Emphasize community outreach and incentives to generate program support*
Key Recommendations:

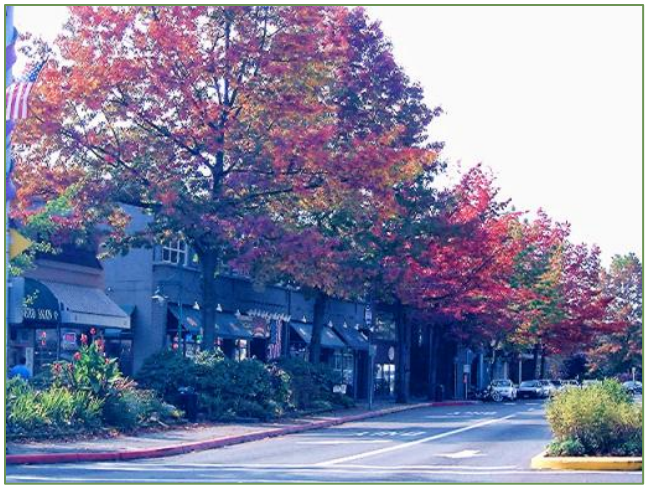
1. *Dedicate funding for Green Kirkland Partnership*
2. *Maintain Tree City USA status and strive to earn Growth Awards*
3. *Engage Community Groups, Neighborhood Associations, and Green Industry Businesses*

Implementing this plan enables the City to measure, monitor and manage its urban forest resource in order to reduce costs and liability, provide consistent or higher levels of service, and achieve the community's vision over the next twenty years.

The 'urban forest' includes the trees in yards, parks, natural areas, in commercial and industrial zoning; along streets, shorelines and stream corridors; and on privately-owned property.

Urban forestry is about making space for, planting and managing trees in these spaces to accommodate population growth and protect community assets for future generations to enjoy and benefit from.

1. Introduction



Autumn in downtown Kirkland

Kirkland's urban forest consists of the trees in woodlands, parks, yards, in public spaces and along streets. Trees affect the air and water where we live and the desirability of our neighborhoods and downtown. They are a valuable natural resource that enhance Kirkland's quality of life, minimize the effects of urbanization, foster civic pride and contribute to community character; long-term benefits that residents, businesses and visitors seek.

Unfortunately, many urban elements negatively impact trees, shortening their normal life expectancy. These impacts include constrained spaces, poor quality and limited volume of soils, reflected heat, and lack of adequate water (Urban, 2008). On a larger scale, tree removal resulting from development, insufficient public tree monitoring or maintenance, the threat of invasive species in fragile forest ecosystems, and the effect of shrinking municipal budgets contribute to the decline of a community's physical environment.

For these reasons, urban forests require sound and deliberate management to ensure that trees function well in their intended landscape, provide optimal benefits to the community, and remain reasonably safe for property and people. To preserve the value and benefits of their tree resource, many jurisdictions -

- Develop a long-term vision for their urban forest resource
- Measure their urban forest asset
- Establish tree protection ordinances
- Determine management goals and service levels

In the last decade, Kirkland has taken most of these proactive steps to manage its urban forest resource, recognizing that urban forest management and protection requires considerable forethought and vision. The intention of this Plan is to examine Kirkland's efforts towards this vision and lay the foundation for sustainable urban forest programming. Identifying Kirkland's challenges to better urban forestry management will support the City's efforts towards efficient urban forestry operations, policies and programs.

"We have an opportunity and a responsibility to create a sustainable community that balances urban growth with natural resource protection…that meets the needs of the present without sacrificing the ability of future generations and other species to meet their own needs."

Comprehensive Plan Vision/Framework Goal (FG-7)

1.1 About Kirkland

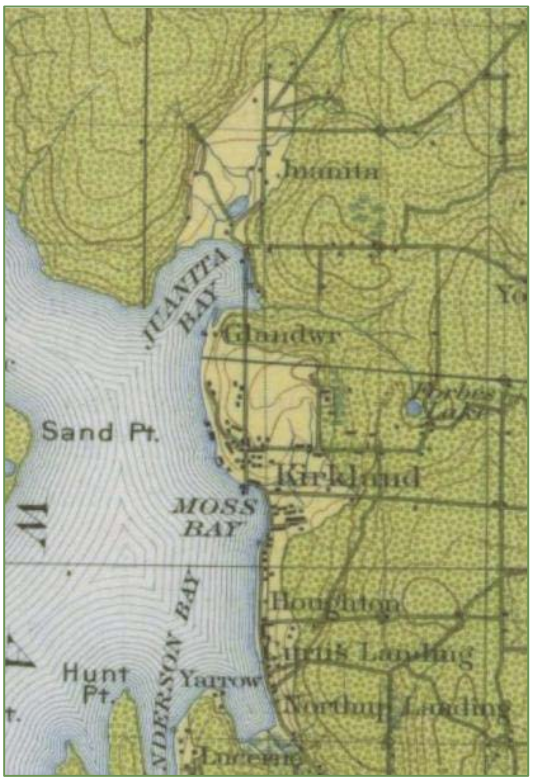
Located across Lake Washington from Seattle, the City of Kirkland is an attractive, vibrant lakefront community situated north of Bellevue, south of Bothell and Woodinville, and west of Redmond in King County, Washington. The City is approximately 18 square miles with a population of about 82,000. Kirkland maintains a distinctive downtown waterfront character with restaurants, art galleries, a performing arts center, public parks, including beaches, and a collection of public art. Having the only downtown frontage located on Lake Washington's eastern shore, Kirkland has a unique history and character of its own, particularly in relation to its urban forest.

History of Kirkland's Urban Forest

Prior to the arrival of the first Euro-American settlers in the late 1860's, the lake and surrounding area provided abundant resources for the original Native American inhabitants from the Duwamish tribe (Harvey, 1992). At that time, the temperate Pacific Northwest forest was dominated by Douglas fir, Western red cedar and mixed hardwood species such as Bigleaf maple, cottonwood and alder.

To open clearings and provide browse for game animals and space to cultivate camas bulb, small areas were cleared by periodic burning. Early homesteaders also cleared land for farming, creating "stump ranches" and burn piles from the large conifers that extended to the lakeshore from what is now the Houghton neighborhood (Sundberg, 2012).

Inland growth was slow as the land beyond the shoreline was densely forested and few decent roads for overland travel existed. Historical records and maps show that just enough local timber was cut to clear sections of land to support early growth and industry; much of the timber resource remained, even around the town's first shingle mill.



Kirkland map, 1897. (Courtesy of Loita Hawkinson)

Where old growth conifers were removed, fast-growing native deciduous species such as Bigleaf maple re-colonized instead. Without further disturbance, the native conifer forest would typically re-establish over the course of time; however, due to increasing development, the regeneration of Kirkland's native conifer forests was unlikely to occur naturally.

Eventually, the original inhabitant and homesteader farms gave way to a small town that would support British businessman Peter Kirk's vision for a steel mill. Completed in 1880, the mill was located on Rose Hill, two miles from the lake's shore. Due to a financial crisis the steel mill closed in 1893 without producing any steel.

Peter Kirk

Kirkland became prosperous again with the successful operation of the state's first wool mill, supplying goods for the Klondike gold rush. The Anderson Steamboat Company originally built ferries; the completion of the Lake Washington Ship Canal and the onset of World War I brought further expansion to the shipbuilding industry in Kirkland, which had become a bedroom community to Seattle (Stein, 1998).

After its incorporation in 1905, Kirkland's homes, businesses and streets steadily grew, leaving the native forest remnants behind, both intentionally and unintentionally, to became part of the urban forest that exists today. As shade, ornamental and food-source trees were planted, the tree species diversity changed over time, too. Scandinavian settlers planted birch trees on Big Finn Hill to partake in the traditional use of softened birch-branch switching during sauna (Hawkinson, 2012).

Since the 1920's, acquisition of Kirkland's renowned waterfront parks has been an ongoing effort with the vision and determination of community leaders and City officials. In 1928, the Forbes family built a two-story bathhouse at Juanita Beach and planted 150 cottonwood trees, some of which have survived and to this day. Oaks and maple trees were planted to beautify landscapes, and small cherry and apple orchards became commonplace on many properties.

Kirkland's modest growth continued after World War II until the SR 520 floating bridge was constructed in 1963, connecting Kirkland to the major metropolitan city of Seattle. As a result, Kirkland's population increased dramatically in the following two decades, especially with the annexations of Houghton, Totem Lake, South Juanita, North Rose Hill, and South Rose Hill. Unfortunately, the rapid growth and development resulted in increased pollution in Lake Washington and a decline in environmental quality (City of Kirkland, 2004).

The Community's Vision

It wasn't until the 1990's, in response to the Growth Management Act, that the importance of the urban forest resource was recognized in the City's Comprehensive Plan. This guiding policy document is a result of the community's efforts to establish a vision for Kirkland in the year 2022. It reflects the support and appreciation for a healthy environment and defines the community's values in its Vision Statements and Framework Goals detailed further in Section 2.2.

In 2002, the City estimated its canopy cover to be approximately 32 percent. Scientific and technical literature had documented the connection between levels of canopy coverage to healthy communities, quantifying the aesthetic, social, economic and environmental benefits of trees in urban areas. As a result, a Comprehensive Plan revision provided further direction for the City to *"Work toward increasing Kirkland's tree cover to 40 percent"* (V-8 Policy NE-3.1). Given the community's vision and the policy goal to increase average tree cover city-wise, the Kirkland City Council adopted a comprehensive tree protection ordinance in late 2005.

Kirkland's Present-Day Urban Forest

Since 2005, Kirkland has hired an urban forester, collected asset data about its urban forest and continued to engage the community in support of protecting Kirkland's urban forest.

In 2008, the Kirkland City Council adopted a 20-Year Forest Restoration Plan to promote the stewardship of native open space areas located in parkland. However, aside from the Green Kirkland Partnership efforts, no formal tree planting programs have been developed since the 2005 Centennial Tree Project, commemorating Kirkland's 100th birthday.

Pines and sequoia at Marina Park

In 2009, Kirkland became the sixth city in Washington certified as a Community Wildlife Habitat by the National Wildlife Federation. Kirkland has maintained its Tree City USA status for ten consecutive years and has been the recipient of two Growth Awards from the National Arbor Day Foundation. As a Tree City USA, Kirkland has qualified to receive numerous state and federal agency grants.

With a recent annexation in 2011, the City of Kirkland nearly doubled its area and significantly increased its population, making it the 12th largest City in Washington State. As a consequence, the City also increased its urban forest resource considerably: including the annexed neighborhoods of Finn Hill, Juanita and Kingsgate, the City's urban tree canopy (UTC) increased from 36 percent to 40.7 percent. The annexation increased Kirkland's UTC due to larger single family residential lots and vast parks/open space areas with high canopy cover. Currently, 60 percent of all tree canopy is found on single family residential properties, while 14.6 percent canopy is distributed in parks and open space. (AMEC, 2011).

While Kirkland has committed to accept its share of growth and development, the challenge becomes balancing this growth while maintaining a livable community. To better understand the returns associated with achieving this balance, the next section details the benefits that trees and urban forests provide.

Presently, Kirkland is comprised of:

- *40.7% tree canopy coverage city-wide, including the annexed areas*
- *60% tree canopy is found on single family residential properties*
- *14.6% tree canopy is from all parks (includes state, county, etc.)*
- *36% of Kirkland's total land base is impervious surfaces*

AMEC, 2011

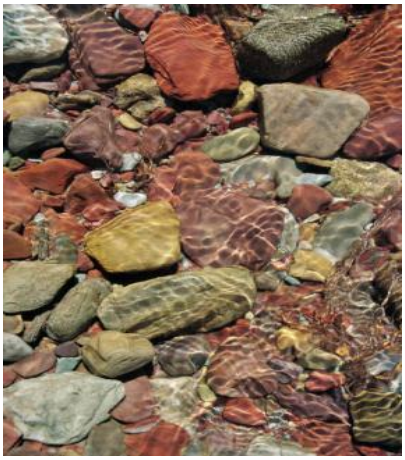
1.2 Benefits of the Urban Forest

Currently, 82% of all Americans live in metropolitan areas, where it's particularly important for trees to provide environmental, social and aesthetic benefits. Urban planners and architects recognize that trees are elements that contribute to a great city (Benfield, 2012). Urban residents report they like where they are living more and feel safer than residents who have fewer trees around them (Sullivan, 1996). A majority of people feel that trees improve one's quality of life (Lohr, 2004).

Many of the contributions that trees make are associated with a low cost-to-benefit ratio. For instance, green streets, rain barrels, and tree planting are estimated to be 3-6 times more effective in managing stormwater than conventional methods per $1,000 invested (Foster, et al. 2011). Portland, Oregon is saving 43 percent ($64 million) by integrating green infrastructure – including planting 4,000 trees – into its innovative stormwater infrastructure (Rosen, 2011).

More and more research shows the enormous contributions that trees make to our cities in terms of public health, stormwater mitigation, energy usage, economic stability, and air, water and soil quality improvements. Quantifiable benefits from urban forests include the following:

Water Quality and Stream Flow



Water quality for fish and people

Surface water runoff is a major source of contamination for Lake Washington and Kirkland's riparian areas, impacting humans and wildlife. Requirements for surface water management are becoming more stringent and costly for both developers and the City. Runoff volumes, peak stream flows and flooding incidents can be reduced by incorporating trees into stormwater management planning; lessening the need for expensive detention facilities and the cost of treatment to remove sediment and other pollutants (Fazio, 2011). Trees improve and protect water quality in the following ways:

Interception - Trees intercept rainfall in their canopy, which acts as a mini-reservoir. Some water evaporates from the canopy, and some slowly soaks into the ground, reducing the total amount of runoff. (Xiao et al, 1998). Canopy interception also lessens soil compaction, which in turn further reduces runoff.

Increased soil capacity and infiltration - Root growth and decomposition increase the capacity and rate of soil infiltration by rainfall and snowmelt (McPherson et al, 2002), resulting in even percolation rates and increased filtration of contaminants.

Reduced soil erosion – Tree roots reduce the flow and volume of stormwater runoff, avoiding erosion and preventing sediments and other pollutants from entering streams, rivers, Lake Washington, and the Puget Sound.

Provide salmon habitat – Shade from trees helps to cool warm urban runoff, which poses a threat to anadromous fish, like salmon. Shade from trees provides lakeside and riparian habitat for salmon and cools water temperatures, increasing dissolved oxygen, which is essential to salmon survival.

Air Quality

Air pollution is a serious health threat that causes asthma, bronchitis, sensitivity to allergens, eye irritation, headaches, dizziness, and nausea (AirNow, 2007). Trees remove tons of material from the air within a city, improving air quality in the following ways:

Coast redwood on Lake Street

Absorb pollutants & particulate matter - Trees absorb harmful pollutants like ozone (O_3), nitrogen dioxide (NO_2), carbon monoxide (CO) and sulfur dioxide (SO_2) (McPherson et al, 1999; Nowak 1992, Rowntree et al, 1991). Trees intercept particulate matter (PM_{10}) including dust, ash, pollen, and smoke. Mature trees absorb 120-240 lbs of particulate pollution each year (University of Washington, 1998).

Ozone and VOC reduction - Shade and evapotranspiration reduce the formation of ozone (O_3), which is brought on by high temperatures. Some trees can absorb more volatile organic compounds (VOCs) than previously thought (Karl, T. et al, 2010). VOCs are carbon-based particles emitted from automobile exhaust, lawnmowers, and other human activities. Although some vegetation can produce VOCs that increase ozone pollution, local i-Tree Eco models have shown trees have a positive overall effect on ozone levels. (Ciecko, et al, 2012).

Increase oxygen levels - Trees and vegetation increase oxygen levels in the atmosphere through photosynthesis. Photosynthesis is the process where plants use sunlight to convert CO_2 to plant tissue.

Carbon Storage & Sequestration

Trees reduce atmospheric carbon dioxide (CO_2), lowering greenhouse gases associated with global climate change. Trees do this in two ways: *carbon storage* (total carbon bound up in tree biomass) and *carbon sequestration* (the annual rate of CO_2 removal through photosynthesis) (Jo, et al., 1995). Urban trees reduce atmospheric carbon in two ways:

Directly – Through growth and the storage of carbon in tree roots, wood and leafy biomass. 'Biomass' is the calculation of the tissue mass of a tree. Atmospheric carbon reductions offset a city's total annual emissions.

Indirectly – By lowering the demand for heating and air conditioning, thereby reducing the emissions associated with electric power generation and natural gas consumption.

The City of Kirkland is a founding member of the King County Climate Change Collaborative and a member of the International Council for Local Environmental Initiatives (ICLEI). ICLEI consists of over 1,000 local governments providing national leadership on climate protection and sustainable development. In 2009, the City Council adopted *A Climate Protection Action Plan* to achieve targeted reduction of greenhouse gases according to ICLEI milestones. Kirkland's canopy cover has been identified as a performance measure contributing to the plan's success.

Energy Conservation

Trees can reduce energy consumption. Urban trees and forests modify the environment and conserve energy in four principal ways:

Well-located trees provide energy savings to homeowners

Shade dwellings and impervious surfaces – Impervious surfaces in 2011 were assessed as 36% of the total land base (Kirkland, 2011). Shade from trees reduces the amount of radiant energy absorbed and stored by impervious surfaces, thereby reducing the *urban heat island effect*, a term that describes the increase in urban temperatures in relation to surrounding urban infrastructure (Stone, 2012). Shade from trees also reduces the amount of energy used to cool a structure in summer (Simpson, 2002).

Evapotranspiration – Evapotranspiration is the release of water vapor from tree canopies, cooling the surrounding area. Through shade and transpiration, trees and other vegetation within an urban setting modify the environment and reduce heat island effects. Temperature differences of more than 9°F (5°C) have been observed between city centers without adequate canopy cover and more forested suburban areas (Akbari, et al., 1997).

Wind reduction – Trees reduce wind speeds by up to 50% and influence the movement of air and pollutants along streets and out of urban canyons. By reducing air movement into buildings and against conductive surfaces (e.g., glass, metal siding), trees reduce conductive heat loss from buildings, translating into potential annual heating savings of 25% (Heisler, 1986).

Green roofs – Native trees and vegetation on rooftops can help reduce the urban heat island effect, decrease the heat loss through rooftops and provide a beautiful addition, not only for enjoyment to humans, but also contribute to the success of the community's ecosystem by increasing habitat for all living creatures (Department of Energy, 2004).

Social and Economic Benefits

Trees create livable cities on an aesthetic level, but also in terms of health, safety, and economic stability. Trees contribute to the improved physical and psychological health of urban residents, creating an atmosphere conducive to community participation. The following benefits contribute to Kirkland's attractiveness as a place to work, live, and play:

Trees and greenery encourage outdoor activity

Health and well-being – Exposure to nature has a healthy impact on people, including higher test scores with kids and reduced symptoms of Attention Deficit Disorder (Wolf, 1998). Residents of areas with the highest levels of greenery were three times as likely to be physically active and 40 percent less likely to be overweight or obese than residents living in the least green settings (Ellaway, et al., 2005).

Reductions in crime – Results of a Portland crime study found that street trees fronting a house reduced 44 crime occurrences. The net effect of all trees was a reduction in 33 crimes (Donovan, et al., 2010). Empirical evidence shows a connection between trees and reduced violent crime and theft (Kuo, et al., 2001).

Increased property values – On average, street trees add $8,870 to home sales prices in Portland, Oregon and reduced time on the market by 1.7 days. The increase in property value with trees extends to neighboring houses (Donovan, 2010). A study found 7 percent higher rental rates for commercial offices having high quality landscapes (Laverne, 2003).

Economic stability – In business districts and commercial areas, trees have been shown to stimulate more frequent shopping trips and a willingness to pay more for parking. Consumers travel further, shop longer and spend 9 to 12 percent more in business districts with trees (Wolf, 2005, 2007).

The cumulative benefits of trees contribute to making Kirkland a healthier and more desirable community. Numerous other benefits, such as wildlife habitat, biodiversity, and scenic values, have been traditionally regarded as free social goods. Undervaluing these services in economic decisions may result in an unhealthy urban forest vulnerable to development and conversion to other uses.

The wide range of benefits provides a strong justification to support better maintenance and management of tree cover in urban areas. However, in reality, this can be very challenging. Protection of existing trees and planting new trees in suitable locations, particularly in denser areas, requires careful planning. Furthermore, tree protection and planting should be balanced with, not at the expense of, urban intensification and infrastructure elements that are also intended to support sustainable communities.

The key to urban conservation is to find the balance between the seemingly conflicting goals of allowing development density and protecting natural resources.

Metropolitan Greenspaces Program, Portland, Oregon

Balancing Tree Benefits with Costs

Ecologists, scientists, engineers and expertise in computer technology have provided an enormous body of work establishing the benefits of trees. But there are also environmental problems that may be associated with the urban forest, such as generation of pollen, hydrocarbons, and green waste; water and energy consumption; obscured views; and displacement of native plant species. Costs associated with urban forests include tree establishment and care, repair of forest-induced damage to other parts of the urban infrastructure (particularly sidewalks and utilities); blocked solar collectors, and foregone opportunities for activities such as gardening and sports.

The challenge faced by planners and decision-makers is to balance the many benefits and costs that are associated with urban forests and trees. Quantifying the benefits from the urban forest can help managers and advocates communicate the value of the urban forest to residents, developers, and city leaders. A cost-benefit analysis can prove critical to budget development and the justification of municipal resources.

Using a tree inventory, cities assess the monetary value of its trees, then calculate the services provided by their urban forest so that a cost-benefit comparison can be made. A good example of a recent assessment of ecosystem functions is Seattle's Forest Ecosystem Values Report (Ciecko, et al, 2012). Generally, nonstructural methods such as trees provide a greater range of benefits at a lower cost to the municipality. Using this data along with software programs such as the USDA Forest Service i-Tree suite (see sidebar), a city can calculate the annual benefits derived from its urban forest. With the addition of regional environmental data and the City's management costs, cities can conduct a cost versus benefit ratio analysis.

The National Tree Benefit Calculator (www.treebenefits.com) can help tree owners estimate the value of benefits from individual trees. The Tree Benefit Calculator is intended to be simple and accessible. As such, this tool should be considered a starting point for understanding trees' value in the community, rather than a scientific accounting of precise values. For more detailed information on urban and community forest assessments, visit the i-Tree website.

Using the calculator, a mature, 24-inch diameter, red maple (*Acer rubrum*), located on a residential street in Kirkland is estimated to provide $201 in annual environmental benefits (Figure 1).

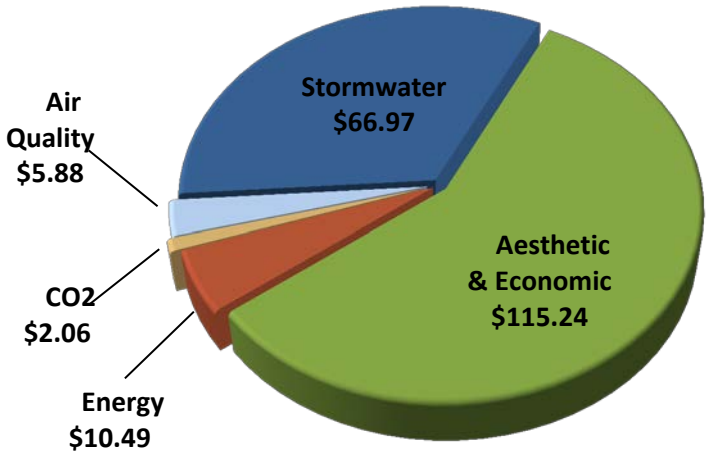


Figure 1. Annual benefits of a mature red maple on a Kirkland right-of-way

Throughout this Plan, there is reference to software programs that can be of immense help to planners and others determined to improve the forests in their community. Two, in particular, are widely used: CITYgreen and i-Tree. This sidebar presents a brief summary of each. To gather further, up-to-date information, consult the respective websites www.americanforests.org/productsandpubs/citygreen/ and www.itreetools.org/

CITYgreen is a GIS-based software tool that analyzes the ecological & economic benefits of tree canopy and other landscape features. The software calculates dollar benefits for ecosystem services (eg., stormwater runoff, air and water pollution removal, and carbon sequestration and storage) provided by land cover within a specified geographic area. CITYgreen, developed by American Forests, is an extension to ESRI's (Environmental Systems Research Institute) ArcGIS and works with Windows-based PCs that have ArcGIS.

The analysis is based on a land cover dataset derived from either aerial photography of satellite imagery and data specific to the area such as soil type, climate, and rainfall. The dataset is first "classified" into various landcover features such as tree canopy, open space, impervious surfaces, water, etc. before CITYgreen can analyze the data.

The analysis findings are summarized in easy-to-read reports that stratify each land cover feature in acres and as a percentage of the total area. This information is very useful when communities are establishing tree canopy goals or managing land use. The City of Kirkland has obtained this information with its 2011 Urban Tree Canopy Assessment.

One of the most powerful features of CITYgreen is the ability to analyze alternate land cover scenarios. Starting with a current land cover map, users can calculate the effects of future land cover changes without are made. With land cover maps from earlier time periods, users can also compare how land cover has changed over time and how these changes affect the land's ecosystem services. This becomes an important decision-making tool. Communities can see how historic land change trends affected air and water quality and use this information to guide their land-use planning in the future.

i-Tree is a suite of programs that can be used by companies of all sizes to inventory, evaluate, and assess the benefits of urban and community forests. Developed by U.S. Forest Service Research, State and Private Forestry, and other cooperators, i-Tree is offered free of charge to anyone wishing to use it. The i-Tree software suite includes the following urban forest analysis tools:

UFORE (Urban Forest Effects Model) is designed to use standardized field data from randomly located plots throughout a community and local hourly air pollution and meteorological data to quantify urban forest structure and numerous urban forest effects and benefits.

STRATUM (Street Tree Resource Analysis Tool for Urban Forest Managers) uses a sample or existing tree inventory to describe tree management needs and quantify the value of annual environmental and aesthetic benefits such as energy conservations, air quality improvement, CO2 reduction, stormwater control, and property value increases.

In addition to the analysis programs in i-Tree, the following utilities are also included:

MCTI (Mobile Community Tree Inventory) is a basic tree inventory application that allows communities to conduct tree inventories and analysis at various levels of detail and effort. Data can be collected and entered into the program using paper tally sheets or a Personal Digital Assistant (PDA) using new or existing inventories.

The ***Storm Damage Assessment Protocol*** provides a standardized method to assess widespread storm damage in a simple, credible, and efficient manner immediately after a severe storm. It is adaptable to various community types and sizes, and provides information on the time and funds needed to mitigate storm damage.

- Hand-held Personal Digital Assistant (PDA) programs to collect field data.
- Plot selection programs to determine where to collect sample field data.
- Report writers to generate reports, graphs, charts, and tables to summarize data and results in an easily understandable format.

1.3 Strategic Plan Overview

The purpose of this strategic plan is to ensure the sustainability of Kirkland's urban forest in order to optimize the ecosystem services provided by trees city-wide. It is developed in response to significant changes in Kirkland, including a major land annexation and the prior achievement of goals established in previous management documents. It is primarily focused on the City's urban forest program, its practices and policies.

Serving as a 'road map' for community leaders, volunteers, and City staff, this Plan is intended to provide long-term, consistent guidance to Kirkland's city-wide urban forestry efforts over the next twenty years. A twenty-year horizon is a reasonable time to achieve tangible urban forest goals for two reasons: a long term planning horizon is needed to sustain various municipal budget shifts, and trees are slow to respond to changes, good or bad.

Strategic planning results in greater efficiency, reduced costs and greater accountability of the city forestry operations. The risk of not having a management plan in place is greater liability, inconsistent or lower levels of service, and not achieving the goals and vision of the community. The framework and methodology for development of this plan is outlined below.

Framework

As a foundation, the first two sections of this Plan introduce a historical perspective of Kirkland's urban forest and the benefits of trees in urban areas. A review of the City's current urban forest management and an assessment of Kirkland's performance follow.

The findings from the review and performance ratings were used to develop broad, long-term goals. The goals are meant to guide the City's urban forestry management efforts and establish the focus and direction over a twenty year horizon through 2033.

Figure 2. Plan framework

To provide further guidance, the goals are accompanied by various strategies identifying how to achieve each goal. The strategies are followed with recommendations, which are specific actions (Figure 2). The goals, strategies and recommendations are incorporated into the first of four Five Year Management Plans (2013-2018).

The third level of planning, typically addressed with an annual operating plan, directs day-to-day operations; essential for projecting budget requirements and developing work programs. It links the high-level 20 year strategic objectives with the daily on-the-ground operations. It incorporates long-range goals into regular routines, which increases efficiency and cost-effectiveness.

The political and managerial structures of the City have not fully accounted for the budget and staffing resources that support the goals outlined in this plan; therefore the Annual Operating Plan level has not been detailed herein. These details may be developed as the Plan is implemented, some which may involve public participation.

The Plan is formatted in accordance to Washington State's Evergreen Communities Task Force, *A Guide to Community and Urban Forestry Programming* (Washington State Department of Commerce, 2009).

Methodology

To identify the challenges related to better urban forestry management and provide a sustainable guide for efficient urban forestry management, a thorough review of the City's current forestry-related practices and policies was conducted by Davey Resource Group (DRG). The multi-departmental Project Team provided direction for research into City codes, policies, documents, and current scientific and technical literature.

Twenty representatives from the Planning, Public Works, Human Resources, Information Technology/GIS and Parks and Community Services departments were interviewed. The discussions generally focused on staffs' specific areas of expertise and reviewed how individuals work within Kirkland's urban forestry program.

Four focus areas emerged that define the environmental, economic, and social components of Kirkland's urban forest management. The Plan is organized by these four focus areas, which are further defined in Section 2:

- Kirkland's Urban Forest Asset
- The City's Guiding Policies and Regulatory Framework
- The Municipal Urban Forestry Program
- Municipal-Community Interaction

Kirkland's performance in each of these areas is examined and assessed in Section 2.6. The criteria for performance are based on *A Model of Urban Forest Sustainability* (Clark et al, 1997), a business model approach to efficient urban forest management using detailed performance measures as outlined in Appendix A. Each performance criteria has an indicator of low, moderate, good or optimal performance. The criteria and indicators in Appendix A provide a template for developing subsequent five year plans.

The basis for the gap analysis used to assess Kirkland's current performance is derived from *Criteria and Indicators for Strategic Urban Forest Planning and Management* (Kenney et al. 2011). A comparison of Kirkland's current operations to best management practices (BMPs) and other urban forestry programs also directed the goals, strategies and recommendations proposed in Section 4. The information used to compare local municipal urban forestry programs in Section 2.4 is based on Tree City USA reporting to the National Arbor Day Foundation and information provided by the Washington State Department of Natural Resources Urban and Community Forestry Division.

Community Outreach

To ensure that the City's efforts are aligned with the community, public feedback was sought during the development of this Plan. Davey Resource Group conducted an online survey using Survey Monkey ™ to gauge the community's interest and priorities for the following:

- Vision and overall sentiment related to trees and ecological systems
- Understanding of Kirkland's tree-related codes and policies
- Priorities for managing the urban forest resource

Over 650 responses resulted from the survey, which is detailed in Section 3.2.

The City partnered with Forterra to conduct focus group meetings to understand the concerns of specific stakeholders regarding urban forestry management issues. These meetings targeted the development and business communities, arborists and tree care professionals, and the general public and environmental groups. The feedback from all public outreach efforts is compiled into summary reports with an analysis of responses, general trends and comments outlined in Section 3.1 and Appendix B and C.

Plan Monitoring & Revisions

As with successful business modeling, the plan was designed to be adaptive to change, even if the criteria and indicators change over time. The concept of adaptive management is a guiding principle of strategic planning and management. The results of the initial approach must be monitored in a systematic manner so that any adjustments can be made based on the experience gained and new information.

The successes and shortcomings experienced after the first five-year management planning period should be reviewed, and findings incorporated into the subsequent management plan (Figure 3). Reviews should be undertaken in the final year of each planning cycle, ideally in consultation with a technical advisory committee and key stakeholders. The result is that the plan remains effective and relevant to the community through 2033 while providing a template for extending into the next 20 years. See Section 4.7 for more detail on monitoring and revisions.

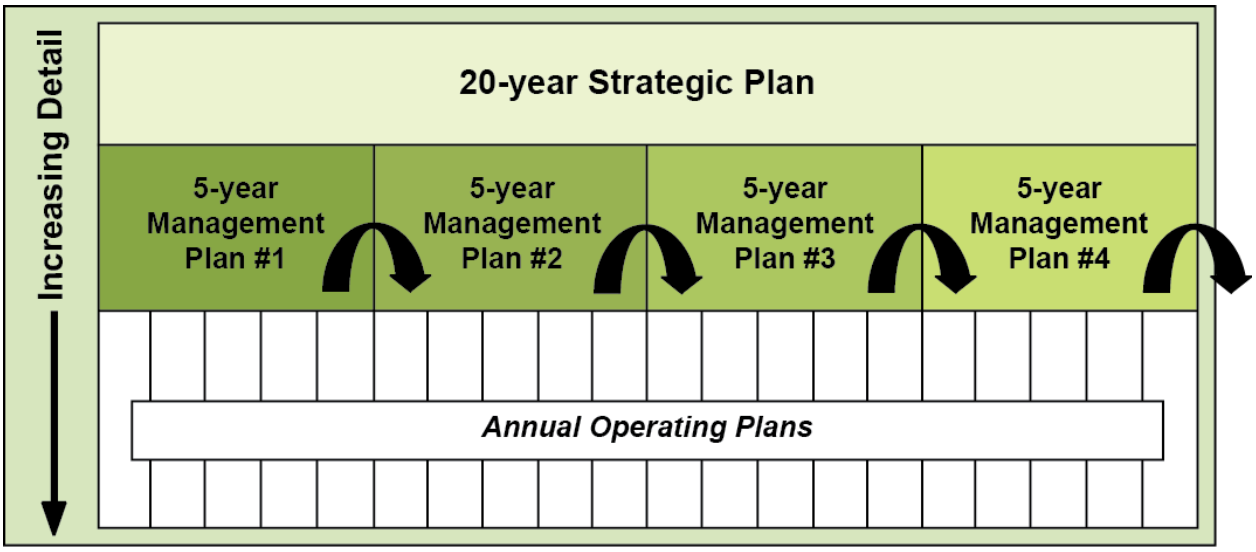


Figure 3. Framework for an adaptive plan that includes monitoring and revisions

2. Review of Current Practices

This section reviews the existing urban forest management practices in the City of Kirkland. As mentioned in the previous section, the environmental, economic, and social components of municipal urban forest management were divided into four primary focus areas:

Kirkland's Urban Forest Asset – the individual and collective tree resource and the current level of knowledge about the structure, condition, and benefits of the asset

Kirkland's Guiding Policies and Regulatory Framework – the official documents, policies and codes that outline the vision, goals and strategies guiding the urban forestry program

The Municipal Urban Forestry Program - – the organization of municipal staff and financial resources dedicated to the care, preservation, and management of the urban forest.

Municipal-Community Interaction – a review of groups and individuals outside the general management structure of the City who are aware and engaged in urban forest sustainability, advocacy, volunteerism, and partnerships

Examining each of these areas enables managers to effectively allocate limited resources with the objective of moving towards optimal performance levels and sustainability. Paired with the performance indicator ratings in Section 2.6, this information establishes a baseline assessment of Kirkland's urban forest performance. This information is an invaluable tool for tracking the successes and shortcomings of each five-year management plan.

2.1 Kirkland's Urban Forest Asset

Business models emphasize the importance of asset inventories, affirming "you can't manage what you don't know you have." Managing the urban forest includes tree maintenance, policy development, and budgetary decisions - all of which depend on understanding current urban forest conditions. Thorough knowledge of the urban forest asset is the basis of effective management and planning. This includes knowing the structure, functions, benefits, and the cost of caring for the asset. In urban forests, structure describes the overall tree population including species and age diversity, the distribution of varying tree ages and species, and the condition, risk potential, and value of individual trees.

Understanding the asset's structure helps managers to plan for succession, guard against catastrophic losses from pests and disease, and to identify both under- and high-performing tree species.

This section describes Kirkland's current understanding of the structure and function of its urban forest. It summarizes available information such as planning documents and current electronic databases including the partial tree inventory and canopy assessment data.

The urban forest asset: the trees themselves

Measuring the Urban Forest

Measuring and assessing the urban forest can be done in several ways: from inventorying individual trees in specific groups or areas, such as right-of-way street tree inventories; to using overhead imagery such as canopy assessments or broader urban forest resource analysis such as i-Tree Eco (see sidebar). The type of asset inventory used may also vary depending on the extent of management in any given area. For example, intensively-managed zones such as streets may have a higher level of inventory detail than natural areas.

Tree canopy assessments determine the amount of tree leaf surface that is covering a large area, usually expressed in acres or square miles. Canopy studies can measure smaller sections within a larger boundary such as land-use zones or neighborhoods, and allow a municipality to see how much of their jurisdiction is covered by trees, regardless if the trees are on public or private property. Measuring canopy can reveal quite a bit of information about a city's growth, especially if compared over time. Having recently become more readily available, cities utilize geographic information system (GIS) technology to set canopy goals, monitor changes in canopy, help with local planning, and calculate urban forests' economic value and ecosystem services. A shortcoming of urban tree canopy assessments is they lack detailed information regarding individual trees.

Tree inventories assess detailed information such as the location, quantity, species, size, and condition of trees. Cities conduct inventories of public trees to track tree maintenance, manage liability associated with tree failure, determine appropriate tree species and prioritize tree planting needs. Inventories may reveal valuable assets such as the presence of rare or endangered species that may otherwise be overlooked. While this information is very useful for managing public trees, it alone does not provide enough information for long-range planning of the citywide urban forest as public trees account for only a fraction of the urban forest.

Over the last decade, the City has conducted a partial street tree inventory, performed a vegetation assessment of its natural areas located in parks and completed a remotely-sensed high-resolution urban tree canopy assessment. The inventory information and the natural area vegetation assessment do not include the 2011 annexation area; only the canopy analysis includes Kirkland's urban forest in the newly annexed neighborhoods. **With these combined projects, the City has insufficient information about its urban forest resource according to the urban forest measurement resources available today.**

Kirkland's Urban Tree Canopy

Periodically measuring urban tree canopy is a good indicator of the impacts of development and resource protection efforts over time. To mitigate the effects of development and provide urban forest benefits to the community, the City established a 40% canopy goal based on the recommendations in an American Forests report for the Puget Sound

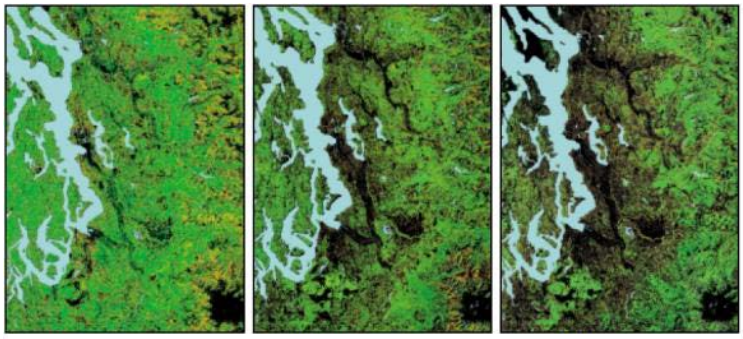


Figure 4. Puget Sound land cover from 1972 to 1996. Impervious surfaces are shown in black; tree cover is indicated by green

Region (Figure 4) (American Forests, 1998). This report conveyed the dramatic decline in canopy cover associated with the rapid growth in the Puget Sound region from 1972 to 1996. The analysis placed a dollar figure on the increased cost of stormwater management and the cost of air quality controls. Based on these findings, American Forests recommended canopy cover goals for the region as follows:

- 40% tree canopy overall in the Puget Sound region
- 50% tree canopy in suburban residential areas
- 25% tree canopy in denser urban residential areas
- 15% tree canopy in Central Business Districts

Measuring urban tree canopy involves mapping the extent and location of tree canopy within the overall community boundaries. A canopy assessment completed in 2002 by the City's GIS Department determined that Kirkland had 2,151 acres of tree canopy. At that time, the City's overall canopy cover was estimated to be 31.6% (Figure 5).

To assess change over the previous decade and determine the effectiveness of its tree regulations, the City completed its most comprehensive and detailed canopy assessment (Kirkland Urban Tree Canopy Assessment Report) in 2011. Through high-resolution satellite imagery, remote sensing and geographic information system (GIS) mapping, the City's tree canopy within the pre-annexation boundaries had a net gain of 4.4% to 36% overall; an increase of 299 acres of tree canopy. As a result of the 2011 annexation, the City acquired an additional 4,561 acres of land. The canopy assessment showed that the annexed area includes an additional 2,187 acres of tree canopy, which nearly doubles the area of tree canopy. With the acquisition of the additional land area and tree canopy coverage, the City reached and exceeded its overall canopy cover goal, totaling 40.7% with annexation.

Kirkland's 2011 canopy assessment provides a comparison of other land covers such as impervious surfaces, shrubs, turf/ grass/meadow and water. It also provides a more detailed evaluation of the canopy within land use zones, drainage basins, parks and open space, rights-of-way and parcel level detail. However, the data has not yet been incorporated into the City's GIS system and is only available in report form, limiting its usefulness and/or accessibility by City staff. Once incorporated, the data can provide a valuable perspective to drive strategies that target specific areas to improve urban forest canopy and optimize ecosystem benefits.

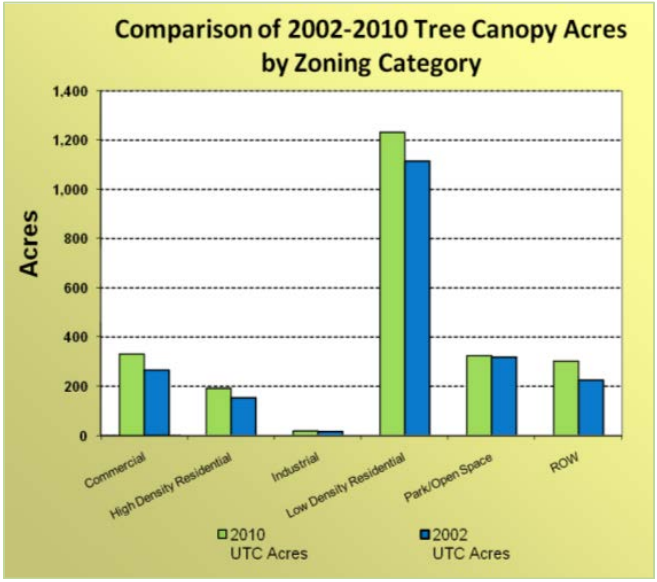


Figure 5. Kirkland's canopy changes over time

Kirkland's Public Tree Inventory

Street trees enhance the City's neighborhoods

Infrastructure is a city's physical capital assets, which include the sewer system, utilities, roads, parks, and trails. Trees on streets and other rights-of-way are also important attributes of the City's infrastructure, much like light posts, signals, and sidewalks. In Kirkland, when development occurs or major arterials or collectors are improved, new street trees are installed.

While it's generally not feasible, or necessary, to account for individual trees in open space, critical areas or naturalized areas, an inventory of public trees on streets, trails, parks, and City facilities is an important step in a comprehensive urban forest management program. A functional tree inventory should record, update and track the following:

- GIS location
- Species
- Size (usually expressed as DBH: trunk diameter at breast height, 4.5 feet above grade)
- Condition
- Risk Assessment
- Maintenance needs and history

Initially created in 2004, the City's Public Tree Inventory, formerly known as the Street Tree Inventory, is now a partial inventory of trees along the public right-of-way within the pre-annexed city boundary. Analysis of the inventory database shows the City has record of 23,404 street trees. This data was collected in 2004 and 2005. The database shows no evidence of having been edited since 2005, suggesting that there have been no follow-up inspections of these trees since they were first inventoried. Stored as a data layer in the City's GIS, the inventory is not maintained and updated by the Public Works department due to lack of staffing resources.

One of the most important indicators obtained through a tree inventory is the condition assessment. Condition is an expression of the overall health, vigor and structure of each tree and can alert managers to public safety concerns. Condition is also an indication of performance in the environment, affecting the quantity of benefits as well as the lifespan of individual trees. When Kirkland's inventory data was collected in 2004, 50% of trees were found to be in good condition and 44% were found to be in fair condition. However, because the inventory data has not been maintained or updated, the current validity of these ratings cannot be confirmed. Of additional concern, 6% of the inventoried trees (1,087) were reported as dead or in poor health; conditions that often pose the greatest risk to public safety.

Currently, there is no data on trees in formally-landscaped parks or rights-of-way in the newly-annexed areas. In late spring 2012, the City's IT-GIS staff recorded the locations of 15,226 right-of-way trees in the newly annexed areas; however, no other tree data was collected. This means that over one-third of Kirkland's total number of right-of-way trees and all trees in formally-landscaped parks are of an unknown value, size, condition, and risk potential. The latter issue has raised broad safety questions locally and nationally in cases where municipalities have been exposed to increased liability associated with tree failure (Glaberson, et al, 2012) (Marcham, 2011).

While the Public Works department uses Hanson software as a work order program and to manage other capital assets, the department does not use this software to manage the public tree assets. However, Hansen can be used to track production, performance measures, and costs associated with trees. It provides mapping links and links to the City GIS browser and is a usable data source.

In summary, the value of Kirkland's current Public Tree Inventory is limited in both scope and utility. A more complete inventory, along with an integrated system for maintaining data, can increase access to grant funding and reduce the City's liability in the event of a public tree failure. Having detailed and reasonably current knowledge of the street trees in Kirkland would facilitate access to Federal Emergency Management Agency (FEMA) funds in the event of a catastrophe. Additionally, the City would be better capable of reducing accident claims and effectively managing for the overall health of this asset. The City has the technological capacity and resources in place to store and manage inventory data within the current GIS system, however, a commitment of staff resources and additional training of field personnel will be necessary to gather and maintain the relevancy of the data.

Beyond safety, a comprehensive tree inventory provides valuable information that is critical to developing sound maintenance strategies. Some knowledge of species diversity and population frequencies can be crucial to pest and disease management and helpful when creating a planting plan. While a neighborhood or community may enjoy the consistency of a common species planted along a street, too many of any one species can have detrimental effects on the urban forest. Introduced pests or disease can easily decimate an entire species. Storms, drought and climate change can affect one species differently than another. From a management standpoint, a succession of diverse species is desirable so that, as trees age, their removal and replacements costs can be spaced over a number of years.

Finally, Kirkland's inventory data is difficult to access in its current format, especially for field personnel. Many cities utilize tree management software systems that are integrated into their fieldwork flow making it easy to search, generate reports, and update their inventory on a daily basis. This strategy of integrating data management into all tree related operations improves the quality of the data and facilitates the communication of urban forest management issues that emerge

> *"It's a fundamental shift in thinking…to get governments to regard green infrastructure as they do other infrastructure investment."*
>
> ***—John Griffin, in "Green Infrastructure: Linking Landscapes and Communities"***

Tree-iage Tree Composition / Invasive Cover Assessment

The City's 20-Year Forest Restoration Plan identifies and categorizes 372 acres of natural areas within city parks according to tree composition and invasive species cover (Figure 6). It defines the urban forest asset in these areas in terms of long-term sustainability and provides a detailed understanding of the ecological structure and function of publicly-owned natural areas. The 20 Year Forest Restoration Plan is discussed in more detail in Section 2.5; however this is an overview of how the Tree-iage model defines the Urban Forest Asset.

Described as a Tree-iage model for assessing forest stand conditions, the Restoration Plan also considers the amount of invasive species cover, quantifying and prioritizing the maintenance needs in these natural areas for the next 20 years. The summary data and appendices in the Restoration Plan provide an additional reference for evaluating Kirkland's urban forest.

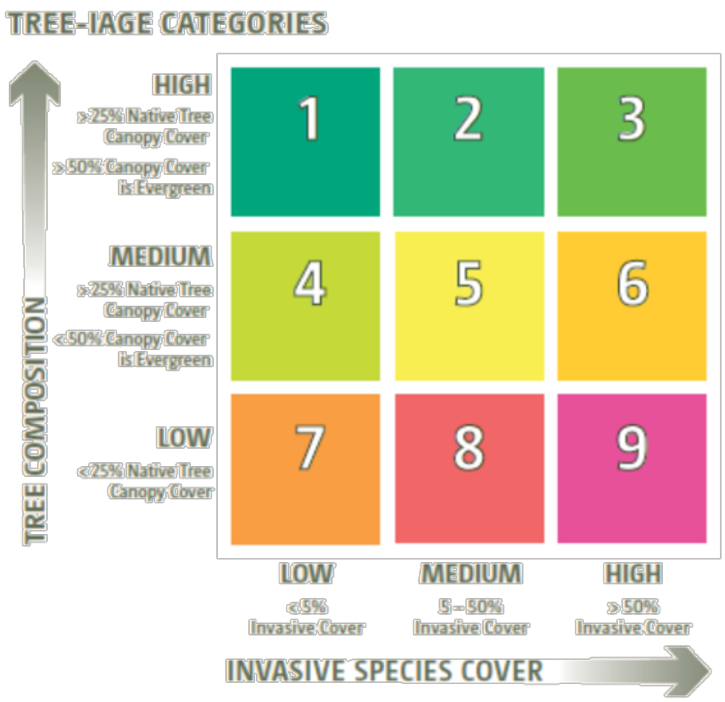


Figure 6. Tree-iage model for tree composition and invasive cover

While more than half (60%) of the city's forested natural areas fall within the "low" invasive threat, the remaining areas with a high threat from invasive species amount to 44 acres. Only 10% of forested city park land is classified as "high" value conifer, which is the desired condition for forested natural areas. Most of Kirkland's forested natural areas in parks are within the "medium" value forest (predominantly native deciduous canopy) categories and are managed for invasive weed species and conifer and native plant succession.

It is important to note that the 2008 Forest Restoration Plan does **not** address these areas

- Parks acquired since the Plan was adopted
- Kirkland parks acquired with annexation
- Significant acreage of parks currently owned or managed by other agencies (such as Bridle Trails State Park and King County's Big Finn Hill Park)
- Easements, private tracts, and greenbelts.

2.2 The City's Guiding Policies & Regulatory Framework

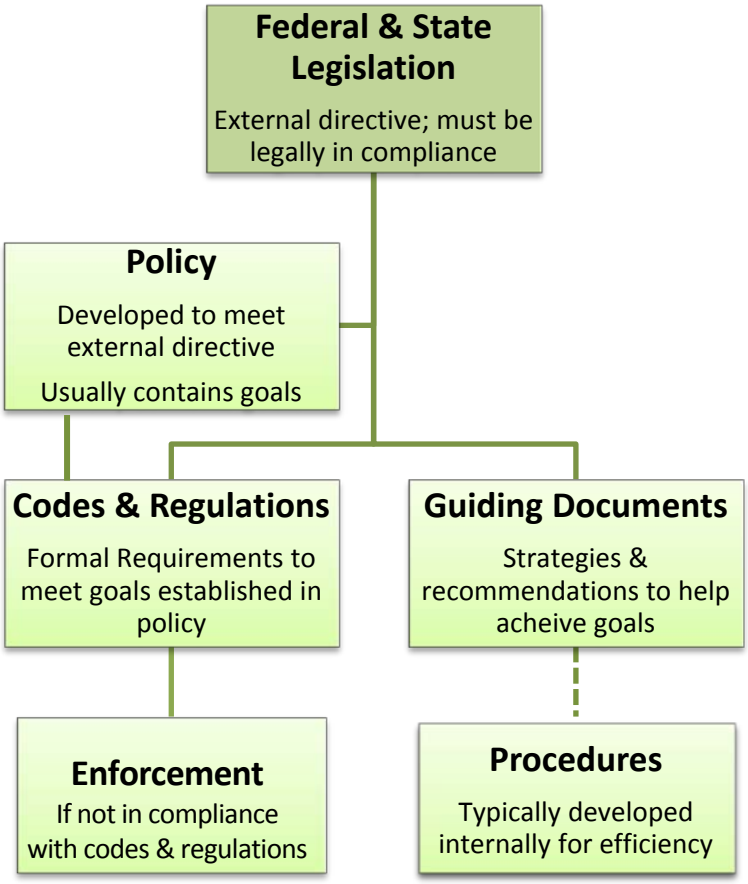
This section outlines the goals, policies, documents and regulatory framework regarding the management of Kirkland's urban forest asset that have been developed over the last two decades, some of which were initiated on a state level. For example, in 1990, the State Legislature adopted the Washington State Growth Management Act (Chapter 36.70A RCW) on the basis that uncoordinated and unplanned growth posed a threat to the environment, sustainable economic development and the overall quality of life in Washington.

Unique among states, the Growth Management Act (GMA) requires that municipalities prepare their own comprehensive plans that provide for growth and development in a manner that is locally and regionally consistent, achievable, and affordable. The GMA requires public participation in the development of comprehensive plans and regulations, and that all regulations must be consistent with the goals and vision stated in cities' comprehensive plans.

City of Kirkland Comprehensive Plan

The Comprehensive Plan reflects Kirkland's intention to meet the requirements of the GMA and to serve as the guiding policy document to attain the community's vision of the future. Figure 7 shows the general relationships between legislation, policy, goals, codes and guiding documents. The Comprehensive Plan contains framework goals and a series of elements that apply citywide, each with its own goals, policies and narrative. Goals generally describe a desired end that the community is striving to attain, and policies are principles that reflect the City's intent.

Figure 7. Legislation, policies, and regulations



Kirkland's Comprehensive Plan identifies specific policies that guide the City's regulations and programs. Kirkland's community values and vision for the future is evident in the Comprehensive Plan Framework Goals:

> **Vision FG-7**: [Kirkland has a] *"responsibility to create a sustainable community that balances urban growth with resource protection…that meets the needs of the present without sacrificing the ability of future generations and other species to meet their own needs."*

When Kirkland's Comprehensive Plan was updated in 2005, it included policy direction to meet a citywide 40% tree canopy cover goal (Policy NE-3.1). This constituted clear direction for the City to prioritize urban forestry efforts to meet that goal. The policies in the Comprehensive Plan that were adopted to guide the City's urban forest management include:

> **Policy NE-1.3**: *Use a variety of techniques to manage activities affecting air, vegetation, water, and the land to maintain or improve environmental quality, to preserve fish and wildlife habitat, to prevent degradation or loss of natural features and functions, and to minimize risks to life and property.*
>
> **Policy NE-2.2**: *Protect surface water functions by preserving and enhancing natural drainage systems wherever possible.*
>
> **Policy NE-3.3**: *Ensure that regulations, incentives, and programs maximize the potential benefits of landscaping.*

The narrative for managing the natural environment in the Comprehensive Plan describes that:

> "…*the systems and features of the natural environment are considered to be community assets that significantly affect the quality of life in Kirkland. In public rights-of-way, City parks, and on other City-owned land, current technology, knowledge and industry standards should be proactively used to practice and model sound stewardship practices. For resources on private property, the City should use a combination of public education and involvement, acquisition of prime natural resource areas, and incentives to promote stewardship, as well as regulations combined with effective enforcement."*

City Council Goals

In November 2011, the City Council adopted goals to articulate their key policy and service priorities for Kirkland. The City Council Goals guide the allocation of resources through the budget and capital improvement program to assure that organizational work plans and projects are developed that incrementally move the community towards these goals. As it relates to urban forestry, the City Council has adopted a goal expressing

> *"[The City is] committed to the protection of the natural environment through an integrated natural resource management system, and to protect our natural environment for current residents and future generations".*

Natural Resource Management Plan (2003)

Adopted by City Council, this guiding document provides further policy direction and functions to refine specific policies in the Comprehensive Plan. It has served as an informational resource

when considering new City practices, programs, and regulations that are proposed in response to the goals and policies in the Comprehensive Plan. Recommendations from the Natural Resource Management Plan (NRMP) provided the framework for the City's comprehensive tree codes, increased tree planting efforts and helped build community support for urban forestry.

The NRMP has been a guiding document for urban forestry efforts in the City for almost ten years. **Nearly all of the goals outlined in this document have been achieved; with the exception of the following goals:**

- **Proactively manage public trees** – *Trees in city parks, rights-of-way, and on other city-owned properties constitute valuable public assets.*
- **Private tree preservation** –*Provide education on the benefits of trees on private property and on the alternatives to [tree] removal.*
- **Transportation standards for a green and safe streetscape** – *Update street tree planting space standards and planting specifications to better accommodate a more diverse palette of tree species.*
- **Notable tree program** – *Develop and maintain a program to identify and preserve notable trees in Kirkland.*

City Codes and Ordinance

Guided by the Natural Resource Management Plan and under the general policy direction of the Comprehensive Plan, the City established its tree protection ordinance by adopting Kirkland Zoning Code, Chapter 95 in late 2005. The purpose and intent of Chapter 95 in the Kirkland Zoning Code (KZC) is to support Comprehensive Plan Policy NE-3.1 by slowing the loss of and enhancing canopy towards the City's 40% canopy goal. The tree code establishes a process and standards to provide for the protection, preservation, replacement, and proper maintenance of trees on private and public property. A Tree Protection Standard for protecting existing trees (public and private) during construction has been developed.

In addition, the following codes contain specific language regarding tree protection, pruning and tree planting requirements on private and public property:

Kirkland Zoning Code, Chapter 83 - regulations concerning tree protection and restoration requirements within the Lake Washington shoreline jurisdiction

Kirkland Zoning Code Chapter 70 - Holmes Point Overlay Zone defining mature tree and native vegetation protection in the Holmes Point neighborhood

Kirkland Municipal Code Title 1, Chapter 1.2 includes the special provisions relating to enforcement of tree regulations.

Trees along streets, in parks, and on private properties are all provided with some protection within Kirkland's codes. Included in these regulations are explicit references to ANSI A300 standards for tree care and definitions for a qualified tree care professionals, both of which help to ensure that trees within the City of Kirkland are being planted and cared for according the best available science of the day.

The City has codified permit requirements for the removal and pruning of public trees and for multiple tree removal on private property (Table 1). Permits are not required for the removal of up to two (2) trees on private property within a twelve-month period. No permits are required for tree

pruning on private property, however topping is not allowed. Tracking all tree removal permits can provide information about tree mortality and loss of canopy. The following table summarizes the permit requirements for trees listed by removal scenario:

Table 1. Summary of Kirkland Zoning Code Chapter 95

	SCENARIO	REVIEW? PERMIT?	MISC.
PRIVATE PROPERTY	Remove 2 trees (regardless of condition)	**No review, no permit**	Notification appreciated to avoid unnecessary Code Enforcement response
	Remove >3 hazard or nuisance trees	**No review, no permit if…**	Photos clearly show hazard or nuisance
	Remove hazard or nuisance trees in critical areas	**Yes, review and permit required**	Arborist report, replacements may be required
	Emergency/urgent tree removal	**No review, no permit**	Contact Planning Dept. 2 weeks after incident
	Prune or trim trees	**No review, no permit**	-Property owners are responsible for tree care -No topping allowed (>50% live crown removal is same as tree removal)
	Tree removal associated with development	**Yes, included with land use or development permit (BLD, SPL)**	-Arborist report required for trees potentially impacted by development -Protection measures required on site
PUBLIC PROPERTY	Prune or remove street trees. Trees in medians/Central Business District maintained by the City. All other street tree care is the responsibility of the adjacent property owner.	**Yes, review and permit required**	-Public Works staff may prune street trees by property owner request -Public Works staff may remove street trees at their discretion without a permit or formal review process
	Prune or remove park trees, including critical areas & open space, wooded areas	**No permit required; review/service performed by request**	-Staff may prune park trees by property owner request -Most hazard tree removal contracted out

In general, the City's tree protection codes and ordinances are serving the intent of preserving and enhancing tree canopy throughout the community while remaining flexible enough to accommodate various development scenarios. This flexibility sometimes provides challenges to

staff resources through requirements for additional reporting, review, and documentation. However, the 2011 canopy analysis found a 13.9% increase in canopy cover in pre-annexation areas, from 2,151 acres to 2,450 acres, and across all zoning categories, seeming to indicate that current regulations are having a positive impact.

Typically, a combination of regulations, incentives and programs can maximize efforts towards goals; a less-balanced approach may not be as effective or may have a polarizing effect in the community, especially regarding natural resources on private property. For resources on private property, the City should use a combination of public education and involvement, incentives to promote stewardship as well as regulations combined with effective enforcement.

20-Year Forest Restoration Plan (2008)

In 2008, the City adopted a 20-Year Forest Restoration Plan to promote the stewardship of native open space areas (Resolution R-4689).This long-range planning document provides guidance and recommendations for implementing goals in the Comprehensive Plan. It outlines the efforts needed to restore natural areas located in Kirkland parks.

