# PORTLAND PLAN

# Urban Forestry

**PLANNING AND SUSTAINABILITY COMMISSION**
**RECOMMENDED DRAFT**
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City of Portland Bureau of
## Planning and Sustainability
Sam Adams, Mayor | Susan Anderson, Director

# Acknowledgments

# Urban Forestry

PROSPERITY AND BUSINESS SUCCESS

**SUSTAINABILITY AND THE NATURAL ENVIRONMENT**

**DESIGN, PLANNING AND PUBLIC SPACES**

NEIGHBORHOODS & HOUSING

TRANSPORTATION, TECHNOLOGY AND ACCESS

EDUCATION AND SKILL DEVELOPMENT

HUMAN HEALTH, FOOD AND PUBLIC SAFETY

QUALITY OF LIFE, CIVIC ENGAGEMENT AND EQUITY

ARTS, CULTURE AND INNOVATION

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**Urban Forestry Background Report - Revised**

## TABLE OF CONTENTS

## MAPS

# INTRODUCTION

This report helps to set the stage and help guide the Portland Plan project to integrate trees and the city's urban forestry goals and aspirations. The report first provides important background information on the benefits of trees, Portland's urban forest, and existing City plans and policies relating to the urban forest. This is followed by discussion of key policy issues and questions that should be addressed through the Portland Plan. A number of these issues were identified by staff and community stakeholders participating in the Citywide Tree Policy Review and Regulatory Improvement Project (Citywide Tree Project) and are recommended for consideration in the Portland Plan project. Issues relating to growth, density, infill development, trees, and how to balance sustainable energy systems with a sustainable forest canopy go beyond the scope of the Citywide Tree Project. These issues need to be addressed in the context of long-term growth management and urban form decision making.

# BENEFITS OF TREES

The benefits of trees within urban areas are well documented, and research is continuing as communities across the country struggle to balance and integrate growth with goals to incorporate green infrastructure, like trees, and improve public health and aesthetics. (See Appendix A for a list of references). Urban trees provide the following benefits, among others:

- *Environmental benefits: Urban trees help manage stormwater, improve air quality, reduce pollution and greenhouse gases, recharge groundwater, decrease flooding and erosion, stabilize slopes, provide wildlife habitat, and shade streams. A recent report produced by the Bureau of Environmental Services notes that each tree intercepts 572 gallons of rainfall, will remove 0.2 pounds of air particulates, and can sequester 0.076 metric tons of carbon dioxide per year. (Entrix, 2010)*

- *Social benefits: Urban trees improve physical and mental health, reduce heat island effects, create visual and noise buffers, enhance neighborhood appearance, and contribute to reduced neighborhood crime.*

- *Economic benefits: Urban trees reduce heating and cooling costs for buildings by providing shade and wind breaks. They also increase property values and reduce landslide and flood damage. A local study found that the presence of street trees increased east-side home values by almost $9,000 on average (Donovan and Butry, 2010). Another study showed a positive effect on median home sales process from tree canopy within one-quarter mile of the home (Netusil, Chattopadhyay, and Kovacs, 2010).*
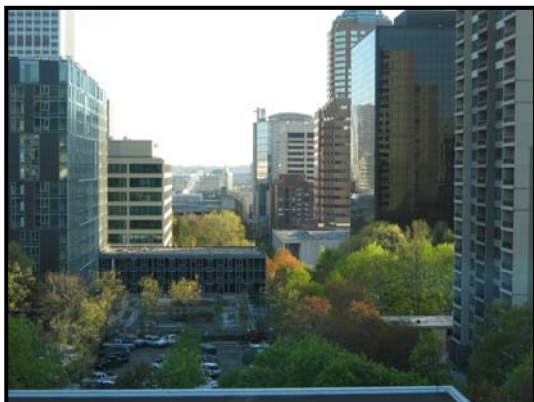
There have been many efforts to quantify the value of benefits or "services" provided by the urban forest. For example, the City of Portland's Bureau of Parks and Recreation recently conducted a study of the City's public trees to estimate the benefits they provide (Karps et al. 2007). The study evaluated the structure of the City's urban forest—the number, type, and relative age and health of the public tree population —and used this information to calculate the value of the environmental and aesthetic benefits of all the city's trees. The conclusion was that trees are a significant and valuable public asset. In addition, several academic studies have recently examined the influence of trees on residential real estate prices in Portland, finding that the presence of street trees and neighborhood trees increase property values (Netusil, Chattopadhyay, and Kovacs, 2010; Donovan and Butry, 2010).  Trees and green features can also enhance local business districts and encourage pedestrian foot traffic and local commerce.

