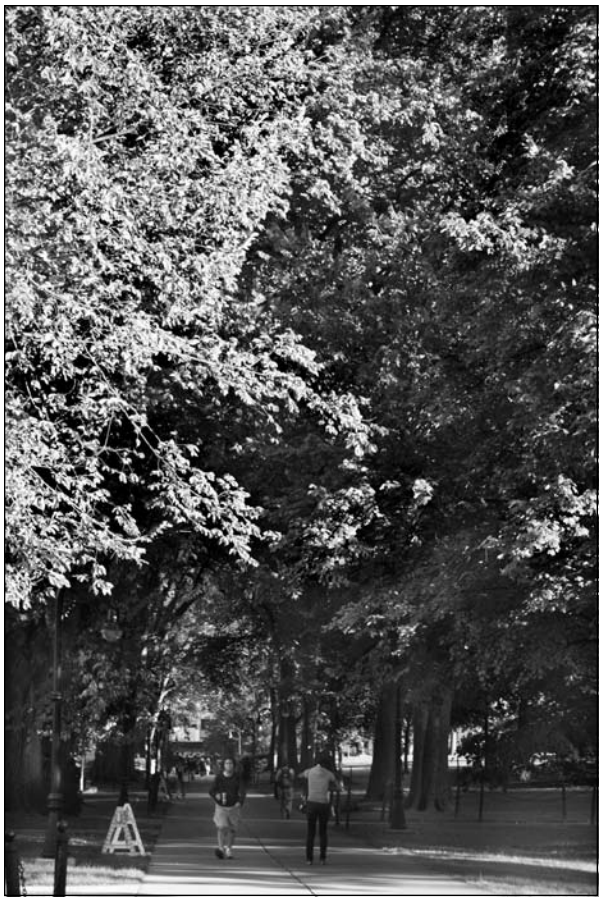
Managing Community Trees, Parks, and Open Space—Why Bother?

Planning and managing the green infrastructure of street trees, parks, and open space will help any municipality safely take advantage of the many benefits these assets provide. With proper planning and management, they are important and appreciating community assets, not liabilities and maintenance headaches. Viewed in the context of sustainable community development, or smart growth, public trees, parks, and open space are as important as the gray infrastructure of streets and utilities in creating healthy and economically viable places. Just like streets and utilities, the public landscapes of trees and other natural resources must be adequately planned for and funded. This helps ensure public safety and comfort and guarantees that the long-term benefits and quality of life provided by trees and parks far exceed their costs.



Municipalities gain economic, health, and quality-of-life benefits by planning for and managing green infrastructure.

Wherever they grow, trees—and the parks and open spaces in which they are found—are living entities that must be nurtured and cared for. Without proper management and care, trees existing in our municipalities can cause disastrous problems. Why would any community want trees today if problems and damage caused by trees planted in the past will be repeated? Besides increasing benefits, proper management also reduces costs, liabilities, hazards, and conflicts often caused by poorly planned and managed trees and parks.

Although their amount and scale can change from cities to rural places, many natural resources can be found in municipalities. Riparian areas, aquifers and wellheads, woodlots and forested areas, meadows, steep slopes, wildlife habitat, fire hazard areas, historical landscapes, important views, parks, street and other public trees, greenways and trails, and open space all provide benefits and should be managed and considered, especially during growth and development. This publication provides an overview of planning and managing this green infrastructure, particularly focusing on street and other public trees and the conservation of natural resources in larger systems of open space.

Why Manage Public Trees?

There are very practical reasons to invest in public trees:

- The costs of storm damage and storm cleanup will be reduced.
- People will be safer and liability reduced.
- Damage to sidewalks, sewers, and streets will be minimized.
- Obstructing motorist views and blocking business and other signs will be avoided.
- Reliable and continuous electricity will be ensured.
- Conflicts and complaints will be reduced.

Concern for public landscapes is not new. Boston Common trees were protected by ordinance in 1661. Since 1903, statutes found within Pennsylvania's borough and township codes have assigned varying responsibility for the care of trees on public property to municipal government. These codes, not different from those in many other states, make it clear that municipalities are responsible

for safe public right-of-ways and, as such, are ultimately responsible for trees that may affect this public space. Although some municipalities have tried, they cannot legislate away their responsibility for the safety of the right-of-ways they have created.