Green Kirkland Partnership volunteers

Risks to forest health from invasive species motivated the creation of this plan to actively manage these areas. The restoration plan was organized based on a similar strategy used by the City of Seattle. The Green Kirkland Partnership has engaged volunteers and businesses to help achieve the goals of this plan, which are to:

- Establish an oversight role for the Park Board
- Educate the community on the threat invasive plants have on urban forests
- Identify issues and resources necessary to reverse the decline of the natural areas and sustain healthy forests
- Identify and recommend best management practices
- Identify revenue sources to consider in funding the restoration work. Restoring 372 identified acres of restoration by 2028 will cost an estimated $5.2 million or $14,000 per acre
- Establish a volunteer stewardship program to sustain a volunteer work force to conduct ongoing restoration maintenance and care of our urban forests and other natural areas
- Acquire land that has ecological and habitat benefits
- Implement an Environmental Education and Outreach program to educate and engage the community in stewardship projects to remove invasive plants and to replant with native species, seek support from partners and businesses for funding and stewardship, and seek grants to support stewardship activities

The 20 Year Restoration Plan is an excellent resource for articulating the urgent need to restore open space native vegetation and provides a long-range strategy to accomplish this. It should be noted that invasive species are not limited to these areas only.

Tree Management Review (2001)

This review was the first effort to understand how Kirkland's trees were managed. A consultant made an in-depth examination into improving the City's urban forest. Key recommendations included the pursuit of Tree City USA designation and further support and guidance for the development of the Natural Resource Management Plan. **Most of the goals outlined in this document have been achieved with the exception of these two actions:**

- *Determine goals and desired level of service to shift from reactive to proactive management of publicly owned trees.*
- *Expand public outreach and the education of residents, business owners, developers, staff, and public officials.*

Although the 2001 Tree Management Review is over 10 years old and most of the action items have been accomplished, this document is still very relevant in its assessment of community awareness of trees and staff roles, responsibilities and knowledge. Interestingly, the staff responses when asked the question: "In relation to trees and urban forest management, as you go about your daily job, what works and what doesn't work?" are very similar to the current staff responses to the same question.

In all, the City has developed many policies, documents and codes based on the vision and direction from the community to preserve and protect the urban forest. These include regulations that limit tree removal on private property and retention and planting requirements on development sites, supported by effective enforcement codes. The City has over a 15 year legacy of consistently placing a high value on natural features, especially trees. The timeline shown below in Figure 8 illustrates the increased recognition and importance of urban forestry in Kirkland:

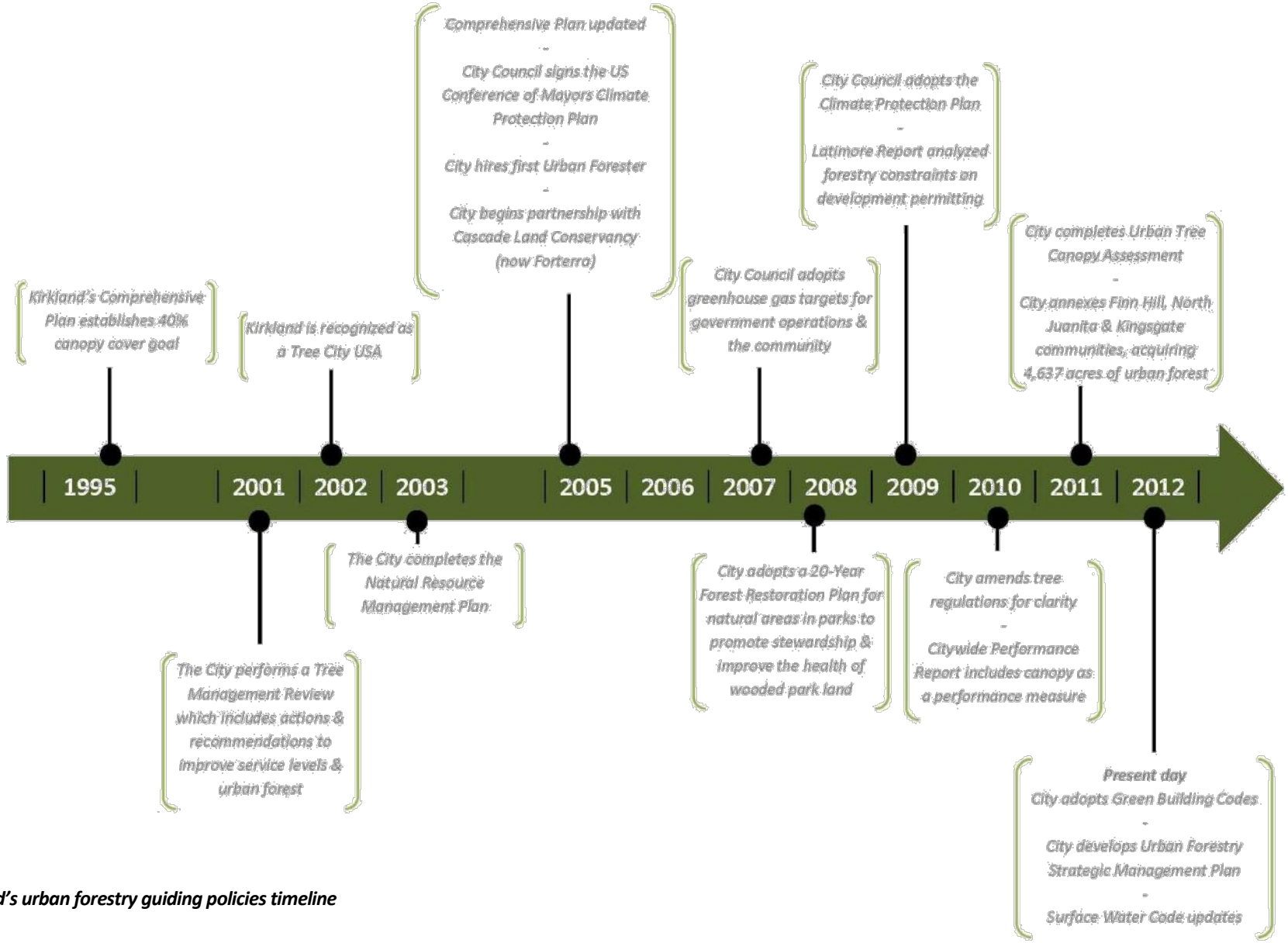


Figure 8. Kirkland's urban forestry guiding policies timeline

2.3 The Municipal Urban Forestry Program

This section describes the City's current forestry resources and operations: staffing levels, funding, procedures and protocols related to urban forest management. It explores City operations in comparison to best management practices and the urban forestry programs at other, similar municipalities. It maps out how the Planning, Parks, and Public Works departments interact with each other, with trees, and with the community on a routine basis.

The information in this section provides the context for the performance indicators described in Section 2.6. Reviewing the City's current practices will allow Kirkland to make decisions about future levels of service, program funding, code changes, or policies with respect to urban forestry and stay aligned with the long-term strategic goals of this plan. Section 4 provides specific goals and recommendations that are designed to improve efficiency in operations and manage the risks and liabilities associated with trees.

WHO IS INVOLVED IN URBAN FORESTRY?

Arborists are trained professionals concerned primarily with the management of individual trees. Commercial arborists provide tree care and management services on private and public property, utility arborists deal with tree management issues along utility – typically electrical corridors, and municipal arborists are those employed or contracted by municipalities to manage tree programs. Many arborists are also skilled in consulting and appraisals.

Foresters are trained to analyze and understand whole ecosystems of stands or large groups of trees on a systemic level. Traditional foresters are likely to be engaged with forestry as a researcher or scientist.

Community or *Urban Foresters* and *City* or *Municipal Arborists* generally have an overlap in the experience, training and skills of the previous two professionals and are those who oversee a municipal urban forestry program.

How these groups work together or relate to another is determined primarily by how a local government organizes its own departments and workforce, and how lines of responsibility are established. A city arborist may be placed within a public works department such as in Tacoma; or, to review development plans, an urban forester may be positioned within a planning department such as in Olympia and Kirkland. Some cities may have the oversight of a city-wide urban forestry program as in Renton and Vancouver while others may have urban forestry functions within individual departments such as Seattle or Mercer Island.

Other cities, such as Woodinville, have a *tree board or commission* that provides citizen oversight or guidance to the program.

Review of Existing Operations

Without formal forestry programs, cities often have staff that work with tree issues in many departments. This is the case with Kirkland. Urban forestry issues at the City are addressed by staff in the legal, building, planning, and public works and parks departments. To assess current staffing levels, over thirty (30) individuals were identified as persons who work with tree issues on at least an intermittent basis. Of those involved with forestry issues or operations on a more regular time basis, 12 individuals were identified with a quantifiable amount of time each week working with trees or tree related issues.

While the 12 individuals identified as sharing tree-related responsibilities are across three different departments, **city-wide, there is only one designated Full-Time Employee (FTE) position dedicated to urban forestry**. This position is solely responsible for public tree care in both Kirkland parks and in the right-of-way. Currently, there is no one full time position responsible for policy or program development, volunteer coordination, or permit review.

In order to assess the collective resources used to meet current levels of service, Kirkland's forestry-related operations were outlined and discussed with department managers and staff. This discussion resulted in quantifying the forestry-related tasks performed by staff and contractors on an hourly and weekly basis. In Tables 2 through 4, the time resources used to meet urban forestry levels of service are shown, split among the three departments that work with tree issues. The current levels of service shown in the tables below can then be compared to the positions designated for urban forest responsibilities in the Organizational Charts shown in Appendix D.

Overall, there is evidence of moderate to good interdepartmental cooperation; staff's ability to accomplish goals and communicate effectively across departmental lines, with allied professionals and the public is a source of pride. However, in other areas, the lack of communication between departments causes problems and hampers goal achievement. These general observations about the cooperation among staff are very important when the City evaluates future staffing needs and levels of service.

Planning Department

Discussions with staff responsible for development review, processing permits and code enforcement were primarily focused on the effectiveness of the current City codes for protecting trees. Staff discussions noted that the code is generally working; however there are some areas that could be improved to be less confusing. Staff believes that the current code, although quite comprehensive, is sufficiently flexible for property owners to accommodate tree retention in their development plans with a variety of tree removal scenarios. There are concerns, however, that some permit applicants and developers do not share that sentiment.

As part of their normal duties, Assistant Planners respond to general tree code inquiries, process most tree removal requests and handle tree removal permits over the planning counter at the time they are received. As the complexity of development scenarios increases, typically the Urban Forester position has been responsible for development permit review, as well as citywide urban forestry policy and program development. Addressing this complexity in development proposals requires the technical knowledge of trees impacted by construction, experience with administering municipal code and balancing urban forest sustainability with city development.

The following issues describe the current challenges to both permitting and urban forest management efforts:

Current staffing levels - To meet staffing needs, the combined efforts of a contracted consulting arborist, planning staff, and a part-time Urban Forester help process the permit review and address work program projects. The 0.5 FTE Urban Forester position is funded through the surface water utility fund and a 0.5 FTE Arborist position is contracted out from the General Fund. The Planning Department also has two code enforcement officers who respond to illegal tree activities for approximately 20 hours per week. **The Planning Department's combined urban forest activities, including code enforcement were determined be 92.5 hours, or the equivalent to 2.3 FTEs**.

Table 2. Planning and Community Development current level of urban forestry services

Planning and Community Development	Current Urban Forestry Levels of Service	Hours Spent per 40 hour week
Development Services	• Development plan review for compliance with tree code • Public information (online, phone and counter)	40
Permit Intake and Review	• Tree removal permit review • Public information (online, phone and counter)	12.5
Code Enforcement & Complaint Investigation	• Pursuing tree removal complaints	20
Comprehensive (Long-range) Planning	• High priority Work Program projects • Tree regulations & related policy • Federal, state grant procurement • Tree City USA applications	20
Neighborhood Planning and Updates	• No Urban Forestry Activity	0
Tree Preservation/Care Education and Outreach	• Web site Content and Public Education • Special projects	~
		Total Service Hours per Week: 92.5

Funding - funding for permit and development review for a .5 FTE Urban Forester (currently used for contact services) and for planner time reviewing tree removal permits comes from the General Fund. The other .5 FTE Urban Forester is funded from Surface Water.

Permit application completeness and quality – The City has reoccurring issues with incomplete or poor quality permit applications, resulting in increased review times, additional review charges, and numerous revisions. The City has tried to address this issue with the Latimore study, pilot programs, and increased staffing.

Urban Forester position – The City has an official urban forester position currently in the Planning Department. Due to the work on the strategic management plan, many planned activities for 2012 have been placed on hold, and priority efforts have been focused on maintaining Tree City USA status, grant administration and project management for special urban forestry-related projects outlined in the department's Work Program for this position. Since 2011, development review tasks have been contracted out to a consultant.

Arborist reports and tree risk assessments – When these reports are required from permit applicants, there are many cases in which the reports or inventories are inaccurate or too subjective. Problems associated with this include:

- Offsite trees or those located along property line not shown
- Grade changes not properly considered
- Utility conflicts with root zones or drip lines
- Symbols used in landscape drawing not representing true drip lines

Development and tree protection in Kirkland

Arboriculture technical support – For the past year, the Planning Department has contracted out its development review to meet budget constraints. This process may be resulting in additional hidden costs. Because the contractor is not always well-versed in city codes, it is sometimes necessary for a City planner to provide additional follow-up.

Code enforcement – Conversations with staff involved in code enforcement revealed that the most common explanation for tree-code infractions is that the property owner did not know what the code allowed or prohibited. However, code enforcement staff does communicate with tree care companies as a strategy to increase public awareness.

Permit fees – The City is adopting a new permit tracking software, which presents opportunities for more detailed evaluation and monitoring of tree related permits to ensure fees are appropriate

Coordination with Public Works and public tree permit review – Trees located in the right-of-way that require a permit review are assigned to the Public Works Department staff. This may be the only tree inspection for public trees that may be formally documented.

Parks Department

Interviews with City staff explored the Parks Department's approach to planting new trees, maintaining existing trees, and managing hazardous trees. Discussions focused on the management of formally landscaped areas, wetlands, critical areas and the natural areas in Kirkland parks. Overall, care of individual trees has occurred according to urgency and budget availability. The following are summary comments from these discussions:

Current staffing levels - Parks and Community Services currently does not have designated positions dedicated to tree care in city parks. Before annexation Parks might get a few calls for

service each month. Now, Parks gets calls for tree service requests each week and often multiple calls a day. Currently, 1.5 Full-Time Employee (FTE) positions are temporarily funded through 2012 to manage the Green Kirkland Partnership Program. **The Park Department's combined urban forest activities were determined be 100 hours, or the equivalent to 2.5 FTEs**.

Table 3. Parks Department current level of urban forestry services

Parks Department	Current Urban Forestry Levels of Service	Hours Spent per 40 hour week
Maintenance Operations	• Tree planting and establishment • Structural pruning on smaller trees • Inspection and identification of hazardous trees in parks	40
Green Kirkland Partnership	• Tree Planting • Implementation of 20-Year Restoration Plan • Event and volunteer coordination	60
Contract Pruning	Typically for hazard trees as needed	~
		Total Service Hours per Week: 100

Funding – In the Parks department, funding for tree maintenance, removals or hazard tree assessments is a discretionary budget item. Parks currently budgets $3,000 each year for hazardous tree management. By September 2012, in response to over 150 written letters, emails, and phone calls regarding tree issues, Parks has spent $18,253 in contract hazard tree removals or snagging. An estimated $25,000 will be utilized to address hazard and other tree-related issues in 2012.

Staffing for tree maintenance and removal comes primarily from the General Fund. The City has continued to staff the Green Kirkland Partnership restoration and planting program (with Forterra and EarthCorps) through temporary funding of a 1.5 FTE for education and outreach. These positions are funded through a combination of Capital Improvement Program (REET) funding and grants from the King Conservation District. Funding for the staffing resources to support this effort at its current level is included in the parks levy. If the levy is not approved other funding (e.g. grants) would need to be pursued to continue staffing to support this program.

Tree inventory – The City has no inventory of trees in parks and no formal protocols for inspection. Without any summary data about park trees, the Parks Department is functioning reactively to tree issues as they emerge in parklands.

Tree planting – On an annual basis, Parks staff focus attention on areas where they know they have deficiencies in tree cover. They communicate with Kirkland's Environmental Education and Outreach Specialist and with local nurseries about tree planting needs and opportunities. With limited funding for establishment care (primarily watering), Parks staff focus on planting native trees and describe this as being an effective strategy to grow the forest in city parks.

Maintenance of small trees – Parks grounds maintenance staff perform simple structural pruning or mitigation of hazardous situations. This tree work is not performed by qualified arborists, but staff is aware of ANSI A300 pruning standards and an effort is made to perform correct tree care practices.

Maintenance of large trees – Parks sets aside $3,000 each year for maintenance or removal of large trees. It is widely accepted in the department that this is insufficient funding and typically only mitigates one or two hazardous trees a year. As tree issues emerge throughout a year, Parks staff will collaborate with the Public Works Grounds Division to secure their staff time and equipment resources. When urgent tree work is identified, priorities for Park staff change. They will divert additional funds from other park activities to contract additional necessary work from professional tree care companies.

Peter Kirk Park

20-Year Forest Restoration Plan – Since 2005, **38 acres** have been restored with over **37,400 hours** of volunteer hours contributing to steward Kirkland's parks and open space. These volunteer hours translate into an estimated total value of **$767,294.06** to the City. Volunteers planted nearly **20,500 native plants,** which will continue to provide benefits to Kirkland as they grow, capturing carbon to clean the air, filtering water before it drains to Lake Washington. Natural areas provide healthy urban habitat for wildlife and making parks desirable places that are well-cared for by the community.

Staff resources are needed to conduct activities not suitable for volunteers, such as removal of invasive trees and the application of chemicals to kill invasive weeds. Forest restoration requires the removal of invasive trees. By the end of 2011, a total number of 1,554 invasive trees had been removed.

For the first few years of plan implementation, the Green Kirkland Partnership exceeded benchmarks for volunteer hours, acres in restoration, and numbers of stewards, but fell below benchmarks for staff numbers. By the end of 2011 the only benchmark exceeded was number of stewards, which was double the benchmark (16 active stewards; benchmark of 8 stewards). **All other measures and staffing levels are below benchmark levels due to lack of resources. Public interest and engagement remains high, but the City is not able to meet the demand**. **The success of the program has been due to the over-reliance of volunteers, which is not sustainable.**

Green Kirkland Partnership staffing at the 1.5 FTE level is currently funded through 2012. Without continued funding, the program will fall short of plan goals. Additionally, annexation in 2011 increased forested natural area acreage in city jurisdiction by approximately 31 acres, but these acres have not been surveyed in the same manner as acres surveyed for the City's 20-Year Forest Restoration Plan (2008). This acreage does not include natural areas in the new

neighborhoods (including King County and Finn Hill Neighborhood Alliance-managed lands), Big Finn, O. O. Denny or Juanita Woodlands parks as they are currently not in the City's jurisdiction.

Public Works Department

The staff in the Public Works division discussed urban forestry from both the perspective of street tree (right-of-way) maintenance, stormwater mitigation strategies and capital improvements. Although Public Works uses a GIS-based inventory and work order software system for its grey infrastructure management (Hanson), it is not utilized with the management of public trees. Staff that is responsible for street tree maintenance do not use the city-wide permit database to track and report permit activity such as public tree removal.

Currently, the Public Works Grounds Maintenance Division is responsible for managing trees in the public right-of-way. When time allows, the pruning, removal and maintenance of trees is performed by the Grounds Lead person and a Field Arborist. Aside from other grounds keeping tasks, their duties include the inspection, pruning, and removal of trees at their discretion in response to service requests from residents and businesses. In addition, they routinely cooperate with Parks Department staff to perform tree work on parks trees as time allows. The following findings were identified through discussions:

Current staffing levels – Public Works has 1 FTE solely dedicated to forestry operations and no dedicated urban forest budget. However, the grounds maintenance division tasks and surface water maintenance projects review determined that a staffing need equivalent to 2.65 FTE exists to address street tree maintenance and removal, hazard tree evaluations, clearing trees and vegetation blocking the right-of-way, reviewing tree permits, maintaining the existing street tree inventory and emergency storm response. The tree crew is shared by the Parks department as needed. **The Public Works Department combined urban forest activities were determined be 106 hours, or the equivalent to 2.65 FTEs**

Table 4. Public Works current level of urban forestry services

Public Works Department	Current Urban Forestry Levels of Service	Hours Spent per 40 hour week
Street and Public Grounds Maintenance	• Pruning and removal of street trees • Service requests for field inspection of street trees • Street tree inventory updates	96
Surface Water	• Maintenance of vegetation in/around stormwater facilities	10
Contract Pruning	Typically for hazard trees as needed or when workload exceeds crew capacity	~
		Total Service Hours per Week: 106

Funding - Funding from Public Works comes from the General Fund and Surface Water Utility for the field arborist and grounds staff to perform tree removal, maintenance and pruning. When

the City undertakes major capital improvements, trees are typically planted as part of the project. For example, street trees have been installed along Slater when that road was improved and will be included in the NE 85th Street project. During the upgrade to Juanita Beach, nearly 900 new evergreen and deciduous trees were planted many of them in the newly created habitat marsh area west of Juanita Creek.

Equipment – Public Works Division staff have access to an aging surplus aerial-lift truck (bucket truck) and climbing gear to perform tree work. Additionally, they have access to a mobile tablet computer with capabilities to update the existing street tree inventory in GIS.

Public Works crew pruning street tree

Safety training – Both staff arborists attend annual International Society of Arboriculture (ISA) training events to maintain professional qualifications and develop their skills. Any additional safety training as it relates to the practice of arboriculture is achieved through self-directed learning. This is undocumented safety training and presents a liability for meeting OSHA requirements.

Review of Kirkland's tree care operations revealed that while contractors engaged in pruning public trees must adhere to ANSI standards, no such requirement exists for internal staff. However, this standard does not reference the ANSI A300 series or its criteria. In addition, City staff was unable to readily produce documentation that demonstrates all City employees and contractors working with trees had been trained on Occupational Safety and Health Administration (OSHA) standards.

Tree maintenance and grounds keeping – The amount of time the Ground Division describes as solely working with trees varies. Because staff spends time fulfilling other grounds keeping obligations, time spent working on trees is difficult to track. As a consequence, the majority of tree work is reactive, with little to no time to implement planned maintenance strategies. The crew anticipates staffing/maintenance needs to double due to the amount of trees in the annexed area.

Public tree pruning and removal – Public trees along street rights-of-way are the maintenance responsibility of the abutting property owner according to 95.21.1 (Kirkland Municipal Code) with the exception of trees located in the central business district (CBD), which are to be maintained by Public Works staff. Additionally, permits are required in the code for both public tree removal and pruning; fees are associated for tree removal only. Occasionally, City crews are responding to pruning and removal requests from Kirkland residents without the required permits or fee collection.

Tree inventory and inspection – Because the majority of street tree work is reactive, the Public Works staff does not perform planned cyclical inspections or updates to the tree inventory. According to the database, over 12,000 City trees have not been revisited since 2004 and no trees were updated in 2010 or 2011. With the recent annexation, the number of street trees may have doubled. These unknowns represent an increasing liability to the City, as it is not performing

the due diligence necessary to maintain the safety of public rights-of-way. Hazardous trees are known to the Public Works department through service requests.

GIS updates – The City's GIS-IT department is updating the GIS to include the location of street trees in the annexation areas. The tree locations will be catalogued but not assessed for age/size, rated for condition, or evaluated for hazard risk.

Tree planting – Public Works does not have a tree planting program or planting goals. Aside from the Green Kirkland Partnership efforts, no formal tree planting programs have been developed since the Centennial Tree Project in 2005. This project funded tree planting in parks and planting strips adjacent to rights-of-way to commemorate the 100th birthday of Kirkland. Consequently, crews plant trees occasionally. Exceptions include trees planted by the Surface Water division when conducting volunteer stewardship projects, those planted with capital improvement projects (updates or improvements to major transportation corridors), and frontage improvements required with development. Public Works maintains a small database of trees they know will require follow-up establishment care, but no large scale projects are planned. Again, available staff time limits this proactive urban forestry activity.

Productivity tracking – The Public Works department does not maintain readily searchable records for productivity tracking with respect to tree work. Staff describe maintaining or removing approximately three (3) trees per week as a typical production rate, but were not able to able to demonstrate how these were in response to work orders or being tracked in any other electronic system like Hansen or the City's GIS.

Tree Care Industry Standards and Best Management Practices

The tree care industry has developed comprehensive standards for maintenance and care, safety, and certification. Compliance with these standards can decrease exposure to risk, increase consistency of maintenance, reduce injuries to workers and the public, and increase the health of the urban forest.

Tree Care Standards – Universally-recognized industry standards provide guidance for tree care operations, including detailed criteria for maintenance activities and safe work practices. The core of the tree care standards is the ANSI A300 Series, developed by the American National Standards Institute (ANSI). These standards have been rigorously vetted by professional tree care practitioners and are based on the latest scientific research. The ANSI A300 Series unify and take authoritative precedence over all previously existing tree care industry standards. The standards are reviewed and revised periodically by a committee of industry experts and are accepted by most cities as the most basic expectation of quality. The standards cover all tree care operations, including the most revision of:

ANSI A300 Pruning Standard - Part 1 (2008)
ANSI A300 Fertilization Standard - Part 2 (2011)
ANSI A300 Support Systems Standard - Part 3 (2006)
ANSI A300 Lightning Standard - Part 4 (2008)
ANSI A300 Construction Management Standard - Part 5 (2012)
ANSI A300 Transplanting Standard - Part 6 (2012)
ANSI A300 Integrated Vegetation Management - Part 7 (2005)
ANSI A300 Tree Risk Assessment Standard a. Tree Structure Assessment - Part 9 (2011)

Best Management Practices - The International Society of Arboriculture (ISA) publishes the Best Management Practices (BMP) Series as companion booklets to the ANSI A300 Series. These BMPs are written as explanatory guides for applying ANSI A300 standards in daily tree care practice and include:

Tree Pruning (2008)
Tree and Shrub Fertilization (2007)
Tree Support Systems; Cabling, Bracing, Guying, and Propping (2007)
Managing Trees During Site Planning & Construction (2012)
Tree Planting (2005)
Integrated Vegetation Management (2007)
Tree Risk Assessment (2011)
Integrated Pest Management (2007)
Tree Inventories (2006)
Utility Pruning of Trees (2004)

Safety Standards – In addition to tree care standards, ANSI provides the most current safety standards in the United States for arborists and other workers engaged in arboricultural operations in the **ANSI Z133 Safety Standard** (2012).

The Occupational Safety and Health Administration (OSHA) is very specific about the personal protective equipment (PPE) that tree workers should wear and requires employers to furnish appropriate equipment. The requirements for workers' PPE and training depend on their specific role in tree care operations. Requirements for safety glasses, hearing protection, head protection, protective clothing, and face masks are described in sections 1910.132, 190.133, 1910.135 1910.95 of the Occupational Safety and Health Administration Standards. OSHA also requires reporting of workplace injuries and imposes fines on employers that are found to be allowing unsafe work environments or practices.

Arborists' Certifications – In addition to publishing industry BMPs, the ISA is the organization responsible for testing and certification of tree care professionals. ISA-certified Arborists and Certified Tree Workers are individuals who have demonstrated a level of knowledge in tree care through experience and by passing a comprehensive examination developed by international tree care experts. Certified arborists must continue their education to maintain their certification and agree to adhere to a code of ethics.

Although currently offered only through ISA's Pacific Northwest Chapter, the Tree Risk Assessor Course and Exam (TRACE) will be sanctioned by ISA in the near future. It is the standard for assessing hazardous trees and has become a required credential for arborists in Kirkland for tree risk evaluation.

Whole tree failure on Central Way, 2012

Emergency Preparedness – Fire, storm events, insect, or disease outbreaks can cause significant damage to the urban forest, resulting in unexpected emergency response situations. The dramatic loss of

elm trees from Dutch Elm disease is one example of the catastrophic effect pests can have on the urban forest. If Asian Long-horned beetle or Emerald Ash borer spread to the Pacific Northwest, the resulting decline and death of trees would be devastating. Debris, leaves, limbs or whole tree failure can block the right-of-way, clog storm drains, increasing the risk of flooding, cause utility infrastructure and property damage, or block transportation corridors.

The City of Kirkland has adopted the 2010 Comprehensive Emergency Management Plan, which establishes structure for an organized and effective response to multi-agency emergencies and disasters that may occur within the City. The plan does not explicitly address trees and the urban forest, but effectively considers them as part of debris management. The Public Works department has an operational plan to coordinate debris removal.

With respect to emergency preparedness and risk management specific to the urban forest, the City has a partial tree inventory, but does not have a routine tree inspection process.

Urban Forestry Program Funding

Municipal budgets can be quite complex, as researching Kirkland's urban forestry budget has shown. Without a centralized urban forestry program or department divisions, there is no itemized accounting that could be described as an urban forest budget in Kirkland. The beginning of this section describes the current staff and program funding for each department. In Section 4.6, potential program funding strategies are identified.

A variety of funding sources are utilized including the **General Fund** (Parks, Public Works and Planning), **Surface Water Utility,** (Public Works and Planning**) REET funding** (Parks with CIP funding for Green Kirkland Partnership staffing and contract work), **grants** (Parks) and the **Capital Improvement Program** (Public Works and Parks). Planning and caring for Kirkland's urban forest is a discretionary item in the General Fund for those activities that utilize this fund. It is not typically delineated in departmental budgets so it is difficult to determine the actual total expenditures for urban forestry programs and whether or not operations are cost-effective and efficient when tracking is not definitive.

Tree care, maintenance, removal and pruning are conducted by grounds crews in the Parks Department (parks and open space) and the Public Works Department (street trees, CBD and city facilities). Division managers balance tree maintenance activities against other operating expenses and needs. Annexation has resulted in additional demand. Even prior to annexation, maintenance and pruning operations were based on reactionary management decisions rather than a prospective or planned approach to tree care.

As part of a major capital improvement project (CIP) such as street or park improvements, trees are typically included in the project budget, however long-term care, maintenance and survey assessment are generally not tracked or put on a maintenance schedule. CIP projects are funded on a project-by-project basis but not necessarily aimed at achieving overarching urban forestry and community goals. During the upgrade to Juanita Beach, for example, nearly 900 new evergreen and deciduous trees were planted many of them in the newly created habitat marsh area west of Juanita Creek.

Permit fees collected for development review and tree removals are not currently tracked and reported independently as revenue income for an urban forestry program staff. While this can be done, the revenues would likely be quite small relative to how much the City is spending on

forest-related activities. A more defined urban forestry program would be able to establish baseline costs and anticipate planned expenses.

The City has recognized the value of trees in reducing storm water runoff by allocating funds from the **Surface Water Management budget** to fill temporary funding for the 0.5 FTE Urban Forester position through the end of 2012.

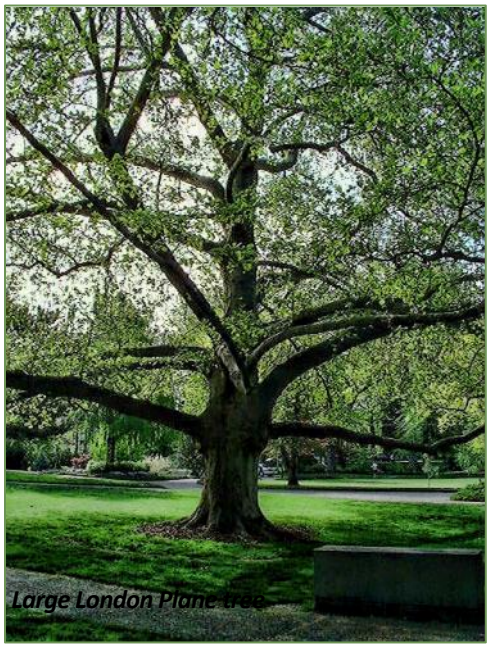
Kirkland has established a **City Forestry Account**, which receives funds according to Kirkland Zoning Code Chapter 95.57, primarily from code enforcement fines and fees paid in lieu of tree planting. The amount currently in this account is approximately $38,000. This account is intended to fund a variety of urban forestry related projects including:

- Acquiring, maintaining, and preserving wooded areas
- Planting and maintaining trees
- Establishing a public tree holding nursery
- Providing urban forestry education
- Implementing a tree canopy monitoring program
- Other purposes relating to trees as determined by the City Council

As part of the overall strategic plan it is important to connect the 20 year strategy time frame to budget planning and funding levels. This timeframe enables short and medium-term financial and organizational planning and to establish funding, staffing and program priorities while maintaining an overall strategic direction that provides continuity. The direction should be towards the community's vision for its urban forest.

2.4 Municipal Forestry Program Comparison

This plan includes a limited comparison of area municipal forestry programs. Most cities in this section have completed tree inventories and performed tree canopy studies; many have drafted management plans and developed tree protection ordinances. The areas in which these cities differ are in how much they spend on urban forestry, how they are organized and how they staff their programs.


Large London Plane tree

Information on funding levels for urban forestry programs is difficult to obtain. Different cities have different sets of resources, therefore, budget numbers may not tell the entire story about the total resources being managed and maintained. Many municipalities have isolated programs that are not viewed under an overall urban forest program. Even so, to start somewhere, municipal forestry budget amounts as submitted to the National Arbor Day Foundation were utilized as a basis for comparison.

In order to be awarded Tree City USA status, cities must report their spending on urban forestry program elements to The Foundation. The standards for reporting are identical: *all expenses related to tree planting, maintenance, removal and management are to be included, even volunteer hours are accounted for at a standardized hourly rate.*

However, many cities – especially those that have multiple departments responsible for various program elements - may not report as comprehensively as others all aspects of their urban forest budget. For example, the City of Bellevue submits the budget amounts from their Natural Resource Division operating budget and capital budget. These numbers do not include any of the tree work in developed parks, right-of-way vegetation management by the Street Maintenance staff or any of the Transportation Department capital projects where they plant new trees and landscaping.

This data is not prescriptive as to what would be the most appropriate spending level for Kirkland. However, as different as these programs may be, it does provide a starting point for determining what might be reasonable for program funding in Kirkland.

Table 5. 2011 funding levels for local urban forestry programs

City	Annual Spending	Total Population	Spending per Capita
Bellevue	$4,475,153.00	123,400	$36.27
Lake Forest Park	$347,662.55	12,598	$27.60
Olympia	$569,409.85	46,478	$12.25
Portland, OR	$5,440,112.69	550,560	$9.88
Redmond	$524,645.10	54,144	$9.69
Renton	$794,192.00	92,590	$8.58
Kirkland	**$553,906.55**	**80,738**	**$6.86**
Vancouver	$982,991.10	162,300	$6.06
Woodinville	$68,822.60	11,350	$6.06
Seattle	$3,336,175.00	608,660	$5.48

Source: National Arbor Day Foundation

In 2011, the City of Kirkland reported a forestry budget to the National Arbor Day Foundation of $553,907. With the recent annexation (and population increase), this equates to a normalized $6.86 in per capita spending. This is lower than other municipalities in the region of varying sizes and urban forestry programs (Table 5). It should be noted that these numbers include volunteer time at a rate of $15 per hour. Due to the level of community involvement in the Green Kirkland Partnership program, volunteer time typically accounts for about a third of Kirkland's annual urban forestry expenses.

In an effort to develop appropriate urban forestry budgets, cities like Mercer Island and Seattle have opted to designate distinct forestry elements within key departments. This creates some stability to program funding and has allowed each department to meet their specific objectives and urban forestry goals. However, individual departments may suffer budget cutbacks or constraints, resulting in certain aspects of the program to suffer city-wide as a result. One

challenge for cities with multiple forestry divisions is communication: both internally between departments and clearly communicating to the public who is responsible for what.

In other cities such as Bellevue, Renton or Vancouver, Washington, an urban forestry division is positioned within one department with oversight or close collaboration with other departments' urban forestry functions. Vancouver's Urban Forestry Division is made possible through a partnership between the City's Public Works Department and the Vancouver-Clark Parks and Recreation Department.

As in Kirkland, it can be difficult to gauge a program's organization and staffing levels in communities that do not have central forestry divisions. For comparative purposes, Table 6 shows the program lead or management positions for urban forestry divisions in each municipality.

Kirkland has been the recipient of the Tree City USA designation for ten consecutive years and earned two Growth Awards from the National Arbor Day Foundation

Table 6. Urban Forestry Statistics in select Washington cities (2012)

Municipality	Population (rank in state)	Area (mi^2)	UTC % (year)	Tree Regs?	UF Mgmt. Plan	Tree Board? (#)	UF Program Lead Positions (Dept)
Seattle	608,660 (1)	142.5	23% (2007)	Yes	Yes	Yes (9)	8-(Parks, SDOT, Seattle Public Utilities)
Tacoma	198,397 (3)	62.6	19% (2009)	Yes	No	No	2-(Metro Parks, Environmental Services)
Vancouver, WA	162,300 (4)	46	19.7% (2002)	Yes	Yes	Yes	3-(Public Works)
Bellevue	122,400 (5)	34	36% (2007)	Yes	No	Yes	4-(Parks; 1 in Development Services)
Renton	93,910 (8)	22.3	28.6% (2010)	Yes	Yes	No	1-(Community Services)
Kirkland	80,738 (13)	18	40% (2010)	Yes	No	No	.5-(Planning)
Redmond	54,144 (19)	16.6	No canopy data	Yes	No	Arborist	3-(Parks)
Olympia	46,478 (17)	19	Tentative data	Yes	No	No	.5-(Planning)
Bothell (unconfirmed data)	33,505 (30)	12	No canopy data	Yes	No	Yes (7)	1-(GIS department)
Mercer Island	22,699 (42)	13	41% (2007)	Yes	Yes	Yes	2.5-(Parks, Public Works, Development Services)
Kenmore	20,460 (45)	6.3	No canopy data avail	No	No	No	1-(Planning)
Lake Forest Park	12,598 (66)	3.6	43% (2004)	Yes	Yes	Yes (9)	1-(Planning)
Woodinville	10,938 (72)	5.7	~34% (2007)	Yes	Yes (1998)	Yes (5)	2-(Development Services, Public Works)

2.5 Municipal-Community Interaction

A review of a municipal urban forest program includes looking at groups and individuals that are advocates and supporters of the urban forest who are focused on making tangible progress in sustainability measures. Typically, these groups are outside of the organization and include business groups, non-profit organizations, or agencies. The opportunity to combine efforts or provide mutual support through collaboration and partnership is extremely valuable to government operations; these groups are stakeholders that can make significant contributions to the strategies and goals essential to the plan's success. They are key partners to promote the urban forest agenda.

The Green Team

The Green Team, a City service team (committee), serves to increase interdepartmental communication of environmental issues and improve the City's efforts in sustainable issues, sometimes externally with partners and the community. Most City departments are represented on the committee. The Green Team has served as the City's ad hoc Tree Board to meet Tree City USA criteria, although typical meeting agendas do not focus on forestry issues.

Developer's Partnership Forum

The City's Development Services committee hosts a forum for developers to keep up to date with development regulations and development-related topics. Once enrolled on the listserv, participants receive the latest information about development regulations in Kirkland via email. Participants are also notified about upcoming meetings with the Partnership Forum, which are held typically a few times a year.

The Green Kirkland Partnership

Since 2005, the Green Kirkland Partnership has built a program that engages the Kirkland community in urban forest restoration. The partnership is an alliance between the City of Kirkland, nonprofit partners, businesses, and the community to restore natural areas in City parks. Organizations that support the Green Kirkland Partnership include:

Forterra
King Conservation District
EarthCorps
Washington Native Plant Society
UW Restoration Ecology Network
National Wildlife Federation
Kirkland Neighborhoods
Kirkland Community Wildlife Habitat Team
Kirkland Kiwanis Sunrisers Club
Eastside Preparatory School
Finn Hill Neighborhood

This approach to community forest management has been adopted by at least six cities in the Puget Sound region, and has become the most successful urban reforestation program in the

state. These six cities (Seattle, Kirkland, Tacoma, Redmond, Kent, and Everett) make up the Green Cities Partnership with Forterra, and have begun to network with each other to share ideas and strategies. Green Cities recognize that green infrastructure and grey infrastructure both need sustainable funding.

One of the main differences between Kirkland and the other Green Cities is that Kirkland currently relies heavily on volunteers for forest restoration. An informal survey of other Green Cities shows that most natural area restoration acres are cleared and managed by the municipal crews, and volunteer efforts comprise a much smaller portion of the restoration work. For example, in both Seattle and Tacoma, 80 percent of restoration acres are managed by paid crews. In Kirkland, the majority of restoration work is conducted by volunteers. This heavy reliance on volunteers limits the extent of Kirkland's reforestation efforts.

> *"I believe it is important to volunteer because it is our responsibility to create the kind of community we want to live in."*
>
> ***Jasmine G., Student***

Tree City USA

The Tree City USA designation shows a community's commitment to protecting its urban forest resource by meeting criteria established by the National Arbor Day Foundation. The four criteria that communities must meet annually to maintain Tree City USA status are:

- A community forestry program with an annual budget of at least $2 per capita
- A tree care ordinance
- An Arbor Day Observance and Proclamation
- A Tree Board or Department

The City of Kirkland has shown a commitment to responsible urban forest management by celebrating its tenth consecutive Arbor Day in 2011, maintaining its status as a Tree City USA. By going beyond the requirements for Tree City USA status, Kirkland has received two Growth Awards from the National Arbor Day Foundation. Aside from the recognition and community pride in this designation, maintaining Tree City USA status enables cities to be competitive for grant funding. Without this support, Kirkland could not have conducted its 2011 canopy assessment and this strategic management plan. Unfortunately, the increase in population with the recent annexation resulted in a decrease in the per capita spending required for Tree City USA designation in 2011. This means that, without planning its urban forestry budget, Kirkland will have difficulty maintaining its Tree City USA designation in the future.

The City of Kirkland Website

The City has a web page dedicated to urban forestry interests and issues. It is updated as needed, such as with policy changes or with the completion of a special project. Visitors to the City website must navigate from the home page to the 'Community Link' and then to the 'Kirkland Green' link to access the page. Although this page is an excellent starting point to accessing

other City webpages regarding trees, visitors to the Kirkland website must know to navigate through the Planning Department to learn about tree related policies. This could be a very useful informational resource if adequately maintained and updated on a regular basis.

To summarize Sections 2.1 through 2.5, a review of current practices has been completed of Kirkland's urban forestry program, which examines these elements:

- Existing operations in the Planning, Parks and Public Works Departments
- Current funding resources
- Comparisons to other municipal urban forestry programs
- Municipal-Community interactions

In Section 2.6, an assessment of Kirkland's performance can be made using the information gathered from the review and from researching applicable codes, documents and policy. The next section outlines 21 criteria for urban forest performance and provides indicators from low to optimal performance for each.

2.6 Kirkland's Urban Forestry Performance

As detailed in the Plan Overview & Methodology, these four focus areas were reviewed to assess progress towards and identify the challenges to better urban forest management:

- **Kirkland's Urban Forest Asset**
- **The City's Guiding Policies and Regulatory Framework**
- **The Municipal Urban Forestry Program**
- **Municipal-Community Interaction**

Using the criteria established in "A Model of Urban Forest Sustainability" (Clark, et al, 1997) shown in Appendix A and the guidelines from "A Framework for Strategic Urban Forest Management Planning and Monitoring" (Kenney, et al, 2011), a gap analysis was generated. Together with the City staff interviews and research into City codes and procedures, the analysis shows how Kirkland's urban forest performance rates in individual program components and then, at the end of this section, overall.

Each of the performance measure criteria are assessed with a rating from low to optimal performance. A description of the current status for each performance measure follows, along with a summary of the risks of inaction and the benefits of increased performance. There are three performance indicators of urban forest health in which the City, without a complete tree inventory, has no data to accurately perform an assessment. This is an example of how many of the criteria items identified in this analysis are co-dependent with the others for achieving improved performance.

URBAN FOREST ASSET

Criteria:	**Measure Canopy Coverage**
Justification	Assess tree canopy cover citywide and within specific areas using a consistent measurement strategy at even intervals.
Performance	Good
Current Status	In 2011, the City used high resolution imagery to compare tree canopy data from 2002 to 2010, but has not fully integrated this information into the City GIS system for use by staff in multiple departments. When integrated, this information can be applied at several levels (watershed, neighborhood, zoning type, by parcel, etc.) to further assist with other City goals/protocols. No subsequent canopy studies are funded or planned.
Risk	Reduced capability to monitor canopy as a performance measure and community goal. Limits interdepartmental effectiveness if canopy data is not available in city-wide GIS system.
Benefit	Provide an overall measure of program success and. Clearly identify targeted opportunities for improvement. With integration into GIS: optimize city-wide coordination, improve internal efficiency, improve public & development services, position for regional collaboration

URBAN FOREST ASSET

Criteria:	**Existing Canopy Cover Status**
Justification	Performance measure towards the City's 40% canopy goal. Gauge of balanced growth, development and natural resource protection.
Performance	Optimal
Current Status	The existing canopy cover equals 75%-100% of the potential. Following the 2011 annexation, Kirkland's canopy coverage was 40.7%; consequently the City has met its 40% canopy goal. The City is positioned to continue efforts to maintain its canopy coverage and possibly shift towards identifying the quality, condition, age, and diversity of its canopy coverage to achieve optimal canopy cover health and succession.
Risk	Disparities exist in tree coverage between zoning classes, land use, watersheds or business districts. Low % of urban tree canopy coverage causes increased flooding, urban heat island effects, energy use; reduces air quality and degrades asphalt road surfaces. Canopy reductions also negatively impact wildlife travel corridors and decrease habitat.
Benefit	Canopy cover can help optimize the ecosystem services provided by the urban forest. Continued efforts towards developing strategies for increasing canopy and target specific areas for enhanced benefits.

Criteria:	**Public Tree Inventory**
Justification	Infrastructure asset inventory
Performance	Low to Moderate
Current Status	Sample-based inventory of public trees: the original 2004 street tree inventory has not been comprehensively updated and only includes the location of trees in the annexation area. There is no inventory of public trees in formally-landscaped parks. Without a complete public tree inventory, the City does not have enough information to assess the current level of performance or manage the following three criteria: urban forest age, species suitability and diversity (see below).
Risk	Difficult for City to proactively manage its public trees, efficiently track operations and monitor public service levels. Without condition and value of trees it's difficult to resolve accident claims and reimbursements for damage caused by extreme weather events or other disasters. Without data on all public owned trees, planning and prioritization of urban forestry activities is based on conjecture and anecdotal evidence.

Benefit	Managers can develop work programs appropriately and justify funding needs. City can quantify assets, risks, and liabilities. Lower public tree maintenance costs. Plan proactive tree management strategies and distribute workloads efficiently.

Criteria: Urban Forest Age

Justification	Provide for an uneven age distribution of trees throughout the City and at a neighborhood level (approximate age determined by DBH) for long-term succession.
Performance	Not enough information to determine
Current Status	Unknown; need complete public tree inventory. 'Low' is any relative DBH class represents more than 75% for the tree population. 'Optimal' is 25% of the tree population is distributed amongst each of four relative DBH classes.
Risk	Substantial maintenance costs and expensive end-of-life tree removals may be necessary in even-aged populations that reach the end of their useful life simultaneously. Tree failure from disease, extreme weather events, and pests can be catastrophic in even-aged tree populations. Neighborhoods and business districts can become devoid of canopy.
Benefit	Age distribution facilitates long-term budget forecasting. Annual costs for care of public trees can be more evenly distributed over many years. A varied age-class distribution is important for a succession of environmental benefits and results in a healthier, more resilient and sustainable urban forest.

Criteria: Species Suitability

Justification	Establish a tree population suitable to the urban environment and adapted to the regional environment.
Performance	Not enough information to determine
Current Status	Unknown; need complete public tree inventory. 'Low is less than 50% of trees are of species considered suitable for the area. 'Optimal' is all trees are species considered suitable for the area.
Risk	Unsuitable species require substantial maintenance and must be replaced more frequently.
Benefit	Poor performing tree species do not continue to be planted, reducing tree maintenance and removal costs.

URBAN FOREST ASSET

Criteria: Species Diversity

Justification	Establish a genetically diverse tree population citywide as well as at the neighborhood level.
Performance	Not enough information to determine
Current Status	Unknown; need complete public tree inventory. 'Low' is fewer than 5 species of trees dominating the entire tree population. 'Optimal' is no species represents more than 10% of the entire tree population at the neighborhood level. Exceptions are made for native species in naturalized areas.
Risk	Predominance of a few species can lead to substantial impacts from weather events that damage certain species and to limit the risk of catastrophic loss from species-specific pests or disease. The dramatic impact of Dutch Elm disease and Emerald Ash borer on urban forests are prime examples of why cities diversify tree species. The risk of ignoring species diversification can be costly for municipalities.
Benefit	Healthier, more resilient and sustainable urban forest.

Criteria: Condition of Public Trees

Justification	Establish a detailed understanding of the condition and risk potential of all public trees.
Performance	Low
Current Status	Request-based, reactive system. The condition of public trees is largely unknown; City trees in the right-of-way or in parks do not typically receive routine planned inspections.
Risk	Lack of proactive hazard tree evaluations can compromise public safety and increase risk of municipal liability.
Benefit	Successfully tree maintenance budgeting. Increased public safety. Reduced liability associated with tree failure.

Criteria: Extensively Managed Public Natural Areas

Justification	Detailed understanding of the ecological structure and function of all public natural areas.
Performance	Good
Current Status	In 2008, the City adopted a 20-Year Forest Restoration Plan for its forested open spaces located in parks, including some road and trail rights-of-way. The Forest Restoration Plan outlines the structure & function of forested parkland, however, it does not include the

	extensive acreage of natural areas in the annexation areas, nor is the ecological structure and function of all publicly-owned natural areas documented in the citywide GIS system.
Risk	If services are not tracked, the value of the asset is unknown and preservation and maintenance is more difficult to rationalize.
Benefit	Healthier, more resilient and sustainable natural areas. Urban forestry projects will be easier to identify, finance and secure when cost-benefit relationships can be established.

Criteria: Trees Planting & Establishment

Justification	Urban forest renewal is ensured through a comprehensive tree establishment program driven by canopy cover status, species diversity, and species distribution objectives.
Performance	Low to Moderate
Current Status	Current tree planting in the City is ad hoc, with the only formal directive for new tree establishment coming from City development code requirements. The City has benefited from substantive planting efforts through the Green Kirkland Partnership and in major park projects (e.g. Juanita Beach Park). An 'optimal' tree planting & establishment program is directed by a planting and directed by needs derived from a tree inventory and is sufficient to meet canopy cover objectives.
Risk	The number of trees in the City will decline without active replanting. To combat typical tree mortality, the City must engage in annual tree planting. Without data to quantify the tree mortality rate, the number of trees that should be planted annually cannot be determined.
Benefit	This will guide the value of the ecosystem services provided by the urban forest and control costs by proactively directing the future state of the urban forest.

Criteria: Native Vegetation

Justification	The preservation and enhancement of local natural biodiversity
Performance	Good
Current Status	This criterion is well managed through the adoption of the aforementioned Forest Restoration Plan, which identifies the composition value of native stands and recognizes the dangers of invasive species. Use of native vegetation is encouraged on a project-appropriate basis; invasive species are recognized and their use discouraged.

URBAN FOREST ASSET

Risk	Reductions in native species decrease preferred habitat for fauna. Example: Declining native range of Pacific madrone.
Benefit	Provides resiliency in the urban forest. Native vegetation often requires less maintenance and optimizes ecosystem health.

Criteria: Tree Location/Habitat

Justification	Public trees planted in appropriate locations or habitats that will maximize current and future benefits of the site.
Performance	Moderate
Current Status	Tree species are considered in planting locations through planting guidelines that are routinely updated. The City can set policies on species selection and planting strategies that are aligned with other plan goals. Although tree species are considered through existing City codes and policies, there are no community-wide guidelines for the improvement of planting sites and the selection of suitable species. Optimally, all trees are planted in sites with adequate soil quality and quantity, and growing space to achieve their potential.
Risk	Improperly planted trees and unsuitable species increase future workloads.
Benefit	This will control costs for urban forest management. This performance measure is important to help to ensure that trees maximize current and future benefits.

POLICIES & REGULATORY FRAMEWORK

Criteria: Effective Tree Protection Codes or Ordinance

Justification	Effective towards meeting City's 40% canopy goal, supports community vision as expressed in the Comprehensive Plan.
Performance	Optimal
Current Status	The City adopted wide-ranging tree protection regulations (KZC 95) in 2005. Code amended for clarity in 2009. Adequate staffing resources dedicated for code administration and enforcement. Canopy increased from 2002 (32%) to 2010 (36%) prior to annexation.
Risk	Loss of canopy and associated ecosystem benefits provided by trees, lower desirability to live, work, recreate in Kirkland vs. adjacent communities with greater aesthetic character.
Benefit	Greater environmental, social, and economic well-being.

Criteria: City-wide Urban Forestry Management Plan

Justification Ensures the sustainability of Kirkland's urban forest in order to optimize the ecosystem services provided by trees city-wide.

Performance Low; shifts to good or optimal pending acceptance

Current Status Currently there is no citywide Urban Forest Strategic Management Plan. The optimal performance indicator for urban forest management plans is a strategic multi-tiered plan for public and private intensively and extensively managed forest resources that has been formally recognized and implemented with adaptive management mechanisms.

Risk Uncontrolled costs associated with tree maintenance and removal, Plan becomes unused and obsolete, inefficient and ineffective public service, increased liability associated with tree failure.

Benefit Creates pathways to stable and predictable funding. Has flexibility to adapt to new information as a result of monitoring outcomes or changes in best management practices based on best currently available research. With periodic reviews and updates, Plan maintains relevance to the community and City staff.

Criteria: Stable Municipality-wide Funding

Justification Achieve overarching goals and individual objectives in the Plan.

Performance Low to moderate

Current Status A variety of funding sources are used including the General Fund, Surface Water Utility, grants and capital improvement program. 'Optimal' performance for municipal-wide program funding is with adequate private and public funding to sustain maximum urban forest benefits.

Risk Objectives will not be attained if staff and funding resources are not available.

Benefit Controlled costs, as funds are allocated to urban forestry programs strategically.

Criteria: Urban Forestry Staffing

Justification Employ and train adequate staff to implement citywide urban forest management plan

Performance Moderate

Current Status The City does not have a formalized forestry unit for sustainable maintenance and management. City-wide, only one staff member is a permanent dedicated full-time forestry position. Permitting, code enforcement and development review staff attend to urban forestry issues but are not formally trained in arboriculture or urban forest management.

Risk Staff may not be aware of most recent best management practices and industry standards. Tree risk assessments made by untrained staff may be exposing the City to a greater liability associated with tree failure.

Benefit Staff can effectively manage urban forest risks and control costs using the best available science and practices.

Criteria: Interdepartmental Cooperation

Justification Ensure all City departments cooperate with common goals and objectives.

Performance Moderate

Current Status Kirkland does not have a centralized urban forest program, nor are there designated urban forest divisions within multiple departments. There are some common goals but also differences and sometimes little cooperation between departments. This approach has been effective so far due to the level of communication and sharing of institutional knowledge by individuals. The City forms informal interdepartmental teams that function to implement these goals on a project-specific basis. Cities with well-developed urban forestry programs ensure all departments are cooperating with common goals and objectives by establishing a formal interdepartmental team providing leadership across all urban forestry projects.

Rationale Team meetings ensure that plan objectives are routinely referenced and plan obstacles can be addressed through collaborative problem solving ensuring that all City departments cooperate with common goals and objectives.

Risk Miscommunications with the public or misalignment of priorities of objectives may occur. Isolation from decisions and collaboration can result in limited plan effectiveness.

Benefit The team will improve operating efficiency on urban forestry projects. Improved levels of public service.

MUNICIPAL-COMMUNITY INTERACTION

Criteria: Green Industry Cooperation (as Stakeholders)

Justification City and contractors operate with high professional standards and commit to city-wide goals and objectives.

Performance Low to moderate

Current Status No adherence to industry standards in many commercial landscapes; general cooperation among nurseries and tree care companies, no vegetation management plans with city's utility providers, issues with development plans/arborist reports not meeting professional standards or City requirements.

Risk Failure to engage with green businesses can result in damage to public trees and canopy loss.

Benefit Establishing partnerships with green industry businesses encourages alignment with City urban forestry objectives and lowers costs associated with urban forest management through voluntary cooperation. Helps to ensure the green industry operates with high professional standards and commits to citywide goals and objectives. Sets a positive example and creates advocates of proper tree care. Kirkland has an opportunity to partner with its two utility providers, Seattle City Light and Puget Sound Energy to draft vegetation management plans for the pruning and restoration of trees within overhead utility jurisdiction.

Criteria: Neighborhood Action

Justification At the neighborhood level, citizens understand and cooperate in urban forest management.

Performance Moderate to Good

Current Status City-wide coverage and regular interaction of Green Kirkland Partnership; otherwise isolated or limited number of active groups. With the recent annexation, all neighborhoods may not be unified in their understanding of the urban forest management objectives of the City. The Finn Hill Neighborhood Alliance (formerly Denny Creek Neighborhood Alliance) is a strong example of neighborhood leadership. Since 1996, this non-profit group serves to "preserve, protect, and restore the natural resources of the area and promote stewardship of wildlife and the environment," has led efforts to restore Denny Creek, help draft a King County ordinance protecting mature trees and native vegetation, raised funds to help purchase Juanita Woodlands, a 40 acre parcel of land and produced a detailed study of watershed issues (Finn Hill Neighborhood Alliance, 2012).

MUNICIPAL-COMMUNITY INTERACTION

Risk	Failure to engage with neighborhoods can lead to misunderstandings and citizen distrust of City staff and policies.
Benefit	Neighborhood stewardship can be one of the most cost-effective methods for creating a sustainable urban forest and foster volunteerism in the community, which lowers costs associated with urban forest management through voluntary cooperation.

Criteria: Municipal-Citizen Interaction

Justification	*All constituencies in the community interact for the benefit of the urban forest*
Performance	Moderate
Current Status	Currently, there is little to no interaction amongst constituencies. On a project-by-project basis, the community may interact with informal or general cooperation. As an example, the Central Business district trees are maintained by the City. Tree vs. view issues and the tree regulations have been polarizing amongst constituencies. Permit processes are a main point of interaction for urban forestry issues. Having a community tree board that meets on a regular basis can increase community participation on urban forestry issues and help ensure success with plan objectives by creating interactions between the community and the benefits of the urban forest.
Risk	Public does not have a way to voice opinions.
Benefit	This can improve community support for urban forestry funding and provide a public forum to resolve tree conflicts.

Criteria: General Awareness of Trees as a Community Resource

Justification	Urban forest recognized as vital to the community's environmental, social, and economic well-being.
Performance	Low and optimal
Current Status	Trees are sometimes seen as a problem by developers and homeowners, while others recognize trees as vital to community, creating very polarized views. Public education on the City's tree protection ordinance, proper tree care and planting guidelines is not readily available.
Risk	Failure to integrate UFMP goals in the City's policies may limit effectiveness of plan, risk conflict or affect funding.
Benefit	Citizens more likely to invest their energy and resources to help achieve goals of Plan, appreciate the vital role of the urban forest in

MUNICIPAL-COMMUNITY INTERACTION

their communities, and are more likely to support urban forestry projects and program.

Criteria:	**Regional Cooperation**
Justification	Provide for cooperation and interaction among neighboring communities and regional groups.
Performance	Low to moderate
Current Status	Plan objectives should be ongoing and have relevance wherever possible to the objectives of Washington State, King County, the Puget Sound Partnership, and neighboring municipalities Bellevue, Redmond, Bothell and Woodinville. At this point, clear regional goals for the urban forest do not exist, however, many cities have adopted a canopy cover goal based on recommendations from American Forests (2007). The City has been a leader in creating local natural resource protection for its shoreline, trees and critical areas as encouraged in the Growth Management Act, Clean Water Act, etc.
Risk	Failure to integrate UFMP goals with regional goals may limit effectiveness of plan or risk conflicts with regional planning efforts.
Benefit	Cooperation with regional urban forest planning outside the City ensures the Kirkland urban forest is an integrated component of larger regional planning efforts. Regional partnerships can create pathways to stable and predictable funding.

Summary of Gap Analysis

In summary, Kirkland's overall urban forest performance based on these indicators is averaged as low to moderate. Although the City is performing well by several indicators, there are slightly more criteria that are rated below a 'moderate' performance rating. Three indicators cannot be evaluated due to a lack of available data. These gaps are significant barriers to the potential success and sustainability of the City's urban forest management. Summary findings in each of the four focus areas are detailed further below:

Kirkland's Urban Forest Asset – Current tree planting in the City is ad hoc, with the only formal directive for new tree establishment coming from City development code requirements. The outdated street tree inventory does not include the recently annexed area, and no inventory exists for trees in formally-landscaped parks. Only partial and outdated information exists on the condition, structure and risk potential of public trees in Kirkland. Although the City's 20-Year Forest Restoration Plan provides an assessment of the quality and health of native trees and vegetation located in parks and open space, it does not include the significant acreage of open space in the annexation area under the current jurisdiction of Kirkland. Although a very comprehensive tree canopy assessment has been completed recently, the information is not usable by all departments.