In Portland it is clear that trees contribute to neighborhood character and cultural identity.  Across the nation and in some other countries as well, there are efforts to explore the emotional and psychological benefits of nature, including trees.  For example, researchers have studied such effects in the context of hospital patients, nursing home residents, office workers, students, and car drivers.  Benefits from contact with various types of green spaces and views have included: better test scores; fewer illnesses, positive effect on physiological measures, and shortened hospital stays (University of Minnesota, 2007).

## PORTLAND'S URBAN FOREST

### DESCRIPTION

Portland's *Urban Forestry Management Plan* describes the urban forest as more than "trees on streets or in city parks. It is the complex system of trees and smaller plants, wildlife, associated organisms, soil, water, and air in and around our city. It is the trees along our streets, the plants and trees around our homes, businesses, and institutions, the multi-layered forests in our natural areas, and the plants in our parks. A healthy and diverse urban forest is essential to our quality of life and important in the City's coordinated efforts to restore the quality of its rivers and streams and improve the environment of the city." (City of Portland Bureau of Parks and Recreation, 2004)



The Portland Parks and Recreation 2007 report, *Portland's Urban Forest Canopy - Assessment and Public Tree Evaluation* (Karps et al. 2007, also known as the PP&R 2007 report), found that the street and park tree population is composed of approximately 171 different tree types, with broadleaf deciduous trees (mostly several varieties of maples) dominating by more than 50 percent. Approximately half of the trees are smaller than 6 inches in diameter, and fewer than 10 percent are larger than 30 inches in diameter.

The PP&R report notes that park trees—those found in developed, undeveloped, and natural areas managed by the City of Portland Bureau of Parks and Recreation—include more large-growing native species such as Douglas fir and western hemlock than are found among the city's street trees. Forest

Park, which occupies approximately 5 percent of the Portland's land area, consists mainly of closed-canopy forest with understory shrubs and groundcover plants that provides a wide array of functions, including wildlife habitat, wind and temperature moderation, stormwater capture and filtration, erosion control, and flood and landslide mitigation. A number of City parks contain areas of tree canopy with little understory, and large areas of lawn to support and more active uses.  Here, the urban forest functions differently than in more natural areas, but also provides important habitat for birds, air cooling and stormwater benefits.

Forest Park also provides a range of recreational opportunities for hikers, bikers, and equestrians. As Portland has grown and developed around Forest Park, wildfire—which was once part of the natural cycle of the forest system—has been suppressed. This lack of fire, in conjunction with proliferation of invasive plants, has led to a buildup of fuels that could result in a catastrophic fire, potentially affecting property owners adjacent to the park and large sections of the park itself. The City is attempting to address the wildfire hazards posed in Forest Park and other parts of Portland through a Federal Emergency Management Agency (FEMA) grant.

Concurrent with the buildup of wildfire hazard in the city's forested areas is the decline of some native tree species and groupings, such as Oregon white oak and Pacific madrone, notably along the bluffs on the east side of the Willamette River and along the foothills of Forest Park on the west side of the Willamette. These native species generally occur in only limited landscape conditions. However, fire suppression, in conjunction with other factors, has allowed the conifer population to out-compete the native oak and madrone population, resulting in conversion of oak-madrone woodland habitat.

The PP&R 2007 report (Karps et al. 2007) notes that tree canopy currently covers about 26 percent of Portland. Within the city, 54 percent of the total area is privately owned, and 46 percent is publicly owned. Similarly, 53 percent of the tree canopy shades privately owned land, and 47 percent of the canopy shades public land and streets.

The maps on the next two pages, Tree Canopy and Percent of Neighborhood with Tree Canopy, depict the distribution of trees citywide, as well as the considerable variability and disparity in the distribution of trees among Portland's neighborhoods.  The maps are based on Metro's high structure vegetation data which can be used to represent tree canopy in general.

The PPR 2007 report estimates Portland's street tree population to consist of approximately 236,000 trees. Street tree stocking levels (the percentage of potential planting spaces within public rights-of-way that are currently occupied by trees) range from 37 percent in Southeast Portland to 64 percent in Northwest Portland, averaging 45 percent citywide.  This indicates that there is tremendous potential for additional benefits from increasing street tree stocking levels over time.

 The report estimates that the replacement value of street trees is just under $500 million, and the replacement value of trees in Portland's parks and natural areas exceeds $1.8 billion. Assuming that private property tree infrastructure is comparable to that of the public trees, the report estimates that the replacement value of the entire urban canopy is roughly $5 billion. The replacement value of a tree includes the cost to replace the tree (which depends on the species, size, condition, and location) and prepare the site. Trees also have value in the ecosystem services they provide. According to the report, Parks and street trees  return approximately $3.80 in environmental and aesthetic benefits (such as clean air and stormwater retention) for each dollar invested in their care and maintenance. The PP&R 2007 report values the annual environmental and aesthetic benefits provided by Portland's street and park trees at approximately $27 million.