In addition, many state-enabling legislations for planning and land-use regulation also provide municipalities with authority and responsibility for the incorporation of trees and other natural resources into community growth and development. The Pennsylvania Municipalities Planning Code provides municipalities with the authority to protect trees, parks, and open space in development and to require parking-lot and other development landscaping. Across the United States, forty-six states have included more than two hundred provisions in their state constitutions to reflect a commitment to healthy natural resources and the environment. In Pennsylvania, the public trust doctrine was formalized by the enactment of article I, section 27 of the state constitution. That section states:

> *The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic, and esthetic values of the environment. Pennsylvania's public natural resources are the common property of all the people, including generations yet to come. As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all people.*

The implication is that citizens and legislators have long recognized the importance of trees, parks, and open space, want to have these assets in their communities, and want them to receive proper care. But how can planning for and managing trees and parks compete with other municipal priorities such as education and police, mounting demands on tax dollars, and reluctance of leaders to increase the tax burden? First, it is clear that many leaders and citizens do not understand the importance of trees, parks, and open space and the many benefits nature provides people and the places they live. As a result, these public assets are often undervalued and ignored, and many municipalities pay very little if anything to manage them. Formalized municipal tree programs and policies can help by providing

- preservation of trees and natural resources in development and growth;
- the timely removal of trees as they become hazardous;
- protection against unwarranted tree removal;
- proper tree planting to replace any trees that are removed;
- desirable and energy-efficient landscape designs;
- proper tree pruning and maintenance, which ensures the health, safety, and longevity of trees;
- an attractive and healthy natural environment;
- increased and stabilized property values;
- reduced stormwater and other costs; and
- high quality of life.

Children are society's foundation. They deserve healthy and supportive environments.

Getting Started: Community Tree Programs

Planning commissions, environmental advisory councils, and tree commissions play large roles in preserving and managing trees and other natural resources in municipalities. Planning commissions and environmental advisory councils are usually involved in zoning and other policy decisions, as well as in subdivision and other development plan review. Municipal street tree programs are usually managed by a tree commission.

A tree program can link the desires and concerns of citizens with municipal policy and action. Conserving trees and other natural resources can really motivate people to work together to improve their community's image, environment, and safety. Civic environmental projects are a rallying point for action and activism. A comprehensive municipal tree program usually includes

- a green inventory of street and park trees, open space, and other important natural resources;
- inclusion of trees and natural resources in comprehensive plans and zoning and other land-use regulation;
- consideration of trees and natural resources in development plan review and approval;
- effective administration and oversight by municipal planning, environmental advisory, and tree commissions;
- sustainable funding for managing street trees and parks and open spaces;
- yearly work plans and budgets;
- a street tree ordinance;
- a community street and park tree management plan; and
- opportunities for public participation and education.

The following suggestions can help you build community support for organizing a program to plan for and manage trees and other natural resources, especially in growing places:

1. Working with someone influential to help get a program started. The person should be supportive of new ideas and willing to champion a program. For example, a municipal manager, department head, council person, or prominent business person can be a strong ally and should be included in planning and activities.
2. A new program also needs help from other key people, organizations, and citizens. Ad hoc committees can bring municipal officials, department heads, business and professional people, service organizations, and concerned citizens together. Do not ignore people from the development and business sectors.
3. Educational activities and volunteer projects help people understand the many benefits trees and natural resources provide and the need for a community tree program. Unfortunately, the support of citizens and leaders may not be automatic. Letters to the local newspaper editor, volunteer tree plantings, informational materials and displays, speaking at public hearings, programs for youth, and soliciting grants and donations may be necessary.
4. Information and support are available from many professional sources of assistance such as a Cooperative Extension office, the Bureau of Forestry district office, or a community forestry or arboricultural consultant. Many examples of ordinances and plans from other municipalities can be acquired and reviewed.
5. Your desires and ambitions need to be fitted into the budget priorities of municipal leaders. The realities of resources (people, equipment, labor, and materials) available within a municipality's budget should be understood.
6. Consider working with a local conservancy or other nonprofit organization.