The City's Guiding Policies and Regulatory Framework – The City's Comprehensive Plan provides a clear vision for Kirkland's future urban forest by establishing a target canopy goal. Recognizing that over 50 percent of the City's canopy is on private property, the adoption of code requirements for tree retention sought to achieve the city-wide 40 percent canopy goal. Kirkland Zoning Code Chapter 95 provides for tree protection and requires a permit to remove trees and a review process for trees impacted by development. This code, while comprehensive and somewhat complex, provides adequate flexibility to accommodate various development scenarios. As a program asset, Kirkland's regulatory framework and code enforcement has played a role in canopy preservation and expansion over the previous decade.

The Municipal Urban Forestry Program – Tree management involves many departments within the City of Kirkland. Staff priorities for urban forestry operations are currently driven by reactive management tactics due to budgetary constraints. This limits the City's ability to realize efficiency gains from proactive management. There is no centralized urban forestry program or division. Some operations involve a moderate level of informal, intra-departmental cooperation and communication. This lack of more formalized leadership results in a general disconnect between staff's understanding of the City's urban forestry policies and the public's understanding and application of them.

Municipal-Community Interaction - Residents, community groups, developers and other organizations that can influence and support urban forest management are important community resources for urban forest managers. As evidenced by the success of the Green Kirkland Partnership, the City has active neighborhood associations, volunteer groups and business interests that support natural resource stewardship. A recurring concern observed during this analysis was the lack of resources available to educate and engage the community on urban forestry issues. A greater emphasis on community outreach can help generate the support and community vision necessary for a sustainable and successful urban forestry program.

3. Community Outreach Results

In the previous section, a review of the City's performance resulted in an assessment of the City's urban forest program. It is essential to consider input and ideas from various external stakeholders in the preparation of this strategic plan; providing an opportunity for stakeholders to contribute ideas and interests is an important component to the planning process. A community outreach strategy was developed early in this process of creating this plan. The purpose of soliciting input is to gauge the community's:

- Vision and overall sentiment related to trees and ecological systems
- Understanding of tree-related codes and policies
- To understand the public's priorities for managing the urban forest resource

> *"[Urban forestry] is a planned and programmatic approach of the development and maintenance of the urban forest. It includes all elements of green infrastructure within the community in an effort to optimize the resulting benefits in social, environmental, public health, economic and aesthetic terms, especially when resulting from a community visioning and goal-setting process."*
>
> ***— Schwab, 2009***

A number of strategies were employed to solicit input and guidance for the Plan. An on-line survey in questionnaire form was sent to several City email listserv recipients. The results are summarized below and noted in Appendix C. The City sent out a news release, included a short article in the fall City Update newsletter and incorporated information on the draft plan on the City's webpage.

The City of Kirkland received a grant from Forterra, formerly known as Cascade Land Conservancy, as part of the Environmental Protection Agency's Building Blocks for Sustainable Communities Program to conduct a series of focus group discussions on the strategic plan to provide residents and other stakeholders an opportunity to express their views about management policy and priorities. Key stakeholders to participate in the focus groups include:

- Neighborhood groups and Kirkland residents
- Developers, builders, architects and the business community
- Tree care professionals, consulting arborists, utility and municipal arborists, landscapers and nursery personnel

3.1 Summary of Focus Group Meetings

The three focus groups were held the last week of September at Kirkland's City Hall. Key findings are outlined below and all focus group comments are in Appendix B. The main findings of these focus groups are grouped into three areas:

- Outreach, education and communication;
- Comments on the draft Urban Forestry Management Plan; and
- Opportunities to improve urban forest management.

All three focus groups spent a large amount of time discussing opportunities and weaknesses around outreach, education and communication. Many of the respondents were not familiar with current requirements around tree removal and the permits required, especially in the annexation areas where these regulations are new. Clear, concise text, easily understandable graphics and outreach efforts to make more residents aware of the current requirements around tree removal, maintenance, recommended species and replacement was requested.

In addition, there was an expectation amongst all focus groups that the City needs to provide an adequate level of service (primarily staff) to respond to code questions, perform outreach and support the effort of urban forest management. It was suggested that a workshop with developers and tree care professionals would be a good first step on outreach around the Plan and current codes.

Obtaining feedback on the draft Urban Forestry Management Plan was a priority at each focus group. Many participants remained unsure about what goals and recommendations were being made by the Plan. It was requested that the report should use less jargon and present a balanced, professional tone that is understandable by the public and professionals alike. Additionally, the Plan should clearly convey the benefits of maintaining and enhancing the urban forest canopy along with the potential costs relating to maintenance, solar access and reduced development flexibility.

It was requested that the draft executive summary be more concise. Regarding the 40% canopy goal, many participants stressed that the report should identify how existing canopy will be maintained as parcels develop, especially in the annexation areas, and whether neighborhoods, watersheds and/or zoning types could have goals that lead to an overall citywide average. The takeaway regarding the management plan was that it should be much more concise, fully articulate the values/costs of the urban forest in Kirkland and make clear recommendations.

All participants in the three focus groups spent much of the time on the opportunities around urban forestry on both public and private lands in the city. Tree professionals stressed that codes should look at function instead of tree size when it comes to tree retention and replacement. All groups stressed the need for some level of flexibility including the opportunity to cluster homes to conserve trees, in-lieu fees instead of retention and incentives to preserve heritage trees.

Concerns were expressed that trees on private property and property rights need to be respected. Tree professionals and developers both thought that a workshop involving these groups would be beneficial to further improve existing codes and regulations. Many participants thought the city could devote more resources to managing existing public tree canopy in rights of way and parks. Much of the feedback involving opportunities for management were closely tied to findings around improved education and communication.

3.2 Summary of Survey Results

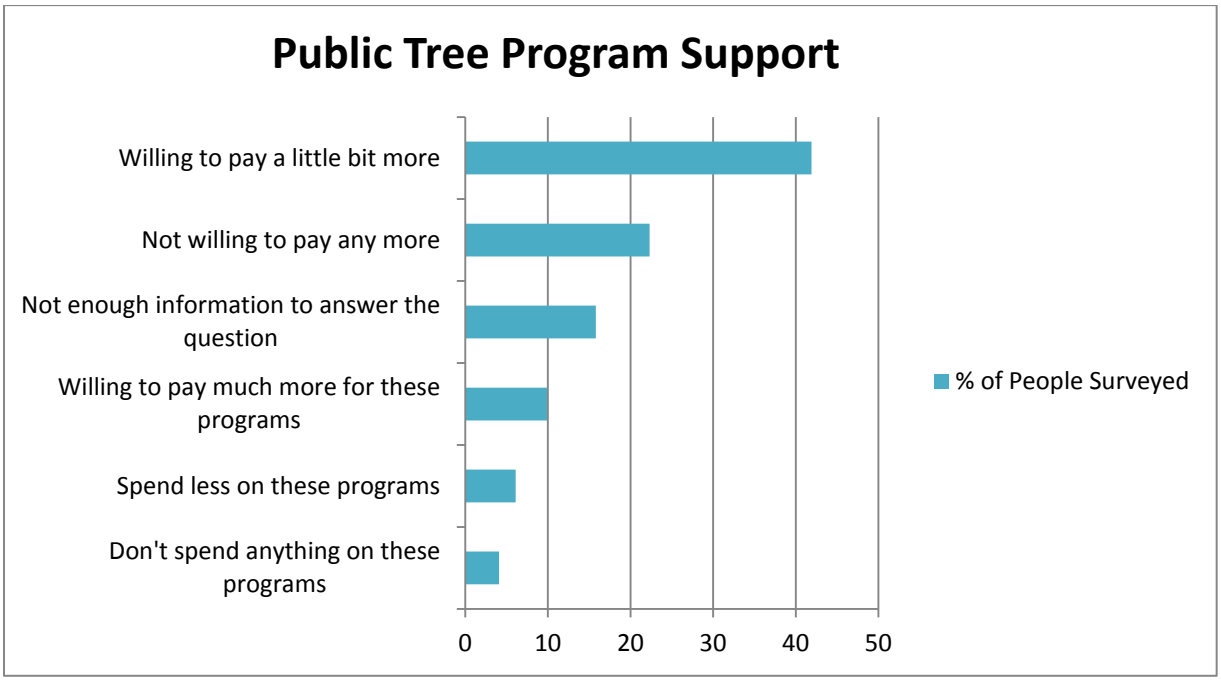
From August 21, 2012 to September 14th, 2012, an online public survey was conducted. A total of 665 people responded, with 484 (72.8%) indicating that they were residents of Kirkland. Another 24% of survey responders live and/or work only in Kirkland. Of residents, the greatest response (18.6%) came from those living in the Finn Hill neighborhood. The majority of respondents said that they have some knowledge of trees (68%) and could identify some of the trees near their home (66.6%).

Eighty-two and a half percent (82.5%) of respondents believe that the urban forest includes native forest areas, trees in formally-landscaped parks, trees located along the road and the public right-of-way, and trees on private property. The majority of those surveyed (>93%) are satisfied with the overall condition of trees in formally-landscaped parks and in forested parks. However, when it comes to trees in the right-of-way (along streets), 17% of respondents indicated that they are not satisfied with the condition of the trees and only 20% thought that the "trees look great".

Nearly forty-eight percent (47.7%) of those surveyed understood that they have a responsibility to care for the trees located in front of their property, between the street and the sidewalk. Twenty-three percent (23.2%) believed that the City's tree crew was responsible for these trees and 29.1% were not sure who is responsible.

Interestingly, while 9.4% of respondents feel that the City is planting too many public trees, 33.5% believe that the City should plant more and 34.3% feel that the City is planting just enough public trees. In addition, 41.9% of those surveyed indicated that they would be willing to pay a little bit more to support public tree protection, planting and maintenance programs.

Figure 9. Survey results on public tree program support

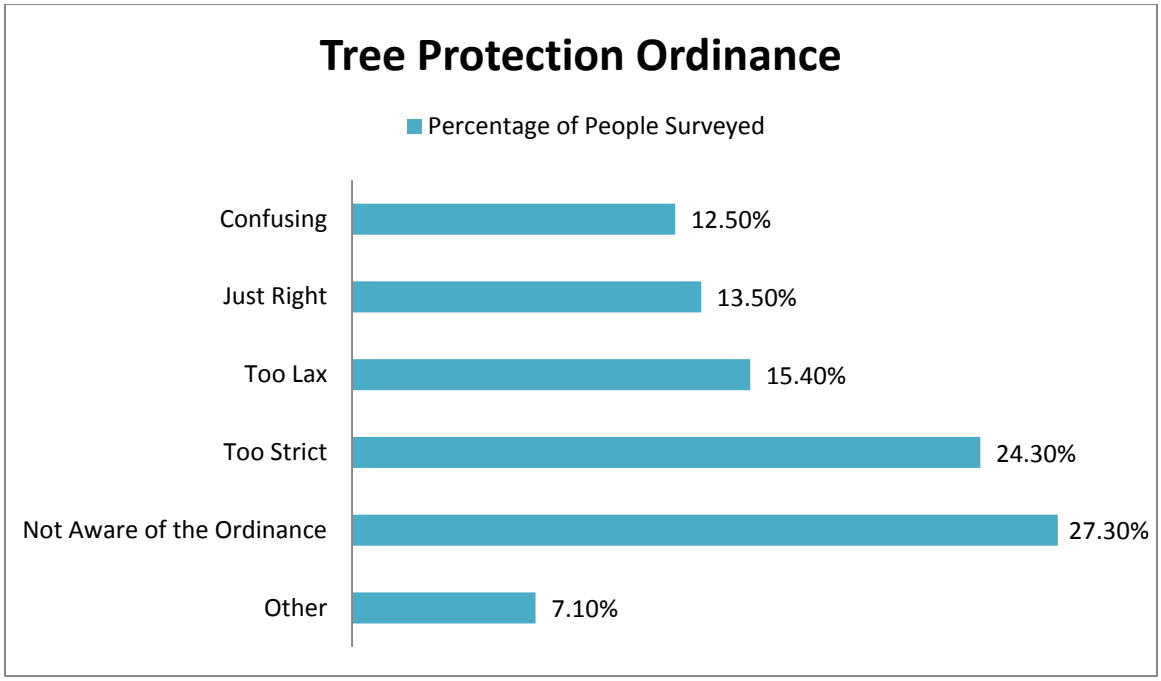


When asked to rate the importance of various benefits of the urban forest, respondents overwhelmingly (64%) expressed the greatest appreciation for providing habitat for birds, animals, and fish. The enhancement of the shopping experience in business districts was rated as the least important environmental benefit (14%).

When asked to provide an opinion about the City's tree protection ordinance, 24.3% of respondents believe the ordinance is too strict, as it limits what can be done on private property. Twenty-seven percent (27.3%) indicated that they were not aware of the city ordinance enough to comment.

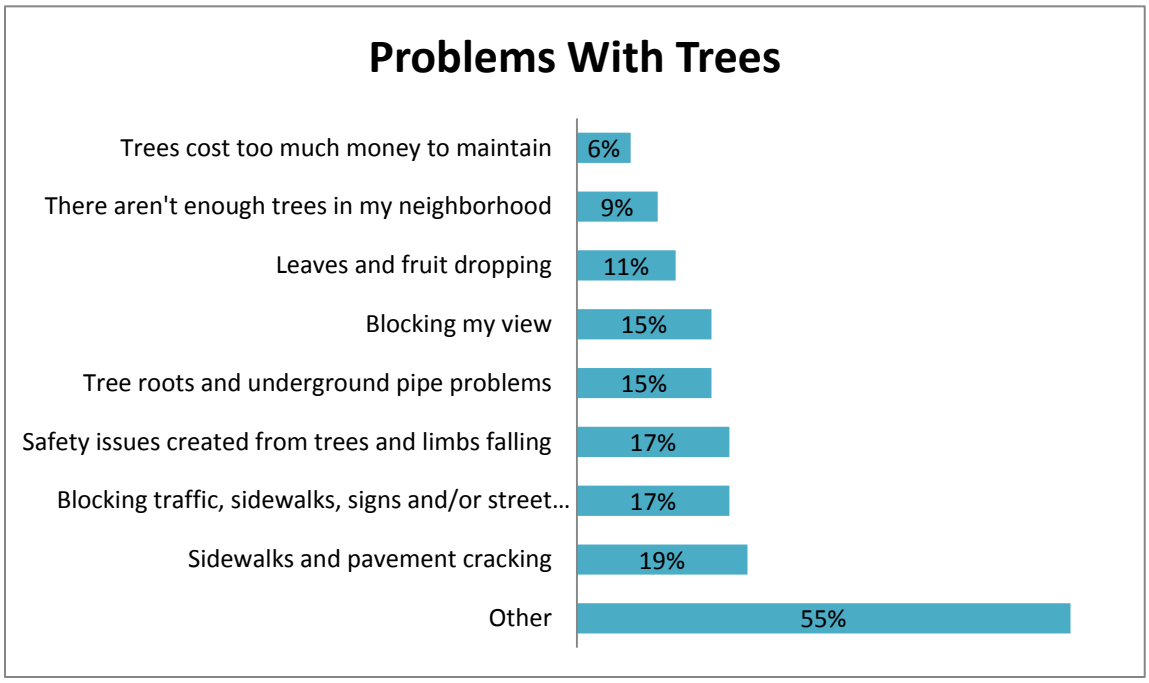
The sum of the number of respondents that feel the tree regulations are 'just right' combined with those that fell the ordinance is 'too lax'(28.9%) is slightly higher than the number of respondents that feel the City's tree protection ordinance is too strict (27.30%).

Figure 10. Survey results on Kirkland's tree protection ordinance



When asked to rate a series of problems generally encountered with trees, 55% of respondents chose "Other" as their major problem, using the comment section to indicate their concern with a variety of unlisted problems, including obstruction of views, power outages, and onerous regulations (See Appendix C for a complete list of comments). The cost of maintaining trees was of least concern, with only 6% indicating it was a major problem. (Figure 11)

Figure 11. Survey results on the perceived problems with trees



The complete survey, along with community response and comments, is included in Appendix C

4. Goals, Strategies and Recommendations

The findings from Kirkland's program review, criteria and indicators, gap analysis, public outreach and comparison to best management were used to develop broad over-arching *goals*. To guide the City's management efforts, *strategies* are provided to identify how to achieve each goal. These strategies provide managers and City leaders with a model for Kirkland's urban forest program over a twenty year horizon. To establish focus and direction on a more short-term basis, *recommendations* are in support of the strategies and specify actions to take in each of the four primary focus areas:

While many of the strategies and recommendations presented here support more than one of these goals, this section provides an overview of each recommendation in relation to the primary goal it is intended to support. Table 8 illustrates the strategies and recommendations that can be accomplished within the 2013-2018 Five-Year Work Plan.

4.2 Urban Forest Asset

GOAL: Ensure the sustainability of Kirkland's urban forest resource.

STRATEGY: Obtain a greater understanding of the structure, function and benefits of the urban forest resource in order to improve the quality and sustainability of the resource.

To accomplish this, the City needs to increase the amount of data about its urban forest resource. While the City has realized its overall 40% canopy goal with the recent annexation, maintaining overall canopy cover and improving the performance of the resource should remain a focus for the urban forestry program. A comprehensive awareness of canopy structure can help the City balance continued development with protection of the community's urban forest asset.

Urban tree canopy: asset or liability?

SUPPORTING RECOMMENDATIONS:

Establish Dedicated Resources for Public Tree Maintenance

Establishing staff and equipment resources dedicated to maintaining the City's urban forest assets will facilitate program efficiency, work planning, and budget forecasting. In addition, having a dedicated staff will promote better and more consistent tree care, higher standards for education and certification, and greater compliance with best management practices.

Establishing dedicated resources for public tree maintenance also supports the goals for canopy, and program funding, and is supported by the following strategies:

- Identify the number of staff needed to fulfill current and desired levels of maintenance
- Ensure qualified arborist staff in Parks and Public Works

- Train and certify field crews and staff to promote and maintain expertise, professional performance, and compliance with industry safety standards
- Identify and provide equipment resources necessary for tree care operations

Establish Dedicated Funding for Public Tree Maintenance (tree crew and equipment)

Tree maintenance (including structural pruning), providing for clearance, and mitigating hazardous conditions are a vital part of urban forest management. The City will need to justify and establish dedicated funding for the staff and equipment necessary for meeting the maintenance expectations of the community.

Establishing dedicated resources for public tree maintenance also supports goals for urban forestry program and canopy, and is supported by the following strategies:

- Identify the number of full-time staff needed to fulfill current and desired levels of maintenance
- Identify equipment needs
- Calculate cost of funding staff and equipment dedicated to public tree maintenance
- Explore funding sources applicable for public tree maintenance (See Section 4.6)

Update Public Tree Inventory

Maintaining a comprehensive and up-to-date inventory of individual public trees in parks and City right-of-ways, provide a critical foundation for management planning. Comprehensive inventory data forms the basis for efficient and effective work planning as well as accurate budget forecasting. In addition, complete and current inventory data can be used in conjunction with freely available, industry supported software to analyze the structure, value, benefits, and cost versus benefit ratio for urban forest assets.

Data maintained on individual trees should include:

- Unique identification
- Specific GIS location
- Genus and species
- Stem diameter at breast height (DBH, at 4'6")
- Condition rating
- Maintenance needs
- Work history

Maintaining an inventory of public trees on streets, parks, and right-of-ways also supports the goals for canopy, program funding, and public engagement, outreach and education, and is supported by the following strategies:

- Update and maintain current inventory
- Conduct inventory for recently annexed areas
- Synchronize and use city-wide work order, GIS, and permit database system
- Quantify the environmental, social, and economic benefits of trees

- Document tree condition and maintenance needs

Identify Costs and Funding Approach for Tree Inventory Work

Completing a comprehensive and updated tree inventory collection is an important objective for this Plan. Identifying the costs and a funding approach for completing this work is critical to the success of a number of objectives aimed at acquiring significant information about the structure, condition, value, and benefits of Kirkland's urban forest

This objective also supports goals for urban forestry program, canopy, and public engagement, outreach and education, and is supported by the following strategy:

- Explore opportunities for state and national urban forestry grants (e.g., Washington DNR), that often support the collection of inventory data for established urban forestry programs

Analyze Urban Forest Benefits, Functions and Value

Quantifying the value and benefits of Kirkland's tree canopy can provide important perspective for maintaining a level of canopy cover that provides the amount of environmental and economic services desired by the community. Available and emerging software, including i-Tree Eco, i-Tree Vue, and CITYgreen, can be used in conjunction with landcover data to quantify the specific benefits of Kirkland's tree canopy, including benefits to air quality, carbon sequestration, and stormwater management. This awareness, evaluated in conjunction with other GIS data, including land-use, parcel data, watersheds, and stormwater drainage areas, is an important tool for preservation. Understanding the current level of benefits can provide critical information for public outreach and communication about the value of Kirkland's trees and the importance of proactive management.

Analysis of canopy benefits also supports the public engagement, outreach and education goal, and is supported by the following strategies:

- Seek grant funding for canopy benefit analysis
- Perform an i-Tree Eco and/or i-Tree Vue analysis
- Present canopy benefit results to the public

Increase Canopy in Key Areas

Increasing canopy in key areas, including areas that are currently underserved and locations where preservation is already supported, will help the City maintain overall canopy goals while continuing to promote economic and community development. The Integration of landcover data into the City's GIS system will provide urban forestry and planning staff with the tools needed to monitor canopy cover, anticipate threats and challenges to canopy preservation, and respond perceptively to requests for tree removal. Once integrated, the landcover data can be further analyzed along with other GIS layers to understand the relationship of canopy to other factors, including:

- Zoning
- Land use
- Neighborhoods

- Watersheds
- Open space
- Preservation areas
- Areas at high risk for development

Understanding these relationships can help Kirkland determine where best to focus tree planting resources that will maintain and enhance the existing canopy cover and associated benefits.

Increasing canopy in key areas also supports the public engagement, outreach and education goal, and is supported by the following strategies:

- Integrate landcover data into the City's GIS system
- Analyze canopy cover by neighborhood, zoning, and watershed
- Seek grant funding for tree planting and forest restoration
- Coordinate with Green Kirkland Partnership in support of reforestation
- Increase public awareness of high value canopy

Plan to Conduct Subsequent Canopy Assessments

The urban forest is part of a dynamic ecosystem, responding constantly to external pressures, including development, weather, climate, pests, disease, and patterns of use by humans and wildlife. Periodic updates to the landcover GIS map layer allows urban forest managers to identify changes in canopy, and may provide critical knowledge for a quick response to changing conditions and threats to Kirkland's forests.

Conducting a canopy assessment every 10 years also supports the public engagement, outreach, and education goal, and is supported by the following strategies:

- Develop a procedure for canopy assessment that ensures consistent analysis
- Include canopy assessment in future urban forest management plans
- Establishing long-term funding
- Seek grant funding for canopy assessment
- Share information about changes and threats to the canopy with the public

Develop a Planting Program

The value of Kirkland’s urban forest should continue to increase as existing trees mature and new trees are planted. Developing a planting program can help urban forest managers focus tree planting resources in the most efficient manner and where they will provide the greatest benefits. In addition, a planting program should tie in with the objective to increase canopy in key areas.

A successful planting program will consider the following factors:

- Identification of appropriate species based on compatibility with local climate, landscape application, and planter size
- Promoting a diverse species distribution
- Promoting a diverse age distribution

Another very important, but often overlooked, consideration for any planting program is future maintenance. As a community's urban forest resource grows, continued investment in

management is critical to ensuring that residents will continue to receive a high return of benefits on their investment. Planning and funding for tree care and tree management must complement planting efforts in order to ensure the long-term success and health of the urban forest. Existing mature trees should be maintained and protected whenever possible, since the greatest benefits accrue from the continued growth and longevity of the existing canopy.

Developing a planting program also supports the public engagement, outreach, and education goal, and is supported by the following strategies:

- Identifying appropriate public spaces for tree planting
- Developing tree planting strategies including setting annual planting targets for street and park trees
- Supporting neighborhood and volunteer efforts
- Considering incentives for tree planting
- Continuing support of the Green Kirkland Partnership program
- Considering implementing a rebate (Tree-bate) program
- Enlisting public support for the protection and establishment of newly planted trees

Establish Funding Options for Tree Planting Program

Investigate and establish funding sources to support a tree planting program, including the cost of trees, installation, and structural pruning and maintenance during the establishment period.

This objective also supports goals for canopy and public engagement, outreach and education, and is supported by the following strategies:

- Explore opportunities for partnership and collaboration with utilities and non-profit groups
- Investigate opportunities for grant funding for tree planting and replacement
- Ensure that CIP planning includes consideration for optimizing tree planting in proposed project areas.

Manage Urban Forest for Age Distribution and Species Diversity

Diversity of both species and age within an urban forest is an indicator of long-term stability. The distribution of individual trees of various age within a tree population influences present and future costs as well as the flow of benefits. An unevenly aged population allows managers to allocate annual maintenance costs uniformly over many years and assures continuity in overall tree canopy coverage and associated benefits. A desirable distribution has a high proportion of young trees to offset establishment and age related mortality as the percentage of older trees declines over time (Richards, 1982/83).

Maintaining a diverse species population is equally important. Dominance of any single species or genus can have detrimental consequences in the event of storms, drought, disease, pests, or other stressors, which can severely affect an urban forest and the flow of benefits and costs over time.

Managing the urban forest for a diverse age distribution and species diversity is supported by the following strategies:

- Analyzing existing conditions
- Ensure consideration for species and age distribution is a consideration of the planting plan
- Encourage or require planting of native species
- Plant suitable species and plan for replacement of unsuitable species

Update the 20-Year Forest Restoration Plan

With the recent annexation and the addition of 2,187 acres of tree canopy, the City's tree canopy has nearly doubled in size since the 20-Year Reforestation Plan was adopted in 2008. This plan should be updated to include newly annexed natural areas and to support long-range planning efforts and the goals of the Comprehensive Plan.

Updating the 20-Year Forest Restoration Plan also supports the goals for program funding, and public engagement, outreach and education, is supported by the following strategies:

- Identify natural areas with the newly annexed locations
- Seek collaboration of resources and funding through Forterra, Green Seattle Partnership, Green Cities Partnership, and other grant funded sources

4.1 Guiding Policies & Regulatory

GOAL: Use effective measures to protect and enhance the urban forest resource

STRATEGY: Balance regulatory approach with education/outreach, partnerships and incentives

SUPPORTING RECOMMENDATIONS:

Increase Public Outreach / Education on Tree Protection Regulations

The City currently has a strong foundation of regulatory and policy framework to support a successful urban forestry program. However, a more balanced approach using incentives, education and outreach may be as effective and less polarizing within the community. Engaging the public by increasing awareness of the value and benefits of public trees and educating residents about the goals and challenges of managing the urban forest is key to developing their support for tree protection policies, funding, and other resources.

Increasing public outreach will facilitate greater understanding and compliance with the City's tree protection regulations. Greater outreach should reduce controversy and misunderstanding with regard to tree permit requirements, where there is a general disconnect between staff's understanding of the City's policies and the public's understanding and application of them.

Increasing public outreach and developing support for urban forestry issues and regulations also supports the urban forestry program goal, and is supported by the following strategies:

- Provide educational opportunities for City staff, developers, landscapers, consulting arborists, and homeowners on city requirements, development review procedures, and proper tree care
- Identify regional planning groups and opportunities for engagement
- Develop presentations, workshops, and materials to communicate important concepts about trees and Kirkland's urban forest.
- Continue to celebrate Kirkland Arbor Day
- Establish a recognition program and Heritage Tree program

Update Codes and Ordinances to Simplify and Provide Clarity

The city should conduct a periodic review and update of codes and ordinances that relate to the management and preservation of Kirkland's urban forest. Review should include consideration for current industry standards, recognition of the intended consequences, and simplification of language to promote greater clarity and compliance.

Updating codes and ordinances to simplify and provide clarity also supports the goals for canopy, and public engagement, outreach and education, and is supported by the following strategies:

- Compare codes and ordinances with most current industry standards and for similar communities
- Review measurable outcomes as a way of evaluating the effectiveness of current regulations and policies
- Consider feedback from staff, residents, and developers to improve clarity and promote compliance

Establish Tree Planting Guidelines

Developing and promoting tree planting guidelines for the installation of public trees will provide greater compliance with best management practices, promote greater tree health and longevity, and increase economic and environmental benefits. Tree planting guidelines should provide for the following considerations:

- Selection of species based on size at maturity and available planting space
- Species selection based on landscape application and desired benefits
- Identify specific applications and standards for structural soils, suspended pavement (e.g., Silva Cells), pervious pavement, and stormwater management strategies
- Planter design and installation specifications and details that in

Installing Silvacell to increase soil volume for urban trees

compliance with industry standards for best management practices

Require Contractor / Staff Compliance with Industry Standards

Require that all contractors and City staff involved in the installation, protection, care, and maintenance of public trees adhere to industry accepted standards and best management practices (BMPs) for tree care operations. These standards provide detailed criteria for all common tree care activities, including planting, support systems, fertilization, and tree risk assessment. They should be referenced and required in all contracts, bid solicitations, and internal maintenance policy guidelines.

Requiring compliance with industry standards for contractors and staff should include observance of the following specific standards:

- American National Standards Institute (ANSI) ANSI A300 Series Standards for Tree Care Operations
- International Society of Arboriculture (ISA) Best Management Practices Series
- ANSI Z133 Safety Standards
- Occupational Safety and Health Administration (OSHA) Standards, Sections 1910.132, 190.133, 1910.135, and 1910.95

Draft Vegetation Management Plans for Utility Corridors

Collaboration with utilities for inspection and maintenance of trees that are within City and utility rights-of-way can provide additional cost savings to both parties. Working with PSE and SCL to develop vegetation management plans for the City's utility corridors can provide Kirkland forestry managers with an opportunity to address concerns about protecting tree health under utility lines (where possible), reducing and avoiding tree utility conflicts, and considerations for risk management. Ideally, the resulting plans will align Kirkland's tree protection codes and the needs of the utilities.

Partnering with PSE and SCL on vegetation management plans for utility corridors also supports the goals for program funding, and public engagement, outreach and education, and is supported by the following strategies:

- Encourage consideration for "right tree, right place" concepts in species selection where overhead lines are present
- Incorporate industry standards and best management practices into utility pruning guidelines
- Seek grants and incentive programs for tree replacement when removal is necessary

4.3 Municipal Urban Forestry Program

GOAL: Build an urban forest program commiserate to the community's vision and goals

STRATEGY: Develop efficiency and increase collaboration between City departments. Develop policies that promote formalized tree management strategies for public trees.

Without a formally recognized forestry program and dedicated staffing resources, Kirkland has struggled at times to successfully engage the public about urban forestry policies and their

application. It is important to distinguish the urban forestry program as an entity within the organization and within the community. Establishing a formal forestry program, with dedicated staffing and resources, will focus authority for the stewardship of the community's urban forest and provide a centralized point for organized outreach and public education about the value and benefits of both public and private trees.

SUPPORTING RECOMMENDATIONS:

Generate Funding

Many beneficial programs, including urban forest management, struggle to maintain adequate funding and attention from community leaders. Similar to many communities, Kirkland struggles with the challenge of generating reliable and sustainable funding for urban forestry programming. Considering the likelihood that budgets will continue to remain lean, at least in the foreseeable future, the urban forestry program will need to operate with optimal efficiency. Program leaders need to explore creative options for funding which maximize the value of available resources.

As mentioned previously in Section 2.6, a recurring concern observed during the development of this plan and program review was the lack of resources available to educate and engage the community about urban forestry issues. In order to fund forestry operations and special projects, urban forestry managers will need to ensure efficient use of available funding while exploring new opportunities for sustainable funding, grants, volunteers, partnerships, and collaboration (See Section 4.6).

Continuing to explore various funding programs and opportunities such as grants, donations, and partnerships also supports goals for urban forestry program and canopy, and is supported by the following strategies:

- Justify and protect established funding sources
- Proactively seek partnerships and collaboration with volunteer, non-profit, and special interest groups that share a similar mission
- Explore all opportunities for grants and donations

Establish a Formally-Recognized Forestry Program

Establishing a formally recognized forestry program also supports the goals for canopy, program funding, and public engagement, outreach and education.

In addition, dynamic leadership and a visible urban forest program can have a dramatic effect on the overall, long-term success of the Urban Forest Management Plan by increasing public awareness of the goals and challenges of caring for the community's trees. The establishment of such a program will provide the necessary authority for:

- Implementing the Urban Forest Management Plan
- Increasing stability and efficiency of funding, staff, and other resources
- Providing leadership for interdepartmental cooperation and coordination with external groups
- Establishing a hub for public interactions

Create a Formal Interdepartmental Working Team

The creation of a formal interdepartmental working group will provide a platform for discussing the goals, objectives, and challenges related to the care, expansion, and sustainability of Kirkland's urban forest. With representation from Planning, Public Works, Parks, and the City's Urban Forester, the team can ensure that urban forestry issues receive appropriate consideration with regard to community planning, development, maintenance policies, and work planning.

Establishing a formally recognized forestry program also supports the goals for canopy.

The following objectives are recommended in support of the public engagement, outreach and education goal:

Develop Annual Work Plans

An annual work plan can help to better focus and track the long-term goals and objectives outlined by the Urban Forest Management Plan. In addition, having an annual plan can facilitate budget forecasting and justify program funding requirements.

Based on the goals and objectives outlined in this Plan, along with reasonable consideration for availability of staff and funding resources, the City's Urban Forester should develop an annual work plan aimed at accomplishing the recommendations for 5-year objectives outlined in Section 4.6 of this Plan.

Developing annual work plans also supports the goals for program funding, and public engagement, outreach and education.

Update Urban Forest Management Plan Every 5 Years

The Urban Forest Management Plan is designed to be adaptive to change over time and with updates to criteria and indicators. Updates should consider the accomplishment of Plan objectives as well as quantitative analysis of progress made towards reaching long-term goals. A comprehensive review should be taken in the final year of each management planning cycle, and ideally in consultation with a technical advisory committee and key stakeholders. The successes and shortcomings experienced after each five-year planning period should be reviewed, and the findings incorporated into the subsequent management plan

Updating the Urban Forest Management Plan every 5 years also supports the goals for canopy, program funding, and public engagement, outreach and education, and is supported by the following strategies:

- Identify key staff members and community stakeholders to serve as an advisory committee
- Invite participation from the Tree Board
- Evaluate progress, challenges, and remaining objectives
- Consider changes within the industry that may affect criteria and indicators

Deliver an Annual Urban Forestry Report

An Annual Urban Forest Report is an excellent way to communicate progress and milestones as they are reached. The report provides an opportunity to update stakeholders on the status of the

Urban Forest Management Plan, including objectives that have been met as well as any challenges or issues that may be holding up the Plan. Keeping stakeholders well informed is the best way to generate support and increase accountability.

Delivering an annual State of the Urban Forest Report also supports the goal for public engagement, outreach and education.

4.4 Municipal-Community Interaction

GOAL: Build stronger community engagement and public participation in urban forest stewardship

STRATEGY: Emphasize community outreach and incentives to generate program support

SUPPORTING RECOMMENDATIONS:

Maintain Tree City USA Status

Tree City USA recognition from the National Arbor Day Foundation (NADF) demonstrates Kirkland's commitment to protecting its urban forest and can play a role in the successful acquisition of grant funding. The designation has requirements for meeting specific criteria, including:

- Spend $2 per capita annually on an urban forest program or tree related expenses
- Adopt a tree protection ordinance
- Proclaim and celebrate Arbor Day annually
- Establish a municipal urban forestry program or a Tree Board

Due to the increase in population with the recent annexation, the annual per capita spending for the urban forest program has decreased and without planning its urban forestry budget, Kirkland may have difficulty maintaining its Tree City USA designation in the future.

Maintaining Tree City USA recognition also supports the goals for program funding, and public engagement, outreach and education, and is supported by the following strategies:

- Budget and track spending for the urban forest program to ensure minimum annual requirements of $2 per capita
- Continue to celebrate Arbor Day
- Investigate additional opportunities for Growth Awards from NADF

Dedicate Funding for Green Kirkland Partnership

The Green Kirkland Partnership works to restore the community's natural forest areas and manage risks to forest health from invasive species. This successful program, an alliance between the City of Kirkland, nonprofit partners, businesses, and the community, relies heavily on volunteer participation. Dedicated funding would provide for additional City staff to support volunteer training and supervision, and for the application of herbicides. Dedicating funding for Green Kirkland Partnership also supports the goals for canopy and public engagement, outreach and education,

Engage Community Groups, Neighborhood Associations, and Green Industry Businesses

Public engagement describes the myriad ways in which information, activity, and benefits associated with the urban forest can be shared with the public. It is by definition, a two-way process that involves interaction and listening with the goal of accomplishing a mutual benefit. Through engagement with stakeholders that directly benefit and have a vested interest in promoting a healthy urban forest, a network of support for policies, procedures and funding is created. Engaging community groups in urban forest goals and challenges not only develops the support base necessary for a sustainable program, it also increases the opportunities for volunteer service and collaboration with non-profits and special interest groups. Sharing the challenges of urban forest management

Engaging community groups, neighborhood associations, and green industry businesses is supported by the following recommendations:

- Identify community groups with a stake or interest in the urban forest
- Develop presentations and workshops that promote active engagement in urban forest issues and challenges
- Seek opportunities for collaboration with groups and organizations who share a vision for urban forest goals

Establish a Community Tree Board

A vital part of public engagement is involving residents in the important, long-term decisions that must be made about the urban forest. Establishing a community tree board to advise urban forest managers and City Council on urban forest issues, including management plan goals and objectives, is a good way to engage the support of community leaders. Establishment of such a group may include the following considerations:

- Appointment by Mayor and/or City Council of 3-7 board members
- Board members are residents of the community
- Board members serve voluntarily with no compensation
- City Urban Forester serves as an information resource to the tree board

Establishing a community tree board also supports the urban forestry program goal, and is supported by the following recommendations:

- Draft and adopt an ordinance establishing a community tree board
- Solicit applications of residents willing to serve on a community tree board
- Encourage, or require, board members to attend online Tree Board University (treeboardu.org)
- City Urban Forester attends board meetings and serves as an information resource

4.5 Five Year Recommendations 2013-2018

The following recommendations direct urban forestry activities over the next five years. The lead department assigned for each recommendation was based on current departmental staffing, and is not necessarily a requirement. All recommendations in the plan will need coordination to develop appropriate funding. Priorities for these objectives should be based on funding availability and their relative value toward successfully achieving plan goals. While costs and value are subjective estimates, general guidelines for setting priorities have been provided to describe the cost and value of each objective to the strategic plan goals (Table 7 and Table 8).

Table 7. Cost and Value categories used to help prioritize objectives

Cost	Relative cost required to accomplish recommendations
$	Estimated at less than $50,000. These recommendations are often accomplished with existing City staff resources.
$$	Estimated between $50,000 - $100,000. These objectives will almost certainly have budgetary implications, dedicated staffing, contractor or volunteer commitment.
$$$	Estimated at greater than $100,000. These objectives involve substantial project management, staffing and commitment.

Value	Relative value of recommendations towards successfully meeting goals.
Low	Objective supports less than 5 plan strategic goals.
Moderate	Objective supports between 5-7 strategic goals.
High	Objective supports more than 7 strategic goals.

Table 8. Recommended 5-Year Strategy (2013-2018)

Objective	*Applicable Goal*	*Product*	*Cost*	*Value*	*Participating Departments*
Establish a formally recognized forestry program with dedicated staffing resources	*Forestry Program* *Canopy* *Funding* *Outreach*	*Formal Forestry Program*	*$$*	*High*	***Planning*** ***Parks*** ***Public Works***
Create a formal interdepartmental working team	*Forestry Program* *Canopy*	*Team*	*$*	*Moderate*	***Planning*** ***Parks*** ***Public Works***
Maintain a comprehensive inventory of street and park trees	*Forestry Program* *Canopy* *Funding* *Outreach*	*Up-to-date Inventory Database integrated with City GIS system*	*$$$*	*High*	***Parks*** ***Public Works***
Update codes and ordinances to simplify and provide clarity	*Forestry Program* *Canopy* *Outreach*	*Revised codes and/or ordinances*	*$*	*Moderate*	***Planning*** ***Public Works***
Tree planting guidelines	*Forestry Program*	*Standards, details, species list*	*$*	*High*	***Planning*** ***Public Works***
Establish dedicated resources for public tree maintenance	*Forestry Program* *Canopy* *Funding*	*Dedicated staffing and equipment*	*$$$*	*High*	***Parks*** ***Public Works***
Require compliance with industry standards for contractors and staff	*Forestry Program*	*Requirements for industry standards in contracts and specifications*	*$*	*High*	***Planning*** ***Public Works*** ***Parks***
Develop annual work plans	*Forestry Program* *Funding* *Outreach*	*Annual Work Plan*	*$*	*Moderate*	***Planning***
Update Urban Forest Management Plan every 5 years	*Forestry Program* *Canopy* *Funding* *Outreach*	*5-Year Management Plan*	*$$*	*High*	***Planning*** ***Public Works*** ***Parks***
Deliver an annual State of the Urban Forest Report	*Forestry Program* *Outreach*	*State of the Urban Forest Report*	*$*	*Moderate*	***Planning***
Partner with PSE an SCL on Vegetation Management Plans for utility corridors	*Forestry Program* *Funding* *Outreach*	*Vegetation Management Plans*	*$$*	*Moderate*	***Planning*** ***Public Works***
Achieve Tree City USA annually	*Forestry Program* *Funding* *Outreach*	*Tree City USA recognition*	*$*	*Moderate*	***Planning***

Objective	Applicable Goal	Product	Cost	Value	Participating Departments
Analyze canopy benefits	Canopy Outreach	Quantitative analysis of the value and benefits of Kirkland's tree canopy	$$	Moderate	**Planning**
Increase canopy in key areas	Canopy Outreach	Increased canopy	$$	High	**Planning** **Parks** **Public Works**
Conduct canopy assessment every 10 years	UF Asset Outreach	Updated canopy assessment	$$$	High	**Planning**
Develop a planting program	UF Asset Outreach	Planting Program	$$	Moderate	**Planning** **Parks** **Public Works**
Manage the urban forest for a diverse age distribution and species diversity	Canopy	Increase diversity of species and age distribution	$$	Moderate	**Planning**
Update the 20-Year Forest Restoration Plan for annexed areas	Canopy Funding Outreach	Updated 20-Year Forest Restoration Plan	$$	High	**Parks**
Increase public outreach and develop support for urban forestry issues and regulations	Outreach Forestry Program	Presentations, workshops, educational materials	$$	High	**Planning**
Engage community groups, neighborhood associations, and green industry businesses	Outreach	Increase exposure with community groups, neighborhood associations, and green industry	$	Moderate	**Planning**
Establish a Community Tree Board	Outreach Forestry Program	Community Tree Board	$	Moderate	**Planning**
Dedicate funding for Green Kirkland Partnership	Funding Canopy Outreach	Funding for Green Kirkland Partnership Success with 20-Year Forest Restoration Plan	$$$	High	**Parks**
Establish funding options for tree planting program	Funding Canopy Outreach	Funding for tree planting program	$	Moderate	**Planning** **Public Works** **Parks**
Identify costs and funding approach for tree inventory work	Funding Forestry Program Canopy Outreach	Funding for tree inventory	$	High	**Public Works** **Parks**

Objective	Applicable Goal	Product	Cost	Value	Participating Departments
Establish dedicated funding for public tree maintenance (tree crew and equipment)	Funding Forestry Program Canopy	Funding for public tree maintenance	$	High	**Parks** **Public Works**
Continue to explore various funding programs and opportunities such as grants, donations, and partnerships	Funding Forestry Program Canopy	Additional funding sources	$	High	**Public Works** **Planning** **Parks**

4.6 Potential Program Funding Strategies

Generating reliable urban forestry funding remains an ongoing challenge for most communities, Kirkland included. Shrinking municipal budgets and expanding deficits may limit traditional, government-generated funding for urban forestry budgets, creating a need for new avenues of program funding strategies. By diversifying funding strategies and sources, long term objectives are achieved without sacrificing either medium-term priorities or day-to-day operational costs. Adequate funding for achieving the goals and objectives within this plan will be critical to its success.

Kirkland has worked with state and federal agencies to obtain grant money to support urban forestry projects, including the development of this plan. Funding strategies such as the **City's Forestry Account, grants, philanthropic donations, volunteer efforts, permit fees** and even the **general fund** allocations can be excellent strategies for short term projects. However, these are volatile sources to rely on for long-term urban forestry objectives. This section details some potential funding strategies that have been utilized in other jurisdictions to generate stable and predictable financial resources for urban forest management in addition to the municipal general fund, which is generated from a tax base.

In the event of severe catastrophes, the City can be eligible for financial assistance if it can demonstrate, with baseline data, the extent of tree failure or damages associated with trees. The Federal Emergency Management Agency (FEMA) and other state and federal institutions release funds in the event of an emergency, but are typically more supportive when the damaged assets have been documented and specific monetary damage assessments are provided promptly after the emergency. To be prepared for emergencies, many cities have adopted the FEMA-approved i-Tree STORM as their damage assessment protocol. In order to obtain the baseline data necessary for re-imbursement, or use i-Tree STORM, a tree inventory is required.

Surface Water Management Fees or Utility Funding

Cities that actively manage their green infrastructure to improve stormwater quality and reduce peak flows typically utilize stormwater utility funding. Two cities in Washington, Bellevue and Vancouver, are currently using this as a funding source. The City of Bellevue has combined the maintenance of parks with stormwater management and has funded mandates that protect riparian open space for over two decades. In Vancouver, urban forestry is supported by utilizing a portion of the City's surface water management fees. These funds are used specifically to provide City services related to canopy restoration: coordination of contractor and volunteer tree

planting efforts, outreach and education to promote environmental stewardship, and enhanced customer service. The use of this funding source is in recognition of the importance of the urban forest for stormwater management functions, water quality protection, and Clean Water Act, Clean Air Act, and Endangered Species Act compliance.

Capital Improvement Projects

Treating trees as capital assets can help to ensure that budgets for large-scale projects include line items for trees. Projects for building or expanding items such as roads or bridges often have an impact on existing trees. If trees are identified as a capital asset, funding can be guaranteed as part of the construction project budget such that any tree impacts will be mitigated through replacement or relocation. Examples where this could apply include major street and freeway improvements, the Cross Kirkland Corridor, stormwater projects, major park projects.

As capital assets, trees are different than items such as bridges and roadways and other "gray infrastructure." With most type of assets, their value is depreciated over their useful lifespan. Trees, on the other hand, continue to grow in value throughout their lifetime, in terms of benefits returned to the community. The Government Accounting Standards Board has set procedures for accounting for capital assets in its GASB 34 rule. Although these procedures typically are used for gray infrastructure and accounting for depreciation, trees can also fit into the GASB 34 program model. Trees can be described as asset management within GASB 34. This will avoid the cost less depreciation model of a typical City infrastructure.

To accomplish this, a complete inventory of City tree assets must be performed to be able to report the current condition of the City asset (trees). The City must also then define a desired condition of the urban forest (asset) and the management costs and activities necessary to maintain the forest at that desired level.

Excess Levy

Another fund raising strategy is the use of citizen approved levies. Washington law allows cities to levy property taxes in excess of limitations imposed by statute when authorized by the voters. Levy approval requires 60 percent majority vote at a general or special election. Excess levies by school districts are the most common use of this authority.

Park & trail land acquisitions for public benefit

Currently in Kirkland, a park levy ballot measure is being considered for the 2012 November election. The measure would include funding for park land acquisition, support tree maintenance and provide stable on-going funding for the Green Kirkland (GKP) program, allowing the City to grow the GKP program over time.

This has proven successful in Seattle where, in November 2000, Seattle voters approved a $198.2 million levy for Parks and Recreation. The levy followed closely the plan forged by the

Pro Parks 2000 Citizens' Planning Committee. The annual cost to the average Seattle property owner during the life of the levy was expected to be approximately $.35 per $1000 assessed value.

Within the levy, Seattle added a Pro Parks tree crew that enabled them to perform preventive maintenance on selected trees. Under the supervision of their Urban Forestry Crew Chief, the Tree Maintenance crew responded to 410 work orders in 350 parks in 2008. A Natural Area Crew was created to allow for cleanup and restoration work in natural areas and forests. Natural Area Crews performed 3,600 hours of labor, supplemented by nearly 5,000 hours of volunteer labor. The team completed 56 work orders, worked with volunteers on 50 projects and worked in 30 parks.

The Levy provides funding for the work of the Green Seattle Partnership. Additionally, the Green Seattle Partnership formed in 2004 and has worked to restore 2,500 acres of forested park land in Seattle by 2025. The unique public/private effort is the largest urban forest restoration project in the nation. Levy funding contributed to the restoration of 126 acres of urban forest in the first two years of the Levy.

This cultural momentum from Seattle's efforts continued in 2008 with the passage of a **Parks and Green Spaces Levy**. It is expected to raise $146 million and will last for six years, from 2009 through 2014. Within this levy remains a $6.6 million Environment category, which is dedicated to creating a healthy ecosystem for Seattle. This "green" funding has three types of projects: Forest and stream restoration, community gardens and shoreline access.

General Obligation Bonds

For the purposes of funding capital projects, such as land acquisitions of facility construction, cities and counties have the authority to borrow money by selling bonds. Voter-approved general obligation bonds may be sold only after receiving a 60 percent majority at a general or special election. If approved, an excess property tax is levied each year for the life of the bond to pay both principal and interest.

Real Estate Excise Tax (REET)

Washington law authorizes the governing bodies of counties and cities to impose excise taxes on the sale of real property within limits set by the statute. Two (2) taxes of ¼ of 1% may be imposed; however, the funds can only be used on capital projects listed in the capital facilities plan. Specifically related to urban forestry, such projects would likely need to be associated with one of the following project types to be eligible: parks; recreational facilities; trails; or river and/or waterway flood control projects. Currently, REET can be used for maintenance or operations on a limited basis. Unless reauthorized by the legislature, this will expire at the end of 2016.

Utility Company Partnerships

Collaboration with utilities such as Seattle City Light (SCL) and Puget Sound Energy (PSE) for inspection and maintenance of trees that are within City and utility rights-of-way can provide additional cost savings to both parties. Where community values of electric reliability and sound tree care intersect, partnerships between utility and municipalities often emerge. In Kirkland, this has included financial support for Arbor Day celebrations by PSE and preliminary discussions of developing vegetation management strategies that are aligned with Kirkland's tree protection codes and the needs of the utility. This is particularly valuable because the utilities may remove

partially or entirely hazardous trees in the rights-of-way at no cost to the city. In the past, PSE and SCL have provided vouchers for replacement of appropriate trees under overhead utility lines. Seattle City Light has a model Urban Tree Replacement program to ensure a succession of the "right trees, right place" where overhead utilities pose a challenge to maintaining a healthy urban forest

Landscape Maintenance District (LMD)

This funding source can be used by property owners who vote to assess themselves an annual fee to pay and receive services beyond what the City normally provides. The Finn Hill Park and Recreation District is an example. It was created by the November 20, 2002 King County General Election as a result of passage of ballot Proposition No. 1. Proposition 1 authorized a tax levy for the creation and maintenance of the Finn Hill Park and Recreation District. The ballot measure was presented to voters who resided within the park district boundaries.

Districts like these can also be formed when a new subdivision is built. The City can require the developer to pay the assessments until they can be turned over to a homeowners association or LMD. Even in small developments, fees can be assessed to the parcels on an annual basis that contribute to the costs of receiving increased maintenance and care of the trees in the project. When a LMD is created, it is specifically documented what additional services will be provided for the assessment. This can include such items as regular tree pruning, litter cleanup, and planting projects. LMDs are also known as maintenance assessment districts, lighting and landscape maintenance districts, or local improvement districts.

Business Improvement Districts (BIDs)

Similar to the LMD strategy, Business Improvement Districts (BIDs) are an additional assessment that can be levied against the property owners to provide increased services in the assessed area. BIDs are formal organizations made up of property owners and Mixed-use commercial tenants dedicated to the improvement of quality of life within their districts. In Spokane, Washington, the Downtown Spokane Partnership manages a streetscape Clean Team and a Green & Beautiful program with BID funding. Tacoma, Washington, has a BID that operates separately from the City government with their own full-time staff providing neighborhood maintenance.

These differ from LMDs in that BIDs are usually self-managed entities as opposed to being managed by the City. BIDs are often compared to residential homeowners associations. Many cities and their contractors allow their BIDs to obtain services such as tree maintenance, street maintenance, and litter cleanup at the same discounted rates as the City pays

Street Repair Funds

The City of San Diego, California has been successful in leveraging street repair funds to contribute to the maintenance of their ROW trees. San Diego's code provides that, when street maintenance activities are conducted, all City assets within that ROW receive any required maintenance. The City urban forester has been successful in extending that maintenance to the trees within the ROW where the street maintenance is being performed.

Frontage Assessments

These are typically applied citywide based on the feet of street frontage a property occupies. Fees are collected annually and dedicated to the program for which they are being assessed. Unlike general fund monies, which change and are approved annually, frontage assessments can be created to provide a consistent funding source to support ongoing maintenance and enhancement of City street trees. The City of Pittsburg, California receives its entire urban forestry budget from a $0.17/foot assessment on private properties. LMDs are also known as maintenance assessment districts, lighting and landscape maintenance districts, or local improvement districts.

Utility Company Partnerships

Collaboration with utilities such as Seattle City Light (SCL) and Puget Sound Energy (PSE) for inspection and maintenance of trees that are within City and utility rights-of-way can provide additional cost savings to both parties. Where community values of electric reliability and sound tree care intersect, partnerships between utility and municipalities often emerge. In Kirkland, this has included financial support for Arbor Day celebrations by PSE and preliminary discussions of developing vegetation management strategies that are aligned with Kirkland's tree protection codes and the needs of the utility. This is particularly valuable because the utilities remove hazardous trees in the rights-of-way at no cost to the city. In some cases this includes replacement of appropriate trees near overhead utility lines. Seattle City Light has a model Urban Tree Replacement program to ensure a succession of the "right trees, right place" where overhead utilities pose a challenge to maintaining a healthy urban forest

City Forestry Account

As a component of the city's Tree Conservation and Landscaping Ordinance (KZC 95.57), a tree fund was established to receive funds from all tree-related, civil penalties and other revenue sources such as the sale of trees, wood and/or seedlings. Funds in the tree account can be used for a variety purposes including acquiring, maintaining, and preserving wooded areas within the city, establishing a holding public tree nursery, conducting urban forestry education, and implementing a tree canopy monitoring program. Additionally, grants and donations received can be placed into this fund.

Private Fundraising

Fundraising projects are used to support special projects and programs. Tree climbing tournaments and plant sales are two examples of successful fundraising efforts. Specific types and sources of fundraising are identified below.

Endowment / Trust Fund - An endowment or trust fund, similar to the Casey Tree Endowment Fund of Washington D.C., could provide a funding source for future tree planting projects and maintenance operations. An aggressive capital campaign could raise the seed money to establish the fund, with future interest earned providing a stable, steady revenue stream.

Business Sponsorships/Donations - Business sponsorships for programs are available throughout the year. Sponsorships and donations can be of any value.

Grants, Donations & Gifts - Many trusts and private foundations provide funding for park, recreation and open space projects. Grants from these sources are typically allocated through a

competitive application process, and vary dramatically in size based on the financial resources and funding criteria of the organization. Philanthropic giving is another source of funding. Community Forestry Assistance Grants are available through the Washington State Department of Natural Resources, utilizing funding from the USDA Forest Service. Over $330,000 in grant money was available in 2011-2012 to be used for ordinance development, tree inventory efforts, or development of street tree management plans. Other grant monies are available through organizations such as the National Tree Trust (NTT) and the National Urban and Community Forestry Advisory Council (NUCFAC), two prominent national urban and community forestry nonprofit organizations.

Interagency Agreements

State law provides for interagency cooperative efforts between units of government. Agreements between Kirkland and neighboring jurisdictions and King County are an example.

4.7 Plan Oversight

To achieve the highest level of efficiency and reduced liabilities, well-executed strategies require monitoring and oversight. The most appropriate strategy for success with this plan is to have a department, position, or designated team who will provide oversight to this plan. Long-range objectives require interdepartmental effort and community partnerships; therefore, oversight is needed to monitor key performance measures, report on progress, and facilitate the interpretation of plan elements whenever necessary.

For greater accountability, **the creation of a formal interdepartmental working team or citizen steering committee is recommended.** As with most cities meeting Tree City USA requirements, a designated 'forestry team' provides the leadership required to accomplish the plan goals, the annual work plan and fulfill the Tree Board requirement for maintaining this national recognition.

4.8 Monitoring and Revisions

The benefit of an over-arching strategy is that day-to-day operations can be associated with achieving long range goals. To ensure City efforts continually support the long range goals of the plan, periodic revisions need to occur. Each year, the plan will be reviewed to determine or reassess operational and management priorities (Figure 1). During this review, an urban forestry performance report will be drafted and appended to the strategic plan document as a performance update for urban forestry. This plan document can then be utilized and referenced for departmental work programs, Tree City USA reporting, and grant applications. When unsuccessful in accomplishing goals, further explanation is warranted along with adaptive strategies that may include establishing new annual priorities and objectives.

As previously stated, this plan provides specific actions to be undertaken in the first five year cycle (2013–2018). The City recognizes this plan as adaptive and dynamic and as such it is unreasonable to forecast how management priorities will shift over time. For this reason, every five-year interval (2018, 2023, and 2028) is marked for a periodic review to adjust for changing community priorities, resources and other unanticipated factors. This is another strategy to ensure that this plan will remain relevant to urban forest management in Kirkland regardless of the changes that may take place over time.

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Appendix A: Performance Measures

The following tables, adapted from Clark, et al, were used as a guide for the gap analysis and development of subsequent performance indicators and goals at the City.

City Opportunity	Criteria	Performance Indicators			
		Low	Moderate	Good	Optimal
High resolution assessments of the existing and potential canopy cover for the entire community	Canopy cover inventory	No inventory	Visual assessment.	Sampling of tree cover using aerial photographs or satellite imagery	Sampling of tree cover using aerial photographs or satellite imagery included in Citywide GIS
Achieve climate-appropriate degree of tree cover community-wide	Existing Canopy Cover	The existing canopy cover equals 0%-25% of the potential	The existing canopy cover equals 25%-50% of the potential	The existing canopy cover equals 50%-75% of the potential	The existing canopy cover equals 75%-100% of the potential
Complete inventory of the tree resource to direct its management, including age distribution, species mix, tree condition and risk assessment	Tree Inventory	No inventory	Complete or sample-based inventory of publicly owned trees	Complete inventory of publicly owned trees and sample-based inventory of privately-owned trees	Complete inventory of publicly owned trees and sample-based inventory of privately owned trees including Citywide GIS
Provide for uneven aged distribution of trees throughout the City and at the neighborhood level	Age Distribution of trees in the community	Any relative DBH class (RDBH) represents more than 75% of the tree population	Any relative DBH class (RDBH) represents between 50% and 75% of the tree population	No RDBH class represents more than 50% of the tree population	25% of the tree population is in each of the four RDBH classes
Establish a tree population suitable for the urban environment and adapted to the	Species suitability	Less than 50% of the trees are of species considered	50% to 75% of trees are of species considered suitable for the area	More than 75% of trees are of species considered suitable for the area	All trees are of species considered suitable for the area.