## TRENDS AND TARGETS

Historically, Portland's forest was subject to extensive logging to make way, help fund, and provide wood for construction of the city. Major tree planting efforts and acquisition of land for parks and natural areas has resulted in extensive tree canopy in parts of the city. However, in some areas the tree canopy is relatively sparse, particularly in North Portland and in Portland's higher density residential, commercial, and industrial areas.

The sample data collected and the analysis developed for the PP&R 2007 report focused primarily on public land. Anecdotal evidence from land division applications and neighborhood comments suggest that development is resulting in removal of trees, including large trees and tree groves both inside and outside the City's environmental overlay zones. This issue has been raised most often in parts of southeast, northeast, and southwest Portland, where much of the residential growth and development are occurring. Of particular concern in outer southeast Portland is the removal of remnant stands of Douglas-fir trees to accommodate infill residential development.

The PP&R 2007 report concludes by recommending focused efforts on retaining existing canopy, planting the right tree in the right place, planting large-species trees where appropriate, and maintaining the health of trees.

The *Urban Forestry Management Plan* (City of Portland Bureau of Parks and Recreation, 2004) establishes tree canopy coverage targets for four major urban land types: residential, commercial/industrial, developed parks/open space, and right-of-way. The residential category includes single-family and multifamily uses. The canopy targets were developed based on recommendations from the nonprofit organization American Forests, canopy targets from other jurisdictions, and City staff analysis. The targets and estimated existing canopy are as follows:

|  | Current Canopy | Target Canopy |
| --- | --- | --- |
| Residential | 30% | 35-40% |
| Commercial/Industrial | 7% | 15% |
| Parks and Open Spaces | 28% | 30% |
| Rights-of-way | 17% | 35% |
| Citywide | 26% | 33% |

An assessment of existing tree planting requirements from Portland's zoning code shows that current landscaping regulations that apply to new development are achieving only a fraction of the target canopy levels identified for residential, commercial, and industrial development (13 percent for single-family development, between 10 and 22 percent for multifamily development, and 8 percent for commercial/industrial development).

An earlier study of Portland's canopy cover by Dr. Joseph Poracsky and Michael Lackner, of Portland State University, used digital satellite imagery and other digital maps from three different years (1972, 1991, and 2002) to extrapolate canopy changes and trends (Poracsky and Lackner 2004). The city's

neighborhoods, as defined by Portland neighborhood association boundaries, were used as units for analysis and comparison. The PSU study showed the following:

- *Overall city canopy cover reflected a slight but consistent increase over the 30-year study period, from 22.4 percent to 23.6 percent.*

- *Canopy cover in 96 of the 102 neighborhoods increased during one or both of the periods 1972 to 1991 and 1991 to 2002, and 50 neighborhoods exhibited increases in both periods.*

- *Canopy cover declined in six neighborhoods during both time periods, and it declined in 22 neighborhoods during the second time period.*

- *A notable pattern of canopy increase could be seen in older neighborhoods of the inner east side of Portland. The increase is attributed to the growth of existing large spreading trees and the planting efforts of Friends of Trees over a 15-year time period.*



Despite the slight increases in total canopy noted in the PSU study, it is important to consider the lag time inherent in development activity when projecting future trends. For example, the land division approval process can take anywhere from 9 months to several years. It can be many more years before the approved development and associated tree removal actually takes place. Land division monitoring has found that a considerable portion of the land division activity has been occurring in outer-east neighborhoods (49% of all the land division applications from 2002 – 2006). This is a result of county annexations in the early 1990s and completion of the mid-county sewer project.  Many of these projects not yet been developed; therefore, additional loss in mature tree canopy can be expected in these areas over the next several years.

Other key trends relate to changes in the composition of Portland's urban forest. For example, development is resulting in the removal of large trees such as Douglas-fir, cedar, cypress, ash, and oak from public and private properties, and replanting with small species of trees that fit on smaller lots and narrower parking strips. In addition, some areas of the city contain a preponderance of aging, large trees of the same species, mostly in parks and rights-of-way, where hazardous situations can develop or disease can spread quickly because the trees are closely planted. Removal of these large, old trees, especially those in planting strips, has a substantial impact on neighborhood character.

Ultimately, it is important to recognize that the urban forest is a dynamic system that will, necessarily, evolve as the City evolves.  Unlike structures, roads and other city infrastructure, trees are living features that start small, grow larger and ultimately die.   While they live, trees in an urban environment require management and maintenance to remain healthy.  It is important to maintain tree age and species diversity to prevent disease and sustain the urban forest.  Even in natural areas, maintenance is needed to protect trees from encroachment by invasive plants such as English ivy.   Thus, sustaining the urban forest requires not only planning but also investment in ongoing care and maintenance activities.