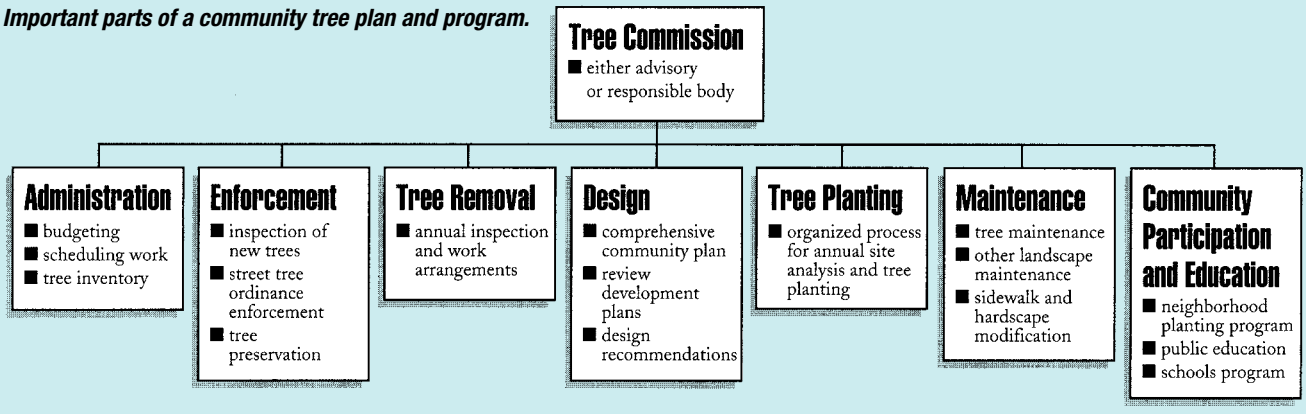
More Than a Municipality

Municipal support is needed to manage public trees and parks, but increasingly the power of citizens and nonprofit organizations such as the Pittsburgh Park Conservancy, Friends of the Pittsburgh Urban Forest, and Philadelphia Green initiate or revitalize a program. Innovative funding solutions such as multimunicipal programs and private/public partnerships are becoming more important. Finally, the role of philanthropy and foundations are becoming more crucial in the world of tight municipal budgets.

The information in this publication can be used to educate yourself, citizens, elected officials, and municipal staff about the important benefits of planning and managing community trees, parks, and open space. Consider that the Borough of State College, Pennsylvania, spends about twenty dollars per resident annually to manage its street and park trees—one of the best public tree programs in Pennsylvania. This amount of money, no more than a nice dinner, provides ongoing maintenance for this municipality's public trees and parks. Those interested in bettering the places they live can work together to empower a municipal tree or environmental advisory commission or a nonprofit organization to start and sustain a community tree program. They can also ensure that their planning commissions and elected officials recognize the importance of natural resource conservation and the nonregulatory and regulatory land-use planning tools that are used to incorporate them into growth and development.

Who benefits from municipal trees and parks? Everyone, citizen and visitor alike, but especially the children and grandchildren who will inherit a caring and beautiful community and will live, work, and play in a richer, better, and safer environment. For this to happen, citizens and elected officials must be aware of the substantial community benefits and cost reductions that can be accomplished by providing proper stewardship to important community assets—trees and other natural resources.

Important parts of a community tree plan and program.



What Is a Community?

A community includes both spatial and experiential dimensions. Most definitions include elements such as family, supporting institutions (school, church, health care, local government, financial institutions), shared territory, a common life, collective action, and social interaction. It is the social field that emerges where people frequently "act together in the common concern of life." A community is not a place; rather, it is a place-oriented process. As sociologist Robert Nisbet states:

> *Community is founded on people conceived in their wholeness rather than in one or another's roles, taken separately, that they may hold in a social order. It draws its psychological strength from levels of motivation deeper than those of mere volition of interest. Community is a fusion of feeling and thought, of tradition and commitment, of membership and volition. Its archetype, both historically and symbolically, is the family, and in almost every type of genuine community the nomenclature of family is prominent.*

Regardless of the definition, participation in a daily rhythm of collective life (interaction) clearly distinguishes and gives unity to a population of a locality—a community.