City Opportunity	Criteria	Performance Indicators			
		Low	Moderate	Good	Optimal
regional environment		suitable for the area			
Establish a genetically diverse tree population Citywide as well as at the neighborhood level	Species Distribution	Fewer than five species dominate the entire tree population	No species represents more the 20% of the entire tree population Citywide	No species represents more than 10% of the entire tree population Citywide	No species represents more than 10% of the entire tree population at the neighborhood level.
Detailed understanding of the condition and risk potential of all publicly-owned trees	Condition of publicly owned trees (trees managed intensively)	No tree maintenance or risk assessment. Request based/reactive system. The condition of the urban forest is unknown	Sample-based inventory indicating tree condition and risk level is in place	Complete tree inventory that includes detailed tree condition ratings	Complete tree inventory that includes detailed condition and risk ratings
Detailed understanding of the ecological structure and function of all publicly-owned natural areas	Publicly owned natural area trees managed extensively	No information about publicly owned natural areas	Publicly owned natural areas identified in a "natural areas survey" or similar document	The level and type of public use in publicly owned natural areas is documented.	The ecological structure and function of all publicly owned natural areas are documented in the Citywide GIS.
Preservation and enhancement of local natural biodiversity	Native Vegetation	No program of integration	Voluntary use of native species on publicly and privately-owned lands; invasive species are recognized	The use of native species is encouraged on a project-appropriate basis in both intensively and extensively managed areas; invasive species are recognized and their use discouraged	The use of native species is required on a project-appropriate basis in both intensively and extensively managed areas; invasive species are recognized and prohibited.
Develop and implement a comprehensive urban forest management plan for private and public property	Citywide management plan	No Plan	Existing plan limited in scope and implementation	Comprehensive plan for publicly owned intensively-managed forest resources are accepted and implemented	Strategic multi-tiered plan for public and private intensively and extensively managed forest resources accepted

City Opportunity	Criteria	Performance Indicators			
		Low	Moderate	Good	Optimal
					and implements with adaptive management mechanisms
Develop and maintain adequate funding to implement Citywide urban forestry plan	Municipality-wide funding	Funding for reactive management	Funding to optimize existing urban forest	Funding to provide for net increase in urban forest benefits	Adequate private and public funding to sustain maximum urban forest benefits
Employ and train adequate staff to implement Citywide urban forest management plan	Urban forestry staffing	No Staff	No Training of existing staff	Certified arborists and professional foresters on staff with regular professional development	Multi-disciplinary team within the urban forestry unit
Urban forest renewal is ensured through a comprehensive tree establishment program driven by canopy cover, species diversity and species distribution objectives	Tree establishment planning and implementation	Tree establishment is ad hoc	Tree establishment occurs on an annual basis	Tree establishment is directed by needs derived from an inventory	Tree establishment is directed by needs derived from a tree inventory and is sufficient to meet canopy cover objectives
All publicly owned trees are planted in habitats that will maximize current and future benefits for the site	Tree Habitat suitability	Trees planted without consideration of site conditions	Tree species are considered in planting selection	Community-wide guidelines are in place for the improvement of planting sites and the selection of suitable species	All trees planted in sites with adequate soil quality and quantity, and growing space to achieve their genetic potential.
Ensure all City departments cooperate with common goals and objectives	Interdepartmental Cooperation	Conflicting goals among departments or agencies	Common goals but little or no cooperation among departments and/or agencies.	Informal teams among departments and or agencies are functioning and implementing common goals on a project-specific basis	Municipal policy implemented by formal interdepartmental/interagency working teams on all municipal projects
Large private landholders embrace Citywide goals and objectives through	Involvement of large private and institutional land	Ignorance of issues.	Educational materials and advice available to	Clear goals for tree resource by landholders, incentives for preservation	Landholders develop comprehensive tree management plans

City Opportunity	Criteria	Performance Indicators			
		Low	Moderate	Good	Optimal
specific resource management plans	holders		landholders	of private trees.	(including funding)
The green industry operates with high professional standards and commits to Citywide goals and objectives	Green industry cooperation	No cooperation among segments of the green industry. No adherence to industry standards.	General cooperation among nurseries, tree care companies, etc.	Specific cooperative arrangements, such as purchase certificates for "right tree in right place"	Shared vision and goals including the use of professional standards.
At the neighborhood level, citizens understand and cooperate in urban forest management	Neighborhood action	No Action	Isolated or limited number of active groups	Citywide coverage and interaction	All neighborhoods organized and cooperating.
All constituencies in the community interact for the benefit of the urban forest	Citizen-municipality-business interaction	Conflicting goals among constituencies.	No interaction among constituencies	Informal and/or general cooperation	Formal interaction, such as a tree board with staff coordination.
The general public understands the role of the urban forest	General awareness of trees as a community resource	Trees seen as a problem, a drain on budgets	Trees seen as important to the community	Trees acknowledged as providing social and economic services	Urban forest recognized as vital to the community's environmental, social and economic well-being
Provide for cooperation and interaction among neighboring communities and regional groups	Regional cooperation	Communities cooperate independently	Communities share similar policy vehicles	Regional planning is in effect	Regional planning, coordination, and/or management plans
Develop tree protection ordinances that support municipal policies and are consistent with the community vision	No codes	Limited land use tree protection	Land use and public tree protection		Tree removal limits and requirements that on private property, protection of public trees, that's enforced

Appendix B: Focus Group Meeting Responses

Neighborhoods and Forest Stewards Focus Group Meeting

Tuesday, September 26th, 2012 at 6:30pm in the Peter Kirk Room, Kirkland City Hall

Question: What are the opportunities/threats around urban forest management on <u>private</u> lands in Kirkland?

1. Permitting process on tree removal—need to have education on the process and the requirements
2. Most people are not even aware of the regulations
3. Regulations are new to the annexation area—most people were under and overlay or King County regulations
4. New construction tree requirements are confusing-it is hard to know what are the tree replacement requirements
5. Can the city monitor whether people are complying with tree regulations/requirements?
6. What about "tree credits"
7. Need to consider the high density areas
8. Different requirements in multi-family and single family is confusing
9. Need monitoring of trees in the right of way and on public lands
10. Need good examples and graphics to explain current regulations
11. Clear recommendations on preferred tree species for private lands, streets trees
12. Offer Incentives for valuable trees (mature, unique species, heritage trees)
13. Need resources (staff) to manage the urban forestry program
14. It's difficult to balance the private property rights and protecting the resource (trees)
15. I don't know what is protected in development regulations already?
16. It's a challenge because each jurisdiction (King County vs. Kirkland) has different regulations and requirements
17. Tree planting programs---giving away free trees for people to plant on their property would be a good step
18. Broaden the cities education efforts to raise awareness of those benefits

Question: What are the opportunities/threats around urban forest management on <u>public</u> lands in Kirkland?

1. Invasive species are a huge problem, currently this is mainly addressed by a group of volunteers in the City of Kirkland
2. We need to invest in long-term health of natural areas
3. The city needs to take a more pro-active approach regarding funding, maintenance staff and planning
4. Other green cities (re: Green Kirkland Partnership) have a much larger paid staff component (vs. volunteer) labor
5. City has done an enough large, fancy parks (Juanita Beach) and improvements. Now they need to invest in restoration along with the quality and connectivity of the tree canopy

Question: What opportunities/threats do you see with Kirkland's plans for balancing walkable, compact development with retaining and enhancing tree canopy coverage and ecosystem functions?

1. I have concerns about more and more regulation and fees
2. Keep it simple---people need to understand the regulations that apply to their property
3. Need clear and consistent message/answers from all city departments
4. Big houses on smaller lots are a threat to trees
5. Can new developments be clumped to make room for trees?
6. Need to keep working towards the 40% canopy goal in "old" Kirkland (pre-annexation)
7. Kirkland needs to accommodate higher density, but where do trees fit as more development occurs
8. Need to balance new density and infill with new open space within the city
9. We need density to prevent sprawl, therefore need to invest in city open space as well. It's about quality of life
10. Use green roofs to offset loss of tree canopy
11. Allow off-site mitigation for tree removal
12. Opportunities to educate developers on regulations and incentives
13. Highly visible properties need special protection, such as the area above Goat Hill (base of Finn Hill). City should conduct outreach for acquisition of future park land.
14. These properties are under threat of future development and we can't count on this canopy just being here---it could be developed

Question: What are the strengths/weaknesses in the draft management plan?

1. The plan needs clear, simple goals that tie into larger city goals and council goals
2. It's unclear what the point of this plan is.
3. What is the overall goal?
4. Include data in the plan on how trees increase property values
5. The plan needs a short executive summary, around 2 pages that is much more readable and makes the recommendations in the plan much clearer.

6 "Adaptive" on page 15 is a powerful explanation (*unclear what this was referring to*)
7 Need measurable goals which are much more clear and concise
8 Sort out the difference between goals and strategies in the plan
9 Should the 40% goal be split into smaller geographies (neighborhoods or zoning types)
10 This goal (40%) may not be realistic
11 Why is 40% the goal
12 Style and tone of the report feels like corporate speak
13 Quality of urban forest and trees are more important than quantity (i.e. percentage of canopy cover)
14 Need to address community benefits of trees and the ecosystem services
15 Report should help us understand what benefits are currently being provided
16 Direct plan consultant to be more clear and concise in their writing

Tree Care Professionals Focus Group Meeting

Thursday, September 28th, 2012 at 6:30pm in the Rose Hill Room, Kirkland City Hall

Question: What opportunities/threats do you see in regards to maintenance of trees in the City of Kirkland?

1 Concerned about the loss of large trees being replaced with small trees that have less function
2 It takes time for replacement trees to provide the value of mature trees that have been lost
3 Kirkland has a tough tree code compared to other jurisdictions, which is good for trees
4 The tree ordinance is based on tree diameter, but canopy loss may be a better metric
5 The site conditions affects ability of trees to survive and function, so should influence design & selection of tree
6 Large trees that are removed should be replaced with native species
7 A tree's contribution to site should influence preservation prioritization, not necessarily strict size requirements (staff should review Bellevue's system)

Question: What are the opportunities/threats around urban forest management on <u>public</u> lands in Kirkland?

1 Adjacent landowners are responsible for trees in the right-of-way (ROW), but it is unclear how (legal speak)
2 Plan needs to clarify this responsibility
3 Many residents are not aware of the existing ordinance – need to educate on ROW responsibilities
4 The right tree/right place should be driving factor for ROW & public utility trees
5 We need a long-term vision with trees selection and the effect of forthcoming needs of utilities above and below ground
6 Was glad to see both above ground and below ground utilities addressed in the plan
7 There is a need to develop a strategy for communicating the ordinance and regulations
8 How do residents know who to hire/trust for tree care
9 Can the city provide an assessment of street trees
10 There is a need for consistency of hazard/risk assessments which could be addressed by the city doing all of the hazard/risk assessments

Question: What are the opportunities/threats around urban forest management on <u>private</u> lands in Kirkland?

1 Many developers are unaware that they need a tree plan
2 There is a need to educate developers that a tree plan is needed & should be planned for early on
3 There should be upfront reporting - during short platting, and retention requirements should be known beforehand
4 It's unclear/confusing as to what needs to be reported in the arborist's UF plans
5 We (arborists/urban foresters) expect that we will be able to call a planner and receive interpretation of the code, rather than reading/interpreting the code on their own
6 Plan should convey that this expected level of service leads to a resource need (staff) that should be recognized
7 Municipality should be flexible in their site-specific requirements: arborists should work with parties to develop a reasonable plan based on desired function, rather than driven completely by ordinance
8 Expect redevelopment in the annexation area, which will lead to canopy loss – how to balance strong preservation elsewhere?
9 The city needs to consider health of the current canopy and plan for succession of the forest

Question: What are the strengths/weaknesses in the draft management plan?

1 Consider having a focus group/review session with other municipalities – regarding the urban forestry management plan
2 There is a need to facilitate outreach and engage community around the plan
3 Strengthen the Executive Summary and realize that some people won't and don't want to read beyond that point
4 A factoid/summary sheet should be created that highlights the essential pieces; distribute this to residents
5 Use language that the general public can understand
6 Make the goals and recommendations clear and obvious
7 Consider training sessions for arborists on the codes/permitting process
    a. workshops are more engaging & effective
    b. walk through of the what & how of codes
    c. take attendance and create a resource for arborist recommendation
        i. incentivizes arborists to attend
        ii. creates knowledge & trust

Developers and Builders Focus Group Meeting

Friday, September 28th, 2012 at 12:30pm in the Peter Kirk Room, Kirkland City Hall

General Comments/Questions about the plan:

1 Now that the goal for canopy has been met, is there intent to increase?
2 Is there a plan to divide the city into areas (by zoning type, neighborhood, or watershed) with specific canopy goals?

Question: What are the opportunities/threats around urban forest management on <u>private</u> lands in Kirkland?

1 Options for replacement and relocation of trees are needed for flexibility
2 Property rights and public good are often in conflict around urban forestry issues
3 Regulation for retention and/or replacement could be based on size/merit or location
4 Views are not included in code as a reason to remove a tree
5 Trees of high retention value in setbacks present challenges, including creating a potential hazard tree
6 Regarding views, safety, number of lots, I should be able to move things around to maximize the parcel.
7 Small lots is where development is going, so need codes that recognize that a 3600 square foot lot is the new normal
8 Codes should allow replacement of significant trees using a calculation value
9 Is there a size of tree that is more appropriate for the urban forest?
10 Private and public rights should be able to find a win-win solution regarding trees on private parcels
11 Using master landscape plans on individual lots would give more control to the process
12 The city should take into account the trees' likelihood of survival, based on location
13 How does the 40% goal resolve down at the lot level
14 Development as an opportunity to balance slowing loss and providing for future growth of canopy
15 Regulations that require changing plans or reducing views have large budget implications.
16 Losing a lot or having to change a plan is not an inexpensive option
17 Outreach and education is important, but other times there are just dead ends in the code and even carefully planned projects that carefully review regulations and requirements well in advance cannot go forward
18 Should have classes of tree retention based on value
19 Mitigation banking or funding benefits off—site may provide options (tree fund or in-lieu fee)
20 A third option is needed (1=all trees cut, 2= all trees retained)
21 There could be value of bringing arborists and developers/builders together to look for options
22 Health, location and species should factor into tree value
23 The code needs to take topography into consideration, especially in sloped side yards
24 Despite outreach and education, dead-ends still exist and need solutions
25 City needs to make sure it avoids unintended consequences with codes that violate the spirit of the regulation
26 Lack of equity in that regulations for homeowners on an existing parcel vs. developer on a new development or remodel allow for different levels of tree removal
27 Public comment is not balanced in terms of development.
28 It is important to make sure that public trees are adequately maintained
29 Resources needed to care for existing trees—can this be compensate?
30 Liability of potential hazard trees is expressed by clients<<<should this liability be passed to city in cases of required retention
31 Compensation possible for other community good or stewardship ---value of canopy and forest health providing opportunities for enhancement.
32 The City could step up around pre-treatment and maintenance of trees
33 It is the City responsibility to maintain these trees

Question: What are the strengths/weaknesses in the draft management plan?

1 The final report should read as an unbiased document---much of the current draft reads like propaganda and the studies' cited are not always fully honest
2 It is good to have documented information about city's tree resources, personnel needed etc. in the plan draft
3 New city processes (such as this plan) need the budget and staffing to vet them and make they will work in the way intended
4 Inclusion of solar potential, rain gardens etc. and also cost of trees would provide good perspective in the plan
5 All regulations need to be as objective as possible with respect to city staff implementing and enforcing so that the answers are clear and don't depend on who is staffing the counter
6 The report should contain more information about canopy studies conducted and expected future development will impact canopy including things like complete streets and other development that will potentially increase canopy

Appendix C: Survey Results

The following represent the summary results of the Urban Forestry Management Plan online survey. At the close of the survey on September 14, 2012, a total of 665 respondents completed the survey. All ranked responses appear in descending order.

1) What is your relationship with the City of Kirkland, do you:

72.8% Live in Kirkland
18.6% Live and Work in Kirkland
5.4% Work in Kirkland
3.2% Neither

2) What neighborhood do you live in?

18.6% Finn Hill
10.5% North Rose Hill
10.4% Other (please specify)
8.4% North Juanita
7.8% South Juanita
7.3% Central Houghton
6.9% Norkirk
6.1% Bridle Trails
5.2% Kingsgate (Evergreen Hill)
5.2% Market
3.7% Highlands
2.9% Moss Bay
2.3% Everest
1.8% Totem Lake
1.7% None
1.4% Lakeview

Comments:

1	11506 NE 113th Pl. 98033
2	Bellevue
3	Close to 132nd Square Park, south of Kingsgate
4	Denny Plateau, between Juanita Dr and Holmes Pt drive.
5	Downtown
	Downtown
6	Edmonds
7	Enatai
8	Finn Hill
	Finn hill
	Finn Hill
9	Firloch near Kingsgate
10	Goat Hill
11	Holmes Point
	Holmes Point
	Holmes Point
	Holmes Point
	Holmes Point
	Holmes Pt
12	Houghton
13	Juanita - I don't know north and south
14	Lake Forest Park
15	Mercer Island

16	Mill Creek
17	Mukilteo
18	Ne70th and 126th Ave
19	North Rose Hill
20	Norway Hill
21	Not Kirkland
22	Other (please specify)
23	Point on Yarrow Bay
24	Redmond Microsoft area
25	Ridgecrest
26	Rocky Point Heights Camano Island, WA 98282
27	Shoreline
28	So Rose Hill
	South Rose Hill
	South Rose Hill
	South Rose Hill
	South Rose Hill
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	South Rose Hill
	South Rose Hill
	South Rose Hill
	South Rose Hill (thanks for remembering us)
	South Rosehill
	Springbrook Square
29	Totem Lake
30	Very near to Bridle Trails
31	Wallingford
32	West of Market
33	West of Market
	West Seattle
34	Woodinville
35	Work at Yarrow Bay

3) How would you rate your knowledge about trees?

68.0% Some
25.7% Extensive
3.6% None
2.7% Professional

4) Can you identify by name the trees near your home?

66.6% Some of them
29.6% All of them
3.8% None of them

5) Kirkland's Urban forest's consists of:

82.5% All of the above (below)
19.7% The native forest areas all over
19.6% Trees in formally-landscaped parks
19.1% Street trees or trees located along the road and the public right-of-way
14.0% The trees in my neighbor's yard
6.7% I'm not sure

6) Understanding which benefits are most appreciated by residents can help guide long-term management strategies. Please rate the following benefits according to their importance, with 1 being the most important and 5 being the least important.

	Rating Average	Most Important
Provide habitats for birds, animals, and fish	**1.57**	**64%**
Reduce erosion and stabilize hillsides	1.58	62%
Protect water quality and reduce stormwater runoff and flooding	1.61	61%
Other	1.66	53%
Carbon reduction or sequestration	1.96	50%
Filter air pollutants and reduce vehicle emissions	1.87	50%
Help define city character and make it a desirable or more livable place	1.95	43%
Improve human health and provide social benefits	2.06	41%
Save energy by cooling homes and neighborhoods	2.17	38%
Provide shade	2.36	26%
Increase property values	2.51	25%
Enhance the shopping experience in business districts	2.91	14%

Comments:

1 A place for kids to learn to climb trees.
2 Recreation
3 A trees provide a place for children to play and stay connected to nature
4 Nature connection for kids
5 Provide a forest for kids to play in and others to use for trail runs and/or biking
6 Absorb traffic noise, enhance local environmental awareness and appreciation especially fragrance, wind sound, weather, season, and biological dynamics, e.g., leafing, bird and wildlife behavior and changes, leaf mulch, fruit, etc.,
7 Buffer Freeway noise
8 Buffer noise, create a sense of privacy
9 Noise reduction
10 Add character to mono-cultured landscaping trends

11 Trees and landscaping reduce visual impacts of urban development
12 Reduce traffic noise, provide visual buffer for roads
13 The impact on water views must be considered
14 Get rid of view blocking trees, trim, or top. The views of Kirkland are what make it special.
15 Block views and lower property values. Wrong trees for the area
16 Block views, so property value is increased when they are useful, but a problem when they just block the view
17 Not too high to block views
18 Adds privacy from neighboring houses
19 Privacy
20 Privacy from neighbors; Don't have shades
21 Aesthetic beauty / offset asphalt & concrete
22 Aesthetically beautiful
23 Beautiful to look at
24 Beauty
25 Enhance beauty. Maintain Northwest identity. Screen undesirable parking lots, night lighting, etc.
26 Esthetics
27 Esthetics
28 Trees are what makes our city green and beautiful
29 Trees can make a yard/house look nice
30 Trees are beautiful!
31 Provide seasonal color to brighten our year
32 Simply beautiful to look at
33 Helps bring normalcy to our hectic city environment
34 Historically significant trees enhance livability
35 Overall quality of life
36 Make sidewalks/streets more walking friendly
37 It is why I live here, trees go - I go
38 Education benefits---nature field trips without leaving the city; major benefits to bees and other insects that collect pollen.
39 Establish corridors that link open space
40 Produce oxygen
41 Respect and care for nature.
42 Reduce the urban "heat island" effect
43 Shade creeks to keep temperature down
44 Wind breaks
45 Habitat for wildlife
46 Wildlife Corridors
47 Have roots that destroy houses and yards, and create the need for massive cleanup all year long
48 Tress can also reduce the value of the area as the water view and sidewalk safety are also important
49 Plant trees that are evergreens less to clean up. Cedar
50 Help improve patient recovery. they help increase the amount of time people spend in business districts and how much they spend
51 I have an immediate calm feeling driving through Holmes Point and N. Juanita from the forest.
52 Trees help us relax and enjoy the outdoors by improving the landscape-- for example; commuting down a highway lined in trees is far more pleasant than driving past monotonous concrete walls.
53 Trees help with our peace of mind, and help to keep peace in our relationships by absorbing negative thoughts. They help the planet hold the energy of “Light”, Love and goodwill towards ourselves and others. Every time I hear the saws cutting another tree in my neighborhood, I wince.
54 Trees are emotionally stabilizing - they make people happy.
55 We have something unique that international visitors can't understand why we can't appreciate and why we destroy them. I think we end up taking them for granted when we live here. The trees are very special and unique and our little area of Holmes Pointe is sacred and special to preserve.
56 Maintains the character of the PNW.
57 More trees more green spaces build businesses up not sprawls less asphalt parking
58 Must be balanced with other important needs of the community
59 Open areas around homes also provide sunshine to warm homes in winter/cool days reducing the need to run the furnace.
60 Provide food
61 Provide fruit
62 Provide fruit, nuts, and wood products
63 They are usually the only source of fresh, healthy foods in our urban areas.
64 Reduce crime
65 Reduce crime
66 Reduce housing congestion
67 None

68 Other (please specify)
69 Personally, I would rate all of the benefits Extremely Important, but have attempted above to segregate significance levels to give you a sense of my priorities
70 Question are slanted to producing a result desired by the forester
71 These questions are obviously all skewed to support what you want to say... All are important... At the same time allowing sunny areas and views are just as important. Planting the right tree in the right place is essential.
72 Stop building so many condos. This would be more effective than trees in reducing air pollution. More people=more traffic=more pollution

7) What problems do you encounter with trees? (1 Most important-5 Least Important)

	Rating Average	Major Problem
Other	**2.38**	**55%**
Sidewalks and pavement cracking	2.76	19%
Blocking traffic, sidewalks, signs and/or street lights	2.92	17%
Safety issues created from trees and limbs falling	3.06	17%
Tree roots and underground pipe problems	3.07	15%
Blocking my view	3.64	15%
Leaves and fruit dropping	3.25	11%
There aren't enough trees in my neighborhood	3.82	9%
Trees cost too much money to maintain	3.93	6%

Comments:

1 Ability to cut trees when necessary without burdensome regs
2 Again a skewed question obviously written to get anticipated results to report. Cost of trees planted by city and sidewalk repair should be borne by the city not the local homeowner.
3 All the nice old HEALTHY trees are being cut down for big box homes. Not necessary.
4 Birds "planting" English holly and laurel
5 Block sun when over planted and over grown (Red Maples)
6 Block sunlight making me depressed
7 Blocking sightline views at certain intersections
8 Blocking sun from garden
9 Blocking sunlight
10 Cause power outages when they blow down. Blot out the sun. Ugly stumps remain.
11 City does not seen to distinguish benefit of removing invasive holly as opposed to Douglas fir; only trunk diameter matters. Just look at what "trees" are selectively fenced off on development projects. City does not seem to value/understand benefits of citizen supplied solar energy, which can be combined with shorter trees, but does require removal of some older trees. "Canopy percent cover rules all" is myopic view that does not consider all sustainable land use.
12 City of Kirkland reluctant to allow removal and replacement of trees that are a nuisance or near the end of their lifespan.
13 City plants but doesn't maintain trees in their own parks
14 City regulations
15 City required trees are wrong type and destroy build infrastructure.
16 City rules and fees for cutting on private property
17 Constant property damage due to moss, pine needles, lack of sunlight and fallen tree limbs
18 Continuing loss of tree canopy
19 Cottonwood trees leave a thick carpet of white sticky blooms that cover *everything* in area, it invades our house and driveway, and is very difficult to remove. This is a nuisance.
20 Cutting and destruction of trees
21 Declining health creates safety issue but those who 'love' trees without adequate knowledge and without common sense make it almost impossible for those trying to do the right thing by replacing an ailing urban tree that we ultimately are impeded from helping promote a healthy tree canopy for the area.
22 Decreased property value by trees blocking views
23 Diseases that reduce the health and affect the appearance of trees
24 Downed branches causing power outages
25 Effects and potential problems vary per species
26 Fir needles are a pain in the back side. They make a mess every where
27 Fir needles in my gutter (sucks)

28	Fire hazard with accumulated downfall in near area; abundance of shade causing moisture problems with house
29	Growing into power lines
30	Having to seek permission to replace diseased or poor choices of varieties of trees.
31	Hazard trees that are not dealt with
32	High costs associated with Tree Ordinance requirements
33	I consider trees to be part of the "view"
34	I rake the leaves into my garden, providing habitat and food for worms and enhancing the productivity of my vegetable garden.
35	Ignored apple trees that spread codling moths
36	In appropriate trees (such as Leland cypress) planted as landscaping cause dangerous situations
37	Increased home roof maintenance
38	Invasive nonnative trees
39	Kirkland has Water; Mountain and City views I use to love driving into Kirkland on 85th and see the mountains and water view now All I see are the huge Maple trees. Nothing special about that I still love driving into downtown Edmonds for the sound view.
40	Lack of knowledge and trust of who to hire to care for my trees
41	Large trees have huge branches falling on creek and my yard. Looks like cottonwood trees over 100 feet that drop leaves, sticky covers for leaves, which is hard to get off lawn, lawn furniture, patios, deck and hot tub. The trees are in an easement that butts up against Juanita-Woodinville Rd. The creek use to have fish and frogs but nothing except branches, leaves, and lots of wild ivy that is growing up the trees. I feel it would be better to have the trees topped, trimmed and clean up the creek to return it to the original way it was. With the trees that have been planted in the middle of Juanita-Woodinville Road, it makes impossible to trim those trees unless the road is closed as there is only 2 lanes. The trees in the middle of the road have grown so much that it is hard to see clear ahead to the crosswalks and there have been accidents due to the low visibility. Trees are great. They are a great buffer for noise, home to many birds, clean the carbon in the air, pretty to look at and provide shade but they are hard to deal with when they get so big you can't do anything.
42	Leaves are a problem not fruit.
43	Many of these questions are irrelevant to trees on public lands. Trees on private property should not be subject to government control
44	More trees needed
45	Most ROW widths are not sufficient for street trees. Shoehorned trees conflict with more important ROW uses and become harmful.
46	My neighbors have large trees on their property and they don’t take the time or spent the money to care for them properly so I fear their tree could fall on my house.
47	Need to get permits and $$$ to remove problem trees. They are pretty in the summer (cottonwood and poplar), but they are a massive problem.
48	Needles clog gutters and storm drains.
49	Neighbors cutting down trees that provide shade or privacy for my yard.
50	Neighbors cutting down trees thoughtlessly or without a permit
51	Neighbors cutting too many trees
52	Neighbors intent on cutting down vast majority of trees on their property, thereby reducing Kirkland green cover
53	Neighbor's trees blocking solar panels
54	New home construction does not do enough to protect trees. Many are removed and more disturbing, many die post construction
55	None
56	Non-native trees can be very invasive!
57	Not allowed to cut trees down
58	Not enough clusters of trees for wildlife habitat due to in-building
59	Not maintained.....pin oaks are nasty all around
60	Nothing else
61	Old trees need to be removed/maintained
62	Other (please specify)
63	Overhang blocks sunlight for garden and solar panels
64	People clear-cutting property for development
65	People don't know how to prune trees properly, and that includes utility workers.
66	Pollen and sap dirties up my car
67	Poor pruning practice from others on street trees
68	Power outage due to limbs falling
69	Provides haven for crime
70	Recently eight (8) old Douglas Firs were ripped out by a construction next to our property. I objected to this because the demolition workers had not yet submitted to the city to remove these trees. They used an excavator to slash the trees down which was an extremely dangerous practice within 9 feet of my house. I do though object to neighbors planting fast growing trees as fencing and which they allow to grow 40 or 50 feet obscuring a diminishing view of the lake and which reduces the value of homes above the offending house. If the city has code that states you cannot erect a fence more than 6 1/2 feet, then the city should have the same code for trees that are being used for no other reason but as fencing.
71	Removal of sick trees in areas city and parks dept are responsible for
72	Restrictions on tree maintenance and trimming/topping - Big but not Major problem

73	Restricts residence construction
74	Ridiculous ordinances that prohibit property use
75	Should be tree/hedge height limit in view areas
76	Some "protected" views aren't being protected.
77	Some trees drip sticky substances that damage cars
78	Strict city rules about trees that aren't well understood by the neighbors
79	Tall trees with large canopies block light entering our homes, are huge safety concerns, and prevents grass from growing in our yard. Lack of useable yard due to too many and too large of trees lowers my property value.
80	The City of Kirkland is preoccupied with trees. We need to focus on reducing traffic congestion and limit building of new condos
81	The city spends too many resources to keep trees that should be removed or replaced, many times to the detriment of the homeowner
82	The city takes down more trees than the neighbors.
83	The power company butchers the trees because of the lines
84	The small inconveniences caused by trees are minor compared to the very large problems caused by the trees being taken down. There was an old, large, gorgeous tree in the front yard of someone's house near my house. It was an unusually beautiful tree. The owner of the tree had it cut to the ground recently - exposing a very ugly house. The large old trees should not be at the mercy of the ignorant person who owns the property
85	The trees are disappearing continually.
86	The trees behind my house are a problem! They are too tall
87	There are TOO MANY trees in our neighborhood
88	There aren't enough NATIVE trees in Kirkland
89	They can get too big for the property/surroundings, and one they do it's hard to deal with (especially if you're prohibited from cutting them down).
90	Too close to houses so increase fire risk
91	Too many Cotton Woods allowed to stand and remain. One of the biggest culprits is the City of Kirkland and all the Cotton Woods allowed to stand along the shores of Lake Washington near Juanita Beach Park and trail.
92	Too many large ones cut to open for development or "better landscaping" and not taking into consideration what might happen if the support trees are removed. Seen too many firs standing alone in someone's yard, waiting to fall in the next storm.
93	Too many large windbreak trees have been removed; now my street experiences very strong winds.
94	Too many non-native trees (e.g., English Laurel)
95	Too many trees are being cut down by developers, AND the beautiful old trees on Kirkland Ave are being cut down because they don't meet the current sidewalk code. What a terrible decision. Those trees are priceless and have been in Kirkland longer than many human residents. I am disappointed that the city couldn't find another solution to level the sidewalk.
96	Too much city time and money spent on this non problem
97	Too much shade reduces sun and solar warming of homes
98	Too much shade, moss damage to roof
99	Tree fall during wind storms does knock out power.
100	Trees *ARE* the view
101	Trees are the view. Don't be so arrogant and self-absorbed.
102	Trees are too close to the house - should be able to remove them.
103	Trees blocking view of cross traffic at driveways as well as street corners
104	Trees do cause some maintenance issues but it's worth it
105	Trees do cost money, so we must be realistic and practical
106	Trees overhang into the road and on power lines this is a major problem, with a simple fix.
107	Views should be protected too
108	Watching some Kirkland trees being removed
109	We are required to maintain trees in the strip along our sidewalk, yet we have no rights to trim them which is not fair.
110	We keep cutting them down in mill creek to make way for new homes. We're losing our natural forests here
111	When the City requires developers to plant street trees, it needs to specify trees that are NOT shallow-rooted and that WILL BE of an appropriate scale in 20 years or more.
112	Wrong kinds of trees...e.g. Cottonwoods
113	Wrong types of trees planted in sidewalks and near buildings

8) To your knowledge, who is supposed to care for trees that are located in front of your property between the street and sidewalk?

47.7% Me: the adjacent property owner
29.1% I'm not sure
23.2% The City's tree crews

9) Do you think the City's tree protection ordinance is:

27.3% I'm not aware of the ordinance enough to say
24.3% Too strict - you can't even remove trees on your own property!

15.4% Too lax - It's sad how many tree are getting cut down everywhere
13.5% Just right - Kirkland has actually increased its canopy coverage
12.5% Confusing - It's not clear what is allowed and what's not
7.1% Other (please specify)

10) Overall, which statement represents your sentiments regarding the condition of trees? (1 Most important-5 Least Important)

	Rating Average	Trees look great!
Trees in forested areas in parks	**1.62**	**47%**
Trees in formally-landscaped parks	1.64	43%
Trees in the right-of-way (along streets)	2.05	20%

Comments:

1 After car accidents street trees that were eliminated/destroyed are rarely replaced
2 Along Market Street median trees need to be trimmed. There are many dead limbs.
3 Always wonder what markings and ribbon mean on some of the trees in the woods
4 Block view of traffic. Icy streets slow to melt because they are shaded.
5 Bridle Trails park is an absolute gem.
6 Carillon Woods needs to have fewer trees in the children's play area vicinity for safety, visibility and warmth.
7 City should focus on basic services, not trees
8 Cottonwoods should be removed and replaced with desirable trees
9 Dead trees all over the place that no one seems to be responsible for; that goes for severe pruning needed.
10 Do general a question if it pertains to existing. Right of ways vary all over the city.
11 Don't know
12 Don't use these parks.
13 Established trees are being cut down at an alarming rate, especially during new home construction because the fines are too low to discourage clear cutting. Spindly saplings take decades to mature. Some trees can live hundreds of years. We need laws that protect our grandchildren's natural tree heritage.
14 Existing large trees in most rows need to be removed.
15 Greenbelt area trees are safety issue with windstorms.
16 I cannot respond because I am unsure
17 I don't live in a neighborhood that has a public right-of-way
18 I feel strongly that government should have no right to dictate the use of plantings on private property unless it presents a public safety issue
19 I know we are working on the forest trees so I put generally satisfied to keep supporting that work
20 I live on the greenbelt and there are dead trees that should be thinned. One fell onto my house years ago.
21 I think our trees seem to be healthy, but I wish we were doing more to replace the old growth trees that periodically get cut down.
22 I think there should be more limits to which kind of trees can be planted as street trees next to sidewalks.
23 I think trees and other landscaping are incredibly important to the overall feel and appearance of a community.
24 I would like more street trees and a way for neighbors to coordinate street tree planning/planting on their street.
25 I would like to see concern for the trees be a high priority over convenience of people. The cherry trees along 130th could use some attention. They need to have the ivy pulled off them.
26 I'd love to see power lines go underground which would allow our trees to grow naturally and continually get topped.
27 It's not the condition of trees; it's the cutting of trees. We are obsessed with controlling things. I moved here because of the firs and cedars and we keep cutting them and replacing them with maples.
28 Kirkland needs to do landscaping and plant trees along 124th ave in Kingsgate. Not nearly enough landscaping is done there.
29 Lack information. Requires both a case-by-case and a general perspective, intelligence, management response(s)
30 Looking forward to trees along 85th St. Rose Hill
31 Many have overgrown their living spaces, damaged sidewalks, blocked views. They need to be replaced with less invasive types of trees or even shrubs
32 Many trees in the Kirkland streets cover signs and street name, this is not ok. The city should maintain these trees.
33 More trees please in parks - especially natives. Please replace trees when they fall.
34 Most residents will agree that views of the city and lake are more important than trees
35 Need more trees spread out in parks, e.g. Peter Kirk Park, etc.
36 Need to deal with sidewalk damage and eradicate the ivy that damages trees in some forested areas.
37 Not enough diversity.
38 Noticing some serious invasive english ivy on some large trees. Doesn't ivy usually kill the tree eventually? If so, seems like a hazard down the road. Earth Corps and other orgs often organize work parties to do invasive removal . . . .
39 Oak trees never should have been planted. Too dirty and leaves cause problems.
40 Obviously budget restraints in Kirkland limit the amount of time given to maintaining the trees. There is room for

	improvement. Also I think there are zones between jurisdictions (like the edges of parks next to roads) where the trees are not well maintained because (I'm guessing) that neither the parks dept or the public works department knows who is responsible. (Along Forbes Creek drive is an example)
41	One of reasons we bought a house here was because of the trees, both on our lot and in our surrounding forests.
42	Other (please specify)
43	Owners of properties should have the right to remove their own trees.
44	Parks ok, street and right of way totally out of control, forested areas?? Ok if old growth only. No crowding.
45	Pay maintenance workers; employ fewer city planners.
46	PSE make a point of butchering our street trees, we should require them to do a better job. The pruning they perform cheats our community.
47	Question wisdom of planting true firs on beach at Juanita Beach Park. Why use more native species in public parks.
48	ROW trees are in bad need of pruning away from the container trucks that damage the limbs and for the health of the tree.
49	Seems to make more sense to plant dwarf trees under utility lines, rather than fighting a losing battle with topping them.
50	Should use more native species maybe shrubs along with trees
51	Some forested areas on Finn Hill need restoration
52	Some of the trees are a driving hazard when they have grown so big they are hard to see around when close to intersections for pedestrian and bike riders.
53	Spotty--some are fine, some are not well cared for--again, who cares for those?
54	Street tree appearance is compromised by pruning for power lines. Push under grounding!
55	The City Arborist should be made available at no cost to evaluate the health of street trees that the property owner has concerns regarding
56	The City should not be creating easements for trees on private property. That right should lie soley with property owners.
57	There are many dangerous, untrimmed trees and poorly trimmed "preserved" trees in our city, particularly under utility wires. These trees should be allowed to be removed (even at personal homeowner expense). Why should we be preserving trees (trimmed like unhealthy mangled shrubs)? These mangled "trees" are actually publicly shameful (!) Examples of our professed love of trees as a "tree city." City should allow and perhaps even promote private homeowner paid removal of these ugly eyesores.
58	There are plenty of places for trees that do no block residences' views.
59	There are too many fast-growing trees planted too close together and they block views, block sunlight and crack pavement.
60	There should be serious penalties for persons/entities who plant potentially tall trees directly under utility lines.
61	Too many forests are being ruined to put in neighborhoods
62	Too much ivy killing trees
63	Tree planning should consider a very long term plan so the trees will be able to age.
64	Trees are allowed to grow too close to power lines along streets resulting in severe power outages throughout communities at a high cost
65	Trees are often overgrown with Himalayan blackberry & ivy
66	Trees by my house look terrible- they are not trimmed
67	Trees generally look like they're butchered!
68	Trees in Parks: YES! Trees in Right of Ways: Yes! Trees on Private Property: Give the owner a break!
69	Trees near traffic signs are not being taken care of
70	Trees on private property are very important since that's the largest area
71	Unfortunately a lot of trees at Juanita Bay Park are at the end of their life cycle and are deteriorating.
72	Very unsatisfied with decision to cut down trees on Kirkland Ave and possibly other areas I'm not aware of. Find another solution to level sidewalks! Don't sacrifice the trees. It seems very hypocritical to say the city has a tree protection policy and acts like it cares with these surveys and then will cut down important, established trees.
73	We have a long way to go in terms of invasives education and reduction in our green spaces.
74	We have sidewalk heaving on 84th Avenue NE and plants growing into the sidewalk, also obstructing views of street signs.
75	We should have more NATIVE trees along streets, in green belts, in parking lots, etc.
76	We should try to keep mature trees, rather than removing them and replacing with small species.
77	When the trees block or partially block sign this is a problem.
78	Where our parks contain views, the irreplaceable and valuable views contribute to tourism and higher property tax dollars collected. Trees in these areas need to be carefully selected so as to maintain this economic benefit to Kirkland (plus the benefit where citizens and visitors feel there enjoyment of the area is enhanced by the water views, the Views of Seattle and the views of the Olympics.
79	Where they block cross walks, lighting and driver vision, the trees should be trimmed or removed.
80	Would like to see more natives in right of way, parks and in new developments. I usually see small non-native maples and other "Junk" or cheap Home Depot style trees used, especially in new housing.
	You don't keep right of ways and intersections safe because you don't trim trees in and around intersections-you're asking for problems.

11) Overall, do you feel the City is planting enough PUBLIC trees?

34.3% Enough
33.5% Not enough
22.8% I'm not sure
9.4% Too much tree planting

12) What ways of encouraging PUBLIC tree protection, planting, and maintenance would you favor?

	Rating Average	Most support
Other	**2.00**	**67%**
Education to increase awareness of the benefits of trees	2.21	39%
Neighborhood volunteer tree planting	2.27	32%
Dedicated funding for City tree crews to plant, prune, and remove public trees	2.28	38%
Incentive programs to encourage citizen tree planting in parks and planting strips	2.33	35%

Comments:

1 A program to help neighborhoods understand what trees they CAN plant in common areas.
2 All the above costs money - Kirkland can't afford
3 Allow an Association to remove trees that are too big.
4 Allowing public to remove nuisance trees
5 Annual expert assessment of trees to be removed (city removes them making wood available to public), and where some should be planted by volunteers
6 At this time of dwindling resources, tax payer funding for tree planting and maintenance is a non-priority. When the economy improves, then the city can indulge in stuff like this.
7 Boy Scout tree planing
8 Bring in an organization like Friends of Trees
9 Budget shortfall DOES NOT ALLOW
10 Buy trees for residents to plan
11 Caring for the trees is great but I do not want to see them cut down!
12 Citizen science based reporting
13 City maintaining trees of neighbors that are hanging over roadways
14 City should focus on basic services, not trees
15 City should have a more balanced approach to trees and vegetation. If trees are planted then resources need to be made available BEFORE they go in so that the expense doesn't fall on the homeowner or they go unattended to like many of the green spaces have.
16 Community partnership with city
17 Dedicated funding to maintain the trees would improve the health of the canopy and provide consistent maintenance to avoid limb breakage and tree falls
18 Definitely protection for the existing old cedars and other old trees
19 Don't spend any more money trying to educate the public, put money in places that are better spent for the community. I these economic times don't stress trees and such.
20 Easy ways to call in illegal cutting by developers
21 Educate neighbors to plant appropriate trees in appropriate locations!
22 Educate public about pruning, removal--regulations, best practices
23 Eliminate tree ordinance to reduce cost of maintaining trees
24 Focus on reducing traffic congestion. This should be the priority.
25 For Developers, INSTEAD of requiring them to save trees on lots where they may not be wanted, have them pay into a fund for planting trees in parks or other green belt areas.
26 Generally people buy the biggest, cheapest tree they can and the result is something too tall and too big for the space after about 10 years.
27 Get the word out -- we need volunteers to remove trees overgrown with invasive species
28 Have a plan and people gift prized specimen trees instead of benches. And remove the overgrown dirty ones.y owners and
29 Home owner incentive to cut or remove problem trees.
30 How can one be supportive of both planting and removing public trees? Very confusing.
31 I am so discouraged having fought for SDOs and they have absolutely no consequences. A beautiful old tree that eagles sat in was cut and sold to a logging company. It managed to squeak by and I feel absolutely helpless to stop it.
32 I do not know if you have laws to protect the trees in planting strips that the city planted. Either way, do not allow

people like my neighbor to remove planting strip trees.
33 I think the plan has to be by neighborhood. More trees in areas w/ out view opportunities, less in areas with property values tied to views. One size does not fit all.
34 I would be very pleased if all public schools had a naturalist, someone who specialized in teaching children about nature and how it is important.
35 I would encourage tree maintenance
36 I'd like to have more public trees, but I know $ is tight.
37 Impact fee on new development, where appropriate
38 Incentive vouchers for saplings of appropriate trees given out to those who would be willing to adopt a tree.
39 Include trees in any new development, e.g. the Houghton Business District. Get an Olmsted book.
40 Just make it easy for us to do it - organize events and the smaller the tree that's planted, the more successful it will grow.
41 Kenmore recently planted the Blue trees along 525, and tree sweaters draw attention. Kirkland could come up with their own AborArtum
42 Less building, more trees
43 Let's get rid of damaged dying trees and prune existing trees large shrubs before we plant too many more. Only spend money on keeping them safe and tidy. People can donate extra to plant new trees. People can memorialize loved ones with tree dedications.
44 Maintain trees so branches don't break off
45 Many urban tree programs are co-opted by tree cutting contractors and tree farms anxious to sell starter trees. I'd prefer a citizen-run volunteer program dedicated to preservation. Kirkland needs a proper legal mechanism for citizen-initiated land marking of trees.
46 Meaningful penalties for topping trees
47 More flexibility in owners' maintaining own trees
48 Neighborhood level planning so that the rules apply to the needs & priorities of the neighborhood
49 Neighborhood volunteer tree maintenance.
50 No view blocking trees!
51 None of governments business to dictate to private land owners when most of the cities beautification looks in shabby shape. Clean your own house before pointing the finger at others.
52 Notify all Kirkland residents that they need to take care of trees in parking strip
53 Once educated, soften your strictness about pruning and replacing right of way and boulevard trees.
54 Other (please specify)
55 Planting strip tress that have huge root systems are not an improvement. Maple trees, Cedar trees and Cottonwoods need to be band as they clog gutters and drop debris all year long.
56 Protect what we have, especially in annexation areas
57 Public awareness of the benefits of trees is important and I feel a voluntary citizen involvement much like that in some of the parks would be beneficial and helpful to keeping our PUBLIC trees planted and maintained would be a welcome opportunity and help contain public costs.
58 Public instruction on how to care for trees, as well as selecting trees and locations for planting. (Perhaps a partnership with the schools? Or an online class? Perhaps completing the class would allow the person to earn a badge on a social network such as Facebook or Google+.)
59 Purchase easements for City trees to be planted on private property abutting streets, 1/2 the canopy diameter off the CL of the sidewalk.
60 Re-prioritize spending to maintain/replace what we have
61 Require new developments to plant trees and keep existing ones when possible
62 Require trees planted on rooftops of businesses.
63 Rules that if you can't care for the trees, don't plant them!
64 School curriculum projects to engage family, neighbor, neighborhood, youth and senior engagement
65 Shrubs and ground cover also
66 Some trees just have to come down. Especially when then are too close to a house.
67 STOP CUTTING TREES ALONG CITY STREETS!
68 Stricter tree policy. I've seen groves of established trees wiped out for new housing development with small ornamental trees and bushes planted here and there to replace them. It does not replace what was lost. The city needs to be held accountable for trees cut on/near sidewalks.
69 Support City knowledgeable crew to plant native trees which are drought-tolerant, pest-resistant, right height for visibility (so don't have to come back and prune); support biodiversity so we don't lose a bunch of the same trees to climate change, pest.
70 The City needs to stop planting trees in the middle of sidewalks. The City needs to maintain their public trees the same way they ask private home owners to maintain those in right of ways.
71 The City provided saplings that we planted on Peter Kirk property. The school and PTSA had no budget for those trees. Volunteers did the work. Seems like a good partnership.
72 The general public are not interested in trees unless it affects their property or right of way.
73 There are more important issues than trees, let's keep trees in perspective with our other responsibilities
74 There are plenty of trees in Kirkland - use public money and staff time to reduce development costs and repair infrastructure.
75 Tougher restrictions on cutting down old healthy trees
76 Tree sponsorships, like benches, in honor or memory of someone
77 Trees along 124th Ave in Kingsgate. Helps to also beautify an ugly street due to massive power lines

78 Unsure what else is required
79 Volunteer planting in public areas should include city governance.
80 We are big on dedicating benches in parks to individuals, how about tree dedications?
81 You are mixing issues and teeing up the idea of tree planting in public parks. Good idea if done without blocking views. That can be accomplished.
82 Zoning Rules for Shopping and Assembly Uses

13) For PUBLIC tree protection, planting, and maintenance programs, which of the following reflects your views?

41.9% I'd be willing to pay a little bit more for these programs
22.3% I'm not willing to pay any more
15.8% I don't have enough information to answer the question
9.9% I'd be willing to pay much more for these programs
6.1% I think we should spend less on these programs
4.1% I don't think we should spend anything on these programs

14) How should the City encourage PRIVATE tree protection and planting?

	Rating Average	Most Support
Other	**1.83**	**69%**
Education to increase awareness of the benefits of trees	2.13	45%
Incentive programs to encourage tree planting on private property	2.24	44%
City ordinance changes	2.9	26%

Comments:

1 Allow interested landowners to plant orchards within the City.
2 Allow owners to cut too large trees if they replace with decent-sized new slower growing ones.
3 Allow property owners to be stewards of their own trees.
4 Allow trees to be planted on private property abutting streets, 1/2 the canopy diameter off the CL of the sidewalk.
5 Also continuous laurel hedges should be trim down to 6 ft to show more tree linese di
6 Are commercial landscaping regulations adequate? Developers should have to improve the greenery when they build.
7 Better enforcement of existing ordinance
8 By forcing density (too many houses on too small lots), we are also pushing the trees out. No one wants a tree towering over a structure as it is asking for trouble (everything from falling branches, masses of leaves clogging gutters, to severe structural failure). We have a massive oak tree that was planted in 1964 too close to our house and it will unfortunately have to go later this year. It is a majestic tree, an asset for the city, but in being too close to the house, the risk in retaining it is just too great.
9 Change city policies. Change apparently inflexible tree rules to allow for reasonable tree removal and replacement. Removal of invasive holly should be encouraged, especially when there are plans to replace with other species. Planned solar installations that include tree replacement should be encouraged.
10 City should focus on basic services, not trees
11 Clarity on the laws. Example: If I plant a tree, am I disallowed from removing it in 10 years without a permit?
12 Discourage mega mansions like the remodel on Waverly.
13 Do more to make homeowners aware of regulations governing tree maintenance and removal on private property.
14 Do the procuring and organizing for us. Work with scouts, schools, and other civic groups.
15 Don't allow developers to cut so many trees down or plant so close to the property line (so as to impact the neighbors)
16 Don't know enough about ordinances to comment
17 Don't know ordinances
18 Don't mess with the citizen's rights to do what they wish with their property
19 Don't spend the money on this; there are more important things to spend money on. I love trees, I have trees, but if I have a sick tree I don't want to have to pay for the city to come and tell me it is sick before I cut it down. Too much legislation, too much Gov. looking over our shoulders.
20 Double-down on Arbor day.
21 Educate on type of trees that do not cause problems and damage to property.
22 Educate the public on beneficial genera/species that are appropriate to the space in height, width, cultural requirements and disease resistance.
23 Educating the general public on the benefits of trees would be a waste of money during this poor economy.
24 Encourage people to do less cement and pavement, clean storm drains and rain gardens
25 Encourage residences to top, prune hack off view blocking trees!
26 Enforce the city ordinances.
27 First stop the removal of common public assets

28 Fliers listing great cultivars for residential use mailed out.
29 Have a tree "exchange" - if one gets cut down, another gets planted
30 Help people maintain healthy trees on their property
31 I and my neighbors were thrilled to get a Backyard Wildlife Sanctuary designation and sign
32 I don't know what City currently does nor what is most effective, to comment.
33 I feel the future of Kirkland's aesthetics when it comes to trees will probably come more from land use ordinance and insuring that the city owns enough land to maintain a long term plan. Otherwise land will be developed without regard to overall public enjoyment.
34 I need more information
35 I need to read the existing ordinance to be better informed.
36 I think we have more than enough trees, especially in my area; I'd like to be able to remove some
37 I'm not sure what the city ordinance would be? Something like mandating more trees would not be good. Offering prime species of trees at a discounted price would be good. Also ordinances that encouraged the elimination of problem species if they are replaces by prime species would be good policy as well.
38 In addition to huge fines for healthy tree removal and penalties for falsifying disease reports, you need to reach out with pro-tree education -- on TV/radio/online, in public schools, at local nurseries, etc.
39 Incentive program should provide the appropriate size and species of NATIVE trees for the appropriate space
40 Incentive programs to encourage proper care of private trees to discourage cutting them down
41 Incentives and education for planting NATIVE trees
42 It is one of my biggest values and a reason I live here.
43 It's important to save existing trees, though it's also important for neighbors to understand or the city to promote a "good neighbor program, wherein folks can become more mindful about blocking neighbors views and/or taking care of their own trees growing into other properties.
44 It's not the city's job to tell private citizens how to landscape their private property.
45 Let me cut more trees down, when the initial planter did something stupid like put the wrong tree in (40ft tree next to house)
46 Like I said earlier. If people can purchase trees and plant them with city approval to plant in public spaces in order to memorialize their loved ones, I think people will care for that area more. This is all privately funded and can get city planning approval to make sure plantings are happening in the best areas. We have several dead or dying trees in our greenbelt area. One went down in the last major windstorm. Other trees have been damaged from that storm and are dying. They are a hazard to the homes. We have had a neighbor who had a tree fall on their house from another neighboring greenbelt because they do not get wind sail pruning. We love our greenbelts but need direction on how these trees can get some attention since they are on city property.
47 Limit tree height/width to prevent property damage to others
48 Lot size - with big house on small lot tree become a nuisance and a danger
49 Make it easier to cut a wrong tree and plant a right tree
50 Make it easier to take down problem trees that can be replaced
51 Make it financially possible rather than excessively expensive to follow your rules to replace ailing trees. Otherwise we have to wait for impending damage to structures to replace an unsafe tree without paying what is an exorbitant fee for most of us (remember you just incorporated a bunch of 'normal' blue-collar working folk in the new incorporated area).
52 No more ordinances!!!
53 Not sure on the city ordinances. Feels like lots of opposition to additional regs these days, so would have to be carefully crafted to provide what folks can do vs. can't do, in my opinion.
54 Nothing else
55 Only allow trees that won't grow out into the street and look bad and share debree with neighbors
56 Ordinance change should not be more strict
57 Other (please specify)
58 Perhaps lead by example in public areas then encourage private involvement to attain a more complete result... perhaps becoming noted as green and beautiful enclave such as Levenworth is noted as a Bavarian enclave.
59 Police & fire should take priority over spending money on this issue
60 Prevent developers from cutting established trees
61 Protect the mature trees we have in addition to adding new
62 Protecting trees from ?!* construction crews.
63 Protection of view should certainly be considered on private property
64 Provide solid guidelines for developers on what trees or how many to keep. Most new infills and subdivisions simply clear cut!
65 Public instruction on how to care for trees, as well as selecting trees and locations for planting. (Perhaps a partnership with the schools? Or an online class? Perhaps completing the class would allow the person to earn a badge on a social network such as Facebook or Google+.)
66 Purchase and preserve undeveloped land for urban wildlife habitat.
67 Reduce the size of house we allow on a lot
68 Remove $200 fee to be told by a city arborist if a nuisance tree (planted by the homeowner) can be removed
69 Remove Tree ordinance so people will want to plant trees
70 Repeal of the current tree ordinance
71 School curriculum projects to engage family, neighbor, neighborhood, youth and senior engagement
72 See concern in # 9.
73 Soften your strictness overall. It’s ridiculous people have to jump through so many hoops just to make their property

safe in terms of tree intrusion and overgrowth. Not everyone has the $ for this, and it invites non-adherence to your city codes.

74 Stay out of private property!
75 Stop allowing wholesale removal of trees in developments
76 Stop wasting tax payer money on printed information material...that's what they made internet and email for.
77 Survey areas and issue action recommendations for WHICH private actions would most benefit the area surveyed
78 The city does not need to focus on private property owners. I think the time and energy needs to be put towards other issues, let's not create new ones. I feel this would be a waste of tax dollars
79 The City has more pressing issues to spend time and money on. There is no shortage of trees in the PNW. It's insane that the City has spent tax money on this survey; quit fretting about trees and solve real problems.
80 The City needs to acknowledge that large trees near a house, sidewalk or underground utilities are a health and safety issue for homeowners. The City and/or other neighbors should not have the right to tell a property owner what he can or cannot do to keep his property or family safe and healthy.
81 The City should let homeowners decide which trees should be retained/removed/planted on their own.
82 The City should not require saving trees that a private property owner doesn't want. Mostly, people don't want a tree that is too large, they feel is a safety hazard, blocks light into the home, or prevents them from having a yard w/ sunlight. Allow them to take those trees down IF they plant new trees elsewhere on their yard where they will be appreciated.
83 The city should stay out of what people do on private property.
84 The tree cutting companies come around with their full color fliers with pictures of huge trees squashing the house - all photo shopped. The next thing you hear is the sound of buzz saws. They are manipulating people by fear to have their large old trees cut to the ground. The way those companies market their services should be illegal. I have found a few good companies who really care about trees and you can tell that they understand and love the trees.
85 The very few trees that were left by developers were removed by homeowners. Acres on two sides of us have almost no trees now. The man next to us even removed the trees required in the planting strip. When there is only one or two trees in the 7,200square foot lots anyway, it is legal for all the trees to be wiped out in a development. It is happening all around our Bridal Trails neighborhood. This needs to be changed.
86 The word PRIVATE means Private. Too much government, too much control. Let Private homeowners do what they want with the property they purchase.
87 The wrong kind of trees can cause big problems. So education has to have some sort of check on it or people will plant trees that end up costing money to maintain. Such as blocking views when driving, blocking sun in neighbor's yard etc.
88 Trees on neighbor's property are danger to ours plus continually dropping limbs, cones and needles on our property
89 Unsure of what else is needed
90 We already are too restrictive in tree ordinances and encouraging private planting may go astray and have a neighbor plant a tree iChat will block public or private views... Which is bad.
91 We already have enough trees
92 We have plenty of trees! The City is OBSESSED!
93 We need to give the authority of decision making for private tree planting into the hands of the property owner. Many people find their yards overgrown after many years and need to have the freedom to landscape/re-landscape to enhance the value and beauty of their property.
94 Who do I find out what the ordinance is?
95 Why should the CITY get involved with PRIVATE tree protection and Planting???

15) What public outreach or communication methods do you prefer to stay informed of urban forestry issues?

65.3% Email or listserv
53.9% City Update newsletter
52.9% City website
22.1% Posters, notices
14.6% Currently Kirkland on TV
14.1% Facebook
10.9% Webinars/online presentations
8.8% Other

Comments:

1 Add to utility bills etc.
2 Articles in local paper or local online blogs
3 Articles in reporter an Kirkland views
4 Booth at Farmer's market, special event at Farmer's market, offering tabling/seminars from outside orgs like Native Plant Society, Audubon, Plant Amnesty
5 Bus posters
6 Community hand on workshops and work parties
7 Deputize the homeless to promote forestry issues instead of their hard times. Costumes would not hurt.
8 Direct mail
9 Email from neighbors
10 Enjoyed the recent PW sustainability workshop on recycling

11	Google+
12	Have City give presentation on urban forestry issues at Finn Hill Neighborhood Alliance member meetings!
13	Having events for public tree planting would increase ownership by the citizens.
14	I am not certain of the best way to reach its citizens other than what i've checked
15	I didn't know I could. I just had my own tree issue - that's how I knew about the urban forest. The city arborist was very helpful to me personally.
16	I read your newsletters but wonder if others do. Email Newsletter might work as one pager? Feeding the info slowly.
17	It's hard to find documents about tree ordinances on city web sites.
18	Kirkland courier
19	Kirkland patch
20	Kirkland patch
21	Kirkland patch
22	Kirkland reporter
23	Kirkland reporter
24	Kirkland reporter
25	Kirkland reporter
26	Kirkland reporter
27	Kirkland reporter
28	Kirkland reporter
29	Kirkland reporter
30	Kirkland reporter
31	Kirkland reporter
32	Kirkland reporter
33	Kirkland reporter
34	Kirkland Reporter/ Kirkland Parks and Rec Guide
35	Kirkland Views is a wonderful resource.
36	Kirkland Views, Kirkland Patch
37	Kirkland Views, the Kirkland Patch
38	Kirkland websites like Kirkland Views or Kirkland Patch, Kirkland Reporter newspaper
39	Local blogs and web sites
40	Mailings specific to issue
41	My neighborhood association listserv (southe rose hill/bridle trails)
42	Neighborhood associations
43	Neighborhood associations
44	Neighborhood e-mail lists
45	Neighborhood meetings
46	Neighborhood presentations of tree importance/value
47	Newspaper
48	Newspapers
49	None of these will reach me. I don't have cable, use Facebook, and get so much junk email it'll get lost.
50	None.
51	Notices, mailed to homes.
52	Online news in Komo and/or Seattle Times
53	Other (please specify)
54	Park tours and lectures about the urban tree and its environs. A festival in the parks celebrating the wonders and beauty of trees.
55	Patch/Kirkland views
56	Plus venues for people to supply input and reactions to policies which directly affect the citizens.
57	School curriculum projects to engage family, neighbor, neighborhood, youth and senior engagement
58	See comments
59	Send me an email
60	Snail mail
61	Stop printing city new letter. News letter are made from paper...once known as trees.
62	Story in Kirkland Review
63	That little newspaper we get... The Kirkland Reporter, and on Kirkland.Patch.Com and (South Rose Hill/Bridal Trails) srhbt.nextdoor.com
64	The City Council needs to intervene and make coherent bylaws regarding tree maintenance and a "good neighbor" policy of sorts.
65	The Kirkland reporter
66	The most cost effective method
67	The Patch and Green Kirkland
68	Tree info page on Kirkland Views.
69	Twitter
70	Twitter
71	Urban forestry sounds like logging - how about another name?
72	Utility bill inserts
73	Via the utility bill
74	We are old school; we read books to educate and inform ourselves.

75	You need to reach out to Condo and housing associations, corporations and individuals, those without computer access.
76	YouTube Currently Kirkland

16) Do you have any additional comments?