## INFORMATION NEEDS

It is important to note that the City does not have a comprehensive inventory of trees in Portland. Much of the data about Portland's existing tree resources are estimated from field samples, aerial

photographs, and satellite images. It is nearly impossible to get an accurate "snapshot in time" of the city's tree stock or canopy coverage because changes occur daily—trees die naturally, are pruned or removed, and are planted.

Generating a tree inventory is labor intensive and requires a high level of knowledge to ensure collection of consistent data on tree species, age, height, and condition.  Still, it is important both to monitor trends and to have a strong understanding of the tree stock so that the City can hone its management approaches to address specific goals and concerns equitably and consistently.

The City of Portland's existing public tree database is not a complete inventory and does not provide the detail needed to inform strategic management decisions.  As noted in the PP&R 2007 report, only a subset of public trees were included in the analysis. Further, the City currently does not require permits to remove trees on most developed single-family properties. Therefore, it is not currently feasible to monitor the extent to which trees are being removed or replaced in more than 25 percent of the city. That said, the report provides statistically reliable, sample-based estimates and provides a starting point for assessing certain management options.

A more comprehensive public tree inventory would be a useful guide in prioritizing planting and maintenance.  Related efforts directed at tracking and monitoring private tree removal and planting would likewise help assess progress toward meeting canopy targets. Given that the amount of public and private property in the city is almost equivalent (46 percent and 54 percent, respectively), it is important that information about trees be collected about the status of trees on both public and private property in order to measure success in meeting goals for growing and maintaining Portland's urban forest.

## EXISTING CITY POLICES AND PROGRAMS

The following policies and programs are related to and directly affect Portland's urban forest.

### URBAN FORESTRY COMMISSION

The Urban Forestry Commission is appointed by the Mayor in consultation with the Parks Commissioner. The Urban Forestry Commission advises the Bureau of Parks and Recreation Director and the City Forester. The Commission provides input on the annual urban forestry program budget, helps develop and update the Urban Forest Management Plan (UFMP), and reports to City Council on yearly progress of the UFMP.  It holds hearings, decides on appeals to street tree removal permits, reviews development plans and assesses impacts on the urban forest. It sponsors the Heritage Tree Program and educates the community on urban forestry issues.  The commission members represent diverse areas and interests of the community.

### URBAN FORESTRY MANAGEMENT PLAN AND URBAN FOREST ACTION PLAN

The Urban Forestry Management Plan (UFMP) was initially developed in 1995 in a coordinated effort led by Portland Parks and Recreation.  The purpose of the UFMP was to provide direction and coordination for the management and administration of Portland's urban forest. The plan was updated in 2004 to respond to new environmental mandates (through the Endangered Species Act, the Clean Water Act, and the Superfund Law) and to clarify and improve coordination between agencies and bureaus for management of the City's tree resources. The UFMP goals and canopy targets have not yet been incorporated into the City's Comprehensive Plan. As discussed above, the UFMP is city policy and should be part of the Comprehensive Plan.

**The Portland Plan**

Following the update of the UFMP in 2004, Portland Parks and Recreation led an interbureau team of city staff who worked together to develop an action plan to implement the goals established in the UFMP. The action plan was accepted by City Council in 2007. The interbureau team continues to meet to coordinate implementation of the UFMP. The Urban Forestry Commission reports to City Council annually on the implementation of the Urban Forest Action Plan. Current activities are diverse, ranging from education and outreach to a substantial overhaul and restructuring of the City's tree regulations.

## URBAN FORESTRY PROGRAM

The Urban Forestry program, part of the Bureau of Portland Parks and Recreation, maintains and manages the publicly owned trees in Portland's parks, along streets, and around public buildings. PP&R Urban Forestry (UF) manages trees on city property and city ROW. Trees in city ROW are the maintenance responsibility of the adjacent property owner. For this reason, UF maintains trees in ROW adjacent to parks (and in parks) because Parks bureau is the adjacent property owner. UF does not maintain any other trees on public property or ROW (barring a special agreement) unless they are paid for that work through an IA. Exceptions include elm tree removals and heritage tree maintenance. It also takes the lead in coordinating efforts to manage the urban forest throughout the City. It does this by:

- Coordinating, planning, planting, inspecting and maintaining trees in City parks and natural areas;

- Providing emergency response services to storm related and other tree related emergencies 24 hours a day;

- Providing technical advice to property owners regarding planting, care, and preservation of street trees;

- Permitting tree removal, planting and pruning on City-managed land, and permitting tree removal on private property in non-development situations (non-dividable single family residential property is exempt);

- Providing guidance and enforcement of the tree cutting ordinance to preserve significant trees on undeveloped and underdeveloped property;

- Working with the Urban Forestry Commission and property owners to resolve tree-related conflicts;

- Manage and coordinate tree fund expenditures.