Natural Resources and Community Development

Trees and other natural resources are fundamental elements in developing the process of community. First, landscapes such as parks, open spaces, and tree-lined streets provide places for human interaction to occur. Second, by using the natural environment in planned open space, parks, and greenways, the unique physical realities of a locality are reinforced. Nature can be used to provide distinction to communities and neighborhoods in the sprawling wave of suburban development. Third, since decisions about land use and development can be at the heart of community conflict, encouraging and empowering people to become involved together in decision making (public hearings, development review, ad hoc and standing committees, protest, conflict) supports the interactional process of a community. Fourth, nature can be used to support volunteer and educational opportunities, which builds both interaction and human capacity. Finally, nature provides a supportive and healthy environment. Sociologist Ken Wilkinson notes:

> *Social and individual well-being cannot be achieved, however, except in ways that also promote ecological well-being. Ecological well-being, which in a literal sense means the well-being of the "house" of civilization, refers explicitly to natural and other conditions that support and sustain human life. It is not accurate or appropriate to treat the environment as though it was somehow separate from the social life it supports. An active interdependence characterizes the relationship between social life and its surroundings.*

Benefits of Trees, Parks, and Open Space to People and Places

Natural resources found in our municipalities are highly diverse, ranging from healthy natural areas within urban wilderness preserves, to traditional parks, to open space and greenways, to woodlots, and to trees and plants found in streetscapes and other residential and business landscapes. It has long been understood that trees and parks provide environmental, human health, economic, educational, family, and social benefits that support healthy and prosperous communities in many ways.

ENVIRONMENTAL BENEFITS

Trees and parks moderate climate and help keep people and places cool, which in turn conserves energy and lowers costs. Trees and soils also slow stormwater, help store and filter drinking water, preserve and increase the integrity of air quality, increase biodiversity, and provide wildlife habitat. One hundred mature tree crowns intercept approximately 100,000 gallons of rainfall per year. Philadelphia's 2.1 million trees currently store approximately 530,000 metric tons of carbon at an estimated value of $9.8 million. If planted correctly on the east and west sides of a home, two large shade trees can save up to 30 percent of a home's air-conditioning costs. Trees placed properly around buildings as windbreaks can save up to 25 percent on winter heating costs.

Did You Know?

A single large shade tree can provide the following benefits each year:

- Saves $29 in summertime air conditioning by shading a building and cooling the air (250 kWh), about 9 percent of a typical home's annual air conditioning cost.
- Absorbs 10 pounds of air pollution, including 4 pounds of ozone and 3 pounds of particulates. The value of pollutant uptake by a single tree is $45 using local market prices of emission-reduction costs.
- Intercept and evaporates 760 gallons of rainfall in its own crown, thereby reducing runoff of stormwater and flooding. This benefit is valued at $6 a tree based on municipal expenditures for stormwater control.
- Reduces the same amount of atmospheric carbon dioxide as produced by a car driven about 400 miles.
- Cleans 90 pounds of carbon dioxide and 10 pounds of air pollution from the atmosphere through direct sequestration in wood and reduced power plant emissions.

HEALTH BENEFITS

Trees and parks provide benefits crucial for human health. They help satisfy a person's basic psychological and emotional needs. People are provided relief from crowding by seeking green places for solitude, escape, and spiritual and aesthetic sanctuary. People can become worn down by daily life. This fatigue causes both stress and lack of concentration. Encounters with nature and even simple views of nature aid in recovery from that cognitive fatigue. Nature helps people calm down and cope after hectic experiences, deal with the frustrations of daily life, and recharge their abilities to carry on and prosper.

By providing mental relaxation and benefits from active and passive physical exercise (breathing around the park), trees and parks help reduce stress and increase health. Constant stress affects the human immune system and reduces ability to cope with challenging situations whether social, economic, political, or disease. Studies have shown that people who viewed and interacted with nature had reduced stress responses, better interest and attention capacity, better productivity, improved moods, and decreased feelings of anger and aggression. Hospital patients recovering from surgery who viewed trees through their windows required fewer pain relievers, experienced fewer complications, and left sooner than similar patients with a view of a brick wall. Symptoms of Attention Deficit Hyperactivity Disorder (ADHD) in children have been relieved after contact with nature, and ADHD kids are better able to concentrate, complete tasks, and follow directions after playing in natural settings.