1	Removal of diseased trees is not inexpensive. I have to go through head ache of getting a permit.
2	1) Trees are valuable, but they are not more important than people. 2) Private property rights need to be balanced with goals for tree planting. 3) The lake views in parts of Kirkland are more important in keeping property values (and the tax base) high and should be protected as much as trees are. There should be view corridor set asides that are at least as important as tree regulations. 4) The existing tree regulations are overly expensive and burdensome.
3	A lot of the trees, planted by the City, are blocking views. Why did you do that?!
4	A real life story: A young family was building a new single family home in Kirkland and a tree was right in the middle of their home design and building envelope. This family had to spend 30K (Yes $30,000 THOUSAND DOLLARS) for all that it takes to go through the City's tree ordinance requirements and eventually get a NO from the City that they could not take out the tree, resulting in a plan redesign. In total, this is what they got from the City of Kirkland over ONE TREE: 1) They can't build their house the way they wanted. 2) $30,000 of consulting and redesign costs that they can't afford. 3) Huge delays in their project. All for ONE TREE because of the overreaching tree ordinances by activist leaders with no perspective on reality. Please figure it out.
5	After serving on the Planning Commission and living in Kirkland over 30 years, the city arborists and codes are not adequately fair to the public, do not protect our infrastructure and are required in places that are in direct conflict with public utilities. It is time to get it right.
6	algae > trees
7	All these strict tree laws are discouraging builders to develop our area
8	As a volunteer in Kirkland parks, I am impressed with the city support and commitment to its parks. Can serve as a model for other cities.
9	As Kirkland becomes ever more densely populated, it is increasingly important to maintain and expand the greenery throughout our community if it is not to become an urban grey-scape.
10	As you can tell from my other comment, I am aghast at the amount of trees being cut down for no good reason. Friday the people next to us cut a huge Douglas down so they could make their deck bigger. Across the street three new homes are going in and we were told all the trees were going down. Really Kirkland? You have to do better than that. The 32 pages of tree ordinance are not doing any good as far as our street is concerned.
11	By forcing density (too many houses on too small lots), we are also pushing the trees out. No one wants a tree towering over a structure as it is asking for trouble (everything from falling branches, masses of leaves clogging gutters, to severe structural failures). We have a massive oak tree that was planted in 1964, too close to our house, and it will unfortunately have to go later this year. It is a majestic tree, an asset for the city, but in being too close to the house, the risk in retaining it is just too great. If it was 10 feet further away, I'd keep it - but it would then just be a problem for our neighbor to the East.
12	City employees enforcing tree planting are not knowledgeable about tree choices and are creating landscape nightmares. Residents in my neighborhood are rightfully proud of our beautiful gardens and would be better off managing our own trees!
13	City needs to do a better job on pruning overgrown bushes along sidewalk. Most homes don't know it is their responsibility.
14	City rule/regs on trees especially needs to be conveyed to the recently annexed areas of Kirkland.
15	Come and see the oldest and most beautiful trees in Kirkland on my property. MD
16	Diversity of trees is as important as the acceptance of the diversity of people.
17	Don't overplant. The Heritage Park walkway no longer has views of the lake. A shame.
18	Don't suggest increased funding in some areas and then leave direct mail off the list of options for public outreach.
19	Encourage accessibility and use of the current parks, such as Bridle Trail and watershed.
20	English holly should be declared noxious weed and not protected. It is not native and invasive. Mangled street trees should be allowed to be removed. Dying and old street trees that are no longer pretty should be allowed to be removed without a fight.
21	Falling trees do cause power outages and PSE should be more proactive in taking problem trees down before the wind does!
22	Finn Hill residents are more knowledgeable about trees than the average urban Kirkland resident. I know from talking to arborists (we deal with at least 6) that Deb is stretched thin with the annexation. I personally think she should concentrate on conflicts between neighbors, and not worry about intervening to enforce the code where the neighbors agree on the proper tree management. For example, we should be able to quickly deal with dangerous trees (we have had quite a few) without going through red tape.
23	For control of environmental quality we should stop additional development rather than planting more trees which block views.
24	For Q4, I know most trees and I know the native ones. I don't know some of the cultivars. For Q8, my understanding is that the homeowner does routine care and the City provides resources for extensive care like disease control, limbing, planting and removal, though the homeowner can plant too
25	Glad you are thinking about this!
26	Go green!
27	Homeowners should be allowed to cut as many trees on their property as they please. (Without paying the city for a

	permit) You get enough of our money.
28	How about an enormous Swiss-Family Robinson tree house to house city hall? :)
29	I also value open space.
30	I am a former downtown resident and developer. Trees were getting too tall and blocking view of lake.
31	I am amazed and dismayed that people don't have the right to do what they want with trees on their own property here. We lived in unincorporated King County for 25 years and cut as few or as many trees down as we felt were necessary. However, I understand that some people would cut them all down, which is not acceptable. Therefore, there needs to be SOME regulations!
32	I am generally satisfied with trees / urban forest area in Kirkland. What I am not satisfied is with city of Kirkland's ability to maintain greenery along city sidewalks and along the roads. They are generally overgrown with weeds at least in my neighborhood. No maintenance is provided by the city. The city needs to figure out on how to maintain these public green areas as it gives a very bad outlook on the neighborhood and ability of city to provide livable neighborhood. Rather than spending time and money on trees I think the city should consider maintaining of existing green belts.
33	I am glad this issue is on the radar!
34	I am glad you are doing this survey. We need to keep our trees and keep them in good condition. I am very interested in helping with this effort.
35	I appreciate what the City has done to protect its trees and to accomplish the goal of increasing its total area of tree canopy. But, beautiful heritage trees are still being lost!
36	I appreciate your concerns and this survey
37	I attended the free class the city did on water gardens. It was very well attended. A similar class relating to urban tree selection and care would be great!
38	I believe that, given the opportunity, people will plant and maintain trees in their yard. Currently City ordinances force residents to keep trees that they don't want to keep.
39	I believe the City of Kirkland needs to drive through the neighborhoods to take a look at the state of the sidewalks, how trees are or aren't being maintained by some, mediate view issues, and make sure traffic signs are always visible or fine warn and/or start fining folks who don't comply.
40	I can't look in any direction without seeing at least 50 trees for every person in Kirkland. Enough already!
41	I chose where I live because of the number of trees. I don't know the ordinances but I do know that education is best with some laws of protection. I don't want too many laws as they get in the way of common sense at times and they are too rigid. I already find the Kirkland police to be that way.
42	I feel strongly that trees aren't just a matter of aesthetics. They are an important part of the survival of the planet and the web of life.
43	I have lived here 20 years and I have no knowledge of what the city regulations are. Where was I expected to pick that up?
44	I have lived in Kirkland for 15 years and have witnessed a dramatic increase in traffic congestion. There has been a noticeable decline in the quality of life in my neighborhood and this has little to do with trees and everything to do with unlimited building projects. More buildings mean more people and more people mean more cars and more cars mean more traffic and more traffic means more pollution. And you can't expect trees to solve these man made problems!
45	I know there are many who want THEIR view protected and see tree removal as the way to do so. However, what they rarely acknowledge is that the "view" they want protected includes all the trees that are not specifically blocking THEIR view. The trees ARE our view! In addition to all else they do. I would say that anyone who prefers a treeless view needs to move to Arizona.
46	I like to understand my right when my neighbor's trees overgrown and dropping leaves on my property. Also pruning requirements to maintain view & vista.
47	I live on the edge of Juanita Bay park and feel very fortunate to live in a vibrant urban forest. Kirkland did a great service in acquiring so much of Forbes Creek valley to preserve as forest land. I think it would be a great benefit to the community and do much to promote awareness of the importance of urban forests by developing a simple trail the length of the park up the valley. Getting people up into this diverse area would teach also about the dangers of invasive and noxious weeds that are becoming established in this and other urban forests.
48	I love trees, but as a condo owner with a view, I know that in 4-5 years, evergreens on my neighbors' property will block my view. I'd like to know if there are any ordinances in place to keep neighbors' trees from blocking views.
49	I myself love trees but when i plant a tree on my land I should have the right to cut it down if needed.
50	I need a better understanding of if and when the city is going to prune the trees on and adjacent to my property that are growing into utility lines. Over 30+ years, this has always been a mystery to us.
51	I object strongly to the use of Roundup/pesticides at our parks. It is known information (and very available) that this causes birth defects and various health side effects. With educating people will understand we are in this together and need to help with weeding. Promoting to schools to get kids out there to help! With stewardships we could solve this! Earthcorp and Green Kirkland are awesome. To inform folks with the info would be great. Thank you for all you do already, realizing $ and paid folks can’t do it all.
52	I realize that not everyone uses the internet, but please don't spend money and paper advertising the incentives of saving trees. It's counter-productive. Still with electronic notification methods and maybe informational meetings at libraries in the area.
53	I see new developments where large trees are fenced and protected during the building process. But in the long run, many of these trees are/will be too large. Instead of insisting on keeping existing trees, I believe developers should be required to replace existing trees with new trees that are more appropriate to the location. Plant more mature trees that have been chosen for their appropriate size in the development.

54 I see this as a biased survey. I don't think the city government should be spending my tax money to promote the planting of trees. I like trees and I've planted them in my own yard; I don't need the city now telling me how or if I decide to take one out. I also see it as a false premise that trees increase a house value. In fact, overgrown or fully mature trees are as likely to lower property values if they drop debris on the house or block a view. This survey didn't seem to survey my feelings about a tree policy in Kirkland; it seems to be a survey to see how willing I am to spend more of my city taxes on public policy to increase tree coverage. This would have been more useful to give a paragraph of education first. Kirkland spends $xx / year on tree policy and forest support. This is Y% of the total budget. Some like to live in a mature forest. Some like to have a view. I can't imagine everyone has a common view of tree policy.

55 I think an urban canopy greater than 60% is an achievable goal. It would be wise to assess the canopy in neighborhoods, rather than average the whole city.

56 I think Kirkland should continue to strive for its original goal of 40% coverage (in the original city limits). There are no more trees in the area as a result of annexation. This is a rather capricious reason for declaring victory on this issue, don't you think?

57 I think the city of Kirkland does a wonderful job with its landscape and hope that the attention to detail I see eventually propagates to Finn Hill. Thanks!

58 I think the city policy on restricting tree removal or requiring tree replacement on a private homeowner site is overboard. I know trees have benefits, but we've gone too far in Kirkland with in tree requirements on private property.

59 I think the council has given the city too much say into tree's and whether people can keep or cut trees. Our neighbor has a big Cotton wood and the roots are raising havoc with our patio, our yard. The tree is approx. 30 feet away from our house and the roots are surpassing our home looking for water. I have small cotton woods growing in my yard, roots 3 to 4 inch in diameter growing near our foundation all from our neighbors' trees.

60 I think the removal of cottonwoods on private property should be allowed at any time. Their removal should be encouraged on public property that are not wetlands/forests (street & formal parks)

61 I think trees are an important part of the city's landscape and character.

62 I think we have too many trees in some areas and don't need people to plant more in these areas. I don't think citizens should be encouraged to plant more trees. It could be that their property already has enough trees and adding trees would be unhealthy for the existing trees, etc. Expert assessments should be made as to where trees would benefit thinning and where more trees should be planted, not just planting whatever, wherever by default. Property owners should perhaps get a subsidy from the city for a periodic tree expert assessment. Our neighbors have several huge trees that appear to be unhealthy with large dead branches hanging near the edge of our property. They could use an expert opinion about what to do about it. They certainly don't need to plant more trees.

63 I understand that the city likes lots of trees and vegetation and so do I but the policies are totally out of balance. The homeowner's hands are tied when needing to take down a tree even when it's obvious the tree is either dead or a hazard to the property. Many areas have been designated wetlands/green spaces then just left to grow wild where rogue trees and vegetation is out of control. When we call the city about taking care of their areas I frequently hear that they can't do that anymore because they don't have the money. That's a problem for me because they shouldn't have been designated in the first place. It's kind of like a builder going out to build a house are not setting aside enough resources to finish the project.

64 I want my view back ... Willing to donate if trees are topped or pay for it.

65 I was able to get the City of Santa Monica, CA, my home town, to enact new tree land marking legislation that made it legal to landmark trees on private property. They had lost about 75% of their tree cover in 40 years due to new construction of whole-lot condo complexes. Without strict laws, trees inevitably fall victim to the whims of owners and construction speculators. I'd like to see property tax credits granted based on the number and size of trees maintained! Stronger anti-cutting penalties, more rigorous tree protection enforcement, and some new planting incentives would set the tone while building new community awareness of the importance the City of Kirkland places on its urban forest.

66 I will spend over $2000 just for permits and professional care of trees required by the Kirkland Tree Ordinance. I will never plant another tree in Kirkland as long as there is a Tree Ordinance that prevents me from taking care of my trees myself as long as I am able. The cost and inconvenience is just too much, and it is totally unnecessary. The annexation area had higher percentage of canopy than Kirkland, without such an ordinance. Urban density is a bigger factor. The city needs to have more open spaces where trees can grow without being a hazard to structures.

67 I wish it was easier to report sign blockage due to overgrown trees and vegetation.

68 I would like the city to think in terms of forest and habitat, instead of "just trees." Diverse, intact properties such as Woodlands Park are more important than planting strip trees. The city should purchase and maintain existing wooded properties. These are far more important to wildlife and water quality.

69 I would like to see an increased and continued focus on maintaining the mature tree cover in the city of Kirkland.

70 I would like to see consistency in pruning of trees at the power/phone lines. Or, not allow planting under power/phone lines. Some of the pruned trees are now misshapen and not as attractive.

71 I would like to see the Finn Hill green belts developed into a trail system.

72 I'd like to see more attention paid to using fruit trees as landscaping. We do this in our yard and it's great to have trees that also provide food. With the help of City Fruit, there should be volunteers to pick the fruit as well.

73 I'd like to see more fruit or nut trees

74 If a developer has to retain certain trees on a property, be sure that the subsequent owner retains them as well, or eliminate the requirement for all. Trees seem to disappear as soon as a redeveloped property is sold. Consider a stormwater credit on the utility bill for properties with exceptional canopy coverage.

75 If the city requires trees be planted they must have a program to clean up after the trees and maintain the trees of

	our city. Bottom line this is a city not a forest. Streets signs and street lights should not be blocked by over grown trees.
76	If the City wants more trees, do it on public property owner and quit regulating private trees
77	If there was a way to provide an incentive for property owners to maintain conifers properly to avoid future property damage that would go a long way toward encouraging residents to care for trees instead of cutting them down.
78	If we organize could have a balance for most cherished lake views and nice trees to complement our environment. Right now too messy, lower branches of pin oaks everywhere. Not pretty at all.
79	I'm a big fan of trees in Kirkland. They add a lot of character. I am NOT a fan of taxes. We pay too much already. If we need more money to help with tree maintenance or education cut something else.
80	I'm glad the city cares about trees. It's a wonderful "cause"!
81	I'm glad you are doing this!
82	In addition to tree, I'd like to see city take some action on discouraging the usage of weed killer and pesticides. Those post a big impact on our environment for our future generations too and they are hidden dangers!
83	In my opinion, I feel the survey is slanted for further protecting or enhancing tree development. Trees grow like weeds. Trees along public streets are hazardous; they can fall on cars passing by and on power lines causing extreme power outages that can last for days sometimes a week or more in addition to the cost of labor to restore the lines - these costs are then passed on to the consumer. Trees disrupt views - the magnificent vistas in the Pacific NW are reasons why people populate to the region. Yes, trees provide many health and aesthetic qualities, but a balance needs to be implemented. The mountain and lake views are substantially diminished with so many trees; we've gone crazy in my opinion. The management plan needs to be seriously reviewed to enhance our vistas while helping to preserve our habitat and erosion issues. Restricting dirt bikes and motor scooters from protected areas needs to be reviewed; it would eliminate the need of planting more trees if the natural habitat were not damaged by such activities. More dog parks for dog owners to avoid the trampling of our forestry areas; enforce the leash law restricting dogs from having a free run through our forests and damaging the wildlife. Not an easy task but one that needs serious revamping.
84	Individual property owners should not have the city dictate what they can and cannot do with trees on privately owned property. Too much legislation already.
85	Instead of encouraging the public to plant inappropriate trees in all the wrong places, why don't you encourage the proper planting and maintenance of the trees that already exist? There should be restrictions on tree height/width in certain locations in residential neighborhoods. The public needs to be educated about the growth habits and eventual size of the trees they are planting! I love trees, but spend too much time and money dealing with the damage caused by misplanted and unmaintained trees in my neighborhood!
86	I really do think there are too many trees which obstruct excellent views such as the water and mountains which are truly wonderful. I come from a country (England) which has an excellent balance of trees in the countryside so that views are not obscured. Frankly, I think there are far too many trees. I would almost say that some people are obsessed with trees. They cause many power outages; in many first world countries, trees are not allowed within falling distance of a power line. In fact this survey is slanted towards the view that more trees are better, when perhaps the opposite may be true.
87	It is currently too easy and too cheap for residents to cut down trees without consequences.
88	It seems like recently most building sites in Kirkland are going in and taking every bit of vegetation out, thus removing old, but healthy growth trees
89	I've been worried to see the tree clearing along 405 S near NE 70th and 520. I see the old growth trees in Kirkland as a huge benefit to our region. They help define the character of our corner of the Pacific Northwest. I wish the city could do more to prevent residents from clearing large healthy old growth trees from their properties. Tree removal on private properties affects not just the home owner, but also the neighbors and the whole neighborhood. If everyone removes just one large tree each year, as time goes by we'll lose a big piece of what makes our city special and desirable.
90	I've lived in Holmes Point for 25 years, and I would like to see the SDO for tree retention maintained and enforced.
91	Keep Kirkland green and beautiful. And we also need more off-leash dog parks. Thank you.
92	Keep the Finn Hill forests forested! It's not just a place for humans.
93	Keep trying to educate the public about trees. We really do not own any of them...really!
94	Kirkland generally has ample flora, and has been easy to work with in the "old" city.
95	Kirkland has a great park system and tree maintenance program. We need to increase the enforcement of existing tree related ordinances.
96	Kirkland is a city of views. Let property owners trim trees for views. Last i heard the city and 1-1/2 arborists on staff. Question if we really need this
97	Kirkland is being taken over by trees. They are nice when they are small but they all grow up onto 50 foot monsters. Kirkland is an urban view community. There is a point when there are too many trees. We are there.
98	Kirkland is wonderful due to its public parks. Thanks for maintaining for all Eastsiders to enjoy.
99	Kirkland made it a nightmare for my wife and I to build a single family home on Rose Hill because of the trees. The threw every piece of red tape at us and finally after 4 arborist visits, 2 redesigns of our house, and $10,000, the city employee admitted to misunderstanding the regulations and gave us the green light. This was all while keeping almost 3 times the required number of tree credits for our lot. It's not even like we wanted to scrape the lot bare... we literally had to spend 8 months and $10,000 just to get them to approve the tree removal when we were keeping 3 times the required number of trees.
100	Kirkland needs to educate people not only about trees but about Kirkland's policy and laws concerning trees.
101	Kirkland's character in part stems from its parks and trees, so appreciate the efforts expended by city crews to make it happen and looking good. Thanks.

102	Let people pay for and trim city trees hiring a professional with your written permission/ special form.
103	Lots of the publicly planted trees in NRH end up dying due to lack of watering. Would prefer to see money going to care for what we have and making sure that trees are pruned to allow us to view oncoming traffic especially along the 124th corridor where smaller trees are blocking our ability to safely pull onto 124th from side streets. Ne 95th and 124th is a particular problem.
104	Love treee! Only major concerns are falling limbs/trees and obstruction of vision to see traffic especially on side streets.
105	Love trees but the City of Kirkland has gone too far in forcing the citizens to plant and protect trees that aren't even owned by the homeowner. They need to find a middle ground and solution to the trees in planter strips that are owned by the City not the homeowner.
106	More trees, better frequent public transportation, less malls and parking lots
107	My neighborhood and property have many tall older evergreens. As the trees are aging, my neighbors are cutting theirs down, which makes me feel guilty about doing so. However, as I get older, I struggle to maintain my roof and yard due to the continuous tree droppings and moss. I don't know what the solution is but I imagine many homeowners have the same dilemma. Perhaps there is a way for homeowners who cut their trees to sponsor new trees in other locations, similar to new development mitigation.
108	Need to know what to do with extra fruit. Love to donate but I can't pick it myself.
109	Never enough trees!!
110	New construction/development get away with so much with loopholes in the plan (buy replacement trees but let them die/don't plant. More inspection!
111	No
112	No
113	No
114	No
115	No offense, but employing a full time urban forester is a waste of money. You are a very nice person, but your position is non-essential.
116	Not a very good survey, I'm sorry to say. Mike Pritchard, mikep@5circles.com
117	Offer incentive to property owners who keep stands of old-growth trees together for wildlife habitat even though their views are blocked!
118	Once again, please landscape and plant trees in Kingsgate along 124th Ave from 132nd St.
119	Open-Ended Response
120	Ordinances are strict enough to discourage proper and beneficial maintenance. Expanding this is counterproductive. Use the money on basic services: police, fire protection, etc.
121	Our neighbor took down two perfectly good 100 year old fir trees this summer. Either the regulations are too lax to allow this, or they are not being enforced. Either way it is tragic.
122	Our neighborhood and the one next to us routinely cut down tall Douglas firs, partly because there has been no visible effort to share reasons not to.
123	Plant something other than Oak or trees that block the views and plug the drains. Most people don't have views and deserve to see the lake without obstruction.
124	Planting on the parking strips simply encourages dog owners to leave dog wastes on the strips. We have an issue in Kirkland/South Juanita with dog owners not picking up after their dogs; this is disgusting and not encouraging to plant trees or have greenery anywhere. The city should be more forceful on maintaining cleanliness on the street before planting trees.
125	Please do your best to conserve the forests in our area!
126	Please don't create more rules that homeowners need to follow. Let us do what we want with trees on our property. however, feel free to educate us
127	Please don't over-react about wanting to promote a healthy tree canopy so it is so difficult and expensive to replace an ailing tree. To those doing everything they can to save every tree ... I LOVE trees and am the biggest promoter of wildlife habitat around ... but the quicker I can afford to change out an unsafe tree and get a better tree in the ground the more robust the future of the tree canopy. It is so ridiculously expensive for the average person to get through your permit costs and the necessary documentation that we can't afford to then pay to have someone safely take out a tree so we can replace it for a more robust tree canopy. Make it reasonable.
128	Please help to keep more trees in Kirkland! Start a Heritage Tree program like Seattle has to celebrate and educate. Education will only help a small fraction; enforcement is the only way to protect our trees.
129	Please protect the urban forests on private and public lands with additional funding from surface water fees and other grant resources and property tax collections
130	Please stop condensed building. Please limit building height. People should see trees, not high-rises. Don’t turn Kirkland into Bellevue. Hire real city planners rather than private interest puppets.
131	Private property owners should not be restricted to cut down trees that belong in a forest. I have had seeming healthy trees fall in the wind. Thankfully, no one was hurt. The city should allow larger fir, cedar, and maples to be removed without restriction. The city should encourage the planting of safer trees. Save the big trees for the actual forest.
132	Property values in Kirkland are based on views! So, tree planning, mgmt. must take that into consideration
133	Protecting views is important for many of us and I am unaware of any city efforts to help on this issue. Protective covenants are not sufficient.
134	Repairing the sidewalks along Central should be done WITHOUT the removal of all those old, beautiful trees....please.
135	Ridiculous survey. What about obvious questions like: Over the previous 10 years of increased forest canopy

coverage, my view has been improved or been diminished? Over the previous 10 years of increasing forest canopy, I feel that my house value has been positively enhanced or not. This seems like a survey to get me to support more trees in Kirkland. This isn't southern California where we have a sun problem and need to shade our houses to keep them cool. Get a clue. We have moss problems on our roofs because our houses have too much shade! Our lawns and gardens can't grow because our season is too short. I like trees where it the property owner wants but I don't want the city to tell me how to plant my yard or what to keep or not. Personally, given our views of the lake, I'd rather have a view than tall trees. If we are looking to put in city advice, I'd rather have the city coach people that semi dwarf trees make great sense for (sub) urban living and they rarely exceed the house height. This provides privacy and fruit if you choose. Be considerate; don't block the view of the lake for your neighbors.

136 Save the trees on Kirkland Avenue. Don't wait until you look back with regret!

137 School curriculum environmental service projects that---oh-by-the-way---engage family, neighbor, neighborhood, youth and seniors, to----oh-by-the-way---enhance resourcefulness and care of both natural and social environments. Engages, matures adolescent energy, and melds it with---oh-by-the-way---revitalized, lonely marginalized senior intelligences.

138 See #9. There needs to be recognition that people living in heavily treed areas face some different issues than those who simply have trees along their street or one in their yard. This particularly relates to the need for trimming to maintain views or /and sunlight, and potential hazards.

139 short plot permits eliminate trees contractors remove too many in the guise of their projects. need to protect the tall pollution controlling trees that are removed all along freeways and etc. and with new bldgs and construction

140 Should be ok to trim for view and should be regulation on types of trees that can be planted in view neighborhoods.

141 Single Family property owners should be allowed to trim, cut down, and generally maintain the trees and any other landscaping on their property without having to pay a fee and submit forms to the city with what they plan on doing as long as it conforms to the neighborhood bylaws (if any).

142 So many trees, not enough city crews to take care of them. Too many removals when there are others construction alternatives available. Removal should be the last choice!

143 Stop planting trees and shrubs at crosswalks and intersections before someone gets killed all for the precious tree. There needs to be laws and inspections for this.

144 Thank you for caring about the trees that make Kirkland more attractive, calming, and healthy.

145 Thank you

146 Thank you

147 Thank you for asking for citizen input.

148 Thank you for caring enough to do this survey. Since I have moved here in the mid 1980's, the area east of Lk WA has lost many of its native trees to development. Just looking at the satellite maps during the TV weather news reveals how much less green the whole eastside of Puget Sound now is. This area would normally be heavily forested with Douglass fir, alders, etc. keeping it cool, shady and moist. Now it is up to local people to try to maintain a tree balance but I don't think that many understand this. Besides trees have unique beauty. So thanks for addressing this issue.

149 Thank you for caring. I really feel that we need to protect our trees. Perhaps the tree cutting companies are the tree’s biggest enemies. They market using a lot of fear tactics.

150 Thank you for conducting this survey. As you have seen, I feel strongly that private citizens should have the right to make landscaping decisions regarding their own property without interference from government unless public safety can be proven.

151 Thank you for creating this survey, I think this is a very important topic.

152 Thank you for seeking public comment!

153 Thanks for asking

154 Thanks for asking for opinions.

155 THANKS for doing this important work!!

156 Thanks for putting this survey together!

157 The answers you are looking for are well known by those of us who follow this issue. The way that most of this is worded is obviously just ripe for the city to pull out "survey results" that support what you already intend to do.

158 The biggest problem is fear of what government will do later. If I plant a tree today, on my property, do I need a permit to remove it? We have a green common area that we (as a group) bark (mulch) and such; are we allowed to plant trees in it? Discouraged from it? There's just no clarity as to what the rules are and what will bite us later.

159 The City has planted trees in the median of 124th St, west of 100th Ave., several times, and then neglected to water those young trees. What a waste of time & $$$.

160 The city is doing a great job supporting park recovery projects

161 The City should allow citizens to make management decisions regarding the planting, maintenance, and removal of trees on their property by relaxing current tree ordinances. Providing education and arborist consultation is more effective when requested by the property owner.

162 The city should consider all uses of an area and how trees can enhance or hinder the various activities that people engage in. It's shouldn't be a one size fits all plan.

163 The City Tree Ordinance should be changed to give back to the property owner the right to remove trees they do not want. I'm okay w/ the City requiring supplemental planting if existing trees are removed. Trees are NOT more important than people or property owner rights.

164 The contract with PSE to maintain trees that are on private property that fall within the "maintenance zone" needs to be readdressed after recently having two trees on our property butchered by an "arborist" hired by Asplundh to

remove branches and limbs that may potentially cause damage to the power grid. Also, on heavily wooded road, Juanita Drive, why doesn't the city look into burying the power lines to prevent outages vs. hacking the crap out of trees, further damaging and potentially leading to disease.

165 The current ordinance is an extreme overreach on a non-problem. This is the Pacific Northwest and vegetation grows very fast. Rather than driving up housing costs with unnecessary regulations, developers and owners should be incentivized to plant trees rather than penalized by requiring permits, inventories, and building adjustments and relocations. In our case we have planted numerous trees on our lot (many now over fifty feet tall) over our 38 years in Kirkland and are now being penalized by the current ordinance for our efforts. We should be able to manage our own forest as we see fit.

166 The cutting down of healthy trees on private property needs to be restricted. We had a beautiful old mature evergreen tree that was the on the property behind us facing the lake, Yes it blocked part of our view but it was beautiful! The owner is starting to cut his trees down to make way for a big BOX home that will be so ugly. I would much rather have a tree blocking my view than the back of a home.

167 The Kirkland City Council has overstepped its authority in annexing Finn Hill, Kingsgate, and Totem Lake. The City of Kirkland did not get the expected payoff from the State nor King County when the "Council members" voted to annex. The citizens of Kirkland did not even get a vote on this issue. Why? The Kirkland City Council methods to win approval for incorporation were (illegal but not prosecuted due to the State & County wanting this process to continue) it's all underhanded. Your open houses at Finn Hill JH and Juanita HS where one-sided diatribes which illegally promoted incorporation and did not allow the public to present their pros and cons to incorporation nor the process used. Where was the debate process? The fact that city staff mismanaged the payoff process and (documents for reimbursement) costing the city millions in unshared expenses means some people should be fired immediately! The size of the Kirkland bureaucracy has outstripped its usefulness. Solution: Freeze retirement plans, eliminate office staff or give an across-the-board 15% pay reduction, fire the dog catcher at Denny Park, consolidate Department heads, eliminate fee's for green energy (solar install permits $750.00! or more), Stay out of peoples yards unless invited. Next time paint Kirkland Police cars blue again. This Darth Vader mode has gone far enough. Gradually expand public access to Lake Washington with new boat launches on road ends. Areas that were formally unincorporated King County should be treated differently when it comes to Kirkland City code. Take half the revenue from the card rooms and set aside money for low income and senior home owners forced to complete sewage hookups that are mandatory? Without public pressure saying STOP, at a time when all financial indicators say save money you looked to tear down several popular fire stations. We are also watching the efforts made behind the scenes to eliminate the Houghton Community Council.

168 The new RR corridor is a great opportunity to plant new trees!

169 The process just to make our own neighborhoods and private properties safe from overgrown and poorly planned trees is silly. City council needs to re-address the codes and encourage planning and building practices to adhere to more strict guidelines so homeowners don't have issues of safety down the line.

170 The required question on trees between my street and sidewalk should have another option if it's going to be required. I don't have a sidewalk and don't have trees on the city right-of-way. I am glad Kirkland continues to pay attention to trees. The annexation didn't add any net trees to the world, so please keep trying to increase the general tree cover.

171 The tree ordinance is a good start but it is not stringent enough to protect our trees.

172 The tree regulations in Kirkland are far too extreme. It is ridiculous to prevent property owners from removing more than 2 trees per year on their property. Having tall trees so close to our homes in a stormy climate is a life threatening safety issue. Furthermore, when these trees become a danger it can be over $2,000 per tree to remove them since they are so close to homes. I believe the City needs to allow more trees to be removed, particularly during redevelopment projects, and allow new trees to be planted on these properties at safe distances from the homes.

173 The trees along the downtown streets and Market Street (in the median) look awful and need to be pruned and maintained. It's ironic the City has strict rules on residents and doesn't appear to take care of their own trees.

174 The trees planted in and near city rights of way cause too many problems with downed electric wires, buckling sidewalks, view blockage of traffic line of sight and deaths where cars hit the trees, whereas if the trees were not so close to the street. In most cases the car would jump the curb, in this unfortunate occurrence, and then get right back on the street with only the need for an alignment, not a car crash. The city engineering standards should not conflict with the condition of the power lines above and future sidewalk damage caused by the tree roots. The trees in the right of way cause great maintenance for leaf clean up. Government should not have control over property rights with trees on private property.

175 There are some street corners west of Market that you can't see cars coming because hedges block the view.

176 There are times when I think there is too much emphasis on saving every tree to the detriment of the community growth and changes. Trees can be replaced and not all need to be saved and protected forever. My sense is that the residential areas of Kirkland have good tree cover, whereas Totem Lake and other nearby commercial areas could use more trees.

177 There are too many too large trees adjacent to my property, they have grown so tall we get no sunlight on half of my yard in summer and none at all in winter, they reduce the value of my property, increase heating cost, continually drop needles and other dendritis, pose a hazard of falling branches when it is windy; the trees are packed too close together and are generally ugly and a constant nuisance.

178 There needs to be a balance in the tree policy. The City seems to be very strict about telling homeowners to plant more trees and restricting them from removing trees. However, the City was more than happy to remove the trees necessary to build the Transit Center. And now the City has removed 7 trees along Kirkland Avenue. The rules should be consistent for the City and for the landowner.

179	There should be serious fines for people who don't properly maintain their trees and for those trees that block right of way views (e.g. impact traffic because you can't see around the bushes/trees). With the annexation, a lot of us don't know the Kirkland ordinances for trees and whether there are any grandfather clauses from when we were county. Sending out information pamphlets (especially before winter!) would be greatly appreciated.
180	There's a lot of sidewalks in Houghton area that have low branches over the sidewalk, or the sidewalk is obscured by adjacent shrubs - It would be nice to have you (City of K) enforce (i.e. drop off a reminder notice on the land owners door) to trim bushes, etc. and keep the sidewalks clear. In so many areas I have to walk in the road, especially on rainy days when the branches drop lower.
181	There's a need for trees, but it should come with balance. Smaller, less invasive trees are easily managed, cost less to maintain, and look fine. Market street is prime example of how giant trees just get out of hand.
182	There's too much heavy handedness from the City when a homeowner wants to make a rational and ecologically sound decision on managing private trees. There should be oversight, but it should be HELPFUL, not punitive.
183	This area has enough trees, and we don't need more. They cost a fortune to remove when they die.
184	This cannot be one size fits all. View properties need some form of protection like a height restriction from neighbors that grow trees into their views significantly. Trees are renewable resources and can be replanted. Many street trees when they get too old, break up the sidewalks making them unsafe for many to navigate.
185	This has been an issue of mine for many years. NE 132nd St. is an example, as well as Juanita-Woodinville Rd., where the planting strips w/ trees and grasses, sometimes 3 fty high, look terrible much of the time. They probably aren't the kind that would look good anyway, and look worse when not cared for. Neighbors habitually chose not to care for the grounds near the streets. Let someone else do it, they seem to be saying.132 costs a fortune for bi-yearly pruning.
186	This is not a very well-written survey... The questions are leading and confusing.
187	This is one of the worst cities I've lived in regarding tree ordinances. You can't even prune a tree, let alone cut one down, if you dare suggest it's to help improve your view. Even if the city planted the wrong tree in the first place, they will not allow you to remove and replace it with an appropriate one. It's decreasing property values and resulting in people moving to Bellevue and other areas that are more flexible. It's time to be more flexible and responsive to your constituents instead of being "tree nazis"
188	Too many trees in downtown block storefronts and signage. Along Juanita Dr trees will block beautiful views of the lake.
189	Tree laws regarding removal on private property are too confusing. We had an evergreen tree pop up that no one planted directly over where our utility and water lines run down to the street. This will eventually cause major issues to our pipes, but even though we did not plant the tree we are getting hassles (not to mention major costs) to try to remove it. Seems like an important part of encouraging trees should be encouraging maintenance, safety, and ALSO removal of trees that will likely cause damage to things like sidewalks, pipes, and others property (all 3 of which will be affected by this tree). This should not cost the citizens exorbitant amounts. Also if our neighbors are not safely maintaining their trees it affects our safety and property. This is a frequent worry in our neighborhood.
190	Tree removal rules and regulations are unclear to me, as a new city member on Finn Hill. I'd like dangerous trees in neighborhoods taken out before they cause property damage.
191	Trees add an immense amt. of quality to our surroundings and keep our community in touch with the benefits of nature. There's enough concrete. In this stress-filled world, people need to live in surroundings that feed & nurture their spirits and give to the quality of life for us all.
192	Trees and plants that are newly planted at schools should NOT be allowed, unless the LWSD will continue to maintain water and care for. They typically plant, water for a short time...turn off irrigation systems to save money and the trees and plants die or look horrible
193	Trees are disappearing too fast in Kirkland
194	Trees are so important and with the increased density we are looking for in the city, it is important that we keep and improve our tree canopy
195	Trees are so important!
196	Trees are something we all need to appreciate and you have mentioned the most important ones. What I have most frustration with are "treehuggers" who block views and are uncooperative with neighbors. I have accommodated my neighbors in every instance when they have wanted something cut and at my own expense. I am also aware of the need to leave the stumps in the ground whenever I have had a tree cut, because the danger of runoff. I think your policy should also encourage "windowing a tree" whenever it becomes unfeasible to cut the tree down or there is resistance from a tree hugger. I don't know what your policy is in these cases. Keep in mind we joined the city of Kirkland, but we do not wish to be hidebound by too many Dr. No. answers. As an aside, I find that you are doing a good job on cleaning the street gutters on 84th Ave NE, which I had to notify the County to do before we were annexed. But I am disappointed in that "tree lawn" areas (between the sidewalk and street) are not maintained by the homeowner, particularly if their house faces north/south and they never look over their fence; they should be encouraged to see the other side facing the street.
197	Try to get the next ISA (International Society of Arborists) conference in this region at St. Edwards State Park. The Climbing Championships are exciting to watch. It was at Marymoor a few years back. Also, PlantAmnesty arborists do a volunteer project for Arbor Day. They also dedicate heritage trees in Seattle. Perhaps we can bring some of these awareness raising events to Kirkland.
198	Un-permitted tree clearing needs more aggressive enforcement and more punitive fines.
199	Urban trees keep the city from becoming one slab of asphalt.
200	Views are also a big part of Kirkland. We need to respect views.
201	We are very disappointed in lack of support from the City as it pertains to a neighbor's planted "hedge" that reaches up to 2x the house and blocks our view but more than that is ugly! We realize natural trees will block our view but

they are beautiful and nice to look at...thanks for listening!

202 We can't afford wasting public money on "weeds & seeds" in this current budget shortfall. GET YOUR FINANCIAL "STUFF" TOGETHER! QUIT PENDING MONEY YOU DON'T HAVE!!

203 We don't think the current restrictions accurately reflect the varying needs of treed neighborhoods. It would be preferable to cut 6 trees every 3 years, rather than 2 trees for 3 years in a row, for example. We have over 100 trees on our property; some are diseased, some are fragile for wind hazards, some are in the last sunny spot on the property-! Give us back some flexibility. The result is the same for you, but it's less expensive and better planning for homeowners.

204 We have an abundance of trees in our city and in our state. Kirkland citizens desire their local government to provide basic services, police protection, and infrastructure maintenance. The only people in Kirkland concerned with trees is the employees of the Kirkland planning department; most of the planners do not live in the Kirkland and should not be dictating private property tree policy to the citizens who actually live here. Every Kirkland resident I have spoken with believes the City's tree policy invades basic property rights. The City should maintain plant and fret over trees in its parks and right of ways and leave private tree ownership private.

205 We have taken the initiative to plant trees in the planting strip in front of our home, but it would be great for neighbors to be able to coordinate this activity with neighbors. A few years ago Seattle had a neighborhood street tree program.

206 We have to take responsibility for tree maintenance, that’s a given. Therefore we should not overplant trees. Trees are very important, but we must be practical too. Fortunately trees can grow 3-4 feet a year in our area. Let’s keep this in mind. We have many financial obligations as a City. So trees must take second or even 10 place to some of our most pressing needs. Thank you for asking. Vikki

207 We have tree ordinances? Really? Some bad landscaper put trees in my yard before I moved in, less than 10 years ago. They are dangerous, and I can't cut them down? Seriously? Frankly, I'm not even sure what the ordinance is, because if I asked, you'd know who I was, and make sure I didn't cut the tree down. We kept most of the trees, but I need to cut a few down. Making that an offense is ludicrous.

208 We live in a dark cloudy area. I live in Kirkland for the meager sunshine and outstanding views. Stop using my taxes to encourage more tall trees that block sunshine and views. Encourage considerate neighbors.

209 We live in the evergreen state and have many more important issues to discuss/fund rather than spending time talking about trees and other such naturally occurring features of our city. I live on a 7200 sq. ft. lot and the city codes required that I plant 6 trees on my lot which is excessive and intrusive. I personally would have planted 3-4 trees for an aesthetic appeal but believe that each private property owner should be allowed to decide what they want to plant on their property. This of course excludes public parking strips; the city has every right and my support to ensure a uniformed look to public spaces. I suggest a rollback of the urban forestry rules that govern private property owners.

210 We love our trees but can't afford to repair the damage they inflict. Maybe volunteer programs or funding to help homeowners manage their existing trees? Also I don't think homeowners should be able to get rid of their trees without having to replace them.

211 We n have plenty of forested areas in Kirkland to filter air. Attention should be given to areas that need trees to retain soil. I want to make decisions about trees on my property!!!

212 We need more NATIVE plants in our parks and elsewhere!

213 We need our trees!!! That's one reason I moved to the Pacific Northwest.

214 We need to keep educating Kirkland residents about the harmful impact that invasive plants like ivy and blackberries have on our urban forest and promote action to remove them.

215 We seem bent on seeing trees as timber, lumber, rather than habitat for wildlife, beauty and the natural character of this area which is why I live here. Sound proofing, protection for wildlife. Beauty in trees for its own sake and for our health and well-being.

216 We've been dealing with King County until annexation so I'm not too familiar w/Kirkland's tree maintenance program & regulations. We have a large number of significant trees on our property and surrounding us and I love it. I truly dislike current building practices where they come in a totally remove all trees from a piece of property to build a house.

217 When I see a tree trimming crew on my street I wish that I could ask them to respond to a problem with a public tree without them having to go and get a request. I have asked and no response except that they couldn't do the trim without another notice. A waste of time for them and my neighbours.

218 While I love trees, I also have heard quite a few complaints from folks who love to raise their own vegetables, but find they cannot due to too much shade from their neighbor's trees. I also know someone who is suffering property damage (cracked walkways and dying plants) due to a neighbor who has decided to allow a cottonwood tree to grow in her small back yard - the roots are causing severe problems for the next door neighbor. There need to be ordinances to help those folks whose property is being negatively impacted by trees.

219 Why are developers allowed to clear all trees, and then plant two inch trees?

220 Why not incorporate a celebration for trees with one or more of the festivals in town?

221 Wise use of money by the city is more important than a few trees....the city needs to "hug" more money and less trees

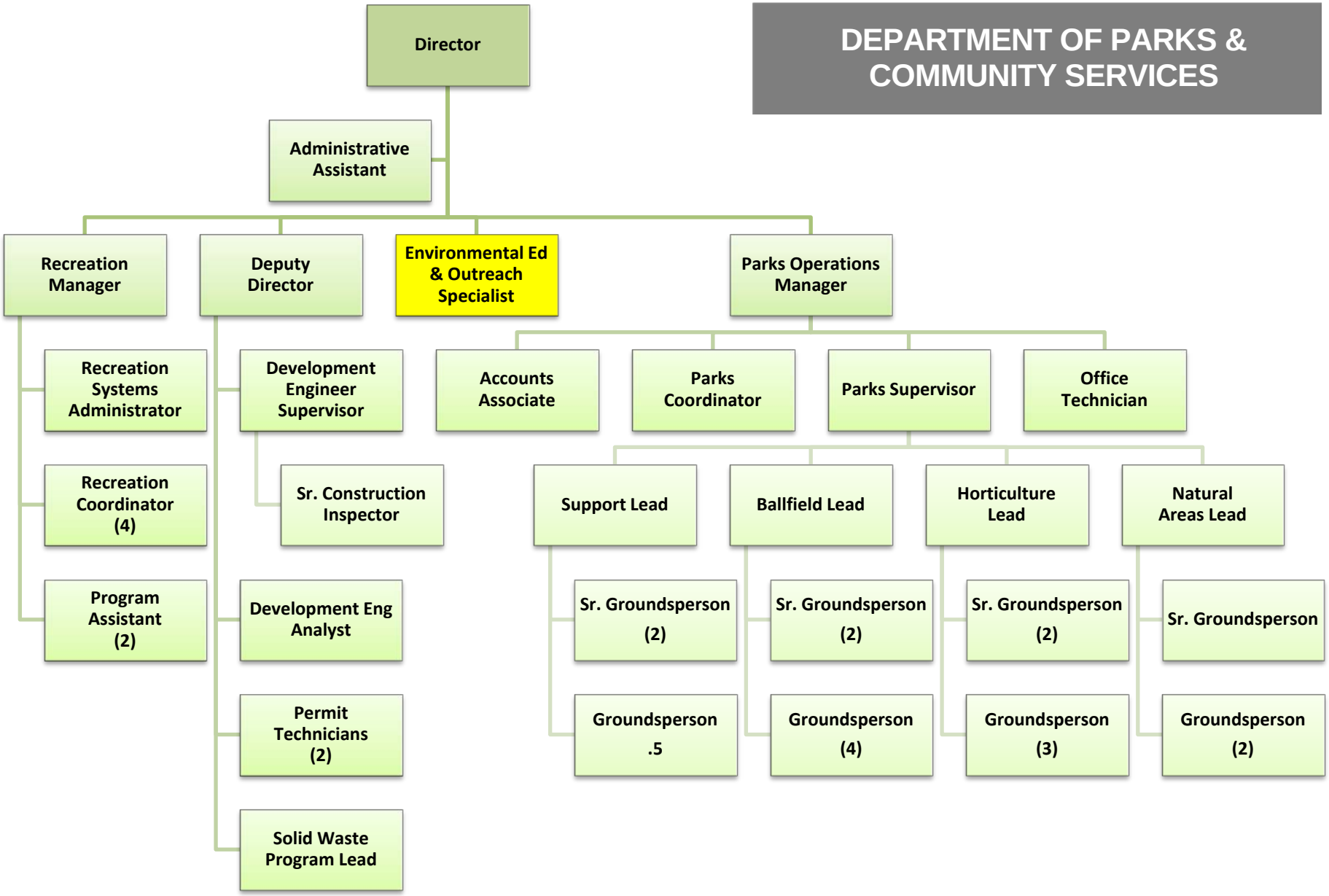
222 Would have preferred that messy, fruit-baring trees had not been allowed in our condo complex. Development.

223 Would love to see an easy to understand brochure explaining Kirkland rules and regs about tree pruning and removal. This could get mailed to each household, and to each new owner who comes to the city. Also need more info on enforcement--what is a violation, what are the consequences, if we witness a violation who to call--weekday and w'end, etc.

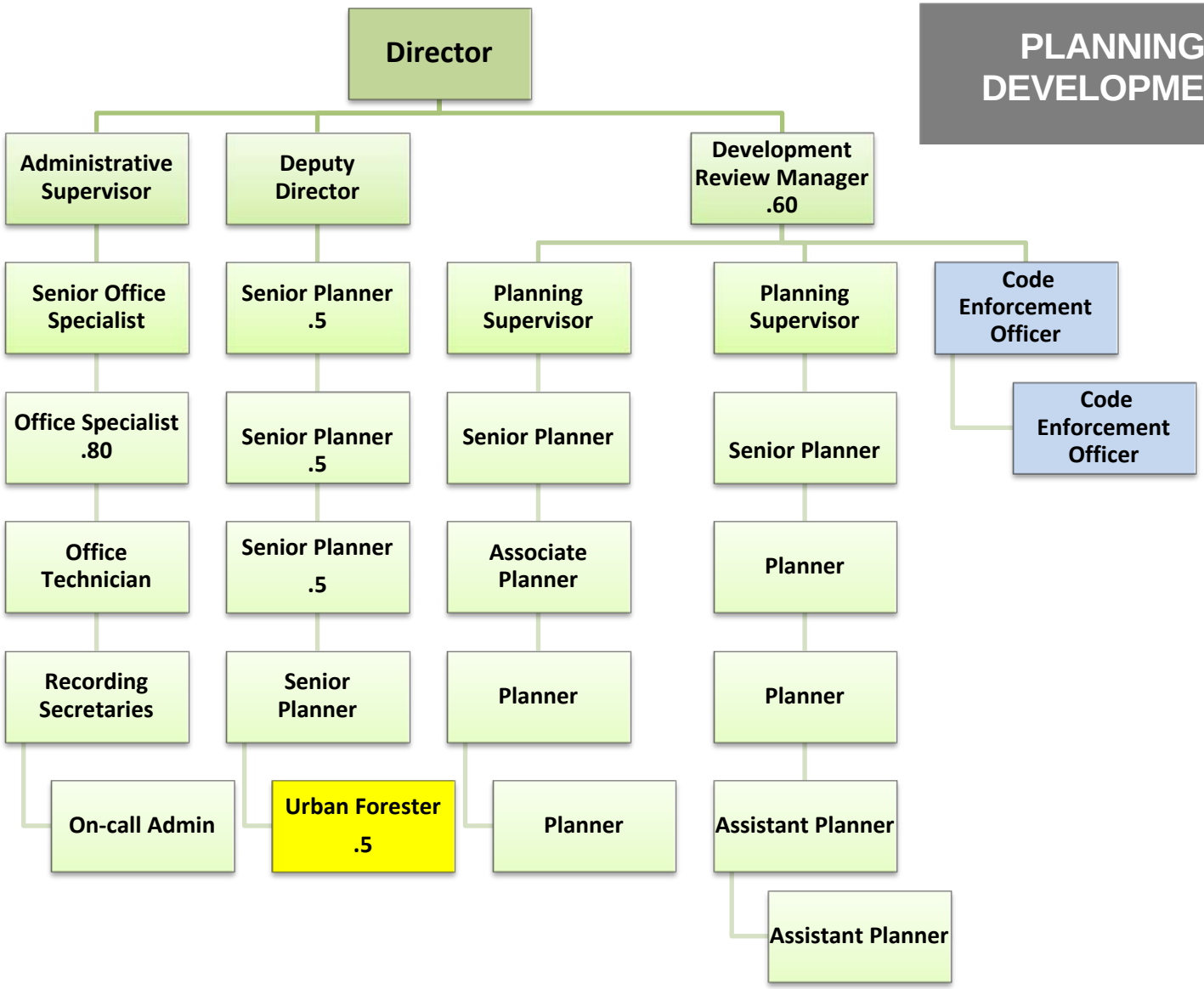
224 Would love trails in the Juanita Woodlands Park (maybe that is County?) so folks can enjoy the forest. And

	awesome that the City is looking at ways to strategize the future of its urban forest goals. Thanks Kirkland!
225	Yes - don't destroy Big Finn Hill park by building a fire station on park land.
226	You cheated - keep the 40% goal for pre-annex areas. Play up the Tree City USA connection. Work with schools to educate kids and their parents about trees. Get developers to plant bigger street trees rather than pathetic ones some have done.

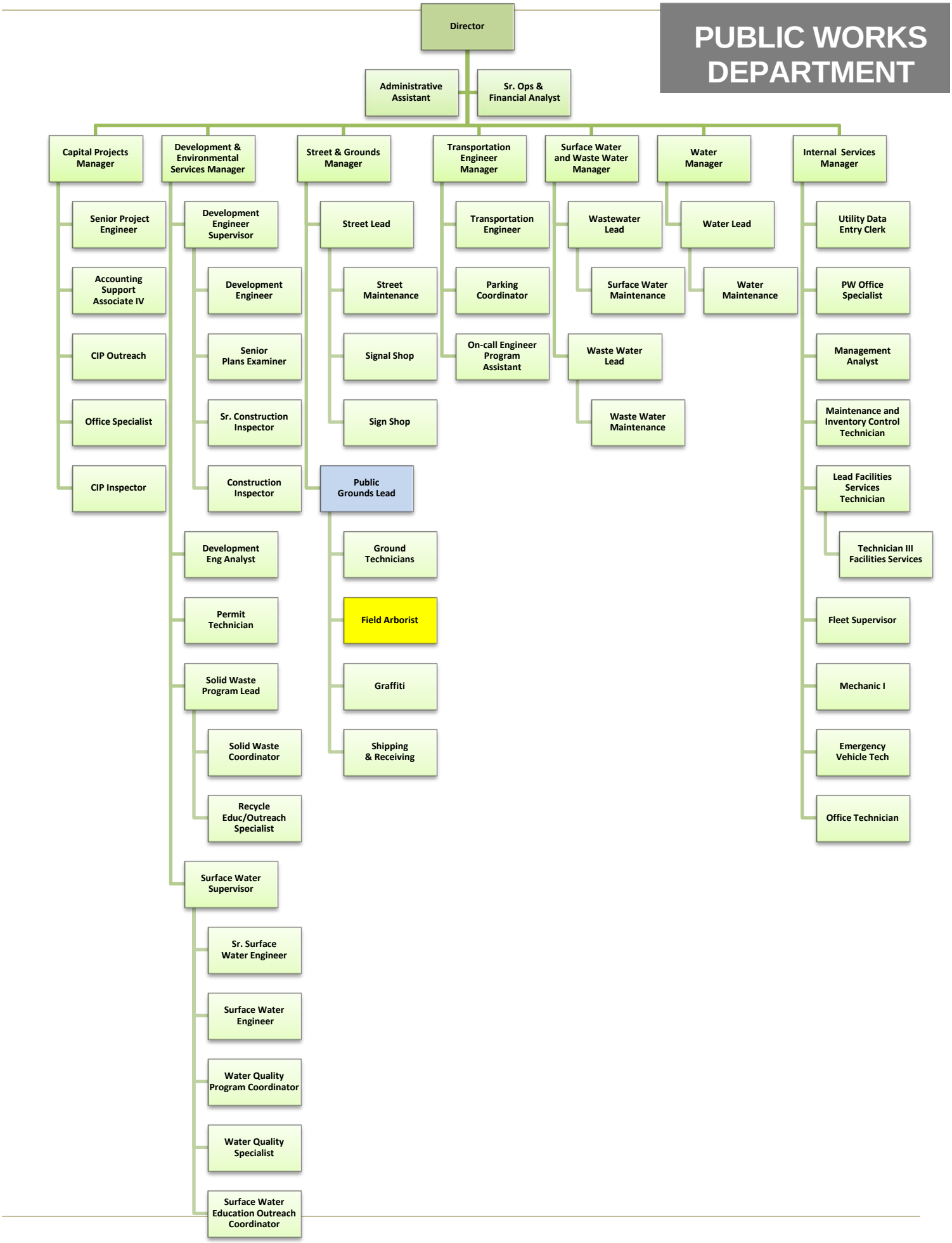
Appendix D: Organizational Charts



PLANNING & COMMUNITY DEVELOPMENT DEPARTMENT



PUBLIC WORKS DEPARTMENT



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CITY OF KIRKLAND
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BULLETIN
No. 55
Dr. James R. Fazio, Editor • $3.00

How Trees Can Retain Stormwater Runoff

Trees in our communities provide many services beyond the inherent beauty they lend to streets and properties. One of the most overlooked and underappreciated is their ability to reduce the volume of water rushing through gutters and pipes following a storm. This means less investment in expensive infrastructure and – importantly – cleaner water when the runoff reaches rivers and lakes.

© iStockphoto.com/Yougen

Drop by drop, rainwater is stored on the leaves of trees, slowing and reducing runoff. The collective effect of this simple action can make a huge difference in a community.

Have you ever stood under a tree that has served as an umbrella during a sudden downpour? Not a good idea when lightning is present, but otherwise the canopy offers welcome shelter.

The next time you experience the umbrella effect, consider the amazing service each tree provides to the quality of our environment. Aside from keeping you dry, the leaves and bark of a tree retain a huge amount of water, allowing some of it to evaporate and some to more slowly reach the ground. Depending on size and species, a single tree may store 100 gallons or more, at least until it reaches saturation after about one to two inches of rainfall. When multiplied by the number of trees in a community, this interception and redistribution can be significant. It is estimated that the urban forest can reduce annual runoff by 2 – 7 percent. This reduction can be converted into dollar savings due to the use of smaller drainage and artificial retention systems. When trees are combined with other natural landscaping, studies have shown that as much as 65 percent of storm runoff can be reduced in residential developments. In fact, sometimes even 100 percent of rainfall can be retained on site.

Through the collective action of leaves and the anchoring and absorbing effects of roots, trees also contribute to soil stabilization, cleaner water and the recharge of groundwater that serves as the drinking supply for over half the nation's population. The role of trees in stormwater retention and its resulting benefits to public health and municipal budgets deserves greater appreciation. It is one more reason why the planting and care of trees in our communities is of critical importance.

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Pioneering Research Leads to Useful Applications

For nearly a century scientists have been studying the influence of forests on rain and snow retention in the mountains. This is important for determining stream flows and making decisions about reservoir management and irrigation schedules. In 1996, scientists at UC-Davis and the USDA Forest Service took a new look at trees and rainfall retention. These studies focused on the potential of individual trees in urban settings.

The work continues today, but research scientist Dr. Qingfu Xiao explained some of the early work he undertook with Dr. E. Gregory McPherson and other colleagues at the Center for Urban Forest Research at Davis, California. The idea was to develop methodology and mathematical models that would explain and predict how much rainwater is intercepted by the leaves and bark of trees. Eventually, this would be refined and described on a species by species basis because retention potential varies with tree structure, bark characteristics and other physical features. The end result has been the inclusion of this information in the i-Tree suite of software programs. These programs, in turn, provide empirical assessment of the benefits of urban trees and offer research-based guidance for cost-effective planting and care.

The initial research was complicated. It went far beyond simply measuring the amount of water reaching the ground under a tree vs. on open land. Instead, it considered seasonal conditions, the 'architecture' of the tree, and the angle, intensity and duration of rain storms. It even considered the size of raindrops! Importantly, leaf sizes, quantities and angles of attachment had to be evaluated, as well as the texture and amount of bark on limbs and trunk. Finally, apparatus was installed to help with measurements each time it rained. Eventually, rather than waiting for rain storms, the researchers constructed simulators and used computer modeling to allow for as many test variations as desired.

Helpful Tools in the i-Tree Suite

In 2007, a series of software programs began being released to help quantify the contributions of urban trees and serve as a modern guide in their management. Several of these aids clarify the value of trees in reducing rain runoff and helping to keep waterways clean.

i-Tree Streets (formerly STRATUM) focuses on the benefits provided by a municipality's street trees. It makes use of a sample or complete inventory to quantify and put a dollar value on the street trees' annual environmental and aesthetic benefits.

i-Tree Hydro simulates the effects of changes in tree cover and impervious surface areas on stream flow levels and water quality. One use of this tool may help communities incorporate urban vegetation into meeting standards of the Clean Water Act.

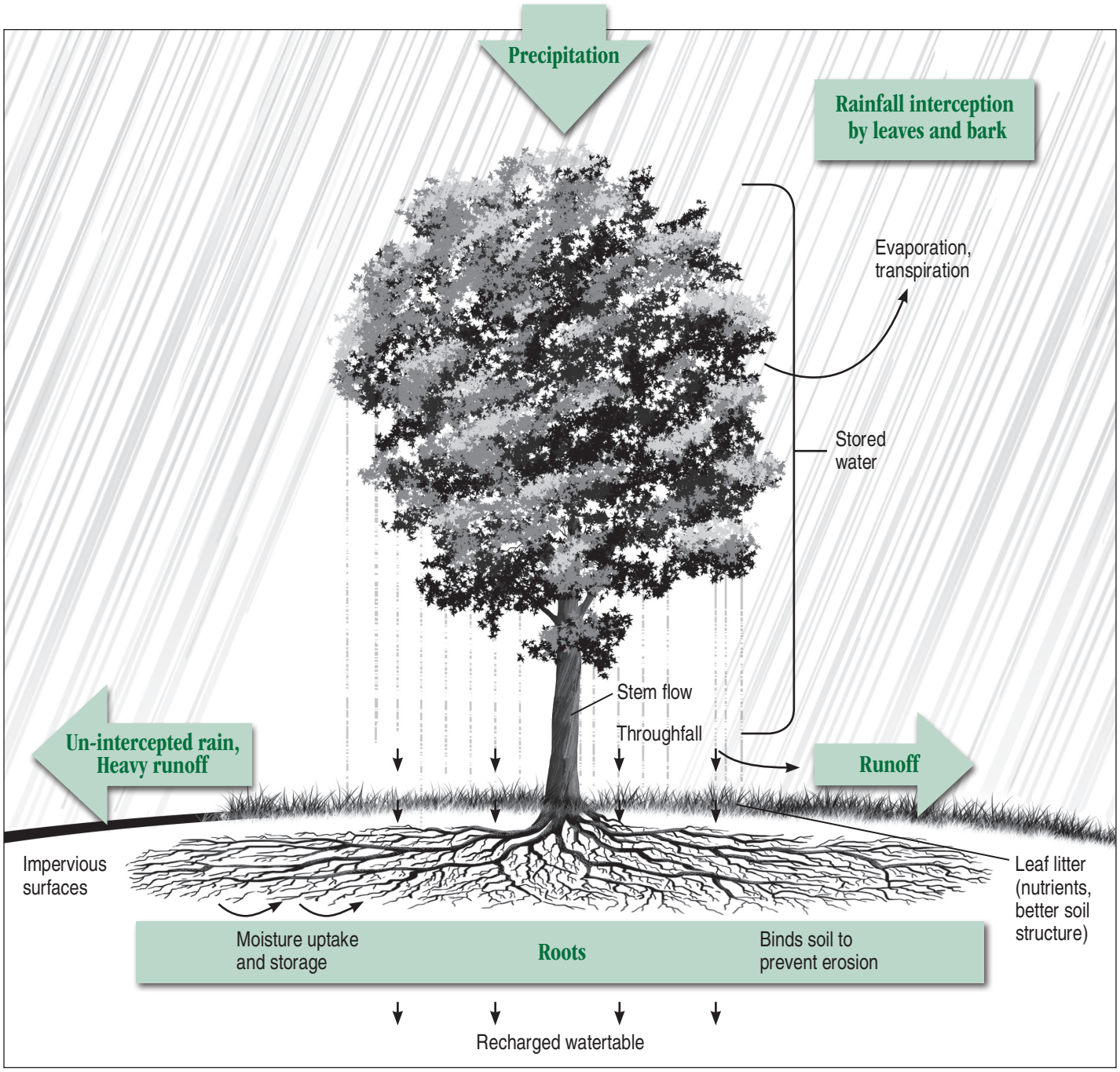
i-Tree Species is designed to help urban foresters select the most appropriate tree species to plant or maintain based on environmental function and geographic area.

i-Tree Vue uses national land cover data maps to assess a community's land cover, including tree canopy, and some of the ecosystem services provided by the existing urban forest. The effects of different planting scenarios on future benefits can also be modeled.