## PORTLAND WATERSHED MANAGEMENT PLAN

The Portland Watershed Management Plan, adopted by City Council in 2005, is a multi-bureau effort led by the Bureau of Environmental Services to improve watershed health. The Watershed Management Plan describes the approach that will be used to evaluate conditions in the City's urban watersheds and implement projects that improve watershed health.

The Watershed Management Plan establishes goals relating to watershed hydrology, water quality, fish and wildlife habitat, and biological communities. An overarching theme of the Watershed Management Plan is to achieve improved watershed health through policies and protection of important natural resources, revegetation, watershed-friendly development, installation of new stormwater infrastructure,

repair and maintenance of existing infrastructure, education, and stewardship. The Watershed Management Plan presents the science behind the need for these approaches and describes a management system to track City progress in achieving well-defined watershed health goals. The management system also will help the City bureaus adapt their strategies as needed to maximize effectiveness. The success of the Watershed Management Plan will depend on the ability of all City bureaus to integrate a "watershed approach" into their routine work. Trees and vegetation play an important role in maintaining key watershed functions.

## THE PORTLAND COMPREHENSIVE PLAN

- *The purpose of the Comprehensive Plan is to provide a coordinated set of guidelines for decision making to guide the future growth and development of Portland. Legislative land use projects must be in compliance with the Comprehensive Plan or recommend changes to the plan where new policy is proposed or existing policies are changing. While the urban forest has been identified as a priority in multiple City initiatives, the Comprehensive Plan does not specifically identify trees or the urban forest as an important resource. For example, Goal 8, Environment, includes policies about air quality, water quality, and natural hazards that do not mention trees or the urban forest's positive role in improving air and water quality and reducing hazards such as flooding and landslides. Protection of vegetation in upland areas is included, but only in the context of providing buffers for wetlands and water bodies, slope protection, and conservation of wildlife corridors. These are all important functions of trees, however the Comprehensive Plan should be updated to recognize the many areas where trees play an important role (further discussion provided in the Portland Plan section below).*

## PORTLAND/MULTNOMAH COUNTY 2009 CLIMATE ACTION PLAN (OCTOBER, 2009)

The Portland/Multnomah County 2009 Climate Action Plan was developed jointly in response to a city-county commitment to reduce carbon emissions 80 percent below 1990 levels by 2050. When adopted, the Climate Action Plan will serve as the long-term roadmap for the institutional and individual change needed to reach ambitious climate protection goals, while also identifying specific actions to be taken in the next 3 years. The goal of the plan is to make Portland a low-carbon society, while further strengthening the local economy, advancing public health, and improving the high quality of life for which this region is known.

The Climate Action Plan recognizes the important role of trees in greenhouse gas reduction across the city. The plan calls for ambitious tree planting through Grey to Green, an update of city tree policies and codes to support preservation of large trees and urban forest replenishment, and continued implementation of the Urban Forest Action Plan.

## WATERSHED REVEGETATION PROGRAM

Through the Watershed Revegetation Program, BES identifies natural areas in need of invasive plant removal and native plant revegetation to restore functioning forests in riparian and upland areas. The program identifies sites in all of Portland's watersheds and conducts outreach to both public and private landowners to increase the connectivity of forested sites. Landowners provide access and contribute to the effort though cost-sharing or
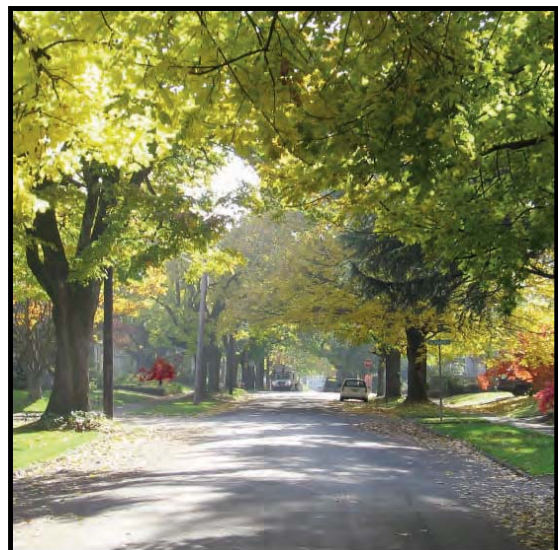
in-kind work.  To date, the program has worked on hundreds of properties, more than 4,000 acres and has planted more than two million native trees.  This restoration work improves water quality, decreases erosion, reduces stormwater pollution, enhances wildlife habitat and helps sustain forest for future generations to enjoy.