ECONOMIC BENEFITS

Municipal trees and parks provide people with savings in health and energy costs and the benefits of increased property and neighborhood values. The economic enhancement value of public landscapes and parks toward surrounding residential and business property values has been well studied, and these values can have significant impacts on property and sales tax roles. Commonly, public trees, parks, and open space

People are willing to stay longer and pay more for parking and merchandise in landscaped commercial areas.

can raise property values from 5 to 20 percent in municipalities that provide these public services. Recent studies by the University of Pennsylvania found that planting a tree within 50 feet of a house can increase its value by 9 percent and that cleaning and greening vacant lots can increase adjacent property values by as much as 30 percent. The presence of public landscapes and parks also enhances public appreciation for the quality of commercial and other business areas. For instance, Kathy Wolf of the University of Washington discovered that trees were good for business and customers enjoyed having them in and near shopping areas. She found that people stayed longer, visited more frequently, interacted with business owners more, and were even willing to pay higher prices for parking and goods in landscaped business areas. The planned conservation of open space and parks, rather than intensive land development, may reduce municipal costs for services such as education, public safety, and transportation. In many situations, the cost of providing municipal services to new development is higher than revenues to local government from an expanding tax base.

Economic Benefits of Trees, Parks, and Open Space

- Increased value of homes and other property from 5 to 20 percent. This benefit positively affects equity development, salability of property, and sales price. It expands property and sales taxes.
- Increased amount of time people spend shopping and the amount they are willing to spend for parking and retail goods.
- Increased desire to lease commercial real estate, even more than a building's proximity to main roads.
- Reduced health, energy, stormwater, and other costs to people and society.

Families and neighborhoods benefit from involving children in civic environmental projects.

EDUCATIONAL BENEFITS

Public trees and parks provide outdoor classrooms (rooms with a view) and an appreciation of nature among urban populations. The green infrastructure of public landscapes may be the only forests that some people ever experience, which provides a context for the creation of values and ethics that urbanites place on the natural environment as a whole.

FAMILY BENEFITS

Since youth are the foundation of any community, families and children need supportive and healthy environments. Public landscapes and parks provide families places and activities that are not segregated in terms of class, age, or skill level for talking, visiting, and loving. Natural landscapes can serve in highly urbanized areas to create suitable and safe play spaces for children—places not overcome by concrete and asphalt. Both the amount and creativity of play are greatly increased in school yards and other landscapes containing trees, plants, and grass. These landscapes provide healthier places where youth and other people can develop and express their human potential in a socially responsible manner through play, self-insight, volunteer work, and team building. Studies of family structure have shown that resident families in Chicago public housing that had trees and green space had healthier patterns of children's play and fewer violent crimes and incivilities, used fewer violent methods to deal with family conflict, and exhibited less physical violence with partners.

HISTORICAL AND CULTURAL BENEFITS

Open space and greenways can be used to preserve and protect archaeological and other cultural resources and the last remaining natural landforms and resources in and near urban areas.

SCIENTIFIC BENEFITS

Aldo Leopold said, "Open space provides the perfect norm for evaluation." Open space can be used to maintain and protect natural influences and resources of flora and fauna and supply a "control" for the evaluation of research and urban existence. Open space can be used to increase and maintain habitat and biodiversity and as preservation for native and natural genetic representation.

SOCIAL BENEFITS

In a 2004 study, Alex Kuo, a researcher at the University of Illinois, noted the relationship between nature and a healthy society:

> *In residential areas, barren, treeless spaces become no mans' land, which discourages resident interaction and invites crime. The presence of trees and maintained landscapes can transform these no mans' lands into pleasant, welcoming, well-used spaces that serve to both strengthen ties among residents and deter crime.*

Contrary to many law enforcement and public works views, the planting and correct maintenance of trees and plants increases people's sense of safety and welfare in inner-city neighborhoods and decreases feelings of fear and anxiety.