Courtesy of Qingfu Xiao

Using unique field apparatus, scientists were able to study what happens to rainwater as it is intercepted by urban trees.

Important Ways a Tree Helps with Stormwater Management



Trees help reduce stormwater runoff in several ways. One is to intercept falling rain and hold a portion of it on the leaves and bark. Part of this intercepted water will evaporate and part will be gradually released into the soil below. At the surface of the soil, fallen tree leaves help form a spongy layer that moderates soil temperature, helps retain soil moisture, and harbors organisms that break down organic matter and recycle elements for use in plant growth. This important layer also allows rain water to percolate into the soil rather than rushing off carrying with it oil, metal particles and other pollutants. Below ground, roots hold the soil in place and absorb water that will eventually be released into the atmosphere by transpiration.

More Ways That Trees Can Help

Whether standing alone to intercept rain or working in conjunction with water-retention facilities, trees can make significant contributions. Their benefits are practical and can save money for the community, but they also add beauty and that counts, too.

Vegetative Swales

As impervious surfaces spread with the increase of paved roads, parking lots, driveways and even former lawn areas, the use of swales is more important than ever. The potential of this facility was well demonstrated by the Center for Urban Forest Research in a Davis, California, parking lot. Using a control area for comparison and after 50 storm events and 22 inches of rain, the researchers credited the swale with reducing surface runoff by 89 percent and reducing pollutants by 95 percent.

While some communities require swales in new developments, the vegetated aspect is sometimes overlooked. Designing with plant materials appropriate to the climate and site is important, as is a plan for occasional maintenance, but the effort is most worthwhile. Not only can trees and other vegetation provide the benefits described on page 3, they add to the beauty of the area, help 'calm' traffic, and offer the welcome cooling effect of shade in the summer. A swale with only rock or sod is depriving the neighborhood of a full return on its investment.

© Seattle Housing Authority

A streetside swale can be attractive as well as useful in retaining and cleaning stormwater runoff.

Stormwater Basins

A stormwater basin is similar to a swale but is generally not linear. Basins are often used in housing developments, especially if the streets and lots do not lend themselves to swales. Designs of basins vary widely. Some are simply concrete boxes that look like fenced, un-peopled swimming pools. They are often eyesores and reduce the space to a single use that contributes little else than the retention of water. On the other hand, stormwater basins can be built to serve as picnic grounds or free play areas during dry weather. Others appear as natural areas, providing open space, wildlife habitat and a touch of beauty.

> *Fencing or hiding stormwater facilities out of view not only loses the opportunity to create an aesthetically pleasing site design, but also sends the message that stormwater is an attractive nuisance. While there are legitimate concerns for safety and liability, these concerns can usually be resolved with careful design consideration, such as specifying shallow facility depths with gentle side slopes.*
>
> – From: Portland Stormwater Management Manual

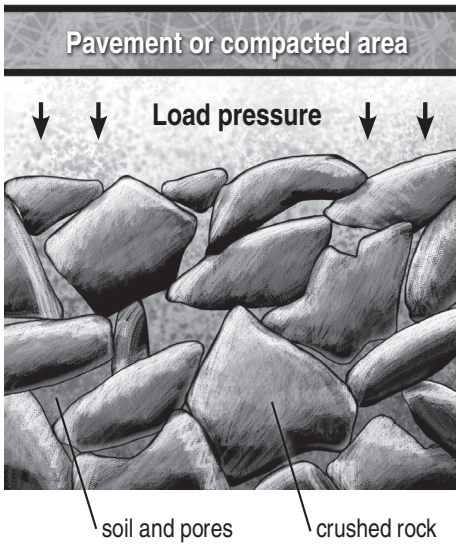
James R. Fazio

James R. Fazio

Community policy can make the difference between ugly, single-use stormwater basins and those that provide not only function but open space, a refuge for wildlife, and a touch of beauty.

Structural Soil

One of the most significant urban forestry developments in recent decades has been the design and use of structural soil. Pioneered by Dr. Nina Bassuk at Cornell University, structural soil can be used beneath sidewalks and parking lots to provide both the strength needed for paving or compaction and a livable environment for tree roots.



In some cases, the use of structural soil can result in zero runoff from a site. Silva Cells, crate-like structures filled with soil, have much the same engineering attributes as structural soil and provide even more growing space for roots. Either way, the result is healthier, more robust urban trees and more water retained onsite.

There are several research-tested benefits provided by structural soil:

- It provides a reservoir for runoff that can then percolate deeper into the subsoil and eventually groundwater.
- It allows deeper, better root development. In turn, this means larger tree canopies, more intercepted precipitation and more uptake by roots for transpiration.
- It can be used under paved areas where space for swales is not available.
- Normal amounts of surface pollutants are intercepted before reaching waterways. Immobilized contaminants can then be transformed by soil microbes or taken up by roots.
- Utilities can share the space.

Notes: Type of soil will affect infiltration. Where soils do not accommodate a reasonable rate of percolation, drain pipes may be necessary. Too much pooling of water will cause tree damage or death. Also, where limestone gravel is used in the structural soil mix, pH may become higher than in the native soil. In this case, plant species that can tolerate more alkaline soil.

Tree Pits

Even traditional tree pits can contribute to retaining stormwater runoff. If engineered for water to drain into the pits (sloping pavement, curbs with inlets, etc.), these are called 'stormwater-capturing tree pits.' Their usefulness is enhanced with greater soil volume and by connecting individual pits with trenches. Of course, as with structural soil, it is important for the subsoil to be able to receive percolating water or a drain system is necessary to prevent drowning the root system.

Riparian Buffers

Trees along the shores of lakes and the banks of rivers and streams are more than decorations. Not only do their canopies intercept some of the rain and reduce its impact, their roots anchor the soil and help take up leached chemicals before they reach the body of water. Shrubs in the riparian zone also help slow flood water. Where banks are washed away or heavily impacted, a range of bioengineering techniques are available using natural materials for restoration.

Kestrel Design Group, Inc.

Development and the spread of impervious surfaces produced more stormwater runoff than could be absorbed by the banks of Pine Creek in the City of Maple Grove, Minnesota. The creek has now been restored using a combination of gradient control, rock 'armor,' and planting native vegetation that will eventually include restored tree cover. Bioengineering techniques result in living, self-repairing systems that grow stronger with age.

Cities Putting Trees to Work for Stormwater

There is untapped potential in utilizing trees to address stormwater runoff in urban areas. Traditional approaches used by most municipalities to manage urban trees have focused on short-term aesthetic goals often to the detriment of tree health and full realization of ecosystem services provided by trees. Many municipalities are reluctant to expand tree programs due to budget, staffing, and liability issues. However trees are useful and valuable components of city stormwater infrastructure and provide measurable reductions in runoff volume and pollutant loads. Municipalities should explore opportunities to expand tree planting programs and incorporate trees into engineered stormwater systems. Trees are not just landscaping placed on top of city infrastructure, they are city infrastructure.

– Shirley Trier, Davey Resource Group

Throughout the nation, communities of all sizes are beginning to include trees in their plans to meet federal standards for water quality. Many, however, are slow to see the relationship between trees and stormwater management. Local tree boards need to embrace the challenge of educating engineers, city officials and the general public about the potential of green infrastructure.

The Portland Example

Portland has perhaps the most comprehensive stormwater management program in the nation. With over 37 inches of precipitation annually and important rivers and streams for recreation and fish habitat running right through the city, it is little wonder that Portland places high priority on managing stormwater runoff. As new development occurs, city officials view sustainable stormwater management as the preferred alternative to the traditional piped approach, and mandate onsite stormwater management to the degree possible. According to Portland's Stormwater Management Manual, "Vegetation may be one of the most cost effective and ecologically efficient means available to improve water quality."

The city's guidelines and strict regulations apply to:

- Properties where new offsite discharges will occur or new connections to the public system are required.
- Any project that develops or redevelops over 500 square feet of impervious surface.

The city's goal is to have developments or other projects contain enough runoff onsite to handle the 3.4 inches of rain expected in a '10-year storm.' The following three steps keep trees in the picture while helping developers understand the city's goals and guide them through the application and permit processes:

1. Create an informed project team.

The project team must go "beyond traditional civil engineering expertise." It should include diverse disciplines, all prepared to integrate sustainable stormwater solutions early in the design process. Examples of such team participants include: landscape architects, geologists, geotechnical engineers, planners and licensed design professionals.

2. Maximize permeability, minimize offsite discharge.

Maximize the site's permeability by retaining existing trees and greenspace and by using strategies like pervious pavement and ecoroofs. Minimize offsite discharge by creating a site design that limits pavement and building footprints. These strategies require integration of decisions at all levels of the project, from site planning to materials selection.

3. Use stormwater as a design element.

Instead of pipes that hide water beneath the surface, green systems can work with natural land forms and land uses to become a major site design element. Starting in the conceptual design phase and with an evaluation of a site's infiltration potential and drainage patterns, designers can create a more aesthetically pleasing relationship to the natural features of the site and provide multiple benefits. This, in turn, can result in:

- Recreational opportunities
- Maximized land values
- Improved project marketability
- Landscape and screening requirements being met
- Providing wildlife habitat
- Providing environmental education

'Grey to Green Initiative' Projects

In many established neighborhoods, Portland's infrastructure – like that in many American cities – is aging and needs to be repaired or replaced. Instead of traditional renovations, the 'Grey to Green' approach implements the kind of techniques described in this bulletin. Incentives for going green include a reduction in stormwater user fees. To encourage tree planting, one incentive is that the city helps residents by paying a portion of new tree costs in addition to reducing fees. The larger the species at maturity, the larger the incentive! The city also promotes tree planting through the use of volunteers and by working with contractors on various projects. In all cases, the city's policy is to focus on green street improvements and private stormwater investments first, followed by traditional pipe replacement and upgrades where required and financially appropriate.

Is it working? In one creek basin alone, the program:

- Anticipates saving more than $58 million by integrating green infrastructure and pipe replacement and repairs, 40 percent less than the cost of traditional solutions.
- Sewer backups and overflows are being reduced.
- Potentially more than 20,000 residents and hundreds of small businesses will be engaged in stormwater initiatives.

Throughout the city:

- More than 900 green street facilities are being constructed and incentives were provided or are available for 150 targeted private improvement projects.
- Over 10,000 new street trees and 60,000 seedlings in natural areas have been planted.
- Habitat in environmentally sensitive areas is being restored, including the removal of invasive species and the planting of native tree and shrub species.

Naomi Tsurumi

Through partnerships with Friends of Trees and volunteers, street trees are being planted to help with stormwater management in Portland, Oregon. The results of using incentives for homeowners exceeded expectations with more than 1,000 new yard trees planted in the first years of the 'Grey to Green' initiative.

Other Blue Ribbon Cities

The Environmental Protection Agency cites several other cities as leaders in the use of trees and other vegetation for stormwater management. These include:

Chicago – Its green roof demonstration on the top of City Hall resulted in numerous others throughout the city, as well as heightened awareness about green infrastructure.

Lenexa, Kansas – Using both regulatory and non-regulatory approaches, Lenexa has created riparian greenways through a stream setback ordinance, protecting natural areas and implementing other green infrastructure practices.

Philadelphia – Demonstration projects and green infrastructure used in planning and development has saved the city approximately $170,000.

Pittsburgh – In addition to having the first ever LEED certified convention center, Pittsburgh is using natural systems to help absorb, infiltrate, reuse and evaporate runoff.

Seattle – Rain gardens, rain barrels, downspout disconnection, swales, green roofs and other green infrastructure techniques are being used along with a campaign to reduce impervious surfaces.

Milwaukee – City funding is paying off in reduced runoff and improved water quality through downspout disconnects and several greening programs.

City of Chicago

Trees, shrubs and other vegetation atop the city hall building in Chicago help slow and retain stormwater runoff as well as reduce the urban heat island effect. The site has served as a demonstration of what can be done with beneficial results elsewhere in the city.

EPA is the Source of Regulations and Help

The Environmental Protection Agency was an outgrowth of the original Earth Day in 1970. It was created to establish and enforce environmental standards that "protect human health and safeguard the natural environment." Today the EPA is challenged to provide federal leadership in the area of stormwater management and other sustainable practices. The agency recognizes trees and other vegetation as part of the 'best management practices' that can help it attain its goal of protecting the quality of our nation's water.

For More Information

Due to the technical nature of much of the material in this issue, its thorough treatment is well beyond the page limits of a bulletin. To find links and other sources that will provide more details, please visit **arborday.org/bulletins** and click on No. 55.

James R. Fazio

Conifers have even more rainwater interception potential than deciduous broadleaf trees, but both can have a significant impact on the volume and purity of storm runoff.

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ATTACHMENT 3

Protecting and Developing the Urban Tree Canopy

A 135-City Survey

THE UNITED STATES CONFERENCE OF MAYORS

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Dear Mayor:

I am pleased to provide you with our report on cities' efforts to protect and develop the urban forests that are critical to moving this nation closer to its current climate protection goals. This report, *Protecting and Developing the Urban Tree Canopy: A 135-City Survey*, is the latest volume in our U.S. Conference of Mayors Best Practices series.

Trees make important contributions to society and are an integral part of urban infrastructure, as critical to the health and livability of communities as roads, sewers, and buildings. Community trees leverage the social, economic, and environmental value of cities, with forestry and related industries providing employment for over 1.6 million people and contributing $231.5 billion to the U.S. economy.

Mayors recognize the invaluable role of urban forests in the protection of public health and reduction of harmful greenhouse gases. And mayors have long appreciated the contributions of urban tree canopies to the sustainability and beautification goals they have established for their cities. During its 76th Annual Meeting this year in Miami, the Conference adopted policies that specifically address energy conservation and efforts to combat the non-native insects and diseases that threaten the urban tree canopy.

We surveyed our members to establish a baseline of information on their current community tree efforts; with this report, we are pleased to share that baseline of information with all mayors and all others dedicated to protecting and expanding the critical national resource our urban forests represent.

For the past three years the Conference of Mayors has partnered with the Home Depot Foundation on initiatives aimed at building sustainable communities. The Conference's annual Excellence in Community Trees Award has been made possible through this partnership, as has this survey report. The Conference appreciates the support provided by The Home Depot Foundation and, in particular, by The Foundation's Director and Chief Operating Officer, Frederick D. Wacker.

Thanks are due, as well, to all the mayors and their urban forestry specialists who contributed the valuable information on which this report is based. Their willingness to share their experiences benefits all America's cities.

Sincerely,

tom cochran

Tom Cochran
CEO and Executive Director

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EXECUTIVE SUMMARY

In cities across America, efforts to preserve and enlarge the tree canopy in support of both sustainability and beautification goals have grown in importance over the past several years. The U.S. Conference of Mayors Community Trees Task Force was created in 2006 in response to mayors' increasing awareness of the value of urban forests and their increasing interest in ways that communities can be improved through expansion of community tree programs. The Task Force requested that Conference staff undertake a survey of current efforts in cities to expand and protect the urban tree canopy; The Home Depot Foundation provided funding for the effort. The goal was to produce a baseline of information – essentially, a report on the state of community trees in America – that could be shared by all mayors and other stakeholders concerned with the management and care of an increasingly important urban forest.

The Conference survey was distributed in September to the nation's principal cities – basically those having populations of 30,000 and larger. Responses were received by early November from 135 cities in 36 states in all regions of the country. For each question, survey findings were calculated based on the number of cities which responded to that question, not on the total number responding to the survey. Among the survey's key findings:

On Climate Protection:

- ***Sustainability Efforts:*** Eighty-four percent of the cities view their activities relating to trees as part of their overall sustainability and/or climate protection efforts. Thirty-eight percent of those which have adopted a sustainability or climate protection plan report that their plan specifically cites the contribution of trees or the tree canopy to achieving the plan's goals.
- ***Carbon Sequestration Measurement:*** Forty-four percent of the cities anticipate being able to measure the carbon sequestered by their tree canopy within the next few years.

On City Organization, Roles, and Authority:

- ***City Ordinances:*** Ninety-five percent of the survey cities have adopted one or more ordinances governing tree management and care. Among these, 85 percent have ordinances which require new development projects to retain trees on site, plant new trees, or pay into a tree mitigation fund; in 63 percent they cover removal of trees from private property; in 46 percent they cover utility practices regarding trees; in 38 percent they cover the planting of public trees on private property. In two-thirds (67 percent) of the cities the ordinances' enforcement provisions impose replacement costs; in two-thirds (66 percent) the ordinances impose fines.
- ***Tree Canopy:*** Forty-seven percent of the cities have made enlarging the tree canopy a stated goal of their overall tree resource management plan or an ordinance. Among those cities which have not done this, 46 percent have undertaken a separate initiative specifically aimed at enlarging the tree canopy.
- ***Tree Inventory:*** Seven in 10 of the survey cities maintain an inventory of city-owned trees, and 55 percent of these inventories are up to date. Forty-seven percent of the cities maintain an inventory of park trees, and 53 percent of these inventories are up to date.

- ***Green Infrastructure Tree Value:*** Thirty-two percent of the cities estimate the value of trees as part of their green infrastructure. The estimated total value for the 32 cities able to report it is $6.58 billion.
- ***New Technologies:*** Three in five of the survey cities are employing new and emerging tools and technologies to inventory trees, map the tree canopy, assess damage, assess value, or perform other functions related to tree resource management.
- ***Threats to Tree Resource Management:*** Cities report that their tree resource management efforts are being hampered or have been hampered by several specific problems: Serious storms are responsible for recent problems in half the survey cities, problems within the past two years in 53 percent of the cities. Infestations are responsible for current problems in 46 percent of the cities, problems within the past two years in 41 percent. Drought conditions are responsible for current problems in 42 percent of the cities, problems within the past two years in 55 percent. Fire is responsible for recent problems in less than one percent of the cities, problems within the past two years in two percent. Other threats, such as budgetary constraints, are reported as current problems by 15 percent of the cities, recent problems by 16 percent, and problems experienced within the past two years by 13 percent. Fifty-seven percent of the cities report that they have plans in place to respond to problems which reach crisis proportions.
- ***City Budgets:*** The 124 cities which reported the amount they had budgeted in the current fiscal year for tree management and care are spending, in the aggregate, nearly $132 million. Sixty percent of the cities said the amount currently budgeted for tree management and care is about the same as the amounts budgeted in recent years; 23 percent said it was somewhat higher, and two percent said it was much higher. Fourteen percent said it was lower.
- ***Staffing:*** Across the survey cities, 69 percent of tree management and care is handled by city employees, 29 percent is handled by contracted workers, and one percent is handled by others, principally volunteers. Seventy-two percent of the cities report that their staff includes certified arborists. Among those cities which do not have certified arborists on staff, 89 percent said that they obtain the services of certified arborists, when needed, through contracts or other means.
- ***Coordination:*** In 63 percent of the survey cities there is an individual at, or reporting to, the executive level of city government who is responsible for coordination of multi-agency and public-private efforts to preserve and/or enlarge the tree canopy.
- ***Responsibility for Street Trees:*** Public works departments were cited by 38 percent of the cities as responsible for street trees; parks agencies were cited by 26 percent of the cities; 14 percent of the cities specified forestry divisions within larger departments, generally public works. Across the survey cities, nearly all (98 percent) said their street tree responsibilities included removal; 95 percent said it included pruning; nine in 10 said it included planting; and four in five said they included protection.
  Responsibility for Park Trees: Parks agencies (including park districts) were cited by 63 percent of the cities as responsible for park trees; public works departments were cited by 16 percent; 12 percent specified forestry divisions within larger departments, generally parks. Across the survey cities, nearly all said their park tree responsibilities included pruning (98 percent); removal (98 percent); and planting (97 percent); nearly nine in 10 (88 percent) said they included protection.

On Partnerships and Community Outreach:

- ***Partnerships with Community Organizations:*** To support the preservation and/or planting of trees, 57 percent of the survey cities maintain formal partnership agreements with volunteer, nonprofit, or community groups.
- ***Partnerships with Adjacent Jurisdictions:*** Twenty-seven percent of the survey cities are working across boundaries with adjacent jurisdictions to preserve or enlarge the tree canopy on a watershed or multi-jurisdictional scale.
- ***Community Outreach:*** Nine in 10 (91percent) of the cities work with partner organizations to provide programs that educate residents on the importance of trees, and 53 percent of the cities believe that public awareness of the importance of the preservation and growth of the tree canopy is increasing.

INTRODUCTION

In cities across America, efforts to preserve and enlarge the tree canopy in support of both sustainability and beautification goals have grown in importance over the past several years. With the emergence of climate change as a priority issue for governments around the world, the role of forests in mitigating global warming is receiving increasing attention by all involved in the shaping of climate protection policy at all levels of government. Mayors in cities across the nation have long understood the value of urban tree canopies; in many cities, this has translated into investments in significantly larger canopies.

The U.S. Conference of Mayors Community Trees Task Force was created in 2006 in response to mayors' increasing awareness of the value of urban forests and their increasing interest in ways that communities can be improved through expansion of community tree programs. The Task Force was intended to serve as a vehicle for sharing information on urban forests among cities and for disseminating information on both federal and private resources of value to cities in their community tree efforts. The first meeting of the Task Force, held in June 2006 during the 74th Annual Meeting of the Conference of Mayors in Las Vegas, was chaired by Honolulu Mayor Mufi Hannemann. The Task Force is currently co-chaired by Palatine (IL) Mayor Rita Mullins and Sacramento Mayor Heather Fargo.

During the winter meeting of the Conference of Mayors in January of this year, the Community Trees Task Force requested that Conference staff undertake a survey of current efforts in cities to expand and protect the urban tree canopy. The goal was to produce a baseline of information – essentially, a report on the state of community trees in America – that could be shared by all mayors and other stakeholders concerned with the management and care of the increasingly important urban forest. Support for this effort was provided by The Home Depot Foundation.

The survey instrument sought information from individual cities on how they had:

- linked their community tree activities to other efforts to promote sustainability and climate protection.
- organized their activities relating to trees, including the roles they play and the authorities they exercise;
- partnered with other organizations in undertaking these activities; and
- reached out to and educated residents and community organizations on the importance of preserving and enlarging the tree canopy.

The survey was distributed in September to the nation's principal cities – basically those having populations of 30,000 and larger. Responses were received by early November from 135 cities in 36 states in all regions of the country. For each question, survey findings were calculated based on the number of cities which responded to that question, not on the total number responding to the survey.

FINDINGS

CLIMATE PROTECTION

Sustainability

Eighty-four percent of the survey cities view their activities relating to trees as part of their overall sustainability and/or climate protection efforts. Thirty-eight percent of those which have adopted a sustainability or climate protection plan report that their plan specifically cites the contribution of trees or the tree canopy to achieving the plan's goals. Among survey cities' descriptions of provisions in plans relating to trees or the tree canopy:

Chandler, AZ: We have a green building initiative that includes trees as part of the plan.

Riverside, CA: The initiative commits Riverside to expanding the urban forest with 100,000 new trees by 2010. Item #24 of the initiative also commits Riverside to plant 1,000 trees in City parks and rights-of-way and encourages the annual planting of 3,000 shade trees on private property.

Norwalk, CT: Sustainability is a key component of the City's Master Plan of Conservation and Development, which has just been updated. It not only addresses tree programs under the purview of the Tree Advisory Committee, but also incorporates tree considerations (among other green initiatives) into planning, zoning, development criteria, etc.

West Haven, CT: We recognize the benefits provided by trees, including but not limited to buffering noise and unsightly views, improving air quality, offering habitat to birds and other animals, preventing erosion, absorbing water, mitigating climate, and improving quality of life.

Wilmington, DE: Trees for Wilmington is a working group of the Wilmington Beautification Commission. The plan acknowledges that the urban forest is a necessary part of the infrastructure, which provides numerous benefits crucial to the community, including environmental (carbon storage, air pollution removal, building energy savings, avoided carbon emissions), social, and economic benefits.
Miami, FL: It includes increasing the tree canopy by 30 percent by 2017.

Oakland Park, FL: It includes increasing the tree canopy in the City to 30 percent.

Honolulu, HI: The plan describes the benefits of trees, with a goal of planting at least 100 trees per year, not including trees required for new developments.

Chicago, IL: The mitigation strategy for trees in the Chicago Climate Action Plan establishes a target savings against business as usual (BAU) of 0.10-0.17 MMT CO2 emissions by increasing canopy cover from 14 to 17 percent.

Evansville, IN: "Maintain healthy urban forests" is one of 12 objectives. Specifics include reevaluating land use, development and zoning ordinances to require larger tree islands/green spaces in parking lots and to require larger vegetative buffer zones between residential, commercial, and industrial developments and along streambed corridors and lakes (riparian habitats).

Michigan City, IN: Tree loss due to large scale infrastructure improvements is mitigated with at least a one-to-one tree replacement.

Alexandria, LA: It includes increasing the canopy to provide a cooler environment.

Minneapolis, MN: Included are no net loss of Citywide tree canopy cover by 2015, and the planting of at least 2,500 trees on public land annually through 2015.

Las Vegas, NV: **"**Whereas, the city actively promotes the planting of trees and for thirteen years (in 2006) has been recognized as a Tree City USA by the Arbor Day Foundation" is included in the City's Climate Protection Resolution.

Providence, RI: The urban tree canopy goal of 30 percent by 2020 is included.

Alexandria, VA: Alexandria's Climate Change Initiative explicitly describes the current commitment to plant 350 trees annually. The City's Urban Forestry Master Plan (now under final review) recommends that the City plant an additional 400 trees annually to achieve recommended street tree stocking levels by the year 2020 and expand the City's tree canopy.

Seattle, WA: The current plan references the Seattle Urban Forest Management Plan's goal to increase the overall canopy of Seattle from the current 18 percent to 30 percent in the next 30 years.

Carbon Sequestration Measurement

Forty-four percent of the survey cities anticipate being able to measure the carbon being sequestered by their tree canopy within the next few years.

CITY ORGANIZATION, ROLES, AUTHORITY

City Ordinances

Ninety-five percent of the survey cities have adopted one or more ordinances governing tree management and care. Eighty-five percent of these cities have ordinances which require new development projects to retain trees on site, plant new trees, or pay into a tree mitigation fund. Ordinances cover removal of trees from private property in 63 percent of these cities; utility practices regarding trees in 46 percent; and the planting of public trees on private property in 38 percent. Among other areas covered by ordinances are regulation of right-of-way trees, identified by six cities; protection of historic or exceptional trees, identified by five; and regulations relating to disease or pest management, identified by three.

In 67 percent of the cities the ordinances' enforcement provisions impose replacement costs; in 66 percent they impose fines. Other penalties identified include civil and/or criminal actions, by six cities; permit-related penalties, such as increased fees or denial of future permits, by four cities; fees in lieu of planting trees, by two; and stopping work orders, by two.

Tree Canopy

Seventeen percent of the survey cities have mapped the total (public and private) tree canopy. Forty-seven percent of the cities have made enlarging the tree canopy a stated goal of

their overall tree resource management plan or an ordinance. Most of these cities described, in varying detail, the goals they have set:

North Little Rock, AR: The Land Use Plan specifically lists the preservation of trees and enhancement of open spaces as a goal to preserve the local environment. The Screening Ordinance requires one tree per six parking spaces and street trees with all new developments.

Chico, CA: The City's street tree population expands with each new residential and commercial development.

Lakewood, CA: The goal is to eliminate tree vacancies.

Riverside, CA: The current goal is to plant 100,000 new trees by 2010.

Santa Ana, CA: The Public Works Agency allocates $50,000 for infill planting yearly. The Parks Department conducts several Adopt-A-Park projects each year. Infilling trees is a part of these events. We partner with Shade Tree Nursery, a non-profit organization which donates trees to help enlarge our City's park tree canopy.

Temecula, CA: The purpose of the ordinance is to protect and preserve a variety of native and non-native trees on public and private property whose visual and historic importance to the community is sufficient to justify special efforts to protect and preserve them, and to encourage the application of management techniques to control the pruning, trimming, shaping, and removal or relocation of these trees within the City.

Tustin, CA: The goal is a tree in every planting site.

West Hollywood, CA: The City has adopted a streetscape master plan whose goal is to plant out residential and commercial streets.

Colorado Springs, CO: Work with neighborhood homeowners to plant and care for street trees.

Norwalk, CT: Over the decades (centuries, actually) trees have been removed from many parts of the City, particularly the urban core, in favor of development. A major goal is to restore the canopy on streets where it has either been totally removed or damaged. Additionally, our goals include expanding the canopy where conditions will accommodate it.

West Haven, CT: The goal is to recognize the benefits provided by trees, including but not limited to buffering noise and unsightly views, improving air quality, offering a habitat to birds and other animals, preventing erosion, absorbing water, mitigating climate, and improving quality of life.

Wilmington, DE: The goal is to increase the tree canopy by 10 percent.

Coral Gables, FL: The goal is to fill all empty planting spaces on the public right-of-way.

Largo, FL: The goal is to plant 5,000 street trees over five years.

Miami, FL: Currently, the City is at a 21 percent canopy. Our goal is to be at 30 percent by 2017. The initiative is called GreenMiami.

Oakland Park, FL: The goal is to increase tree canopy in the City to 30 percent.

Orlando, FL: We would like to get to 30 percent tree-covered.

Plantation, FL: Our urban forest is considered a part of the City's infrastructure. After the loss of tree canopy (25-30 percent) in the middle of the decade, we have made great efforts to replace what we lost and enhance the general canopy. We have applied part of what we have leaned from the hurricanes in the middle of the decade to our many urban forestry programs.

Tamarac, FL: The goal is to preserve the old trees because they have better root structure.

Tampa, FL: The City is currently in the process of updating our comprehensive plan. Objective 32.3 under Tree Canopy states: "The City will provide 800 trees annually to preserve and augment the community's canopy and sustainability." In addition, Policy 38.7.2 under Urban Forestry states: "The City will develop a 'greening' program with a goal of increasing tree cover in areas of concentrated vehicular use where the urban heat island effect could be mitigated through planting trees and shrubs."

Savannah, GA: Satellite images helped us set a goal of 50 percent overall canopy coverage.

Chicago, IL: The City's Chicago Climate Action Plan has a stated goal of increasing canopy cover from 14 percent to 17 percent by 2020. Our upcoming Urban Forest Management Plan is exploring targets of doubling the canopy by 2040.

Evanston, IL: The Overall Management Plan goal is to achieve a fully planted status on all public property Citywide.

Lombard, IL: The goal is to continually increase the number of parkway trees.

Northbrook, IL: Reforestation fees are collected via our tree preservation ordinance. Money is utilized to reforest unplanted public rights-of-way.

Palatine, IL: The goal is 100 percent parkway plant out; City is at roughly 93 percent today.

Schaumberg, IL: The "Fill the Gap Program" provides parkway trees at +/- 40-foot spacing.

Evansville, IN: We attempt to plant two trees for each tree removed, as time and funding allow.

Michigan City, IN: Currently our goal is to replace what is removed from the street tree inventory and increase our total tree cover in our park lands.

Manhattan, KS: We attempt to maintain a positive tree-planting-to-removal ratio of three planted to one removed.

Muskegon, MI: Goals are to improve the tree canopy, plant as many trees as we remove, and plant a variety of trees to prevent disease devastation.

Sterling Heights, MI: The goal is to maintain 37 percent of tree canopy on any new development.

Westland, MI: Goals are to plant a tree for every tree removed and to replace all of the trees removed due to the Emerald Ash borer.

Burnsville, MN: Goals are to increase tree cover and diversity, and to reduce and prevent tree loss due to existing and potential threats.

Minneapolis, MN: The City's sustainability report/greenprint sets a target of no net loss of Citywide tree canopy cover by 2015. We use a baseline from 2004 of 26 percent.

St. Louis, MO: Tree removals must result in tree reforestation; a no net loss policy ensures sufficient tree canopy Citywide.

Hattiesburg, MS: The 2008-2028 Twenty-Year Comprehensive Plan has goals of improvement and sustainability for green infrastructure for both the public and private sectors. The City's parks program continues to improve with better maintenance, yearly tree planting initiatives, and creation of new green areas. We have land development ordinances which require developers to use the urban forest as an important building block with preservation, protection, and establishment of green infrastructure.

Clifton, NJ: Since 2000, the City has committed to a Community Forestry Management Plan. The plan's goal is to increase the City's overall tree resources through many different programs, such as mini-woodlots, reforestation of park and open lands, adopt-a-tree program on City streets, and replacement of City trees during construction and renovation related to street improvement projects.

Las Vegas, NV: The goal is to double the average tree canopy coverage to 20 percent by 2035. (Resolution 26-2008)

Scranton, PA: Our goal concerning the planting of trees is to plant as many trees curbside as possible in the treeless area of the City. We have a current contract to plant 238 trees in South Scranton and have planted over 600 trees during the last six years.

Providence, RI: Increasing the City's urban tree canopy from 23 percent to 30 percent by the year 2020 is the goal.

Columbia, SC: Enlarging is not a stated goal but maintaining is, even for planting vs. removals. As newly planted trees grow, we hope to have an increase goal.

Chattanooga, TN: The goal is increasing the tree canopy in the downtown area from the current seven percent to 15 percent, with an overall canopy goal of 40 percent Citywide.

Frisco, TX: Under the heading "objectives," our landscape ordinance states several items, including providing shade for outdoor activities, providing habitat for wildlife, and planting for energy conservation.

Laredo, TX: Under the current land development code, a landscape ordinance requires trees and shrubs in new residential and commercial development.

McKinney, TX: Enlarging the tree canopy itself is not the official goal. Through tree preservation and tree mitigation we are conserving and replacing.

Roanoke, VA: Achieving 40 percent canopy in 10 years is the goal.

Everett, WA: Short term goal: no net loss of forest canopy cover on public lands. Long term goal: measurable gain.

Seattle, WA: The goal is increasing the tree canopy to 30 percent from the current level of about 18 percent. Goals have been set for each land use category (single family residential, industrial, parks, etc.).

Milwaukee, WI: Forty percent canopy coverage is the goal.

Among those cities which have not made enlarging the tree canopy a stated goal of their overall tree resource management plan or an ordinance, 46 percent have undertaken a separate initiative specifically aimed at enlarging the tree canopy. Several of these cities described their initiatives:

Napa, CA: The City is insuring that the canopy is not reduced and trees that must be removed are replaced.

Santa Clarita, CA: The City plants 1,000 trees per year. As a result, the City has been awarded Tree City USA recognition for 18 consecutive years.

Pinellas Park, FL: The City Tree Bank enables contractors and developers to contribute money in lieu of certain landscape requirements when necessary or allowable. The tree bank funds a tree giveaway program for residents and provides trees for public areas.

Carol Stream, IL: Once trees have been reestablished in areas with parkway trees, we will focus on enlarging the canopy outside the area where parkway trees were not allowed during construction.

Muncie, IN: We are planting about 100 trees a year, but that is not enough.

Lexington, KY: A volunteer tree planting event is held each spring.

New Bedford, MA: The City replaces all trees when road construction takes place. Also, the City has budgeted for new tree plantings throughout the year.

Meridian, MS: As trees are removed from public property, we document and make provisions for tree replacement the following planting season with the largest species that the site will sustain.

Albuquerque, NM: We are following the U.S. Forest Service and Dr. Greg McPherson's specific recommendations based on the Municipal Forest Research Analysis (MFRA) completed for Albuquerque. We have been planting 2,000 trees annually to increase the canopy while maintaining diversity. A Citywide urban forestry initiative is in the planning stage; it includes implementing urban forestry programs and high levels of tree planting on streets and private property. Outreach is a key element of this program and we are coordinating efforts with all the local tree nurseries, providing educational information in various formats, working on non-traditional methods of outreach, and establishing a tree-planting goal. We have contracted with a marketing firm to research sponsorships for these efforts.

Garfield Heights, OH: We are replacing diseased, damaged, problem trees.

Warwick, RI: We are planting street trees on major arterial roadways as well as in neighborhoods.

Charleston, SC: A new ordinance, currently being crafted, makes increasing overall tree canopy a goal.

Columbia, SC: We have programs for donations to plant more trees (Forever Forest) and designate Treasured Trees.

Chattanooga, TN: The Take Root initiative has a stated goal of increasing the canopy in the Central Business District from seven percent to 15 percent.

Mesquite, TX: The Tree City USA goal of 20,000 trees by year 2000 was accomplished.

Alexandria, VA: The Urban Forestry Master Plan is now under final review.

Redmond, WA: The Green Redmond partnership with Cascade Land Conservancy is restoring forest lands in parks.

Tree Inventory

Seventy percent of the survey cities maintain an inventory of city-owned trees, and 55 percent of these inventories are up to date. Forty-seven percent of the cities maintain an inventory of park trees, and 53 percent of these are up to date.

Thirty-two percent of the cities estimate the value of trees as part of their green infrastructure. The estimated total value for the 32 cities able to report this is $6.58 billion. The estimated value ranges from $200,000 in Beloit, $500,000 in Lakewood (WA), and $692,907 in Evansville, to $520 million in Chattanooga, $756 million in Minneapolis, $1.466 billion in Tampa, and $2.315 billion in Chicago.

Sixty percent of the survey cities are employing new and emerging tools and technologies to inventory trees, map the tree canopy, assess damage, assess value, or perform other functions related to tree resource management. The technologies most frequently identified by the cities are GIS (Geographic Information System) and GPS (Global Positioning System), with the two often used in combination. Also mentioned by several cities were ArborPro and elements of the I Tree software suite, including UFORE (Urban Forests Effects) and STRATUM (Street Tree Management Tool for Urban Forest Managers). Identified by at least one city each were Landsat 5 Thematic Mapper and IKONOS, both satellite imagery programs; CITYgreen, software used to analyze the ecosystem; and ConVis, an image editing program used to create natural resource planning simulations. A few of the cities' commented on inventorying; among their comments are the following:

Chico, CA: The City is currently updating its inventory using GPS to locate the trees on our GIS map. Our database is being upgraded to a Web-based data system.

Sacramento, CA: The City is currently implementing a public tree inventory and mapping project in a GIS/asset management application. Part of this effort will include the value of the infrastructure.

Santa Clarita, CA: The City is implementing a digital inventory system using global positioning system technology. Tree coordinates will be overlaid onto an aerial map of the City with tree data imbedded into position links.

Tampa, FL: We are currently using information provided by partnerships with the University of South Florida, University of Florida, and the Hillsborough County Extension Office in our recent Urban Ecological Analysis. Tools utilized were Landsat 5 Thematic Mapper satellite imagery for the tree canopy cover change detection analysis, and high resolution IKONOS satellite imagery (GeoEye, Inc.) for the full study area used to classify existing tree canopy cover. In addition, the Urban Forest Effects Model (UFORE) (Nowak et.al. 2002) was used to assist with the analysis of the data collected. The UFORE model calculates values for variables such as tree diversity, species origin, abundance, density, size, cover and energy savings, air pollution removal, carbon storage, carbon sequestration, and compensatory or replacement values.

Albuquerque, NM: The newest research in urban forest benefits comes from coordination with the U.S. Forest Service to establish Albuquerque as a Climate Reference City. That provides us with the direct information needed to place a value on our urban forest. We are one of only 12 Reference Cities nationwide.

Threats to Tree Resource Management

Cities were asked whether their tree resource management efforts had been hampered or were being hampered by several specific problems. Their responses on specific threats:

- Serious storms – Recent problems in half the survey cities; problems within the past two years in 53 percent of the cities.
- Infestations – Current problems in 46 percent of the cities; problems within the past two years in 41 percent.
- Drought conditions – Current problems in 42 percent of the cities; problems within the past two years in 55 percent.
- Fire – Recent problems in less than one percent of the cities; problems within the past two years in two percent.
- Other threats – Current problems reported by 15 percent of the cities; recent problems reported by 16 percent; problems within the past two years by 13 percent. The problem identified most frequently was budgetary constraints, followed by development and redevelopment.

Fifty-seven percent of the cities have plans in place to respond to problems which reach crisis proportions. When asked to identify the threats for which their city has crisis response plans in place, survey respondents most frequently mentioned efforts to prevent and respond to particular infestations, such as Emerald Ash Borers and Gypsy Moths, and to diseases, such as Dutch Elm disease; responses to storm damage, including clean-up, tree removal, and tree replacement; and irrigation efforts in response to droughts.

City Budgets

The 124 cities which reported the amount they had budgeted in the current fiscal year for tree management and care are spending, in the aggregate, $131,981,750. Amounts budgeted range from $5,000 in Lima, $10,000 in Warwick and McKinney, and $15,000 in Auburn to $7,383,877 in Honolulu, $9,734,940 in Minneapolis, $15 million in Milwaukee, and $27 million in Chicago. Sixty percent of the cities said the amount currently budgeted for tree management

and care is about the same as the amounts budgeted in recent years; 23 percent said it was somewhat higher, and two percent said it was much higher. Fourteen percent reported that it was lower.[1]

Staffing

Across the survey cities, 69 percent of tree management and care is handled by city employees, 29 percent is handled by contracted workers, and one percent is handled by others, principally volunteers.[2]

Seventy-two percent of the cities report that their staff includes certified arborists. Among those cities which do not have certified arborists on staff, 89 percent said that they obtain the services of certified arborists, when needed, through contracts or other means.

Across the survey cities having arborists on staff, the average number employed is six. Sixteen of the cities have one certified arborist, 12 have two, and 13 have four. Seattle has 25, Minneapolis 31, Honolulu 33, and Chicago 80. Forty-nine cities specified that their arborists have received certification from the International Society of Arboriculture (ISA). In addition, several cities indicated that at least some of their arborists were also certified as municipal specialists.

In 63 percent of the survey cities there is an individual at, or reporting to, the executive level of city government who is responsible for coordination of multi-agency and public-private efforts to preserve and/or enlarge the tree canopy.

Responsibility for Street Trees

In an open-ended question, the cities were asked to name the city agency or department responsible for the management and care of street trees. Most frequently cited were public works departments, by 38 percent of the cities, and parks agencies, by 26 percent. These were followed by service departments – general, public, central, or other – by six percent of the cities, and transportation or street departments, by 4.5 percent. Four percent of the cities reported that they had urban forestry departments which were responsible for street trees; 14 percent of the cities specified forestry divisions within larger departments, generally public works.[3] Seven percent of the cities reported that two or more agencies were jointly responsible for street trees. In all but two of these cities the public works department was one of the agencies identified.

Across the survey cities, 98 percent said their street tree responsibilities included removal; 95 percent said they included pruning; 90 percent said they included planting; and 81 percent said they included protection. Among the other responsibilities identified by the survey cities were pest management and control, infestation control, fertilizing, and watering and irrigation.

Responsibility for Park Trees

In another open-ended question, the cities were asked to name the city agency or department responsible for the management and care of park trees. Most frequently cited were parks agencies (including park districts), by 63 percent of the cities. Public works departments

[1] Percentages do not total 100 due to rounding.
[2] Percentages do not total 100 due to rounding.
[3] Those cities which identified a forestry division in a larger department are also included in the count for the larger department.

were identified by 16 percent of the cities, and service departments by seven percent. Four percent of the cities reported that public works or services and parks and recreation departments are jointly responsible for park trees. Three percent of the cities reported having urban forestry departments which were responsible for park trees; 12 percent specified forestry divisions within larger departments, generally parks.[4]

Across the survey cities, 98 percent said their park tree responsibilities included pruning; 98 percent also said they included removal; 97 percent said they included planting; and 88 percent said they included protection. Among the other responsibilities identified by the cities were pest management and control, infestation control, fertilizing, watering and irrigation, and the planting of memorial trees.

PARTNERSHIPS AND COMMUNITY OUTREACH

Partnerships

Fifty-seven percent of the cities maintain formal partnership agreements with volunteer, nonprofit, or community groups to support the preservation and/or planting of trees in the city. Twenty-seven percent are working across boundaries with adjacent jurisdictions to preserve or enlarge the tree canopy on a watershed or multi-jurisdictional scale.

Community Outreach

Ninety-one percent of the cities work with partner organizations to provide programs that educate residents on the importance of trees. Among these cities, 81 percent work with these organizations to educate residents on the maintenance of healthy trees; 63 percent do so to provide residents with trees and/or other assistance to encourage or enable them to plant trees on their property; and 59 percent do so to provide schools with educational materials for students. Among other kinds of community services cities provide in partnership with other organizations are tree planting programs, Arbor Day and Earth Day events, city beautification activities, adopt-a-tree programs, and one-on-one consultations with homeowners concerning the health and care of their trees and shrubs. Among the specific activities described by the cities:

Chandler, AZ: Our Water Conservation Division works with individual homeowners and homeowner associations, teaching proper trimming, planting, and care.

Plantation, FL: We work with neighborhoods and other homeowner associations to help establish, restore, and maintain tree canopies on their properties.

Tampa, FL: Parks and Recreation provides community outreach programs to schools and neighborhood associations. Development and design professionals provide information on the benefits of trees and on construction with trees, as well as proper pruning and planting. In addition, numerous events, such as the Mayor's Beautification Program and National Arbor Day, are held throughout the year.

Bolingbrook, IL: We attend homeowner association meetings to answer tree-related questions and provide tree care seminars to homeowner associations, hour-long seminars at local garden

[4] Those cities which identified a forestry division in a larger department are also included in the count for the larger department.

centers, and Arbor Day events to distribute educational materials and saplings, with an arborist on hand to answer questions.

Rockville, MD: The Parks Department works with neighborhood volunteers to plant trees when we have adopt-a-park volunteer efforts in our parks.

Meridian, MS: The City has conducted eight Tree Care and Maintenance workshops through Urban and Community Forestry grants from the Mississippi Forestry Commission.

Clifton, NJ: The City obtains free trees from the New Jersey Tree Foundation. Most of those trees have been planted at schools and in parks to reforest school grounds and create mini-woodlots. The City also partners with the New Jersey Community Forestry Service to obtain grants and free trees, and to meet the goals of our community forestry management plan.

Albuquerque, NM: As part of our Bio-Park we have an arboretum that holds various classes and events focusing on appreciation of trees, plants, and wildlife.

Scranton, PA: Our City Forester, upon requests from residents, will examine trees and shrubs on private property and make recommendations at no cost to them. The City Forester also aids the Scranton School District by providing information on the realm of trees during classes and field trips to McDade Park; he helped one school erect 15 birdhouses at Nay Aug Park.

Charleston, SC: Department of Parks staff members regularly make presentations on the value and care of community trees to school groups, neighborhood organizations, garden clubs, and professional and service organizations.

Frisco, TX: The City has a very active urban forestry board which promotes tree planting, preservation, and tree care in the community and schools.

Seattle, WA: The City supports volunteer efforts working to help restore forested parklands; this has produced 95,000 volunteer hours in 2008.

Fifty-three percent of the cities believe that public awareness of the importance of the preservation and growth of the tree canopy is increasing; 44 percent believe it is staying at the same level; three percent believe it is decreasing. This assessment is based on communications received during the past year from city residents, or on resident response to city education efforts.

BEST PRACTICES

Survey respondents were invited to provide a brief description of what they considered to be one of their city's most exemplary initiatives to preserve and/or enlarge its tree canopy. Many provided descriptions – some detailed, some brief – of individual initiatives; many others responded with summaries of their overall approaches to urban forestry management or the organization of their urban forestry departments. Respondents ranged from cities which have had urban tree policies and programs in place for decades to those just getting programs underway.

Goodyear, AZ: Efforts to preserve the tree canopy in Goodyear include adequate budgeting for proper large tree canopy trimming on an annual basis and purchasing GBA software to keep an inventory of all trees and a record of the maintenance that should occur. The City in the process of becoming a Tree City USA and is seeking grants to help gather information for the tree inventory.
Contact: Jennifer Campbell, Parks and Recreation Superintendent, (623) 882-7531, or jennifer.campbell@goodyearaz.gov.

Yuma, AZ: The City is getting started on a complete Urban Forestry program. It is now a Tree City USA and is following all the required guidelines. Work is underway on a complete tree inventory and tree resource program, and the City's Urban Forestry Crew is receiving additional personnel, quality training, and top-of-the-line equipment.
Contact: Dave Faires, Supervisory Urban Forester, (928) 373-5000, ext. 5283, or dave.faires@yumaaz.gov.

North Little Rock, AR: The City's effort to expand the urban tree canopy involves the enforcement of the street tree and parking lot tree regulations by the Planning Commission and the routine checking for compliance and required remediation where required by the Planning Department.
Contact: Robert Voyles, Planning Director, (501) 975-8870, or rvoyles@northlittlerock.ar.gov.

Bellflower, CA: The City's goal is to become greener as it builds out. To accomplish this it requires that all new development must include approved street trees, where these do not already exist. Trees must also be included in all on-site landscaping.
Contact: Deborah Chankin, Director of Public Works, (562) 804-1424, or dchankin@bellflower.org.

Chico: CA: Currently, the City's most successful initiative involves a requirement that all new developments provide at least one street tree per home, planted in the City right-of-way and guaranteed by the developer for one year. This has effectively ensured the expansion of Chico's tree canopy into newly developed outlying regions. The City is upgrading its tree ordinance to establish a Heritage Tree Program that gives recognition to significant City trees and provides mitigation requirements for removing trees having trunks over 12 inches in diameter. Proposed new mitigation measures would specify and codify the number and size of replacement trees.
Contact: Denice Britton, Urban Forest Manager, (530) 896-7802, or dbritton@ci.chico.ca.us.

Fairfield, CA: Between 1996 and 2006 the City's Tree Division planted and braced over 1,000 15-gallon trees – between 90 and 110 trees per year. Before City crews departed the work sites

they educated residents on the importance of watering and maintaining their trees, and on the future impact of their trees on the City's urban forest.
Contact: Mike Gray, Landscape Maintenance Manager, (707) 428-7404, or mgray@ci.fairfield.ca.us.

Napa, CA: The purpose of the City's tree protection ordinances is to promote the health, safety, welfare, and quality of life of the residents through the protection of specified trees located on public and private property within the City. In establishing this protection of specified trees, it is the City's intent to promote a healthy urban forest that contributes to clean air, soil conservation, energy conservation, scenic beauty, enhanced property values and a quality of life ensuring that Napa will continue to be a desirable place to live and work.
Contact: Dave Perazzo, Parks Superintendent, (707) 257-9234, or dperazzo@cityofnapa.org.

Pleasanton, CA: Key elements of the City's tree initiative include a consistent tree trimming program, annual updating of the City's inventory of trees, and winter planting and replenishment of 300 to 400 trees each year.
Contact: Lisa Hagopian, Parks Maintenance Superintendent, (925) 931-5565, or lhagopian@ci.pleasanton.ca.us.

Riverside, CA: The City's Public Works Forestry and Landscape Division is moving toward the goal, established by the Mayor in 2000, of planting 100,000 trees by 2010. The Division is currently seeking grant funding from the State, through its Urban Forest for Every City program, and from various other grant sources. Recent collaborations between the City and the Keep Riverside Clean and Beautiful initiative include The Great Clean Air Tree Planting project in October 2007, which resulted in the planting of 200 trees; the Sycamore Highlands Tree Planting project, with 50 trees; and, most recently, the Villegas Park Arbor Day project, with 50 trees. Through the plan check process for new developments and capital improvement projects, the Division has required the planting of thousands of trees. Approximately 34,000 trees have been planted in the last eight years as a result of plan checks; collaborations with businesses, nonprofits, and other City departments; neighborhood improvements; and other tree planting measures. The City's Public Utility Department has given away 53,013 trees by printing coupons for free trees on the back of March utility bills; a Tree Power rebate program has resulted in another 9,000 trees being supplied to residents.
Contact: Robert Filiar, Urban Forester, (951) 351-6112, or rfiliar@riversideca.gov.

Sacramento, CA: The City has two noteworthy initiatives: The first began with a Best Management Practices Report in 2003-04 that reviewed current work practices and organization structure. The outcome was a citizen- and staff-driven Best Management Practices Implementation Plan that prioritized the recommendations resulting from the best practices study, one of which called for an Urban Forest Enhancement Program that included 10 phases of improvements. The initiative includes a comprehensive inspection and care program for some of the City's oldest and most important trees, an inventory of public trees, and tree planting and replacement. The City is currently implementing the second phase of the program with the installation of a modern work/asset management system and an inventory of public trees. The study also recommended restructuring the organization and adding key positions, and revising the City's tree protection ordinances – an effort which is underway. The second initiative involves City participation in the Sacramento Tree Foundation's "Greenprint" program, an award-winning regional effort to lead agencies to better urban forestry practices.
Contact: Joe Benassini, Urban Forestry Manager, (916) 808-6258, or jbenassini@cityofsacramento.org.

Santa Clarita, CA: The City of Santa Clarita has three ordinances aimed at preserving community trees. The Parkway Trees Ordinance regulates planting, maintenance, and removal of trees planted on City property. The Oak Tree Preservation Ordinance protects, preserves, and regulates removal and encroachment of native oaks through a permit and review process. The Public Nuisance Ordinance protects community trees by ensuring their care and maintenance. It requires treatment of trees with pest problems in order to prevent the infection of the community forest. The City's Urban Forestry Division is responsible for the protection and maintenance of the community forest, including the enforcement of the tree protection ordinances.
Contact: Gordon MacKay, Public Works Deputy Director for Operations, (209) 937-8438, or gordon.mackay@ci.stockton.ca.us.

Sunnyvale, CA: Sunnyvale has just been awarded a grant to develop an Urban Forestry Management Plan. The State requires that the plan be comprehensive, to include an evaluation of the City's current canopy cover and a policy to increase the overall canopy to at least 25 percent of total area of the City, including all public and private lands. The Urban Forestry Management Plan is to be a City Council-adopted policy document governing tree management within the City limits.
Contact: Leonard Dunn, Urban Landscape Supervisor, (408) 730-7505, or ldunn@ci.sunnyvale.ca.us.

Temecula, CA: In May 2000 the City embarked on a new urban reforestation campaign, "Street Trees for Temecula," which provides for the replacement of missing or damaged street trees within the public right-of-way areas throughout residential neighborhoods in the community. A variety of tree species, consistent with the California Department of Forestry's approved tree list, are incorporated with existing neighborhood trees. Their selection is also based on the conditions exclusive to that development and the proximity to streets, sidewalks, and overhead and underground utilities. Temecula's residents have been extremely receptive to the program, which has replaced over 65 percent of the missing trees within the initial targeted neighborhoods. Several homeowners' associations have contacted the City, requesting that their neighborhoods be considered for future planting of street trees. Officials believe that by stressing the importance of planting trees at the local government level, citizens will be encouraged to take more of an interest in the environment and, they hope, encouraged to support larger programs on the state and national levels.
Contact: William Hughes, Director of Public Works, (951) 694-6411, or bill.hughes@cityoftemecula.org.

Tustin, CA: For the City's annual Arbor Day ceremony, numerous schools are invited to participate in tree planting throughout the community. The ceremony includes presentations on the importance of trees to the environment, a demonstration of proper planting, and a question and answer session.
Contact: Pat Madsen, Maintenance Supervisor, (714) 573-3350, or pmadsen@tustinca.org.

Vallejo, CA: The City is using a $500,000 grant for a project titled Vallejo Adds Life to the Urban Environment (VALUE). The project includes pruning trees, planting new trees, creating a Web site, producing educational materials, working on the historic tree files, conducting field trips for children, utilizing offenders who are reentering the community, and using the byproducts of the urban forest.
Contact: Jeanine Perasso Kaczmarczyk, Assistant Maintenance Superintendent, (707) 553-7219, or jeaninek@ci-vallejo.ca.us.

West Hollywood, CA: The City has adopted a Heritage Tree Program in order to identify, promote awareness of, maintain, and protect designated heritage trees. The program acknowledges that heritage trees, whether located on public or private property, are distinct and unique living resources of the community. Its intent, beyond increasing public awareness of the heritage trees in the City, is to provide reasonable assurance that West Hollywood's tree heritage will continue for future generations.
Contact: Sam Baxter, Facilities and Field Services Manager, (323) 848-6321, or sbaxter@weho.org.

Whittier, CA: The City has published a Parkway Tree Manual, which addresses the preservation of street trees, and an Uptown Specific Plan and a Whittier Boulevard Specific Plan, both of which identify the trees that can be planted on public and private property.
Contact: Jim Kurkowski, Director of Parks, (562) 464-3375, or jkurkowski@cityofwhittier.org.

Colorado Springs, CO: The New Home Tree Program has added over 35,000 trees to the City's street tree inventory. The program is a joint effort with developers and builders that has been in place for more than 30 years.
Contact: Paul Smith, City Forester, 719-385-6548, or psmith@springsgov.com.

Enfield, CT: As a matter of policy, the Town actively protects its trees as a natural resource. In November 1995 the Connecticut Supreme Court ruled that trees are protected under the State's Environmental Protection Act. Trees over 18 inches in diameter cannot be trimmed or removed by the State or a public utility without first notifying the Mayor. Enfield designates the Director of Public Works as Tree Warden. Connecticut Light and Power and the Tree Warden inspect every tree proposed for trimming or removal by the utility. The Department of Public Works monitors trees along 184 miles of roads and 106 miles of sidewalks, around 12 schools, and in parks and recreation areas daily. Notice of intent to remove Town trees over six inches in diameter must be posted prior to removal to allow individuals to object in writing and request a public hearing: Residents are encouraged to preserve their rights and their trees.
Contact: Piya Hawkes, Tree Warden/Director of Public Works, (860) 763-7599, or phawkes@enfield.org.

West Haven, CT: In 2003 the City launched a partnership with residents through which individuals could sponsor trees that would be planted along the shoreline of the West Haven Historic Green. The sponsorship of a tree includes its purchase and the installation of a commemorative plaque at its base. Individual tree sponsorships have averaged $200 and have resulted in the planting of 170 trees to date. This partnership program, in addition, has generated $34,000 for the planting of trees in a City park.
Contact: Beth Sabo, Commissioner of Public Works, (203) 937-3588, or beth_sabo@cityofwesthaven.com.

Wilmington, DE: The Wilmington Tree Commission was created to advise the City Forester and Director of Public Works regarding the planting, maintenance, and removal of trees.
Contact: Romain Alexander, Director of Parks and Recreation, ralexander@ci.wilmington.de.us.

Coral Gables, FL: The City has a long-standing tree maintenance, preservation, and planting ethic. The City plants approximately 500 trees and trims more than 5,000 trees each year, and has been doing so for decades.
Contact: Dan Keys, Public Service Director, (305) 460-5130, or dkeys@coralgables.com.

Largo, FL: The City adopted its Urban Forest Master Plan in 2000; it calls for an inventory of the City's public trees and vacant planting sites; implementation of a tree maintenance management software package, and the planting of more than 5,000 trees along City streets in a five-year period – a goal that City officials expect will be reached by 2010. The plan and the software, officials say, enable the City to proactively manage trees, extending their life and increasing the tree canopy and its benefits to residents and the environment.
Contact: Joan Byrne, Director, Recreation, Parks and Arts Department, (727) 587-6720, or jbyrne@largo.com.

Miami, FL: "Ourgreenmiami" is the City's comprehensive tree planting, protection, and public education program. Working with community groups, schools, residents, and business partners, the City has developed a Web site and materials to promote the planting and protection of trees. The site (www.ourgreenmiami.org) describes the importance of a healthy tree canopy to Miami's continued prosperity, as well as information on how to obtain free trees, and how to volunteer to plant trees in neighborhoods. The site provides instruction on the planting and maintenance of trees, information on how properly-planted trees protect property during hurricanes, and links to numerous additional sites containing information on trees and tree programs. Partial funding of the City's site is provided by a tree mitigation fund.
Contact: Jennifer Grimm, Environmental Outreach Liaison, (305) 416-1601, or jgrimm@miamigov.com.