## GREY TO GREEN

Grey to Green is a citywide effort to expand Portland's green infrastructure and manage more stormwater in a way that mimics natural systems. The programs are managed and implemented by BES and include the Watershed Revegetation Program, the Green Streets Program, the Ecoroof Program, and a (new) street and yard tree planting program. The Grey to Green Program is helping to achieve the goals of the Urban Forest Action Plan.  The goal of the program is to plant 83,000 trees citywide over a 5-year period.  BES is coordinating tree planting plans with the Urban Forestry program.

- *Treebate Program - As part of the Grey to Green program the City has established "Treebate" which provides a financial incentive for homeowners to plant trees in their yards.  The City provides a credit of $10 to $50 on the stormwater bill for half the purchase price of a new tree.  The larger the tree at maturity, the higher the credit on the stormwater bill will be.  The property owner must provide proof of purchase to receive the credit.*

- *The Grey to Grey program is scheduled to end by April 30 2013.*

## NATURAL AREA MANAGMENT

PP&R manages over 7,000 acres of natural areas and developed parks that include over 28% of the City's public forest.  Management focus includes protection and enhancement of these areas for use and enjoyment by the public, wildlife, clean water, and biodiversity.

## PARKS NEIGHBORHOOD TREE STEWARDS AND COMMUNITY TREE COMMITTEES

Portland Parks and Recreation (PP&R) offers tree care and maintenance training to citizens, who then promote proper tree care and serve as a resource for their neighborhood on tree issues. The program is open to anyone willing and able to volunteer their time. Once trained, tree stewards work with a coalition of existing Neighborhood Tree Stewards, city staff from multiple bureaus, the Urban Forestry Commission, and nonprofit organizations such as Friends of Trees on tree projects in their neighborhoods.

PP&R supports the formation of Community Tree Committees to develop neighborhood tree plans and work toward achieving them.

## PUBLIC EDUCATION

Portland Parks and Recreation and BES have developed educational programs for use in Portland's schools or at public community centers. BES offers watershed health-related classroom and field trip programs that teach students about the causes and effects of water pollution and what individuals can do to protect rivers and streams. Topics include stormwater, combined sewer overflow, endangered species, healthy home practices, environment and the arts, watershed awareness, environmental storytelling, water chemistry, stream bugs, salmon survival, the Portland Harbor Superfund Program, and bioaccumulation. The G2G trees program relies on a cadre of outreach staff who canvass door-to-door and table at outreach events to educate people about the importance of the urban forest and the value of trees as green infrastructure, and encourage Portlanders to plant street and yard trees. Portland Parks and Recreation offers diverse environmental experiences in the city's parks, gardens,

and natural areas. Classes, guided walks, camp programs, volunteer opportunities, and special events focus on the forest, grassland, and water ecosystems available in neighborhoods throughout the city.

## COMMUNITY VOLUNTEER TREE PLANTING EFFORTS

Several organizations throughout the Portland metropolitan region partner with the City, property owners, and others to plant trees:

- *Friends of Trees (FOT) is a non-profit organization that coordinates tree planting and tree care projects along city streets, in urban natural areas, and on school grounds. FOT also educates the public about the urban forest.*

- *The Community Watershed Stewardship Program provides opportunities for community groups and residents to be involved in watershed issues by promoting community-initiated restoration projects that improve watershed health.*

- *The Columbia Slough and Johnson Creek watershed councils, among others, have initiated planting projects in riparian and floodplain areas to help maintain and improve water quality, habitat, and floodplain functions.*

# TREES AND THE PORTLAND PLAN

This section presents a set of policy issues, questions, and recommendations that have been identified by community stakeholders and City staff for consideration as part of the Portland Plan project. The project will result in an update to the City's Comprehensive Plan and Central City Plan and will provide guidance and direction for citywide policies, growth management, and urban form.

Addressing the urban forest in developing the City's long-range growth management and urban form policies will be somewhat of a shift in thinking. For example, urban planners are accustomed to making the connection between land use and transportation-related choices, and air pollution, traffic and other impacts on environmental quality.  However, there are also important links between how the City meets its tree canopy goals and future decisions regarding right-of-way design (e.g., on-street parking availability, street, sidewalk and planting strip widths, etc), development types and lot coverage, and urban form generally.. The Portland Plan provides an important opportunity to address the following fundamental issues and to update existing City policies and practices relating to trees in the context of a comprehensive long-range planning project.

## REFLECT FORESTRY GOALS IN THE COMPREHENSIVE PLAN

The Comprehensive Plan provides the context and guidance for future city programs, major capital projects, and a coordinated set of guidelines for decision makers to guide future development of the city. Managing the urban forest must be considered within the context of City programs, growth, and capital projects; however, the Comprehensive Plan does not currently include explicit policies or objectives pertaining to the urban forest.

Three overarching goals for managing the city's urban forest established in the 2004 Urban Forestry Management Plan (UFMP) should be incorporated into the Comprehensive Plan:

*Protect, preserve, restore, and expand Portland's urban forest.*

*Promote stewardship of the urban forest.*

**The Portland Plan**

*Provide equitable urban forest benefits for all residents of the city.*

These goals and associated objectives should be integrated with the desired built form and other elements of the spatial plan (consideration of town centers, transit corridors, green corridors, access to nature, etc).

As noted in the 1980 Comprehensive Plan, "Physical conditions, economic factors, environmental considerations, and citizen's attitudes do not remain static, but change over time. Therefore, these Goals and Policies must be reviewed periodically and be modified when necessary to respond to changing conditions." (*Comprehensive Plan Goals and Policies*, page 5)

The inclusion of urban forestry goals in the Comprehensive Plan will require an understanding about the goals and how they could be achieved. The urban forestry goals relate to and will need to be integrated with existing and soon to be updated Comprehensive Plan goals, including Goal 2, Urban Development; Goal 3, Neighborhoods; Goal 4, Housing; Goal 5, Economic Development; Goal 6, Transportation; Goal 7, Energy; Goal 8, Environment; Goal 11, Public Facilities; and Goal 12, Urban Design. The updated Comprehensive Plan should provide clear policy links between trees and public health (e.g., improving air quality along roads by capturing particulates, cooling air temperature), heat island/carbon footprint (e.g., identify goals for heat island hotspots and tree canopy), food policy (e.g., establishing objectives for fruit/nut tree planting), and property value and other economic benefits.

## SHIFT PUBLIC PRIORITIES TO VALUE TREES AS INFRASTRUCTURE AND A VALUABLE COMMUNITY ASSET

Historically, trees have been viewed primarily as an aesthetic or environmental asset, or as an element of landscaping. Trees also have been viewed, in some instances, as a constraint to development. Street trees are not yet systematically integrated into public and private infrastructure plans and projects. Existing trees can be removed or damaged as trenches, sidewalks, streets, and other facilities are constructed around them.

The Portland Plan project provides an opportunity to explicitly recognize the valuable functions or "services" provided by trees in the urban and urbanizing environment:

- Stormwater management

- Air quality filtering and particulate capture

- Cooling and reduced heat island effects

- Aesthetics and improving neighborhood character

- Improvements to mental health and reduced crime

- Pedestrian-friendly streets

- Food for people

- Wildlife habitat

- Slope stability and erosion control

- Carbon absorption

- Reduced energy demand as a result of shading

- Increased residential and commercial property value

These benefits accrue to all urban development types and uses, including across property lines. Explicit acknowledgement of the benefits of urban trees provides a tool for future growth decisions when tradeoffs are examined.

Through the Portland Plan, the City has an opportunity to address trees as integral elements of its infrastructure and amenity systems. Existing City programs such as the Watershed Revegetation Program and the Grey to Green program are steps in this direction, but could be elevated and recognized more explicitly as ongoing infrastructure programs. The benefits and fiscal impacts of trees should be further characterized and quantified. Trees should be managed as assets with level-of-service targets, schedules for future installation and maintenance, and schedules for replacement of aging trees. A diverse array of funding options, including selling bonds to obtain capital dollars and dedicated funding sources, should be examined.

## INTEGRATE TREES AND URBAN FORM

The following should be addressed in evaluating Portland's future urban form goals and choices:

- *Integrate trees and canopy targets and modeling as different scenarios are developed to accommodate growth. Recognize trees as critical elements of site design framework, neighborhood character, and the city's cultural landscape that need to be considered early in the planning and design process.*

- *Identify priorities for preservation and planting that recognize the role of tree groves, habitat corridors and dispersed canopy in contributing to the City's goals.*

- *Design "tree systems" to provide key functions in different parts of the city. Examples include slope stability and healthy riparian corridors in hilly areas with streams, stormwater management and heat island mitigation in highly developed areas, pedestrian-friendly streets in neighborhoods and business districts, and air quality and carbon absorption citywide.*

- *Design with trees at site, neighborhood, watershed, and citywide scales, ensuring that space is reserved for trees. Consider canopy goals that reflect the zoning designation, lot size, and intensity of use in each zoning designation, and integrate canopy goals that are appropriate for the desired built form(s) for that zone. Integrate open space, impervious surface, and building coverage standards into the design standards that apply to new development.*

- *Pursue the "City Green" concept to create an integrated, synergistic network of habitat corridors, urban greenways, and civic corridors that link important habitat areas and other destinations for people and wildlife.*

- *Address equity issues, such as tree-deficient areas, income, public health, and food security. For example, evaluate tree groves at the industrial/residential interface and along highways for noise buffer potential.*