Oakland Park, FL: The City has applied for certification as a National Wildlife Federation Community; officials project that certification could be obtained within two years. The certification process involves both the residents and the City in providing wildlife food sources, water sources, places for cover, and places to raise young. The City's effort to increase its tree canopy, especially its native tree canopy, meets three of these four Federation goals.
Contact: John Perrone, Parks Division Manager, (407) 246-2287, or john.perrone@cityoforlando.net.

Pinellas Park, FL: Three City programs work together to encourage preservation and enlargement of the tree canopy: 1) The Tree Bank, started by the City Council to control requests for variances to the landscape ordinance, discourages unnecessary variance requests by requiring the value of required landscape to be contributed to the bank, and provides resources to plant additional trees in the community. 2) The Tree Giveaway Program allows residents to obtain approved trees from a local nursery free of charge and is funded, in part, by the Tree Bank. 3) An annual tree sale and giveaway program partners with Nina Harris School, a local public school for special education students. The City provides seed money (literally), the students plant and grow trees year 'round, and the trees are then sold at very reasonable prices -- $3 to $5 – at the City's annual Country in the Park event, which is attended by 15,000 people. Many years, small seedling trees are given away free to participants. Proceeds from the sale are returned to the school to fund the ongoing program.
Contact: Cara Reed, Neighborhood Services Manager, (727) 541-0800, or creed@pinellas-park.com.

Plantation, FL: The City's street tree program is a staple of its urban forestry program since 1976. Originated by volunteers (the Junior Women's Club), it has grown into a program whose services are in great demand. Through the program, homeowners request trees for their property; the City purchases the appropriate trees, installs them, and does the initial watering; and the homeowners assume responsibility for their day-to-day care. The City also maintains the trees, providing trimming and other services, as they mature. Homeowners are charged $100 per tree; the City covers the balance of the cost – approximately $250-300. Plantation

strives to plant 200 to 300 trees per year through this program, and there is always a long waiting list of homeowners wishing to participate.
Contact: Jeffrey Siegel, Landscape Architect, (954) 797-2246, or jsiegel@plantation.org.

Tamarac, FL: Within the City's Public Works Department, the Landscape Division in the Public Works Department maintains all roadway medians and city facilities except for parks. The Division implements a minimum of 75 percent of the best management practices detailed in the Florida Green Local Government Standard Environment Landscape Module. All landscape personnel must observe standards covering testing and adjusting of irrigation systems, adequate spacing between plantings, annual mulching at proper depth, proper pruning of trees, and appropriate placement of appropriate trees on sites.
Contact: Levertis Byrd, Landscape Supervisor, (954) 597-3717, or levertisb@tamatac.org.

Tampa, FL: The Urban Ecological Analysis, an economic analysis of the City's urban forest resource, is an ongoing program that will analyze these resources every five years, as required by the City's Tree Protection and Landscape Ordinance. An analysis was delivered to the City in April 2008 by the University of South Florida and the University of Florida. The analysis process ensures that the City's canopy is monitored and evaluated through future years, and provides for science-based recommendations and goals for sustainability. Chapter 13 also provides for an elevated level of protection of grand trees, those native specimens that provide the most environmental benefit in relation to carbon storage. The City also has a progressive Urban Forestry Program for the management of existing tree resources, a Community Tree program, and a Tree Trust Fund that is utilized for all Urban Forestry programs and projects.
Contact: Karen Palus, Parks and Recreation Director, (813) 274-7730, or karen.palus@tampagov.net.

Albany, GA: The City hired its first arborist about 18 months ago, is in the process of preparing a five-year tree plan, and is beginning a downtown street tree inventory this year.
Contact: Ili Si Malone, City Arborist, (229) 883-6950, or imalone@dougherty.ga.us.

Athens, GA: The Athens Clarke County Unified Government's adoption of a community tree management ordinance in 2005 has resulted in trees being conserved and replaced during the development process. Tax credits have been issued as an incentive to conserve large or significant trees. Streets and parking lots have plant and tree requirements. The "protected" designation given public trees gives local officials the tool they need to protect the public assets that these trees represent.
Contact: Andrew Saunders, Community Forester, (706) 613-3561, or forester@co.clarke.ga.us.

Bartlett, IL: Under the Village's Street Scape Program, right-of-way areas on parkways are reviewed and trees appropriate to the sites are planted and maintained. This program covers sites not included in the 50/50 Parkway Tree Program, an initiative through which residents and the Village share the cost of trees to be planted by nursery contractors in parkways adjacent to their homes. The Village reviews and approves planting locations and handles all the details.
Contact: Keith Johnson, Arborist, (630) 837-0811, or kjohnson@vbartlett.org.

Bolingbrook, IL: As part of the regular budget, the Village of Bolingbrook plants up to 600 new and replacement parkway trees each year, 300 in spring and 300 in the fall. The Village regularly prunes up to 3,000 parkway trees each year. During the summer of 2008 the Village monitored four Emerald Ash Borer traps. The Village is working towards a co-op with the Park District and the private sector to control Gypsy Moths.
Contact: Michael Drey, Director of Public Works, (630) 226-8800, or mdrey@bolingbrook.com.

Chicago, IL: Chicago's City Foresters review street construction plans to make recommendations on tree preservation, tree removal, and tree planting. Over the years federal highway programs such as ISTEA and TEA-21 have allowed local communities flexibility in roadway design; now Foresters have input on design width. In one instance, a plan called for an arterial street to be widened from its existing 38 feet to 42 feet. This would have required the removal of nearly 95 percent of all the street trees. Foresters worked with engineers and preserved the majority of the trees by maintaining the existing roadway width.
Contact: Joseph McCarthy, Senior City Forester, (312) 746-5254, or jmccarthy@cityofchicago.org.

Evanston, IL: In FY 2005-2006 the City created a business unit to track the activities of a new inoculation program that was implemented to reduce the incidence of Dutch Elm Disease (DED). This program injects all publicly-owned elm trees that meet one or more qualifying criteria: 1) The tree is larger than 10 inches in diameter and located in a park or other City-owned or -maintained property; 2) The tree is 30 inches in diameter or larger and located on a public parkway; and 3) The tree is larger than 10 inches in diameter and located on a public parkway on either a major collector or distributor street, as listed in the City's Comprehensive General Plan. This program injects Abotect fungicide, which is effective in controlling the spread of DED by elm bark beetles for a three-year period.
Contact: Paul D'Agostino, Superintendent of Parks/Forestry Division, (847) 866-2912, or pdagostino@cityofevanston.org.

Northbrook, IL: Through its Tree Preservation Initiative, the Village of Northbrook has preserved more than 20,000 trees and required the replanting of 12,800 new trees on private property. Removal of any tree over six inches in diameter requires a permit, and each removal is assessed prior to permit approval. Hardwood trees larger than 12 inches in diameter are categorized as "landmark" and may not be removed unless an inch-for-inch replacement requirement is met or a fee in lieu of reforestation is paid.
Contact: Terry Cichocki, Village Forester, (847) 272-4711, or cichocki@northbrook.il.us.

Oak Lawn, IL: The Village, a Tree City USA for the past 12 years, maintains over 22,000 parkway trees. It offers a 25/75 cost-share program to residents who wish to have a new tree planted in their parkway; provides parkway tree inspection, trimming, and removal services; and inspects for pests such as the Emerald Ash Borer, Asian Longhorned Beetle, Gypsy Moth, and Oak Wilt.
Contact: Heather Green, Village Forester, (708) 499-7098, or hgreen@oaklawn-il.gov.

Palatine, IL: The Village's 50/50 Tree Planting Program is designed to promote the planting of trees on Village parkways; it allows residents to select the species and location of trees to be planted. Residents who participate agree to water the trees for up to two years and split the cost of the trees with the Village. The Village's Tree Gap Program is designed to plant trees on parkways not adjacent to residential property. Combined with the Village policy of replanting any parkway tree that dies, it has enabled the Village to plant 93 percent of its parkways.
Contact: Andrew Radetski, Director of Public Works, (847) 705-5200, or aradetski@palatine.il.us.

Park Ridge, IL: The City's Urban Forester responds to residents' requests for help in solving various insect and disease problems affecting trees, shrubs, turf grass, and flowers. The City has had success with its Gypsy Moth Spray Program, now in its third year, which targets aerial spraying to areas of the City most affected by the pest.
Contact: Todd Fagan, Urban Forester, (847) 318-5451, or tfagan@parkridge.us.

Quincy, IL: At one time in Quincy's history, Maine Street and many others were flanked by large trees whose branches met above the street to form a leafy canopy. Over the years the loss of many of those trees to disease, weather, and human interference has left gaping holes where majestic trees once stood. Now underway is a grassroots effort, Trees for Tomorrow, which aims to replant the trees needed to restore 12 blocks of the Maine Street canopy. This group of volunteers is inviting residents to contribute to the purchase of suitable trees which they will plant, fertilize, mulch, and water for a year. The volunteers are also offering opportunities for contributors to memorialize loved ones by placing granite tribute stones near the trees they purchase.
Contact: Anne St. John, Trees for Tomorrow Chair, (217) 223-0055.

Elkhart, IN: The City sponsors an annual spring and fall tree planting program through which shade and ornamental trees are planted within street rights-of-way at no cost to homeowners. Homeowners request trees through the Buildings and Grounds Department. The City's goal is two-for-one replacement when removal of a tree is necessary.
Contact: Allysa Diman, City Forester, (574) 970-0542, ext. 204, or allysa.diman@coei.org.

Michigan City, IN: A large-scale initiative to enlarge the City's tree canopy has resulted in the planting of more than 800 trees throughout the City during the past two years.
Contact: Franklin Seilheimer, Urban Forester, (219) 873-1500, or mcforester@emichigancity.com.

Kansas City, KS: The Unified Government of Wyandotte County and Kansas City adopted an ordinance that includes the formation of a Tree Board and specifics for the care, placement, and protection of trees in public rights-of-way.
Contact: John Bower, Deputy Director of Parks, (913) 573-8362, or jbower@wycokck.org.

Manhattan, KS: Through the City's tree planting program, trees removed are automatically placed on a replanting list. Residents can request that trees be planted on the City street right-of-way that adjoins their property; depending on the number of requests and resources available, at least one tree will be planted. Residents can continue to request plantings until their property has the maximum number of trees that proper spacing will allow. This works in conjunction with efforts to remove and replace trees negatively affecting utility lines – the "right tree, right place" concept.
Contact: J. David Mattox, Forestry Supervisor, (785) 587-2757, or mattox@ci.manhattan.ks.us.

Louisville, KY: A coordinating body, "Community of Trees," meets monthly to coordinate work of state and local government agencies, community organizations, and private tree service providers in regard to education and outreach, planning, plant material purchase, research, and fundraising.
Contact: Cynthia Knapek, Chair, Community of Trees, (502) 574-3613, or cynthia.knapek@louisvilleky.gov.

Alexandria, LA: The City maintains an Urban Forestry Web site that provides detailed information on public tree maintenance, private tree maintenance, and utility line tree trimming. It also presents the City's Tree and Landscape Ordinance, and a list of trees of all sizes recommended for the area. A page for the City's Urban Forest Management Plan is under construction. Alexandria has created a Citizen Forester Program which enables residents to become knowledgeable about trees and to become advocates for the benefits trees provide.
Contact: Darren Green, Urban Forester/Landscape Architect, (318) 441-6060, or darren.green@cityofalex.com.

Rockville, MD: The City's Forest and Tree Preservation Ordinance was revised in 2007 to give the City increased authority to require preservation of existing trees during new land development. It also requires a minimum level of tree cover to be planted on new developments.
Contact: Wayne Noll, City Forester, (240) 314-8705, or wnoll@rockvillemd.gov.

New Bedford, MA: In 2007 the Tree City Committee was established to work toward increasing the number of trees planted Citywide. The committee is working to encourage citizen participation through the purchase and adoption of trees; goals are City beautification, neighborhood enhancement, and improved air quality. Members of the Tree City Committee encouraged residents to join the National Arbor Day Foundation and to donate the 10 saplings they received upon joining to the Department of Public Infrastructure. About 100 trees, purchased with a $20,000 urban forestry grant from the State's Department of Conservation and Recreation, are being planted throughout the City, beginning with treeless areas and moving toward downtown.
Contact: Tree City Committee Co-Chairs: Jo Ann Soares, Jo_Ann.Soares@newbedford-ma.gov, or Gig Lang, giglang@hotmail.com.

Southgate, MI: The City's recently-enacted Woodlands Ordinance provides strict guidance on the removal and replacement of trees. The City sells trees to residents and plants the trees for them for $80 each.
Contact: Levon King, City Administrator, (734) 258-3021, or lking@ci.southgate.mi.us.

Westland, MI: The City's tree replacement program is a partnership in which citizens pay $75 toward the City's total cost of purchasing and planting new trees that are over 2.5 inches in diameter. "Rooting for the Rouge" (a reference to the area's Rouge River) is a partnership with local schools through which fourth grade students design projects that help solve local environmental challenges and volunteer their time in carrying out tree planting and other projects at schools and in the community.
Contact: Kevin Buford, Director, Department of Public Service, (734) 467-3241, or dps@cityofwestland.com.

Bloomington, MN: In each of the past four years the City has held a public resident tree sale in which a variety of deciduous bare root trees – hardy varieties suitable for the Minnesota climate – have been offered at wholesale prices. The City also provides buyers an educational packet containing information on proper planting and care, along with information on allowable planting locations relative to rights-of-way, utilities, and other factors. Since the start of the tree sales, more than 1,000 trees have been planted on Bloomington residential properties.
Contact: Paul Edwardson, Assistance Maintenance Superintendent, (952) 563-8760, or pedwardson@ci.bloomington.mn.us.

Saint Paul, MN: Tree Saint Paul was started early in 2008 in response to the loss of about 1,000 trees – many of them mature and of majestic varieties – in an August 2007 windstorm, the third major storm in 10 years. A tree restoration master plan was developed and the Parks and Recreation Department, recognizing that the City budget would be unable to cover the replacement of trees on the scale required, created a program to solicit public donations on a continuing basis. Tree Saint Paul, in its first six months, collected more than $7,000. While originally created to address past storm damage, the program is expected to be in place, contributing to the sustainability of the community's trees, for years to come.
Contact: Cy Kosel, Natural Resources Manager, (651) 632-2412, or cy.kosel@ci.stpaul.mn.us.

Hattiesburg, MS: The City has a full-time Urban Forestry Department which includes an ISA Certified Arborist and a six-man crew responsible for maintaining the City's tree canopy – tree trimming, hazard removals and tree planting – along streets, parks and rights-of-way. The crew plants an average of 300 trees annually and provides the necessary maintenance of young trees with mulching and pruning. The City Arborist works with the City's urban development and code enforcement staff on all tree-related issues. Hattiesburg updated its tree ordinances in November 2007. A seven-member Tree Board helps guide the City's urban forestry program.
Contact: Andy Parker, City Arborist, (601) 545-1541, or aparker@hattiesburgms.com.

St. Louis, MO: The City's 2,682-acre park system contains about 30,000 trees. Prior to 2002, when the Forestry Division instituted its Lawnmower Prevention Program, many of these park trees were being damaged by the lawn maintenance equipment being used by the Park Division. Through the program, a poster, informational handout, and prevention standards (covering inspections, mulch, and trunk guards) were developed and annual staff training was instituted. The cooperative Forestry-Park program has been very successful in reducing tree damage. The program has also produced and distributed to the general public an informational handout on street tree care and avoidance of lawnmower damage.
Contact: Greg Hayes, Commissioner of Forestry, (314) 613-7205, or hayesga@stlouiscity.com.

Lincoln, NE: The City's Parks and Recreation Department offers a cost-share assistance program (when funds are available) to property owners who wish to purchase and plant a street tree on the City right-of-way adjacent to their property. Through the Street Tree Voucher Program, residents can match or exceed the cost-share assistance to purchase and/or plant better street trees, which can increase their property values as well as the City community forest. Because voucher recipients match or exceed the value of the voucher, the impact of the City's investment in street trees is nearly tripled. The effort has provided residents with better information on the proper planting and care of trees; as a result, the community forest has benefited from a higher level of stewardship.
Contact: Steve Schwab, City Forester, (402) 441-7036, or sschwab@lincoln.ne.gov.

Elizabeth, NJ: The City participates in a grant program offered by Union County through the Open Space Recreation and Historic Preservation Trust Fund. Tree purchases by the City are matched, one-for-one, by the program, which also provides installation by forestry professionals and a one-year maintenance guarantee. Another City initiative involves Groundwork Elizabeth, a nonprofit organization established to improve the quality of life in the City by planting trees, landscaping, reclaiming derelict Brownfield properties, restoring parks, and involving the community in regeneration efforts. In the last four years the City and Groundwork Elizabeth have planted more than 2,500 trees in public areas.
Contact: John Papetti, Jr., Director of Public Works, (908) 820-4101, or emadorma@elizabethnj.org.

Clifton, NJ: The City's tree-planting program got underway in the early 1990s, part of a larger effort to make the City an environmentally friendly community, and in response to residents' calls for more greenery in their neighborhoods. The program launched then is still active today and is responsible for planting over 500 trees per year; the trees are purchased using grants from various organizations. The City operates its own tree farm, maintains partnerships with tree organizations and community environmental groups, follows a Community Forestry Management Plan which sets goals set every five years, and maintains a Sustainability Report on the Web site which is constantly under revision.
Contact: Alfred Du Bois, Jr., Recycling Coordinator, (973) 470-2239, or adubois@cliftonnj.org.

Piscataway, NJ: The Township's Tree Preservation Ordinance, which covers the indiscriminate cutting of trees, requires all tree removals on construction sites to be approved by the municipality. A replacement plan is necessary when more trees are being removed then preserved within an area of disturbance. The permit process allows the Township to recognize and preserve quality and specimen trees where possible and prevent the elimination of its tree cover.
Contact: Henry Hinterstein, Landscape Architect, (732) 562-6560, or hhinterstein@piscatawaynj.org.

Albuquerque, NM: A City Forester position created to implement a new City forestry program is responsible for developing the support and methods that will protect and improve the City's urban forests for environmental, economic, and social purposes. Projects implemented include a baseline study from a multi-spectral mapping and environmental assessment contract, and an Urban Forest Initiative, a Citywide tree planting effort undertaken in coordination with outreach programs that will develop new partners and sponsors. This award-winning program is creating an extended base of support that will directly improve the effectiveness of Albuquerque's present and future projects.
Contact: Nick Kuhn, City Forester, (505) 768-5370, or nkuhn@cabq.gov.

Buffalo, NY: ReTreeWNY is a local not-for-profit organization funded by donations, grants, and the City. It provides trees at no cost to residents for planting on City rights-of-way; it also provides education and training seminars. Through this partnership program, 4,000 trees have been planted in a two-year period.
Contact: Jeffrey Brett, City Forester, (716) 851-5013, or jbrett@city-buffalo.com.

Rochester, NY: The City's broad-based effort to preserve its tree canopy includes: an annual street tree inventory survey; an annual hazard tree survey and removal of hazard trees; regular tree maintenance pruning on a seven-year cycle; regular tree planting with aftercare, which yields a 95 percent success rate; a training program for forestry staff, seven of whom are ISA Certified Arborists, six of whom have the State Pesticides License; a Trees and Flowers Program that cost-effectively aids in the establishment of newly planted trees; removal of dead or severely declining trees within 10 days of their identification; and, to ensure quality work, tree planting and stump grinding performed by the City's forestry crews. Rochester has a team of well-trained Urban Forestry Technicians in addition to its professional tree workers.
Contact: Ian Nadar, City Forester, at (585) 428-7581, or nadari@cityofrochester.gov.

Burlington, NC: The City is in the process of approving a downtown revitalization plan that includes the planting of approximately 200 trees within the central business district. The goal is to provide some shade along with the many other benefits trees can add to a streetscape. The trees will be planted along sidewalks and parking lots and in some green spaces.
Contact: Jeff Parsons, Cemetery and Grounds Superintendent, (336) 222-5077, or jparsons@ci.burlington.nc.us.

North Royalton, OH: To improve the aesthetic qualities of the City, the Service Department works closely with garden clubs and Parks and Recreation staff, planting and maintaining trees, shrubs, turf, and flowers. The department also works closely with the City's Building Department to implement provisions of a master tree plan with developers and residents as new construction occurs.
Contact: Kris Kamps, Service Director, (440) 582-3002, or servicedir@northroyalton.org.

Harrisburg, PA: The City has been a Tree City USA for the past 21 consecutive years and has received the Growth Award for the past five years. The City plants appropriate species of trees that are ideal for urban setting while attempting to increase the tree canopy within Corporate limits. The City encourages and assists property owners by identifying appropriate street trees to be planted between sidewalks and curbs; it also assists with placement of new plantings after all underground utility lines are marked – an effort that increases the sustainability of the trees being planted – and advises on proper spacing between trees. Tree wells that are too small and the planting of trees above steam lines can cut into the life of the trees being planted. The City recognizes that appropriate species, spacing, and tree well sizes are all critical when trying to ensure proper growing conditions for an urban landscape.
Contact: Tina Manoogian-King, Parks and Recreation Director, (717) 255-3020, or tking@cityofhbg.com.

Scranton, PA: The City's Urban Forestry Program was started about seven years ago with the addition of a professional graduate forester to the City staff. Currently, the program's main concern is the removal of all potentially dangerous trees and limbs, those that pose a serious threat to life and property throughout the City and its eight parks. Approximately 500-plus dangerous trees have been removed to date; during this same time period, over 600 trees have been planted. A Fall contract will result in the planting of an additional 238 street trees in the South Scranton area. With strong City support, the planting program is expected to continue far into the future. Under a program launched two years ago, the City Forester, working in conjunction with the Bureau of Licensing, Permits and Inspections, can order the removal of very dangerous trees and/or limbs from private property. About 25 such trees have been removed to date.
Contact: Anthony Santoli, City Forester, (570) 947-2885.

Providence, RI: The Providence Neighborhood Planting Program is a partnership between the City and the Mary Elizabeth Sharpe Street Tree Endowment. It provides free street trees to community residents that apply for group plantings, and involves residents in the tree plantings at Saturday events. Since 1989 the program has planted over 7,000 trees.
Contact: Douglas Still, City Forester, (401) 785-9450, or dstill@providenceri.com.

Warwick, RI: In the Spring of 2005 the City dedicated approximately one acre of open space for use as a tree farm – the Barton Farm Pot in Pot Tree Farm. Using pot in pot technology, the City designed and built a farm that would allow harvesting of about 100 trees per year. The trees are purchased as bare root stock, potted up and grown for one to two years, depending on species, and, when ready for harvest, planted on public properties by employees of the Planning and Public Works Departments. The pot is returned to the tree farm, and the process begins again. The tree farm offers the City many advantages: the cost of planting each tree is approximately 20 percent of the cost formerly incurred, there is much greater control over the species available to the City, and the mortality rate appears to be much lower. The City has been growing smaller species, which are commercially unavailable, for planting under utility wires. The smaller trees are easier to plant and they don't require heavy equipment, which saves fuel and operator costs. Tree farm trees are planted with 100 percent of their root ball intact; they don't have to struggle to survive transplant as do traditional larger trees.
Contact: Margaret Ryan, Landscape Project Coordinator, Planning Department, (401) 486-7313, or margaret.e.ryan@warwickri.com.

Charleston, SC: Since the inception of the City's Street/Park Tree Planting Program in 1983, over 10,000 trees have been planted on public property. Through this program, the City resells to citizens, at wholesale cost, trees to be planted on public property. City crews prepare the site

and plant the tree. If the tree to be planted is a street tree, the purchaser agrees to water it for a period of one year. City crews perform all subsequent maintenance for the duration of the tree's life.
Contact: Danny Burbage, Superintendent of Urban Forestry, (843) 724-7416, or burbaged@ci.charleston.sc.us.

Columbia, SC: Columbia has been a Tree City USA for 29 continuous years. Officials believe this designation increases the visibility of tree issues and keeps these issues fresh in the minds of City residents. The City maintains approximately 45,000 street trees and adds 500 trees to this inventory each year.
Contact: Sara Hollar, Forestry and Beautification Superintendent, (803) 545-3860, or sehollar@columbiasc.net.

Sumter, SC: The City requires the submission of tree protection plans for all commercial developments and subdivisions before any permits are issued. Landscaping plans including canopy trees are a part of this requirement.
Contact: Charles Holmes, Arborist, (803) 774-1612, or cholmes@sumter-sc.com.

Chattanooga, TN: In March 2008 the City launched a new program, “Take Root," with a goal of increasing the tree canopy in the Central Business District from the current seven percent to 15 percent. Reaching the goal will necessitate the planting of thousands of new trees. Although the program has been underway for only a few months, the City has already received more than $100,000 in foundation support, and local businesses are creating ways to donate portions of their sales proceeds to the effort. The financial goal is $1 million.
Contact: Gene Hyde, City Forester, (423) 757-7283, or hyde_gene@mail.chattanooga.gov.

Hendersonville, TN: The City requires that, for all new development (except for one- and two-family residential), the developer is required to retain trees, replace them, or pay into a Tree Bank which is used to pay for the planting of trees along streets or on other public property.
Contact: Fred Rogers, Jr., Planning Director, (615) 264-5316, or frogers@hvilletn.org.

Frisco, TX: The City’s landscape ordinance emphasizes environmentally responsible landscapes and best management practices. The goal of the ordinance is conservation of 50 percent of the water used for landscapes. It sets a limit on the amount of water that may be used annually and provides the calculations and design tools needed to achieve the conservation goal. The ordinance also provides for the expansion of the tree canopy by requiring that trees be used to provide shade for buildings, outdoor pedestrian areas, parking areas, and streets, and it requires a minimum of 500 square feet of root space per tree to facilitate the growth of larger canopy trees in and around commercial areas. Both the City’s landscape and tree preservation ordinances have been used as models by other cities.
Contact: Bob Johnson, Manager of Park Services, (972) 292-6500, or bjohnson@friscotexas.gov.

Laredo, TX: Through its landscape ordinance and the installation of irrigation systems throughout its park sites, the City of Laredo has pursued a strict policy of preserving mature trees in public areas and rights of way. The ordinance requires the planting of trees and shrubs in all new residential and commercial developments throughout the City. The Parks and Leisure Services Department maintains a tree nursery which holds approximately 500 young trees slated for future transplant in parks and other public places. In past efforts, Parks crews have prepared for tree planting with the assistance of volunteers from the “Keep Laredo Beautiful” and Boy Scouts organizations. Planting events are planned throughout the year. In addition to

pruning and maintaining canopy trees in the parks, the Department hosts educational sessions on tree trimming and planting for maintenance personnel and other interested parties and provides educational materials on the benefits of trees to the schools. Enlarging the tree canopy has been an ongoing initiative that has benefited from the generous assistance of schools and local organizations.
Contact: Celinda Rivera, Assistant Director of Parks and Leisure Services, (956) 795-2350, or crivera@ci.laredo.tx.us.

Mesquite, TX: In January 1996 the City Council adopted a landscape and tree ordinance requiring the preservation of the existing tree canopy. It mandates that developers of new properties submit a tree survey/mitigation/preservation plan before work is initiated on a project. The regulations require that a minimum of 10 percent of the property have landscape; they also require a tree canopy equivalent to one three-inch caliper shade tree per 500 square-feet of landscape material, and they restrict the planting of shade trees around or under power lines.
Contact: Travis Sales, Park Superintendent/Municipal Arborist, (972) 216-6913, or tsales@ci.mesquite.tx.us.

Sandy, UT: Sandy Pride Day, an annual Citywide volunteer effort supported by the City and the Chamber of Commerce, includes planting and cleanup projects. In most years more than 200 volunteers are involved in the projects. In some years up to 900 trees and shrubs have been planted in areas with irrigation to sustain them.
Contact: Scott Earl, Parks and Recreation Assistant Director, (801) 568-2910, or searl@sandy.utah.gov.

Alexandria, VA: Currently in final review, the City's Urban Forestry Master Plan presents a comprehensive evaluation of the tree canopy and an analysis of the public and private components that make up the urban forest. The plan includes goals and recommendations for expanding the City's tree canopy and improving its health and longevity, and actions to be taken to improve the management and maintenance of street trees and others on park, school and other public properties, and to expand outreach and educational components that will encourage the planting and maintenance of trees throughout the City.
Contact: John Noelle, City Arborist, (703) 838-4999, or john.noelle@alexandriava.gov.

Roanoke, VA: The City's Urban Forestry Plan, an element of its "Vision 2001-2020" comprehensive plan, was adopted by the City Council in April 2003. Goals of the 10-year plan are to achieve 40 percent tree canopy coverage within the10 years; plant enough street and park trees to reverse the "annual net loss" trend of public (City-owned) trees; strategically target non-residential transportation corridors or gateways to the City that need additional "greening" by planting more trees; plant more trees in neighborhood areas where the City owns easements or roadside strips or medians; encourage planting of trees by citizens in their yards; and improve tree management. The Parks and Recreation Department is the lead agency in the implementation of the plan, but interdepartmental cooperation is essential to reaching the goals.
Contact: Dan Henry, Urban Forester, Roanoke Parks and Recreation, (540) 853-1994, or dan.henry@roanokeva.gov.

Everett, WA: Through the City's tree ordinance and the tree policy established by that ordinance, the City has a fully-staffed, seven-member, appointed Tree Committee that functions as a subcommittee of the Parks Board of Commissioners (although committee members are not Park Board members). This group advocates tree preservation and expansion of the tree inventory in public forums. An active outreach and education program is part of this effort.

Contact: John Petersen, Parks and Recreation Assistant Director, (425) 257-8371, or jpetersen@ci.everett.wa.us.

Seattle, WA: The Green Seattle Partnership is a unique public-private venture dedicated to promoting a livable City by reestablishing and maintaining healthy urban forests. The Green Seattle Partnership 20-Year Plan was inspired by over 10 years and more than 500,000 hours of citizen volunteerism dedicated to reforestation of Seattle's Parks. Formed in 2004 by a Memorandum of Agreement between the City and the Cascade Land Conservancy, the Green Seattle Partnership is working to restore 2,500 acres of forested parkland by 2025.
Contact: Mark Mead, Senior Urban Forester, (206) 684-4113 or mark.mead@seattle.gov.

SURVEY CITIES

Chandler	AZ
Goodyear	AZ
Yuma	AZ
North Little Rock	AR
Antioch	CA
Bellflower	CA
Chico	CA
El Monte	CA
Fairfield	CA
La Mesa	CA
Lakewood	CA
Lancaster	CA
Napa	CA
Oxnard	CA
Pleasanton	CA
Riverside	CA
Sacramento	CA
San Leandro	CA
Santa Ana	CA
Santa Clarita	CA
Stockton	CA
Sunnyvale	CA
Temecula	CA
Tustin	CA
Vallejo	CA
Vista	CA
West Hollywood	CA
West Sacramento	CA
Whittier	CA
Colorado Springs	CO
Enfield	CT
New Haven	CT
Norwalk	CT
West Haven	CT
Wilmington	DE
Coral Gables	FL
Largo	FL
Miami	FL
North Miami	FL
Oakland Park	FL
Orlando	FL
Pembroke Pines	FL
Pinellas Park	FL
Plantation	FL
Tamarac	FL
Tampa	FL
Albany	GA
Athens	GA
Savannah	GA
Honolulu	HI
Twin Falls	ID
Addison	IL
Arlington Heights	IL
Bartlett	IL
Bolingbrook	IL
Carol Stream	IL
Chicago	IL
Evanston	IL
Lombard	IL
Northbrook	IL
Oak Lawn	IL
Palatine	IL
Park Ridge`	IL
Quincy	IL
Schaumburg	IL
Springfield	IL
Elkhart	IN
Evansville	IN
Michigan City	IN
Mishawaka	IN
Muncie	IN
Kansas City	KS
Manhattan	KS
Lexington	KY
Louisville	KY
Alexandria	LA
New Bedford	MA
Rockville	MD
Farmington Hills	MI
Muskegon	MI
Southgate	MI
Sterling Heights	MI
Westland	MI
Bloomington	MN
Burnsville	MN
Edina	MN
Minneapolis	MN
Roseville	MN
St. Paul	MN
Meridian	MS
Hattiesburg	MS
St. Louis	MO
Lincoln	NE
Clifton	NJ
Elizabeth	NJ
Perth Amboy	NJ
Piscataway	NJ
Albuquerque	NM
Las Vegas	NV
Buffalo	NY
Rochester	NY
Utica	NY
Burlington	NC
Canton	OH
Garfield Heights	OH
Lima	OH
North Royalton	OH
Harrisburg	PA
Scranton	PA
Providence	RI
Warwick	RI
Charleston	SC
Columbia	SC
Sumter	SC
Chattanooga	TN
Hendersonville	TN
Bryan	TX
Frisco	TX
Laredo	TX
McKinney	TX
Mesquite	TX
Phair	TX
Orem	UT
Sandy	UT
Alexandria	VA
Newport News	VA
Portsmouth	VA
Roanoke	VA
Auburn	WA
Everett	WA
Lakewood	WA
Redmond	WA
Seattle	WA
Beloit	WI
Milwaukee	WI

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Final Report: 7/25/98

Regional Ecosystem Analysis Puget Sound Metropolitan Area

Calculating the Value of Nature

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AMERICAN FORESTS®

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Regional Ecosystem Analysis Puget Sound Metropolitan Area

Project Overview

AMERICAN FORESTS conducted a Regional Ecosystem Analysis of the Puget Sound area to determine how the landscape has changed over time. It also assessed the value of the area's ecology. A regional level analysis was conducted of three satellite images spanning a 24 year period from 1972 to 1996. Landsat Multispectral and Thematic Mapper images were used to study an area approximately 100 by 70 miles in the Puget Sound watershed. This included 3.9 million acres (3.4 million acres of land and about .57 million acres of water) and encompasses the cities of Seattle, Tacoma, Seatac, Redmond, Bellevue, and Everett. Within the regional study area a smaller urban growth area of 422,446 acres around Seattle was also analyzed.

The Ecosystem Analysis uses Geographic Information System (GIS) technology to measure the changing structure of the landscape and analyze the scientific and engineering implications of the change. Neighborhood level computer models were developed using CITYgreen software, AMERICAN FORESTS' GIS application for calculating ecosystem benefits. The models represent five typical neighborhood landscapes and measure the effects of these landscapes on stormwater and air quality.

The purpose of this project is to document the value of tree-covered landscapes to urban areas. Furthermore, it provides urban decision makers with the information and tools they need to measure the value of natural landscapes and incorporate more trees into future development.

Major Findings

The ecology of the Puget Sound watershed has changed dramatically in the 24 year period from 1972 to 1996.

■ Areas with high vegetation and tree canopy coverage (those with 50% tree cover or more) have declined by 37% from 1.64 million acres to 1.04 million acres.

■ Areas with very low tree cover (less than 20%) have more than doubled from 25% of the region to 57%.

A dollar value can be placed on these regional ecological changes.

■ The loss in tree cover and increase in impervious surfaces increases the cost of stormwater management and the cost of air quality controls.

■ Stormwater flow during a peak storm event has increased by an estimated 1.2 billion cubic feet (29%). Replacing this lost stormwater retention capacity with reservoirs and other engineered systems would cost $2.4 billion ($2 per cubic foot).

■ Lost tree canopy would have removed about 35 million pounds of pollutants from the atmosphere annually, at a value of approximately $95 million.

■ Puget Sound's urban forest improves air quality by removing the following pollutants: nitrogen dioxide (NO_2), sulphur dioxide (SO_2), carbon monoxide (CO), ozone, and particulate matter 10 microns or less (PM_{10}).

The rapid growth in the urban landscape is the biggest single factor affecting the Puget Sound ecosystem. The regional trends in tree cover loss are equally pronounced in the 422,446 acre urban growth area.

■ Heavily vegetated areas (50% or more) have declined from 208,166 acres to 101,166 acres.

■ Areas with very low tree cover (20% or less) have dramatically increased from 85,123 acres to 229,878 acres.

■ The loss of trees has resulted in a 35% increase in stormwater runoff.

■ The location and intensity of urban development has damaged salmon spawning streams.

Tree cover and natural resource information should be officially incorporated into the planning process.

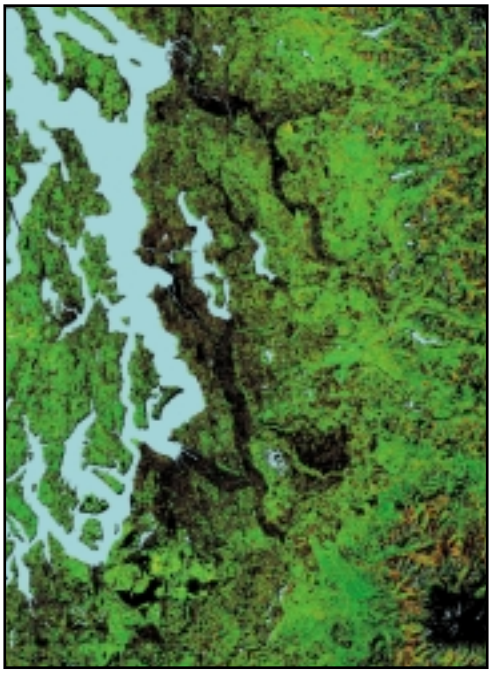
■ Existing landscapes should be recognized for their potential economic value.

■ Increasing the average tree cover to 40% in the urban areas would significantly improve the environment in stormwater management and air quality.

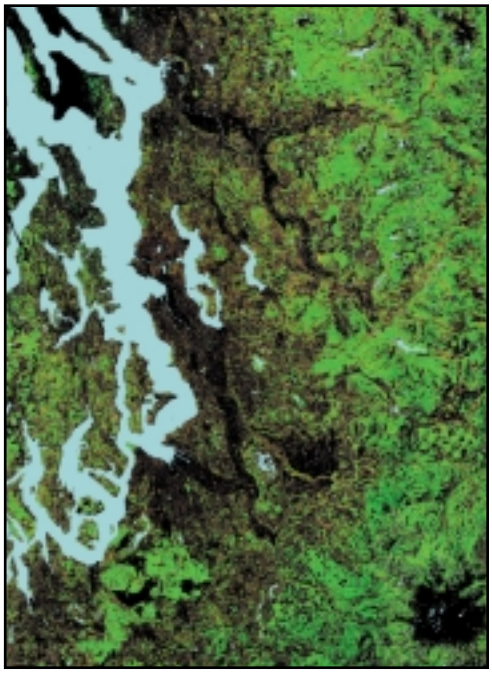
■ Strategically planting trees will accelerate stream restoration improving wildlife and fisheries habitat.

Regional Level Analysis

Landsat MSS 1972 *80 Meter Pixel Resolution*



Landsat TM 1986 *30 Meter Pixel Resolution*



Landsat TM 1996 *30 Meter Pixel Resolution*

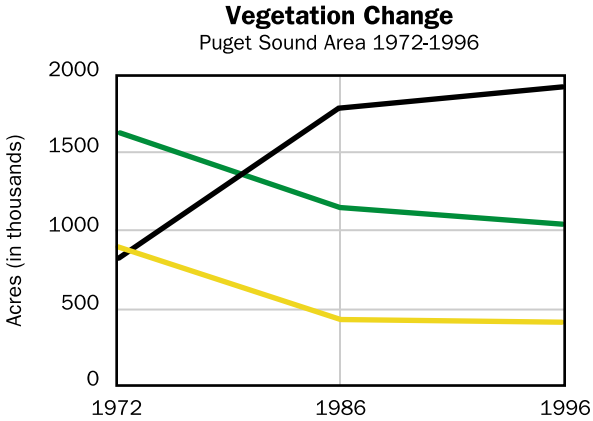
Puget Sound Satellite Images

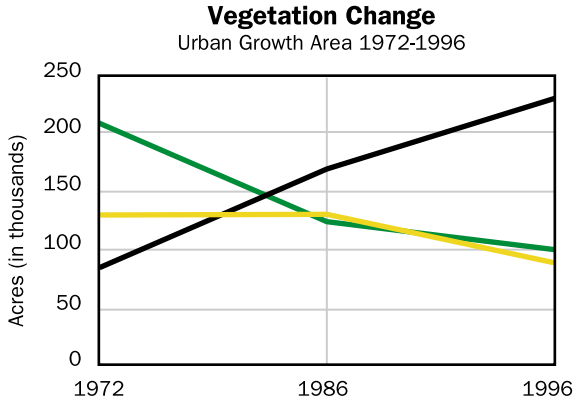
Landsat TM and MSS satellite images show the change in the landcover in the Puget Sound region over a recent 24 year period. Tree cover is indicated in green and the impervious surfaces associated with urban areas in black. The analysis measured eight categories of tree cover and the data from the detailed analysis is used in all calculations. The visual images above group the eight categories into three because additional detail is not visible to the human eye.

Graphing Change

The change in vegetation depicted in the satellite images above is represented in line graphs at right. Both charts show the change in vegetative cover over a 24 year period for three categories. Natural forest cover is represented by a green line and indicates places with greater than a 50% tree canopy. Developed areas are represented by a black line and indicate areas where tree canopy is low, less than 20%. The yellow line represents land where the tree cover is in the middle range between 20 and 50%. Open space, residential areas, and park land would all fall in this category.

- Low Vegetation (<20% Vegetated)
- Moderate Canopy (20-50% Vegetated)
- High Canopy (>50% Vegetated)





Neighborhood Level Analysis

What is a Neighborhood Level Analysis?

The Puget Sound Ecosystem Analysis has two levels of detail: one is regional scale, covering approximately 4.5 million acres, and the other is at a neighborhood scale covering about two to five acres.

Using the land patterns identified from the regional image, aerial photographs are used to document the landscape at the local or neighborhood scale. CITYgreen software is used to determine detailed measurements of the value of the local ecology.

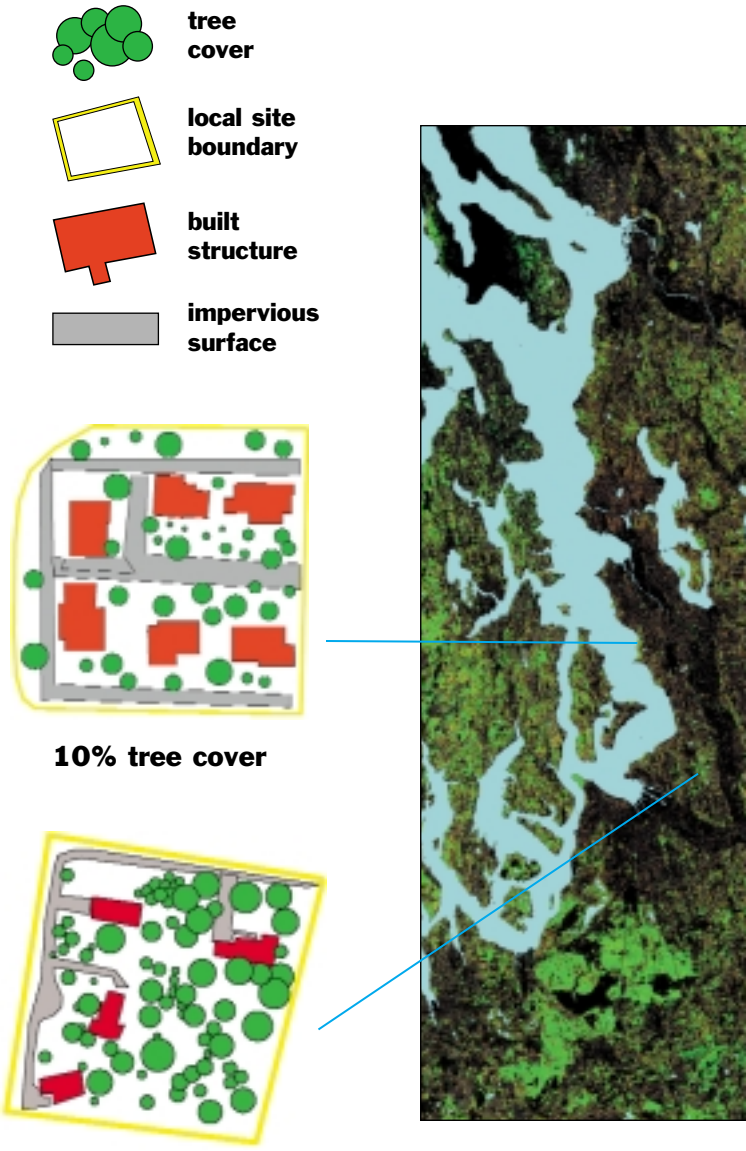
The neighborhood scale analysis is conducted in conjunction with local groups and agencies. This data is not yet available for the Puget Sound, therefore AMERICAN FORESTS has developed computer models to represent the structure of the landscape in various neighborhoods. Data gathered from local sample sites was used extensively in building these models.

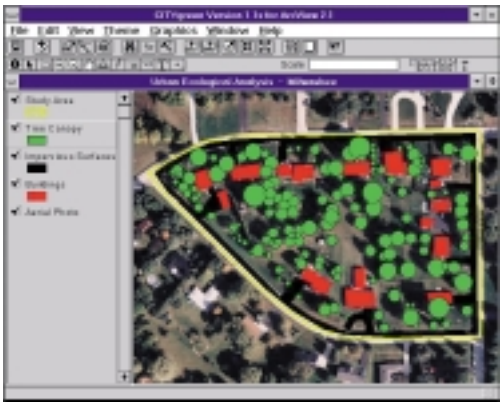
The models are designed to simulate Puget Sound's tree species, soil type, rainfall patterns and configurations of land use. In each model neighborhood, the greater the tree canopy percentage, the less impervious surface there is. The resulting benefits from these representative sample sites are multiplied by the total land area (identified in the regional summary). The findings from the neighborhood analysis are summarized in the table on page 5.

Trees as Indicators of a Community's Ecological Health

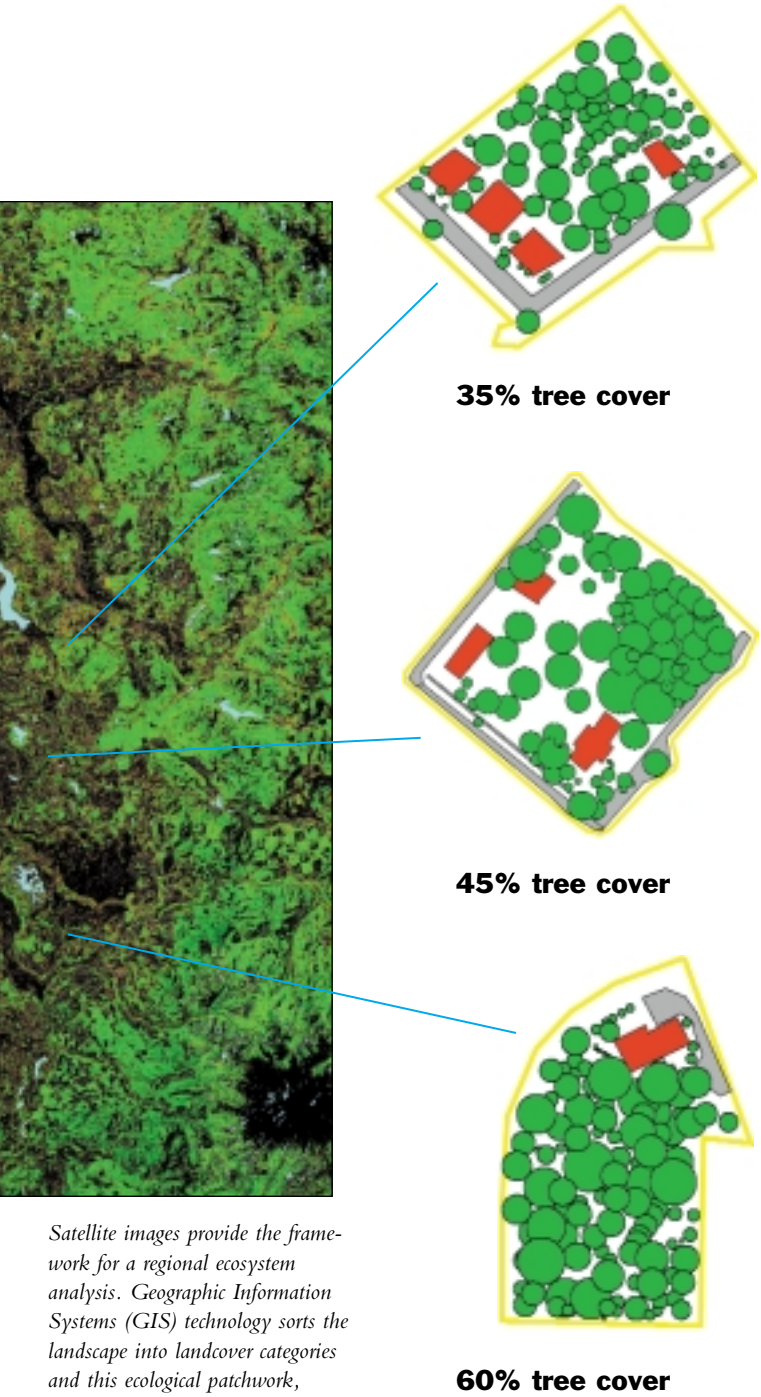
Even though urban ecology is much more complex than just trees, tree canopy cover is a good indicator of the health of an urban ecosystem. When urban forests are healthy, they provide communities with many valuable services that can be measured in dollar benefits. Two such services are: 1) slowing stormwater runoff and reducing peak flow and 2) improving air quality.

Cities spend tremendous amounts of money installing stormwater control systems and repairing damage from unmanaged water flow. In addition, cities that cannot meet EPA attainment levels for air and water quality, jeopardize federal funding for capital improvements. Nonstructural methods, including trees, can reduce stormwater runoff and improve air quality. The benefits they add increase the importance of maintaining and restoring the natural infrastructure of our communities.





Aerial photography is used by CITYgreen to conduct a neighborhood analysis.



Satellite images provide the framework for a regional ecosystem analysis. Geographic Information Systems (GIS) technology sorts the landscape into landcover categories and this ecological patchwork, called Ecostructures (see pg.8) is used with CITYgreen software.

How CITYgreen Analyzes Neighborhood Data

CITYgreen software conducts a detailed analysis of how the structure of the landscape affects its function. For example, how do various neighborhood layouts affect stormwater movement and air quality? Scientists and engineers have developed mathematical formulas which measure these functions and are incorporated into the CITYgreen software program.

Stormwater Runoff

Trees and soil function as one to reduce stormwater runoff. Trees reduce stormwater flow by intercepting rainwater on their leaves, branches, and trunk. The intercepted water evaporates back into the atmosphere, reducing the total amount of runoff that must be managed in urban areas. Trees also slow down storm flow reducing the volume of water that a containment facility must store. In addition, trees improve water infiltration characteristics of soil as biomass decomposes. The TR55 model was used to measure stormwater (see page 8).

Local governments are looking toward non-structural stormwater management strategies, including trees to reduce the costs of building stormwater control infrastructure. Trees' economic value for stormwater management is based on avoided storage of stormwater and thus the reduced construction costs of building retention ponds. Local construction costs are multiplied by the total volume of avoided storage to determine dollars saved.

In Puget Sound, the existing tree canopy reduces the need for retention ponds by 2.9 billion cubic feet per storm event (defined as the largest average 24 hour, 2 year storm). Using a $2.00/cubic foot construction cost, trees currently save $5.9 billion. In the urban growth area, trees save 355 million cubic feet in avoided storage, valued at $710 million.

Air Quality

Trees provide air quality benefits by removing pollutants such as NO_2, CO, SO_2, ozone and PM_{10}. To calculate the dollar value for these pollutants (see page 8), economists multiply the number of tons of pollutants by an "externality cost" or what these pollutants cost to society in terms of rising health care. For example, NO_2 and ozone are $6,750/t (metric ton), SO_2 is $1,650/t; CO is $950/t and PM_{10} is $4,500/t. In Puget Sound, the existing tree canopy removes 78 million pounds of pollutants, valued at $166.5 million. Tree cover as it existed in 1972 would save an estimated $266 million. In the urban growth area, trees remove 9.2 million pounds, valued at $19.5 million. Tree cover in this area as it existed in 1972 would save an estimated $34 million.

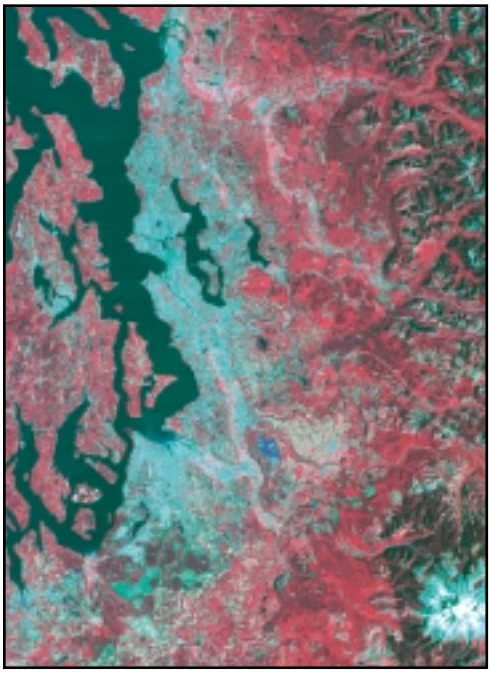
Summary Table, Puget Sound Area, 1996

Air Quality Benefits		Stormwater Benefits	
Pollutants Removed (lbs.)	$ Value	Cu/ft. Avoided	$ Saved
78 million	$166.5 million	2.9 billion	$5.9 billion

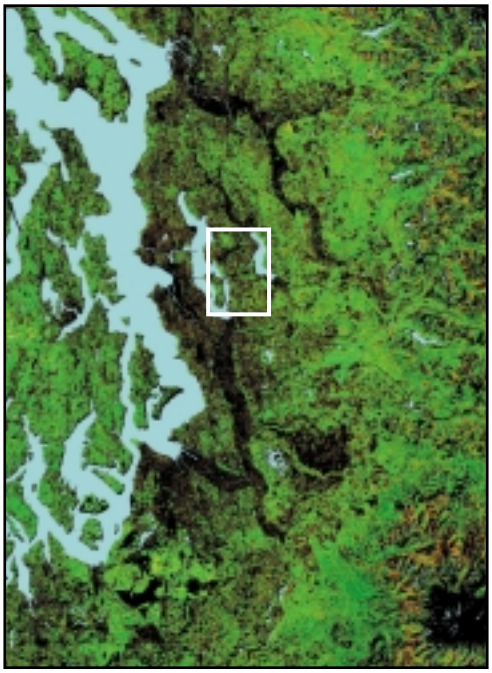
Summary Table, Urban Growth Area, 1996

Air Quality Benefits		Stormwater Benefits	
Pollutants Removed (lbs.)	$ Value	Cu/ft. Avoided	$ Saved
9.2 million	$19.5 million	355 million	$710 million

From Raw Satellite Data to Neighborhood Level Information



Raw Satellite Data 1986



1986 Regional Analysis *white box indicates Bellevue area (enlarged to the right)*

1986 Bellevue Area *white box indicates area of aerial photogrpah below.*

Combining Regional and Neighborhood Level Analysis

American Forests ecosystem analysis starts with raw satellite data as displayed upper left. The raw image shows vegetation in red and urban areas in aqua. The image produced from the raw satellite data does not show percent changes in vegetative cover. To determine tree cover, the raw satellite image is analyzed using Geographic Information Systems (GIS) (middle image). American Forests uses ERDAS Imagine software and a subpixel classification technique to determine eight categories of tree cover and one category of less than 20% tree cover. Green areas are at one end of this spectrum and represent tree cover over 50%; urban areas are black.

The regional level image contains a great deal of data. The image above right provides an enlarged view of the landscape between Lake Washington and Lake Sammanish (see box insert in middle image). The image at the lower right shows how regional satellite data is connected to aerial photography and used for neighborhood level analysis. This aerial photograph represents a neighborhood in Bellevue. Citizens from Advance Bellevue used these images along with CITYgreen software to conduct a detailed analysis of the tree cover in their city. American Forests recommends that all cities in the Puget Sound conduct a neighborhood level analysis like the one conducted by the citizens of Bellevue.

Aerial Photograph of a Bellevue Neighborhood

What's Next for the Puget Sound Metropolitan Area

Recommendations

The Regional Ecosystem Analysis provides detailed information about the value of natural resources to local governments. It is a public policy tool designed to assist in land-use planning and growth management. The recommendations below focus on tree cover because trees are a visible measure of the quality of the community environment. When urban trees are large and healthy, the ecology that supports them is also healthy. Large healthy trees are the result of healthy soils, adequate water, and healthy air. This report and the recommendations that follow bring together the expertise of ecologists, scientists, and engineers with modern computer technology to evaluate the environment in the Puget Sound and chart a course of action to improve it in the future. We encourage the agencies and community to act on these recommendations.

(1) Expand the capacity and usefulness of this analysis for regional planning and growth management.

■ Incorporate a natural resource data layer into the regional planning process.

■ Use the data from this analysis as a basis for building that regional model.

■ Obtain additional data for this model from city and county government.

(2) Recruit county and city governments as partners in creating a regional model.

■ Establish neighborhood scale data collection plots in local jurisdictions.

■ Use information from the local level analysis for community planning.

■ Use the City of Bellevue as a demonstration area and model for other communities to follow.

■ Utilize CITYgreen and the AMERICAN FORESTS analysis technique as a model for community participation.

(3) Increase and conserve the tree canopy cover in urban areas.

■ Develop urban tree canopy goals for the region and local areas:
40% tree canopy overall
50% tree canopy in suburban residential
25% tree canopy in urban residential
15% tree canopy in the Central Business District

■ Implement innovative land-use planning techniques and engineering guidelines for saving existing trees and planting new ones.

■ Incorporate the dollar values associated with trees when making land-use decisions.

■ Use trees as a valuable and essential element of the urban environment.

■ Use CITYgreen software as a tool to incorporate the value of trees into the land-use planning process by collecting data on the tree cover and analyzing the value of the trees. The findings are used in the decision making process.

About the Urban Ecosystem Analysis

Ecostructure Classification

AMERICAN FORESTS' Urban Ecosystem Analysis is based on the assessment of Ecostructures, unique combinations of land use and land cover patterns. Each Ecostructure performs ecological functions differently and thus provides different values. For example a site with a heavy tree canopy provides more stormwater reduction benefits than one with a light tree canopy.

In this study, the regional analysis provided an overview of tree cover change in the Puget Sound Metropolitan Area. Using the tree cover percentage categories to model the area's Ecostructures, sample study sites were selected to further examine the effects of different tree canopy cover percentages on air quality and stormwater management. Further neighborhood analysis using aerial photos of representative Ecostructures is needed to refine the values given in the model analysis.

Data Used in this Study

Landsat satellite TM (30 meter pixel) and MSS (80 meter pixel) images were used as the source of land cover data to determine the change in landcover from 1972-1996. To provide more detail to the analysis we used a subpixel technique and divided the land cover change into eight vegetation categories plus a ninth category of 0-20% tree cover.

AMERICAN FORESTS developed CITYgreen as a Geographic Information System (GIS) software to analyze the value of trees and other natural systems as part of urban infrastructure. CITYgreen is an application of ArcView, a GIS desktop software developed by ESRI.

Analysis Formulas

TR-55 for Stormwater Runoff: The stormwater runoff calculations incorporates formulas from the Urban Hydrology for Small Watersheds model, (TR-55) developed by the US Natural Resource Conservation Service (NRCS), formerly the US Soil Conservation Service. Don Woodward, P.E., a hydrologic engineer with NRCS, customized the formulas to determine the benefits of trees and other urban vegetation with respect to stormwater management.

UFORE Model for Air Pollution: CITYgreen uses formulas from a model developed by David Nowak, PhD, for the US Forest Service, which calculates how many pounds of ozone, sulfur dioxide, nitrogen dioxide, and carbon monoxide are deposited in tree canopies as well as the amount of carbon sequestered.

The urban forest effects (UFORE) model is based on data collected in 50 US cities. Dollar values for air pollutants are based on externality costs or the costs to society such as rising health care costs per pollutant. For example, ozone is valued at $1,650 per ton and nitrogen dioxide is $6,750.

Acknowledgments for this Study

We gratefully acknowledge the support of the following agencies and business partners in conducting this study:

The USDA Forest Service
The City of Bellevue
ESRI for Geographic Information System software
ERDAS for remote sensing software

For More Information

AMERICAN FORESTS, founded in 1875 is the oldest national nonprofit citizens conservation organization. Its three centers—Global ReLeaf, Urban Forests, and Forest Policy—mobilize people to improve the environment by planting and caring for trees. Global ReLeaf for the Puget Sound is a regional campaign of AMERICAN FORESTS and part of its Global ReLeaf 2000 campaign to plant 20 million trees for the new millennium.

AMERICAN FORESTS' CITYgreen software provides individuals, organizations, and agencies with a powerful tool to evaluate development and restoration strategies and impacts on urban ecosystems. AMERICAN FORESTS provides regional training workshops and technical support for CITYgreen and is a certified ESRI developer and reseller of ArcView products. For further information contact:

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click on "Green Cities"

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AND FORESTS SINCE 1875

A Framework for Strategic Urban Forest Management Planning and Monitoring

Abstract

With global climate change, ever-increasing urban populations and rapidly spreading invasive species and pests, the challenges facing urban forests today are immense. To address these challenges and achieve true sustainability, urban forest management programs need to transition from a reactive maintenance approach to one of proactive management. The clear solution is collaborative, long-term, strategic urban forest management planning. This paper outlines a three-tiered planning framework comprised of a high-level, 20-year strategic plan, with four five-year management plans, and twenty annual operating plans. The concept of active adaptive management is firmly embedded in this framework, providing managers with the opportunity to review the successes and shortcomings of their management activities on a systematic basis, and integrate new approaches or address new issues as required. The framework is further supported by a comprehensive set of criteria and indicators for performance assessment. These 25 criteria and indicators support the process of adaptive management by providing clear and consistent measures by which progress can be gauged, and are positioned as tools for improving the development and implementation of urban forest management plans over time. Finally, the flexibility of the framework and its applicability at different scales is highlighted with several case studies, including the development of strategic urban forest management plans for municipalities and golf courses.

Keywords:
adaptive management, canopy cover, criteria and indicators, municipal planning, relative canopy cover, sustainability, urban forestry

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Introduction

The benefits provided by healthy and well-managed urban forests are far-reaching and extensively documented (e.g. Dwyer *et al.*, 1992; McPherson, 1994; Simpson, 1998; Kuo, 2003; Wolf, 2004, Donovan and Butry, 2010). There are, however, many challenges currently facing trees in urban and peri-urban areas. Generous estimates suggest that the average lifespan of a typical urban tree is 32 years and that many newly planted trees do not survive their first year (Moll and Ebenreck, 1989). A number of factors contribute to such dismally short life spans and, as a result, few urban trees are ever able to reach their full genetic potential to provide important social, economic and environmental services for urban residents.

Cities and their surrounding areas are complex and dynamic entities. A wide range of decision-makers, stakeholders and interest groups are active in setting the agenda in most communities, and urban forest managers must compete with other interests for limited resources. In spite of the additional challenges posed by invasive species, development intensification, climate change and other stress factors, a solution to effective urban forestry in this context lies in good planning that balances the need for immediate action with the need for a long-term vision. Effective planning can support the development and implementation of proactive, as opposed to reactive, management approaches in a strategic and collaborative fashion. Proactive management leads to tangible results in the form of increased operational efficiency, risk reduction, increased urban forest canopy and leaf area, and perhaps most importantly, the sustained provision of ecological, social and economic benefits to urban residents and the greater environment.

The first part of this paper outlines the context for urban forest management planning and presents an effective twenty-year planning framework for use in the development of urban forestry strategies. The second part builds upon the work of Clark *et al.* (1997) and demonstrates how a comprehensive and practical set of monitoring criteria and indicators tailored to assess urban forest sustainability can improve management planning and

implementation. Finally, the paper explores how these tools have been applied in southern Ontario, Canada, to work towards achieving true urban forest sustainability in communities of various sizes.

The context for urban forest management today

The challenges to growing and maintaining healthy urban forests are numerous and, by necessity, must be addressed on a long-term horizon. Urban foresters must remember that they work on 'tree time.' Trees are a long-term investment, and successes and failures are rarely realised overnight because trees can take years to respond to stress factors or improvements designed to promote their health and longevity.

From a basic biological perspective, cities are difficult places to grow trees. Unlike in forests (where we all too often forget that trees come from), urban soils are typically of poor quality, limited in volume, and can be effectively sterile or even contaminated. Often heavily-modified, urban tree rooting environments are typified by low biological activity, poor nutrient availability, compacted pore space and a number of other problems (Urban, 2008). Simply put, good soil is in short supply. Furthermore, trees must compete for space with various forms of built infrastructure, such as roads, buildings and sewers. In many jurisdictions, these grey infrastructure components take precedence over trees and other forms of green infrastructure, which are seen as additional niceties to be included in urban designs where feasible and when budgets permit.

Compounding the difficulties associated with poor-quality growing sites and inadequate soils is the reality of urban intensification and development. In 2011, the world population is expected to exceed seven billion, with over half now residing in towns and cities (UNFPA, 2010). This influx of urban citizens places increasing stresses on existing trees and makes urban land a premium commodity. In many areas, planning regulations require intensification in urban centres and settlement areas in an attempt to curb urban sprawl. Paradoxically, this leaves little room for trees in the very places where they are most beneficial.

Finally, the additional stress factors presented by climate change will continue to affect urban forests (2degreesC, 2007; Colombo, 2008; Galatowitsch, *et al.* 2009). In highly-urbanised communities, climate change-related events such as periods of extended drought, extreme winds, high temperatures, and shifting species distribution patterns for both native and invasive species will further strain already-thin operating budgets.

The challenges outlined above, including poor urban soils, intensification and climate change, are just three of many factors weighing against urban forest sustainability. Others include invasive species, pests and pathogens, limited knowledge of proper tree care practices, poor public perception of trees, and inadequate maintenance and management practices, among others. No matter what the threat, it is clear that attention needs to be given to planning for the future health and enhancement of the urban forest resource in any community, as was previously noted by van Wassenaer, Schaeffer and Kenney (2000).

Any efforts to proactively manage urban forests to provide the greatest amount of benefits requires a targeted, strategic approach that is collaborative in nature and considers the wide range of stakeholders with interests in urban forest sustainability. Providing a framework for such a planning approach is one of the central objectives of this paper.

A strategic framework for urban forest management planning

While the pace of daily life in urban areas is often accelerated, trees in cities can be relatively slow to respond to physical damage and environmental changes, whether they are negative or positive. Similarly, municipal governments are rarely, if ever, able to quickly summon the financial and human resources necessary to make meaningful changes to urban forest operations and management. As such, a long-term planning horizon is needed in order to outline required action items, prioritize implementation, and accommodate long-term budget planning. Even with the best laid plans, unexpected occurrences such as long-term droughts, invasive pests, or worsening economic circumstances may force significant reprioritization of short- and medium-term operations. Planning on a longer time horizon can ensure that strategic objectives are still met.

Planning horizon and temporal framework

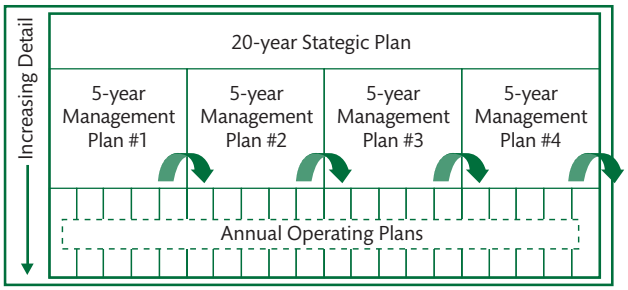
A number of municipalities in southern Ontario, Canada, have determined that a 20-year planning horizon is appropriate for planning a sustainable and healthy urban forest, and have developed plans using this framework. This timeframe enables short and medium-term financial and organisational planning, while maintaining an established overall strategic direction that will remain unchanged and

thus enable the community's vision for its urban forest to become realised.

While a long-term planning horizon is necessary to achieve urban forest sustainability, shorter-term objectives and day-to-day operations must be supported by more readily implementable directives. Therefore, an effective urban forest management plan must make clear links between long-term strategic directives, medium-term priorities, and day-to-day operational activities such as tree pruning or establishment.

This can be achieved through a three-tiered temporal framework (Figure 1) for urban forest management planning, wherein a **20-year strategic plan** is divided into four **five-year management plans**, which are further subdivided into **annual operating plans**.

Figure 1 Temporal framework for a strategic urban forest management plan.



The highest level of the urban forest management plan sets out the vision, goals and objectives to be achieved by the end of the planning horizon. This **20-year strategic plan** can be developed as a separate document from lower-level plans, and should provide connectivity to other relevant strategic documents and policies in the community. A vision, strategic objectives, and guiding principles should be developed in consultation with municipal staff, community members and other stakeholders such as local land developers, environmental groups and organisations, and representatives of other levels of government (i.e., regional councils). These goals and vision should guide the overall direction of plan development, and must therefore be developed early on in the process.

Effective urban forest management requires an end goal – a reason to justify the expense and complexity associated with the undertaking. While every community will develop its own vision for what its urban forest should look like and what benefits its residents will enjoy, a workable guiding objective is presented below, stating that the goal of any community's urban forestry program should be:

> "To optimise the leaf area of the entire urban forest by establishing and maintaining a canopy of genetically appropriate (adapted and diverse) trees (and shrubs) with minimum risk to the public, and in a cost effective manner."

Nested within the 20-year strategic plan are four **five-year management plans**. Each of these will be the first level of operational planning and represents the link between high-level strategic objectives and on-the-ground management activities. This level of planning also presents the opportunity to implement active adaptive management, defined by the Millennium Ecosystem Assessment project (2005) as:

"A systematic process for continually improving management policies and practices by learning from the outcomes of previously employed policies and practices. In active adaptive management, management is treated as a deliberate experiment for the purpose of learning."

This concept recognizes that urban forests are complex, dynamic entities and that while managers may not always be able to predict changes, they must be prepared to accommodate such changes while still working towards broader goals for the management of the resources in their care. Through active adaptive management, a problem is first carefully assessed and a strategy or approach is designed and implemented to address it. The results of the approach are then monitored in a systematic manner and any adjustments are made based on the experience gained and new information that has become available. The adjusted approach is implemented and the evaluation cycle continues for as long as is necessary to accomplish the goals or to accommodate changing environmental, social, or policy directions. This is achieved through the review of each five-year management plan near the end of its planning horizon, and subsequent five-year management plans are based upon the results of these reviews. Therefore, the intention is not to attempt to develop all four plans at once; but to develop them sequentially in response to lessons learned and, if applicable, changing priorities. This is represented graphically by the arrows connecting each five-year management plan shown in Figure 1.

The final level of planning is the **annual operating plan,** which directs day-to-day operations and can be used to project budget requirements for all aspects of maintaining the urban forest. Each annual plan may include detailed plans for tree establishment, pruning, removals, inspections and maintenance of the tree inventory. Such activities should be guided by directions outlined in the strategic and five-year plans. Initially, annual operating plans will need to

address priorities derived from a community's tree inventory, but as these are addressed over time, more effort can be focused on proactive management objectives. Annual operating plans can be integrated with a community's asset management system and GIS information technology to optimise resource allocation. For example, planting locations can be mapped on a municipal GIS to inform all related staff about the future location of street or park trees to help plan future maintenance activities.

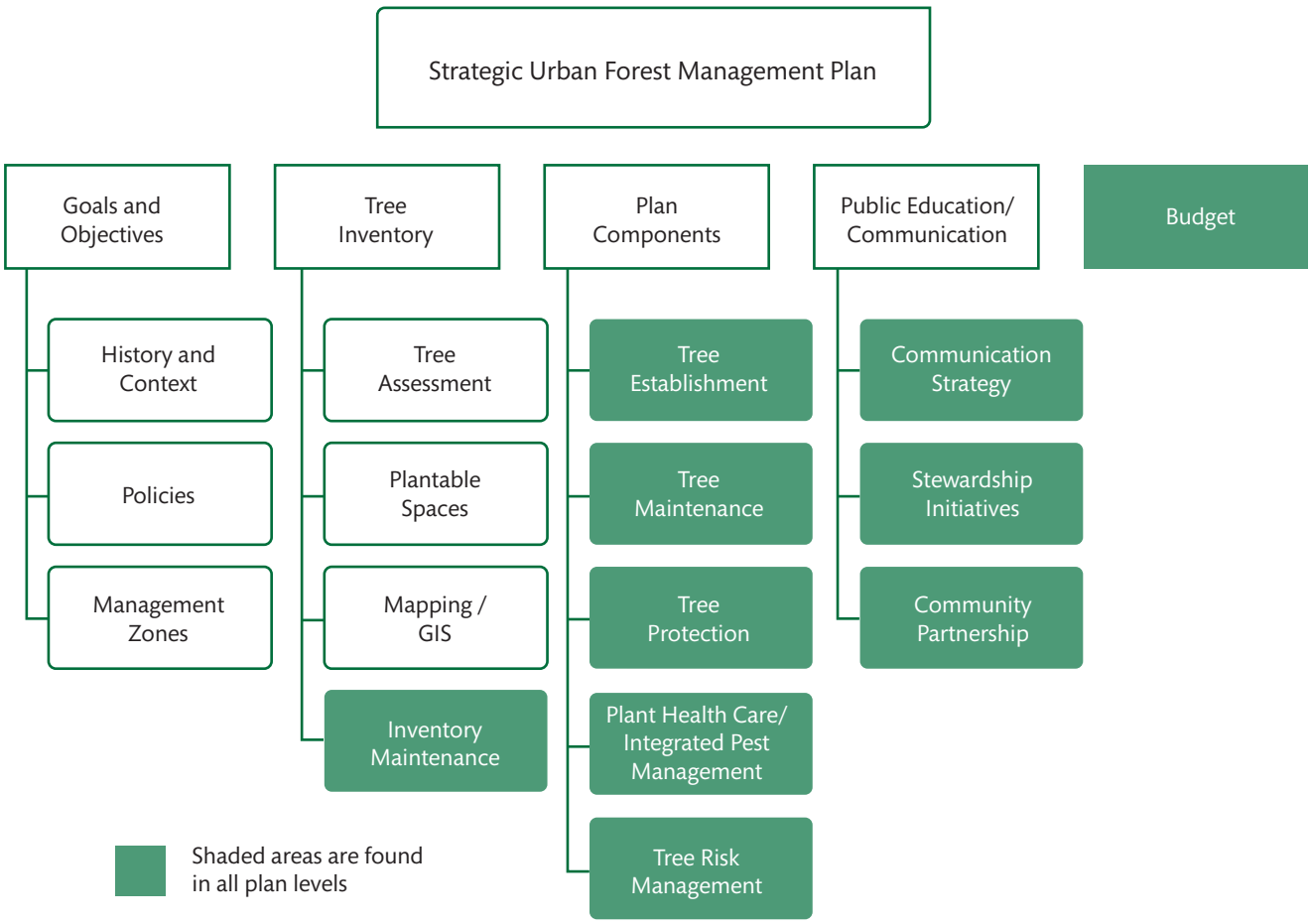
Key urban forest management elements

Several key themes and issues should be addressed as components of any urban forest management plan, and some must be addressed at all three (20-year, five-year and annual) planning levels. The content and scope of each plan component can vary depending on a variety of factors specific to the community undertaking the planning process. These factors may include the community's urban forest objectives; its historic, current and anticipated land use cover; the degree to which it has already begun to undertake urban forest management; available resources; the level of stakeholder and community interest; and the willingness of the community and its residents to invest in the local urban forest.

Figure 2, below, represents the basic structure of a typical urban forest management plan developed using the framework outlined in this paper. The top row (the overall plan) is divided into five key components, which are further sub-divided into different topic areas, or planning components. As stated, these will vary and should be tailored to each municipal context.

As noted above, some of these components (shaded in Figure 2) are addressed at each planning level. To illustrate how these components can be addressed at each level, let us consider the example of tree establishment. On a long-term horizon (20-year strategic plan), the plan can set long-term objectives such as increasing species diversity, developing improved tree planting standards, or increasing tree canopy cover through tree planting. At the medium-term (5-year management plan) level, the plan can commit to implementing pilot projects to test new tree species or

Figure 2 Typical components of a strategic urban forest management plan.



planting methods, or might identify particular locations for targeted planting to provide specific benefits (e.g., more trees in urban heat island areas.) At the annual operating plan level, operations staff might prepare planting lists and locations for next year's plantings to ensure adequate budget and staff allocations that address the mid and long-term objectives.

Conversely, other components (not shaded in Figure 2) may or may not need to be addressed at each planning level. For example, there may not be a need to plan for coordination with higher level management policies during day-to-day operations, and these would therefore not be considered in the development of an annual operating plan.

In order to effectively develop and support recommendations designed to improve urban forest management, each plan component must contain four elements to inform the recommendations. The first element is a review of current management practices and policies in the community, with regard for the particular subject area in question. The second is a review of relevant 'best management practices' from scientific and technical literature and precedents from other jurisdictions. The third component should compare the current status to best practices, and identify gaps and opportunities for improvement. Finally, the fourth component should review and consider input and ideas from the various internal and external stakeholders, typically garnered through a multi-part consultative process. This information provides the background and rationale for recommendations and resource requirements proposed in the management plan.

The key sections of a typical urban forest management plan are outlined in more detail, below.

Urban forest / tree inventory

As is the case with any renewable resource, an inventory is an essential tool for the development of management strategies. It will identify details of the structure of the urban forest, which are necessary for the planning of management activities to achieve specific goals. These details may include species composition, the mixture of native and non-native species, age structure, tree condition, location, size, management history, and habitat. Inventories may also reveal other valuable assets such as the presence of rare or endangered species that may otherwise be overlooked. A wide range of inventory options are available, from basic street tree assessments to broader urban forest resource analysis studies (e.g., i-Tree Eco), which can provide a better understanding of urban forest structure and function in both the public and private realm. The type of inventory used may also vary depending upon the extent of urban forest management in a given area. For example, intensively-managed zones such as streets may have a higher level of inventory detail (e.g. individual tree assessment) than extensively-managed zones such as natural areas (e.g., forest stand inventory or ecological classification).

Communities with well-developed inventories may develop much of the management direction based upon the results of such studies in this section of the plan. Communities with limited or no inventories may direct the plan towards collecting such data in order to inform future management. A key component of the tree inventory section should also be an inventory maintenance plan, outlining how the inventory will be updated and used to its fullest capacity on an ongoing basis.

Tree establishment

At the level of the strategic plan, tree-planting priorities should reflect overall objectives with respect to tree cover, species distribution, tree replacement policies, stock specifications, habitat requirements, and other considerations. At the management plan level, planting plans can be drawn up once an accurate assessment of the plantable spots is determined from the inventory or from other means of spatial analysis. Innovative approaches to providing suitable tree habitat should also be identified and recommendations to implement them should be developed.

Tree maintenance

At the level of the strategic plan, the plan should establish overall goals for tree maintenance such as pruning, and define the minimum standards to be applied. Objectives to enable a transition from reactive to proactive management, including grid pruning, regular inspection, etc., should be developed. In the medium-term management plan, the plan should identify the areas in which tree maintenance will take place over the five-year term.

Tree protection

This section should review current practices and threats related to tree protection and the municipal development approval process (if applicable) with respect to trees and tree protection. This section may also discuss existing, proposed or potential tree protection by-laws as well as tree-related guidelines for protection during the construction process.

Plant Health Care and Integrated Pest Management

The urban environment is hostile to the long-term health of trees and shrubs. Environmental stresses both above and below ground weaken natural defence systems and leave plants prone to insect infestations and diseases. Plant Health Care (PHC) and Integrated Pest Management (IPM) planning should be an integral part of any strategic plan. PHC is a proactive approach to tree management that strives to increase the health and vigour of trees such that their natural defence mechanisms will protect them. IPM includes similar aspects, with a focus on reducing pesticide use and managing and monitoring pest populations. Some aspects of PHC and IPM are:

- Proper tree selection: the right tree in the right place;
- Early pruning of young trees to establish strong structure for long-term stability;
- Fertilisation and watering according to the soil conditions and the species requirements;
- Structural support systems;
- Utilising an array of cultural practices and biological controls to reduce the use of fungicides, pesticides and herbicides;
- Pest vulnerability analysis;
- Regular monitoring and reporting, and;
- Active adaptive management.

Tree risk management

Liability is a major concern for urban forest managers. At the strategic level, the plan should commit to developing a tree risk management strategy if one is not already in place, tailored to available resources and tolerance for risk. At the five-year management plan and annual operating levels, the plan should identify risk trees and outline implementation of mitigation practices.

Outreach and public engagement

Effective communication is a vital part of urban forest management. In most jurisdictions, the urban forest is an 'unknown' entity that both the public and administrators take for granted rather than recognize as an important municipal and community asset. In many communities most of the urban forest is privately-owned. Therefore, an educational communications and outreach program for the community should be developed and implemented in order for urban forest management to be effective. This component should also outline existing and potential partnerships and funding sources.

Budget

At the strategic level, items that must be considered in management and operational plans will be ascertained. The initial budget available to the urban forest management process will help to focus or prioritise the issues that can be addressed. Sources of funding, as well as opportunities for resource sharing, should also be identified. It is important to note that while recommendations should be realistic from a budgetary standpoint, current available resources should not limit or guide the direction of the plan, or prevent the development of progressive initiatives and recommendations.

Monitoring

This section of the plan should include mechanisms for monitoring the implementation of the plan's recommendations and assessing successes and shortcomings. It is recommended that a criteria and indicators based approach to monitoring, as outlined in the following section of this paper, be used at the end of every management plan (i.e., five-year) cycle. This section should also include the baseline criteria and indicators based analysis to provide a benchmark of the state of the urban forest prior to the development and implementation of the plan.

Recommendations

In keeping with the proposed plan framework, it is suggested that recommendations to be implemented within the first five years be supported with accurate budget forecasts, clear priority rankings, delineation of responsibilities, and other supporting information such as potential partnerships, funding sources, etc. Recommendations for implementation in the remaining years of the strategic horizon can be supported by a priority ranking or a time range (e.g., 2015-2019), or can be slotted into one of the future five-year management plans (e.g., within 3rd planning cycle).

Integrating criteria and indicators into strategic planning

A progressive urban forest management plan should include recommendations that improve the effectiveness and efficiency of a community's urban forestry program, moving it from reactive maintenance to proactive management. However, the concept of active adaptive management embedded in such a plan necessitates regular monitoring to ensure that progress is being made towards urban forest

sustainability. A means of defining sustainability is also required. For these reasons, the framework of criteria and indicators of urban forest sustainability, developed by Clark *et al.* (1997) and refined and updated by Kenney, van Wassenaer and Satel (2011), is well-suited for integration into the development and implementation of an urban forest management plan for any community.

The publications referenced above have discussed criteria and indicators in detail, and they will not be greatly expanded upon in this paper. In summary, this approach to planning includes 25 distinct criteria under three general topics (Vegetation Resource, Community Framework and Resource Management Approach). A community's current standing relative to each criterion is assessed by means of four indicators, ranging from low through moderate, good or optimal. Each indicator refers to a key objective; moving along the scale from low to optimal for each criterion places the community closer to achieving a sustainable urban forest. Table 1 shows three example criteria and their related indicators and key objectives.

A major strength of the criteria and indicators approach is that it enables an in-depth and comprehensive assessment of the current status and progress of an urban forest management program. It also challenges the all-too-prevalent notion that overly-simplistic metrics such as canopy cover percentage or the number of trees planted per year are, in and of themselves, good indicators of urban forest sustainability. Moreover, a criteria and indicators assessment illustrates the strengths of a community's urban forest management program, and more importantly, clearly highlights opportunities for improvement. This in turn enables managers to more effectively allocate limited resources with the objective of moving towards optimal performance levels and sustainability.

Criteria and indicators are most useful at two stages of the management planning process. Firstly, they can be used to undertake a baseline assessment of the current status of a community's urban forest and forestry operations. Secondly, they are an invaluable tool for tracking the successes and shortcomings of each of the five-year management plans discussed in the previous section, in order to inform goal setting and prioritisation for each subsequent planning horizon.

As a method for undertaking a baseline assessment, criteria and indicators are typically reviewed at the outset of the management planning process by a community's head urban forester, or preferably by an inter-departmental committee including staff such as engineers, planners, communications personnel and information technologists. Outside of the municipal realm, criteria and indicators can be reviewed by the various stakeholders who are in a position to inform and improve the indicators. Completing the level of assessment

Table 1 Three example criteria for urban forest sustainability with associated indicators and key objectives.

Criteria	Performance Indicators				Key Objectives
	Low	Moderate	Good	Optimal	
Relative Canopy Cover	The exiting canopy cover equals 0-25% of the potential.	The existing canopy cover equals 25-30% of the potential.	The existing canopy cover equals 50-75% of the potential.	The existing canopy cover equals 75-100% of the potential.	Achieve climate and region appropriate degree of tree cover, community wide.
General awareness of trees as a community resource	Trees seen as a problem, a drain on budgets.	Trees seen as important to the community.	Trees acknowledged as providing environmental, social and economic services.	Urban forest recognised as vital to the communities environmental, social and economic well-being.	The general public understanding the role of the urban forest.
Tree habitat suitability	Trees planted without consideration of site conditions.	Tree species are considered in planting site selection.	Community-wide guidelines are in place for the improvement and the selection of suitable species	All trees planted in sites with adequate soil quality and quantity, and growing space to achieve their genetic potential.	All publicly owned trees are planted in habiats which will maximise current and future benefits provided to the site.

required to determine the appropriate indicator for each criterion may take some time and effort, but is an effective way to set the priorities for the strategic management plan. Once the baseline performance assessment is completed, the planning effort may focus on moving the lowest assessed criteria towards the optimal range. Alternately, managers can choose to prioritise management to address the key objectives that are most closely in line with broader community strategic objectives. Finally, the assessment may serve as an information-gathering exercise; simply going through a collaborative assessment process will provide managers with invaluable insight into the state of the urban forest and the perspectives of other stakeholders.

Criteria and indicators are also a key component of the active adaptive management cycle. Near the end of each five-year management plan's scope, urban forest managers can use the criteria and indicators to evaluate the strategic plan by tracking in which direction the indicators for each criterion have transitioned on the scale, if at all. Then, by comparing where recommendations and resource allocations were initially focused relative to successes and shortcomings, alternate strategies can be developed as required.

Practical applications of the strategic planning framework

To date, the strategic management planning framework and criteria and indicators have been adopted by several municipalities in southern Ontario, Canada, as part of the process of developing each community's urban forest management plan. Each community's experience has been unique, and the differences in each case highlight the flexibility of the conceptual and temporal framework presented here.

Two distinct examples of the application of the strategic planning framework are the Town of Ajax and the City of Burlington. Located to the east and west, respectively, of the most populous city in Canada – Toronto – both municipalities have dedicated and skilled urban forest managers, but differ in terms of the resources available for urban forestry, with Ajax having the smaller urban forestry program. Both municipalities undertook the plan development process in 2010, albeit with markedly different approaches.

Ajax's focus was strongly geared towards developing a medium-term plan to improve on-the-ground operations within the first five years, with fewer long-term strategic objectives or recommendations. To this end, much of the up-front consultation, such as visioning sessions and goal-setting, was undertaken by municipal staff internally and with key stakeholders well in advance of developing the plan. In Ajax, the plan development had the benefit of being informed by a recently completed urban forest study that collected and analyzed data on overall urban forest cover, structure and species composition. This study developed its recommendations in the context of the urban forests sustainability criteria and indicators (Kenney *et al.*, 2011) and highlighted gaps in areas such as tree inventory, canopy cover and leaf area assessment. Criteria and indicators were then recommended for use as part of the urban forest monitoring program, to be implemented towards the end of the first five-year management plan to inform the subsequent plan.

The City of Burlington adhered more rigorously to a three-level strategic planning framework, with a focus on both short and medium-term operational improvement as well as more long-term strategic objectives. Consultations were held throughout the planning process, with internal and external stakeholders being given an opportunity to participate extensively in the visioning process, development of strategic priorities, and review of recommendations. There was also a strong desire to maintain consistency with the direction of the City's overall strategic plan, which is updated every four years. Unlike in Ajax, a preliminary criteria and indicators assessment was undertaken at the outset of the project, and helped inform the direction of the plan by highlighting key gaps and issues to be addressed. As in Ajax, criteria and indicators also form the main component of the active adaptive management strategy to measure the success of plan recommendations in promoting urban forest sustainability.

Overall, the experiences of developing urban forest management plans for the two communities discussed above, as well as the final products, were quite different. Both municipalities tailored the framework requirements to better suit their needs, illustrating the flexibility of the strategic model. Whereas one community focused more on short- to medium-term operational improvements, and the other on long-term strategic objectives, in neither plan were any key urban forestry issues overlooked or given less than the necessary level of attention or detail. This is due in part to a strategic framework that clearly identifies the important items for all urban forest managers to consider, and outlines the appropriate planning horizons to enable effective management actions to be implemented.

Although this paper focuses on the use of the planning and monitoring framework in the municipal realm, they can also be applied in other urban forest management contexts. The same plan framework has been successfully tailored by

other stewards of the urban forest, which, although they manage fewer trees, contend with many similar issues. These have included large landholders such as golf and country clubs. Issues such as cyclical maintenance, tree establishment, protection and risk management, invasive species, and even community stewardship and public awareness, are equally relevant and pressing for such institutions as they are for municipalities, albeit on a smaller scale. Planning horizons may or may not be as long as for municipalities; some courses have elected to shorten their long-term plans to ten years, while others have maintained a twenty-year frame of reference.

In the context of golf course tree management, a number of criteria may not be useful, applicable or practical. For instance, assessing the relative canopy cover on golf course grounds has little utility since landscaping needs typically take precedence on such lands and obtaining full canopy cover is not practical. Many others, however, remain as important as they do for municipalities. These include tree species diversity, cooperation with local governments, and community buy-in into tree management, among others.

Adoption of this strategic framework and monitoring approach by smaller institutions and landowners further highlights the model's flexibility. Similarly, the framework has been implemented by at least one municipality to neighbourhood scale planning, with city staff and resident representatives working jointly on a steering committee to develop and implement plan recommendations. This pilot project is still in its infancy and the success of this application is yet to be determined, but it holds promise, and the process itself is a good opportunity for neighbourhood residents to become more engaged in their part of the urban forest. The same community is looking for ways to tailor the criteria and indicators approach to undertaking a gap analysis for management of a significant natural area. It is anticipated that many of the current criteria will need to be replaced, while some will be equally applicable as they are to urban forest management.

Concluding remarks

In this paper, we have presented a temporal and contextual framework for strategic urban forest management planning and reviewed how a comprehensive monitoring framework can be integrated into the plan development and review process.

The three-tiered framework is well-suited to addressing the challenges faced by urban forests through planning for at least three reasons. Firstly, it enables real linkages between long-term, high level strategic objectives and daily on-the-ground management and maintenance activities, by way of intermediate management plans. Secondly, it is flexible enough to enable a community, or others involved in planning, to tailor it to suit their needs, while ensuring that important topic issues are not overlooked. Thirdly, with built-in mechanisms to ensure adaptive management by way of management plan review, progress towards achieving urban forest sustainability is, if not ensured, then greatly enhanced. With the integration of criteria and indicators, this planning approach effectively addresses urban forest management and sustainability issues on a long-term horizon.

The challenges to urban forests are clear and undeniable. It is our hope that more communities, institutions and landowners recognize the value of a strategic and collaborative approach to urban forest planning so that future generations might enjoy all of the important benefits that trees provide us with today.

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A MODEL OF URBAN FOREST SUSTAINABILITY

by James R. Clark, Nelda P. Matheny, Genni Cross and Victoria Wake

Abstract. We present a model for the development of sustainable urban forests. The model applies general principles of sustainability to urban trees and forests. The central tenet of the model is that sustainable urban forests require a healthy tree and forest resource, community-wide support and a comprehensive management approach. For each of these components, we present criteria and indicators for assessing their status at a given point in time. The most significant outcome of a sustainable urban forest is to maintain a maximum level of net environmental, ecological, social, and economic benefits over time.

Creation and management of urban forests to achieve sustainability is the long-term goal of urban foresters. The notion of sustainability in urban forests is poorly defined in both scope and application. Indeed, the question of how to define sustainability, and even whether it can be defined, is an open one (9, 12). At a simple level, "a sustainable system is one which survives or persists" (5). In the context of urban forests, such a system would have continuity over time in a way that provides maximum benefits from the functioning of that forest.

Since there is no defined end point for sustainability, we assess sustainability by looking backwards, in a comparative manner (5). In urban forests, we measure the number of trees removed against those replanted or regenerated naturally. In so doing, we assess progress towards a system that "survives or persists." Therefore, our ideas of sustainability are "really predictions about the future or about systems . . . (5)."

This paper presents a working model of sustainability for urban forests. We describe specific criteria that can be used to evaluate sustainability, as well as measurable indicators that allow assessment of those criteria. In so doing, we accept sustainability as a process rather than a goal. As suggested by Kaufmann and Cleveland (12) and Goodland (5), we consider social and economic factors as well as natural science. Goodland believed that "general sustainability will come to be based on all three aspects" (social, economic and environmental). Maser (14) described sustainability as the "overlap between what is ecologically possible and what is societally desired by the current generation", recognizing that both will change over time.

Therefore, our approach integrates the resource (forests and their component trees) with the people who benefit from them. In so doing, we acknowledge the complexity of both the resource itself and the management programs that influence it. We also recognize that communities will vary in both the ecological possibilities and societal desires.

Defining Sustainability

In developing a model of sustainable urban forests, we first examined how other sustainable systems were defined and described. Although we have concentrated on forest systems, other examples were considered. While some principles of sustainable systems were directly applicable to urban forests, others require modification or were in conflict with the nature of urban forests and forestry.

The Brundtland Commission Report (21) has generally served as the starting point for discussion about sustainable systems. It defined sustainable forestry as:

"Sustainable forestry means managing our forests to meet the needs of the present without compromising the ability of future generations to meet their own needs by practicing a land stewardship ethic which integrates the growing, nurturing and harvesting of trees for useful products with the conservation of soil, air, and water quality, and wildlife and fish habitat."

Both Webster (22) and Wiersum (23) examined this definition from the perspective of forest management. They recognized that issues of *what* is to be sustained and *how* sustainability is to be implemented are unresolved. Wiersum (23)

acknowledged the historical focus on sustaining yield and its recent broadening to sustainable management. Webster (22) suggested a need for focus on the issue of *scale:* the size of the area or space to be included.

Further refinements in the Brundtland Commission's definition of sustainability were made by Salwasser (16) and Sample (17). Salwasser (16) described sustainability as:

"Sustainability means the ability to produce and/or maintain a desired set of conditions or things for some time into the future, not necessarily forever."

Salwasser (16) included environmental, economic and community based components, acknowledging that sustainability is not simply a resource matter. He also stressed that the goals and objectives for forest management cannot exceed the biological capacity of the resource, now and into the future.

Sample (17) focused more closely on forest management, emphasizing the need for shared vision among diverse property owners. In a workshop on ecosystem management, Sample described sustainable forestry as:

"Management and practices which are simultaneously environmentally sound, economically viable and socially responsible."

Some definitions of sustainable forests are not directly applicable to urban settings. For example, the description presented at the conference on Sustainable Forestry (18) included comments about capacity for self-renewal. Since regeneration of urban forests must occur in a directed, location-specific manner, use of such a definition is inappropriate.

Other definitions consider the goal of sustainable forests in a manner inconsistent with our concept of urban forests. Thompson *et al.* (20) described sustainability as "programs that yield desired environmental and economic benefits without wasteful, inefficient design and practices." While these authors were interested in urban settings, their approach was limited to municipal forestry programs rather than city-wide processes or results. Dehgi *et al.* (6) focused on California's native Monterey pine forest and restricted their definition of sustainability to that system. Moreover, their interest was limited to sustaining the "natural dynamic genetic process." In another approach, the American Forest and Paper Association's Sustainable Forestry Initiative (1) is largely aimed at industrial forest practice and products. This focus on industrial forestry seems largely incompatible with urban environments.

Given the examples noted above, the role of humans in sustainable systems (including forests) is generally accepted. However, Botkin and Talbot (2) (as criticized by Webster) argued that sustainable development of tropical forests requires non-disturbance by humans. Again, this idea is incompatible with urban forests.

Applying Concepts of Sustainable Forests to Urban Forests

In moving the concepts of sustainable development of forests towards implementation and practice, Webster (22) raised several significant questions. We have considered these questions from the urban forest perspective:

What objects, conditions, and values are to be sustained?

In urban areas, we focus on sustaining net benefits of trees and forests at the broadest level. We are sustaining environmental quality, resource conservation, economic development, psychological health, wildlife habitat, and social well-being.

What is the range of forest activities that contribute to sustainable development?

Simply put, urban forests require a broad set of activities, from management of both single trees and large stands to education of the community about urban forests and development of comprehensive management plans.

What is the geographic scale at which sustainable development can be most usefully applied?

Political borders do not respect biology (and vice versa). Principles of ecosystem management argue for a scale based on ecological boundaries such as watersheds. However, cities form discrete political, economic and social units. We must respect the reality that political borders may be more significant to management than ecological boundaries. Urban forestry programs work within

this geographical framework.

For this project and model, we have chosen to focus on the city and its geographic limits. While this approach may violate some of the biological realities of forest stands, it logically reflects the jurisdictional boundaries and typical management units found in cities. The more common alternative approach, working with ecosystems, is not without problems of definition and scale (7).

What is the relationship of sustainable development for (urban forests) to new technology, effectively applied research and investment in forest management?

Urban forests stand to benefit tremendously from new technology, information and investment. Not only will the ability to select and grow trees in cities be enhanced, but the ability to quantify the benefits accrued by their presence will expand.

Wiersum (23) provided an in-depth look at sustainability in forest systems, noting the long history of the concept in forest practice. Many would argue that the concept of sustained yield is not equivalent to sustainable development. Gatto (9) discusses this fact at length. However, Wiersum (23) observed the evolution of forest sustainability towards multiple use, biological diversity, mitigating climate change and socioeconomic dimensions. Wiersum summarized four concepts involved with sustainable forest management as maintenance or sustenance of:

- forest ecological characteristics
- yields of useful forest products and services for human benefit
- human institutions that are forest-dependent
- human institutions that ensure forests are protected against negative external institutions.

A similar perspective on sustainable forest management (13) described the measurable criteria as:

- desired future condition (the vision of the forest in the future)
- sustained yield
- ecosystem maintenance
- community (city) stability

Keene (13) also noted that these principles can be practiced in traditional forest management. Products derived from forests in which sustainable forest management is practiced may receive a third-party certification as such, in a manner similar to certification of organically-grown produce.

Maser, (14), Wiersum (23) and Charles (4) all argued that a sustainable forest would include biological, social and economic issues. For example, from the perspective of a fishery resource, sustainability is the simultaneous pursuit of ecological, socioeconomic, community and institutional goals (4). In Maser's view of ecological sustainability, the goals and needs of society must reflect the potential of the resource to meet them. This idea may be universal for sustainable development and must certainly be for urban forests.

This approach can be directly applied to cities, for we want urban forests to contribute to environmental, economic and social well-being. We need not sacrifice one goal in pursuit of another. Trees reduce atmospheric contaminants at the same time that they enhance community well-being. While there may be conflicts in specific situations (eg. planting trees under utility lines or using invasive species), in general, all of the broad goals for urban forest sustainability are compatible with the others. In this sense, when we focus on appropriate management of trees and urban forests, where management activities take place with community-supported goals and objectives, we focus on sustaining a broad range of values.

We also concur with Charles' (4) conclusion that sustainability can only be achieved when:

- Control is local (for fisheries, community and region-wide)
- Management is adaptive, recognizing the dynamic resource and its complexity
- Property rights are respected

In summary, a wide range of definitions for sustainable development have been derived from the original concept of the Brundtland Commission. No universally accepted derivation has arisen for forestry. Despite this problem, progress has been made in identifying criteria and markers for success.

Characteristics of Urban Forest Sustainability

Given the general characteristics of sustainable systems and the specific nature of urban forests, we identified 4 principles to which any model of sustainability must adhere.

1. Sustainability is a broad, general goal. While we may be able to describe the desired functions of a sustainable urban forest, we cannot yet design the forest to optimize them. Although we know that urban forests act to reduce atmospheric contaminants, we do not yet know how to design those forests to maximize that function. However, we accept that existing urban forests provide these functions to some degree. Trees in cities serve to improve community well-being, reduce the urban heat island, eliminate contaminants from the atmosphere, etc. While there are costs involved in planting, maintaining and removing trees in cities, in a sustainable urban forest the net benefits provided by these functions are greater than the costs associated with caring for the forest. A sustainable urban forest provides continuity of these net benefits over time and through space. We therefore have decided to recognize the general character of sustainable systems and develop steps that form such a system in urban areas.

2. Urban forests primarily provide services rather than goods. Descriptions of sustainable systems usually focus on the goods that system provides, i.e. sustained yield. Forests provide fuel and fiber, agronomic systems provide food and fiber, fisheries provide food, etc. In such examples, goods are the primary output.

In contrast, goods comprise a rather limited output of the urban forests. The most important outputs are services, such as reducing environmental contamination (from removing atmospheric gases to moderating storm water runoff), improving water quality, reducing energy consumption, providing social and psychological well-being, providing for wildlife habitat, etc. These services, or benefits, are provided in two ways: 1) direct (shading an individual home, raising the value of a residential property) and 2) indirect (enhancing the well-being of community residents).

In planting and maintaining sustainable urban forests, we should strive for a balance among all benefits and not maximize the output of one service at the expense of all others. For example, one of the benefits that urban forests provide is wildlife habitat. Maintaining the largest wildlife habitat possible could conflict with other services, such as limiting economic development from property development or creating conflicts with humans.

3. Sustainable urban forests require human intervention. One of the wonderful characteristics of natural systems is their capacity for self-maintenance. Sustainable forests, farms and fisheries take advantage of this fact by harvesting some limited segment of the resource, often with a period of rest to allow renewal and replacement. The Brundtland Commission Report (21), Maser (14) and Charles (4) emphasized this critical aspect of the resource to be sustained. For example, Goodland (10) defined environmental sustainability as "maintenance of natural capital." Maser noted that a biologically sustainable forest is the foundation for all other aspects of a sustainable system. In forestry, there can be no sustainable yield, sustainable industry, sustainable community or sustainable society without a biologically sustainable resource. As Charles put it (for fisheries), "If the resource goes extinct, nothing else matters."

Many (but not all) urban forests are a mosaic of native forest remnants and planted trees. The native remnants may have some capacity for self-renewal and maintenance, particularly in greenbelts and other intact stands. However, the planted trees have essentially no ability to regenerate *in place*. Therefore, we must accept, acknowledge and act on the fact that urban forests (particularly in the United States) may have a limited ability to retain or replace biological capital (to use Maser's term). This is particularly the case when we desire that regeneration occur in a manner appropriate for human benefits. Indeed, unwanted tree reproduction may actually have a net cost for control and eradication programs.

Sustainable urban forests cannot be separated from the activities of humans. Such activity can be both positive and negative. In the latter case, creation and maintenance of urban infrastructure

can be extremely destructive and disruptive. In essence, we superimpose cities atop forests. The greater the imposition, the less natural the forests appear and function (D. Nowak, personal communication).

The adverse impacts of humans can be mitigated by positive actions such as planning, planting, and management; all occurring with common commitment and shared vision. We cannot separate sustainable urban forests from the people who live in and around them. In fact, we want to meld the two as much as possible.

The implications of this principle are far-reaching. First, urban forests require active, consistent, continuing management. The accrual of net benefits can only occur when adequate and reasonable care is provided. Second, tree managers (both public and private) must involve the surrounding community in decisions and actions regarding urban forests. We do not suggest abdicating responsibility on the part of tree managers; we advocate sharing it.

4. Trees growing on private lands compose the majority of urban forests. While publicly - owned trees (primarily in parks and along streets and other rights-of-way) have been the long-standing focus of urban forestry, they comprise only a portion of the urban forest. An estimated 60 - 90% of the trees in urban forests in the United States are found on privately owned land (see 19; also G. McPherson, pers. communication). Therefore, sustainable urban forests depend to a large degree on sustainable private forests.

If we consider further that trees probably are not evenly distributed among all private land-holders, then we may also conclude that a small number of land owners and managers may be responsible for a large fraction of urban trees. For example, universities, business parks, corporate campuses, commercial real estate, autonomous semi-public agencies, utilities, etc. may manage large numbers of trees. The success of any effort at sustainability must include their participation and commitment.

However, small private landholdings, particularly residential properties, may also constitute a significant fraction of community trees. Their contribution to the urban forest must be considered in any effort towards sustainability.

Defining Sustainable Urban Forests. Applying these 4 principles leads to the following definition of a sustainable urban forest:

"The naturally occurring and planted trees in cities which are managed to provide the inhabitants with a continuing level of economic, social, environmental and ecological benefits today and into the future."

Applying this definition in urban areas requires accepting 3 ideas:

1. Communities must acknowledge that city trees provide a wide range of net benefits. Planting, preserving and maintaining trees is neither simply a good thing nor an exercise. Rather, urban forests are essential to the current and future health of cities and their inhabitants.

2. Given the goal of maintaining net benefits over time, the regeneration of urban forests requires intervention and management by humans. To quote David Nowak, "people want and need to direct the renewal process because natural regeneration does not meet most urban needs." Therefore, urban forests cannot be sustained by nature, but by people.

3. Sustainable urban forests exist within defined geographic and political boundaries: those of cities. Moreover, sustainable urban forests are composed of all trees in the community, regardless of ownership.

A Model of Urban Forest Sustainability

Given the 3 premises listed above, we developed a model of urban forest sustainability which is founded on three components: 1) vegetation resource, 2) a strong community framework and 3) appropriate management of the resource. Within each component are a number of specific criteria for sustainability (see Tables 1, 2 and 3).

1. Vegetation resource. The vegetation resource is the engine that drives urban forests. Its composition, extent, distribution, and health define the limit of benefits provided and costs accrued. As dynamic organisms, urban forests (and the trees that form them) change over time as they grow, mature and die. Therefore, sustainable urban forests must possess a mix of

Table 1. Criteria of urban forest sustainability for the Vegetation Resource.

Canopy cover	Achieve climate-appropriate tree cover, community-wide.	Though the ideal amount of canopy cover will vary by climate and region (and perhaps by location within the community, there is an optimal degree of cover for every city.
Age distribution	Provide for uneven age distribution.	A mix of young and mature trees is essential if canopy cover is to remain relatively constant over time. To insure sustainability, an on-going planting program should go hand in hand with the removal of senescent trees. Some level of tree inventory will make monitoring for this indicator easier. Small privately owned properties pose the biggest challenge for inclusion in a broad monitoring program.
Species mix	Provide for species diversity.	Species diversity is an important element in the long-term health of urban forests. Experience with species-specific pests has shown the folly of depending upon one species. Unusual weather patterns and pests may take a heavy toll in trees in a city. It is often recommended that no more than 10% of a city's tree population consist of one species.
Native vegetation	Preserve and manage regional biodiversity. Maintain the biological integrity of native remnant forests. Maintain wildlife corridors to and from the city.	Where appropriate, preserving native trees in a community adds to the sustainability of the urban forest. Native trees are well-adapted to the climate and support native wildlife. Replanting with nursery stock grown from native stock is an alternative strategy. Planting non-native, invasive species can threaten the ability of native trees to regenerate in greenbelts and other remnant forests. Invasive species may require active control programs.

species, sizes and ages that allows for continuity of benefits while trees are planted and removed (Table 1).

The vegetation resource of a sustainable urban forest is one that provides a continuous high level of net benefits including energy conservation, reduction of atmospheric contaminants, enhanced property values, reduction in storm water run-off,

Table 2. Criteria of urban forest sustainability for the Community Framework.

Public agency cooperation	Insure all city departments operate with common goals and objectives.	Departments such as parks, public works, fire, planning, school districts and (public) utilities should operate with common goals and objectives regarding the city's trees. Achieving this cooperation, requires involvement of the city council and city commissions.
Involvement of large private and institutional landholders	Large private landholders embrace city wide goals and objectives through specific resource management plans.	Private landholders own and manage most of the urban forest. Their interest in, and adherence to, resource management plans is most likely to result from a community-wide understanding and valuing of the urban forest. In all likelihood, their their cooperation and involvement cannot be mandated.
Green industry cooperation	The green industry operates with high professional standards and commits to city-wide goals and objectives.	From commercial growers to garden centers and from landscape contractors to engineering professionals, the green industry has a tremendous impact on the health of a city's urban forest. The commitment of each segment of this industry to high professional standards and their support for city-wide goals and objectives is necessary to ensure appropriate planning and implementation.
Neighborhood Action	At the neighborhood level, citizens understand and participate in urban forest management.	Neighborhoods are the building blocks of cities. They are often the arena where individuals feel their actions can make the biggest difference in their quality of life. Since the many urban trees are on private property (residential or commercial), neighborhood action is a key to urban forest sustainability.
Citizen - government - business interaction	All constituencies in the community interact for the benefit of the urban forest.	Having public agencies, private landholders, the green industry and neighborhood groups all share the same vision of the city's urban forest is a crucial part of sustainability. This condition is not likely to result from legislation. It will only result from a shared understanding of the urban forest's value to the community and commitment to dialogue and cooperation among the stakeholders.

Table 2. Criteria of urban forest sustainability for the Community Framework (continued)

General awareness of trees as a community resource	The general public understands the value of trees to the community.	Fundamental to the sustainability of a city's urban forest is the general public's understanding of the value of its trees. People who value trees elect officials who value trees. In turn, officials who value trees are more likely to require the agencies they oversee to maintain high standards for management and provide adequate funds for implementation.
Regional cooperation	Provide for cooperation and interaction among neighboring communities and regional groups.	Urban forests do not recognize geographic boundaries. Linking city's efforts to those of neighboring communities allows for consideration and action on larger geographic and ecological issues (such as water quality and air quality).

and social well-being.

There are costs associated with the accrual of these benefits. Dead, dying and defective trees may fail and injure citizens or damage property. Some species may pose a health risk from allergenic responses. Others may compete with native vegetation and limit the function of naturally occurring fragments and systems.

2. Community framework. A sustainable urban forest is one in which the all parts of the community share a vision for their forest and act to realize that vision through specific goals and objectives (Table 2). It is based in neighborhoods, public spaces and private lands.

At one level, this requires that a community agree on the benefits of trees and act to maximize them. On another level, this cooperation requires that private landowners acknowledge the key role of their trees to community health. Finally, in an era of reduced government service, cooperation means sharing the financial burden of caring for the urban landscape.

3. Resource management. In many ways, this component is not simply management of the resource but the philosophy of management as well (Table 3). On one hand, specific policy vehicles to protect existing trees, manage species selection, train staff and apply standards of care focus on the tree resource itself. In contrast, acceptance of a comprehensive management plan and funding program by city government and its constituents allows shared vision to develop.

Cities must recognize that management approaches will vary as a function of the resource and its extent. A goal of maintaining native wildlife habitat may best be achieved where there is a strong native forest resource. For some cities, this is simply not attainable. Similarly, management of the urban forest must exist in connection to the larger landscape (such as adjacent forests). For example, maintenance of intact riparian corridors requires the cooperation of the managing agency of the stream.

Achieving Sustainable Urban Forests. A sustainable urban forest is founded upon community cooperation, quality care, continued funding and personal involvement. It is created and maintained through shared vision and cooperation with an ever-present focus on maximizing benefits and minimizing costs. Taken together, they acknowledge the need for shared vision and responsibility, for direct intervention with the resource and for programs of care that are on-going and responsive. The implementation of

Table 3. Criteria of urban forest sustainability for Resource Management.

City-wide management plan	Develop and implement a management plan for trees on public and private property.	A city-wide management plan will add to an urban forest's sustainability by addressing important issues and creating a shared vision for the future of the community's urban forest. Elements may include: species and planting guidelines; performance goals and standards for tree care; requirements for new development (tree preservation and planning); and specifications for managing natural and open space areas.
Funding	Develop and maintain adequate funding to implement a city-wide management plan.	Since urban forests exist on both public and private land, funding must be both public and private. The amount of funding available from both sources is often a reflection of the level of education and awareness within a community for the value of its urban forest.
Staffing	Employ and train adequate staff to implement a city-wide management plan.	An urban forest's sustainability is increased when all city tree staff, utility and commercial tree workers and arborists are adequately trained. Continuing education in addition to initial minimum skills and/or certifications desirable.
Assessment tools	Develop methods to collect information about the urban forest on a routine basis.	Using canopy cover assessment, tree inventories, aerial mapping, geographic information systems and other tools, it is possible to monitor trends in a city's urban forest resource over time.
Protection of existing trees	Conserve existing resources, planted and natural, to ensure maximum function.	Protection of existing trees and replacement of those that are removed is most often accomplished through policy vehicles. Ordinances that specify pruning standards and/or place restrictions on the removal of large or other types of trees on public and private property and during development are examples.
Species and site selection	Provide guidelines and specifications for species use, on a context-defined basis.	Providing good planting sites and appropriate trees to fill them is crucial to sustainability. Allowing adequate space for trees to grow and selecting trees that are compatible with the site will reduce the long- and short-term maintenance requirements and enhance their longevity. Avoiding species known to cause allergenic responses is also important in some areas.

Table 3. Criteria of urban forest sustainability for Resource Management (continued)

Standards for tree care	Adopt and adhere to professional standards for tree care.	Sustainability will be enhanced by adhering to the professional standards such as the Tree Pruning Guidelines (ISA) and ANSI Z133 publications.
Citizen safety	Maximize public safety with respect to trees.	In designing parks and other public spaces, public safety should be a key factor in placement, selection, and management of trees. Regular inspections for potential tree hazards is an important element in the management program.
Recycling	Create a closed system for tree waste.	A sustainable urban forest is one that recycles its products by composting, reusing chips as mulch and/or fuel and using wood products as firewood and lumber.

Table 4. Criteria and performance indicators for the Vegetation Resource.

Criteria	Performance indicators				Key Objective
	Low	Moderate	Good	Optimal	
Canopy cover	No assessment	Visual assessment (i.e. photographic)	Sampling of tree cover using aerial photographs.	Information on urban forests included in city-wide geographic information system (GIS).	Achieve climate-appropriate degree of tree cover, community-wide.
Age - distribution of trees in community	No assessment	Street tree inventory (complete or sample)	Public - private sampling	Included in city-wide geographic information system (GIS).	Provide for uneven age distribution.
Species mix	No assessment	Street tree inventory	City-wide assessment of species mix	Included in city-wide geographic information system (GIS).	Provide for species diversity.
Native vegetation	No program of integration	Voluntary use on public projects	Requirements for use of native species on a project-appropriate basis	Preservation of regional biodiversity	Preserve and manage regional biodiversity. Maintain the biological integrity of native remant forests. Maintain wildlife corridors to and from the city.

Table 5. Criteria and performance indicators for the Community Framework.

Criteria	Performance indicators				Key Objective
	Low	Moderate	Good	Optimal	
Public agency cooperation	Conflicting goals among departments	No cooperation	Informal working teams	Formal working teams w/ staff coordination	Insure all city departments operate with common goals and objectives.
Involvement of large private and institutional land holders	Ignorance of issue	Education materials and advice available to land-holders	Clear goals for tree resource by private land-holders; incentives for preservation of private trees	Land-holders develop comprehensive tree management plans (including funding)	Large private landholders embrace city-wide goals and objectives through specific resource management plans.
Green industry cooperation	No cooperation among segments of industry (nursery, contractor, arborist). No adherence to industry standards.	General cooperation among nurseries - contractors - arborists, etc.	Specific cooperative arrangements such as purchase certificates for right tree, right place	Shared vision and goals including the use of professional standards.	The green industry operates with high professional standards and commits to city-wide goals and objectives.
Neighborhood action	No action	Isolated and/or limited no. of active groups	City-wide coverage and interaction	All neighborhoods organized and cooperating	At the neighborhood level, citizens understand and participate in urban forest management.
Citizen - government - business interaction	Conflicting goals among constituencies	No interaction among constituencies	Informal and /or general cooperation	Formal interaction, e.g.. tree board w/ staff coordination	All constituencies in the community interact for the benefit of the urban forest.
General awareness of trees as community resource	Low -- trees as problems; a drain on budgets	Moderate -- trees as important to community	High -- trees acknowledged to provide environmental services	Very high -- trees as vital components of economy and environment	The general public understands the value of trees to the community.
Regional cooperation	Communities operate independently	Communities share similar policy vehicles	Regional planning	Regional planning coordination and/or management plans	Provide for cooperation and interaction among neighboring communities and regional groups.

a model for urban forest sustainability would further redirect the traditional orientation of urban forest management away from municipal trees to the mix of public and private trees.

Achieving sustainability for urban forests involves meeting each of these criteria. To assist in this task, we have described indicators of success for each criteria (Tables 4, 5, and 6). A city that meets the highest level of each indicator for each criteria would have the best tools and resources to achieve sustainability.

Our approach of developing criteria and

Table 6. Criteria and performance indicators for Resource Management.

Criteria	Performance indicators				Key Objective
	Low	Moderate	Good	Optimal	
City-wide management plan	No plan	Existing plan limited in scope and implementation	Government -wide plan, accepted and implemented	Citizen - government - business resource management plan, accepted and implemented	Develop and implement a management plan for trees and forests on public and private property.
City-wide funding	Funding by crisis management	Funding to optimize existing population	Adequate funding to provide for net increase in population and care	Adequate funding, private and public, to sustain maximum potential benefits	Develop and maintain adequate funding to implement a city-wide management plan.
City staffing	No staff	No training	Certified arborists on staff	Professional tree care staff	Employ and train adequate staff to implement city-wide management plan.
Assessment tools	No on-going program of assessment	Partial inventory	Complete inventory	Information on urban forests included in city-wide GIS	Develop methods to collect information about the urban forest on a routine basis.

indicators is patterned after that found in the Santiago Agreement (11) which suggested criteria and indicators for the conservation and sustainability of temperate and boreal forests. It recognized that both quantitative and qualitative (descriptive) indicators were needed, for not all criteria could be accurately measured.

Conclusions

Maser suggested that ecological sustainability encompasses 4 ideals:

1. Providing a long-term balance between society and the resource, today and in the future.
2. Seeking to increase the overlap between societal desires and ecological possibilities.
3. Developing assessment tools for both the resource and its outputs (benefits, services).
4. Restoring ecosystems.

Our model for urban forest sustainability adheres to these 4 ideals, placing them in an urban context. It recognizes the nature of society in cities and encourages participation at the broadest level. The model also acknowledges the need to foster regeneration, to provide for the continuity of the resource. Management of a sustainable urban forest is based upon a shared vision for the resource, in which goals and needs are balanced. Since sustainability is a general goal, we must be able to assess our progress relative to defined standards. Finally, we recognize that our actions, through such activities as development, will damage forests and their function. We accept the responsibility of restoration.

Urban trees and forests are considered integral to the sustainability of cities as a whole (3, 8). Yet, sustainable urban forests are not born, they are made. They do not arise at random, but result from a community-wide commitment to their creation and management.

Obtaining the commitment of a broad community, of numerous constituencies, cannot be dictated or legislated. It must arise out of compromise and respect. While policy vehicles such as ordinances play a role in managing the

Table 6. Criteria and performance indicators for Resource Management (continued)

Protection of existing trees	No policy vehicle or policy not enforced	Tree preservation ordinance present and enforced	Tree preservation plan required for all projects....public, private, commercial, residential	Integrated planning program for conservation and development	Conserve existing resources, planted and natural, to ensure maximum function.
Species and site selection	Arbitrary species prohibitions	No consideration of undesirable species	Identification/prohibition of undesirable species	On-going use of adapted, high-performing species with good site - species match	Provide guidelines and specifications for species use, including a mechanism for evaluating the site.
Standards for tree care	None	Standards for public tree care	Standards for pruning, stock, etc. for all trees	Standards part of community - wide vision	Adopt and adhere to professional standards for tree care.
Citizen safety	Crisis management	Informal inspections	Comprehensive hazard (failure, tripping, etc.) program	Safety part of cost - benefit program	Maximize public safety with respect to trees.
Recycling	Simple disposal (i.e. land filling) of green waste	Green waste recycling	Green and wood waste recycling - reuse	Closed system -- no outside disposal	Create a closed system for tree waste.

urban forest, developing commitment is probably more a function of education, awareness and positive incentives. This may represent our most significant challenge: to provide information that creates commitment and guides action.

This is not to ignore the budgetary requirements for sustainable urban forests. It has long been our belief that if education were adequate, funding would soon follow. Despite the current state of funding, we must hold to this perspective.

Finally, sustainable urban forests also require a viable resource base. While urban foresters and arborists have long felt confident in their ability to sustain the resource, we must acknowledge our limitations as well as our strengths. The optimal structure of urban forests, i.e. the arrangement of trees in a city, remains the subject of research. Our industry must strive to resolve conflicts such as quality of nursery stock, appropriate cultural practices and the match between site considerations and species selection.

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Zussammenfassung. Das Modell des sich selbsterhaltenden Stadtwaldes wendet allqemeine Prinzipien der Selbsterhaltung auf städtische Bäume und Wälder an. Sich selbst erhaltende Stadtwälder erfordern eine qesunde Herkunft der Pflanzen, kommunale Unterstützung und ein umfassendes Management. Die Kriterien und Indikatoren, um diesen Status zu überprüfen werden hier vorgestellt. Das deutlichste Resultat eines sich selbst erhaltenden Stadtwaldes besteht darin, einen maximalen Grad an umweltbezogenen, ökologischen, sozialen und ökonomischen Vorzügen zu erreichen.