- *Provide for wildlife, including migratory birds.*

- *Evaluate the relative impacts that different housing types have on trees and space for trees. (For example, development standards in multifamily zones do not create sufficient open area to reach the tree canopy goals.) Evaluate setback and outdoor area requirements and lot coverage limits to ensure that there is enough space for trees. Consider urban form that puts more emphasis on conserving green space in the interior of blocks in high-density areas.*

- *Identify tools to meet multiple objectives comprehensively at a citywide, watershed, or area scale (vs property by property) . Possibilities might include transfers of development rights or flexible development standards. Identify and retain places for tree replacement and mitigation.*

- *Address the cumulative impacts of individual site planning decisions on the urban forest. The impacts of allowed development types should be evaluated as to how they generally do or do not maintain space for trees, as well as how they affect stormwater runoff, air pollution, heat island effect, and aesthetics.*

- *Evaluate the impact to trees from the lot confirmation process, which re-establishes historically platted lots. The confirmation process leads to infill development without the same consideration of trees that might occur during a land division process.  Areas that have a high potential for lot confirmations should be identified so that potential tree impacts can be evaluated.*

## ADDRESS POTENTIAL TRADEOFFS

The Portland Plan should seek to optimize and integrate trees with other key City goals. Potential considerations include the following:

- *Housing affordability and environmental justice. How might the City establish affordable housing, environmental justice, and environmental quality goals and policies that complement and support each other? How can the City avoid pitting tree preservation against affordability?*

- *Industrial land supply, employment targets, and housing. How should the City balance its goals for industrial land, employment, and housing with efforts to ensure that all property owners share the responsibility and cost of maintaining and improving the urban forest?*

- *Solar access, energy and trees. Consider identifying solar receiving sites for community energy projects. Consider solar access, energy demand, and tree-related objectives in subdivision, site, and building design. Draw on contemporary examples (such as Boulder, Colorado and Oregon City), tempered by past experience implementing similar regulations and the unintended effects on urban form. Provide policy direction regarding when tree removal should and should not be allowed for the purpose of installing solar energy systems.*

- *Regional issues.  Assess the impacts of preserving and increasing the urban forest canopy on the urban growth boundary, taking into consideration the City's growth strategy and urban form priorities.  Explore opportunities to work with other jurisdictions and Metro to integrate urban forest management into long-range regional planning policies and plans.*

## OTHER QUESTIONS AND RESEARCH RECOMMENDATIONS

- *Have other cities or jurisdictions shifted to view and manage "trees as infrastructure"? If so, what steps were taken and what kinds of data were used to inform and shape this approach?*

- *The planting, maintenance, and replacement of street trees currently are the responsibility of adjacent property owners. In the interests of maintaining a public asset with public funds, what would be required for the City to take on this responsibility?   Would City maintenance activities, costs and funding mechanisms vary for different parts of the city?  The following map shows Street Tree Area Archetypes that were developed as part of a study called the Initial Assessment of the Costs of Managing Street Trees as a Public Asset (DAVEY Resource Group for the City of Portland Bureau of Planning and Sustainability, June 2009).  Information from this study can inform further examination of this issue.*

- *Are there ways to shift the traditional locations for underground infrastructure within and adjacent to streets (sewer, water, and other utilities) to provide more space for trees?*

- *Evaluate the requirement that infrastructure be improved incrementally alongside infill development. Consider allowing development-related monetary contributions to be pooled for comprehensive design and one-time construction of facilities such as sidewalks and street tree improvements. This could delay the incremental removal of trees for small stretches of roadway expansion, and allow comprehensive street tree planning.*

- *Continue working to integrate tree planting and maintenance with the sustainable stormwater green streets program. .*

- *Evaluate the options to increase private tree planting, maintenance, and protection, including incentives, education and regulation.*

- *Identify practical options for stable, dedicated sources of funding to manage the urban forest.*

## CONCLUSION

This report provides background information on the benefits of trees, the value of Portland's urban forest, existing programs and policies that address the urban forest and key policy issues that should be considered in the context of the Portland Plan project. Existing research supports the goals of the Urban Forestry Management Plan as a way to sustain a high quality of life for Portland's residents by maintaining and enhancing the urban forest. The City's key policy document, The Comprehensive Plan, should be modified to reflect these goals, and policy changes emerging from the Portland Plan work should incorporate and reflect the important role of the urban forest.

## APPENDIX A: REFERENCES

http://eetd.lbl.gov/Heatisland/ Lawrence Berkeley National Laboratory's Heat Island web page with information from research conducted on the effect of trees on energy use.

http://www.naturewithin.info/ University of Washington's Human Dimensions of Urban Forestry and Urban Greening, features research on peoples' perceptions and behaviors regarding nature in cities.

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