The natural environment of a municipality plays a significant role in the healthy social lives of people by providing many things, including shared and structured symbols. These symbols (e.g., historical landscapes, important views, trees) help ground people in their everyday lives and, as change occurs, provide residents with a consistent sense of place and comfort. In 1979, a social researcher named Donald Appleyard discussed the importance of trees and other symbols in everyday life:

> *A life is, in a very large part, a life lived through symbols. Caring symbols communicate hospitality, responsiveness, assurance, shelter, and comfort. They play the host to welcomed guests and can extend the concept of home to neighborhood and city. Ordinary citizens interpret their environment as evidence of the presence of others and actions, services, livability, aesthetics, and as a reflection of self.*

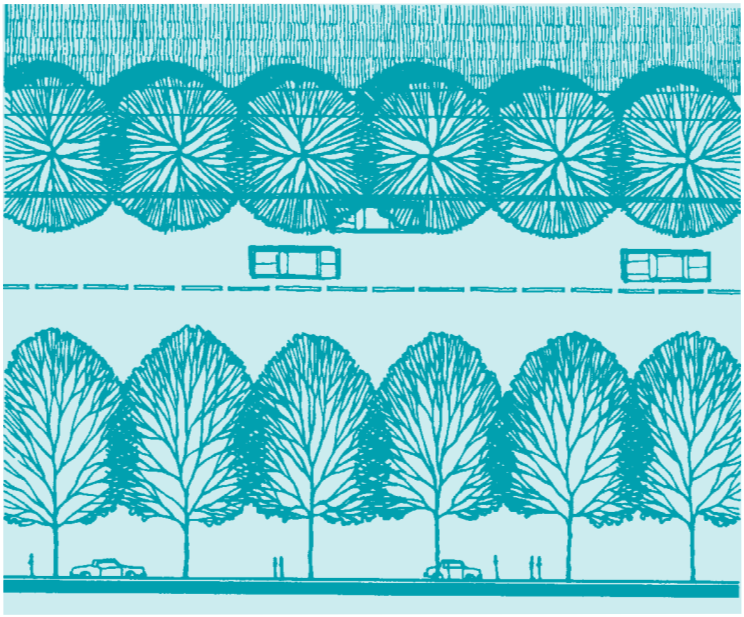
With proper planning and management, municipal trees and parks are shared and structured symbols—caring and supporting symbols that become part of the identity and features of a place that invoke pride, attract outside attention, and stimulate economic activity. In 1977, Christopher Alexander pointed out that

> *trees have a very deep and crucial meaning to human beings. The significance of old trees is archetypical; in our dreams they often stand for the wholeness of personality. The trees people love create special places; places to be in and places to pass through. Trees have the potential to create various kinds of social places.*

Nature proves important to people and the places they live because the sense of self in place is more important than simply a sense of place. Nature's social role in reinforcing a person's sense of locality or place is important; it helps create a feeling of identification and belonging that is important to both people and community.

Tree planting and other civic environmental projects have been repeatedly used by community organizations such as Philadelphia Green, Trees Atlanta, Friends of the San Francisco Urban Forest, Los Angeles TreePeople, and New York Green Gorillas as a community development tool that helps bring people into the folds of the community fabric through participation and interaction. These projects have been used to help build and rebuild the sense and capacity of community and, in some cases, ameliorate the effects of drugs, crime, violence, apathy, and despair in often seemingly hopeless urban neighborhood settings.

Planners and sociologists have long known that the act of planting a tree enables people to have an immediate, tangible, and positive effect



Planting large trees along busy streets can slow and calm traffic.

on their environment. It fosters community pride and opens channels and networks for individuals to meet their neighbors, tackle community problems, and build neighborhood associations. As Andy Lipkis from the Los Angeles TreePeople believes:

> *Tree planting fosters community spirit and pride, bringing people together for meaningful purposes that can build the bridges and promote the understandings that bring the neighborhood together. The initial efforts of the tree planters compound themselves as others find in the trees a deeper appreciation of the community as well as natural beauty. It is the beginning of the formation of new values that is the foundation for citywide transformation. The newly organized group can further push for bike paths, improvements in public transportation, and changes to make the area less congested, less polluted, and more livable.*

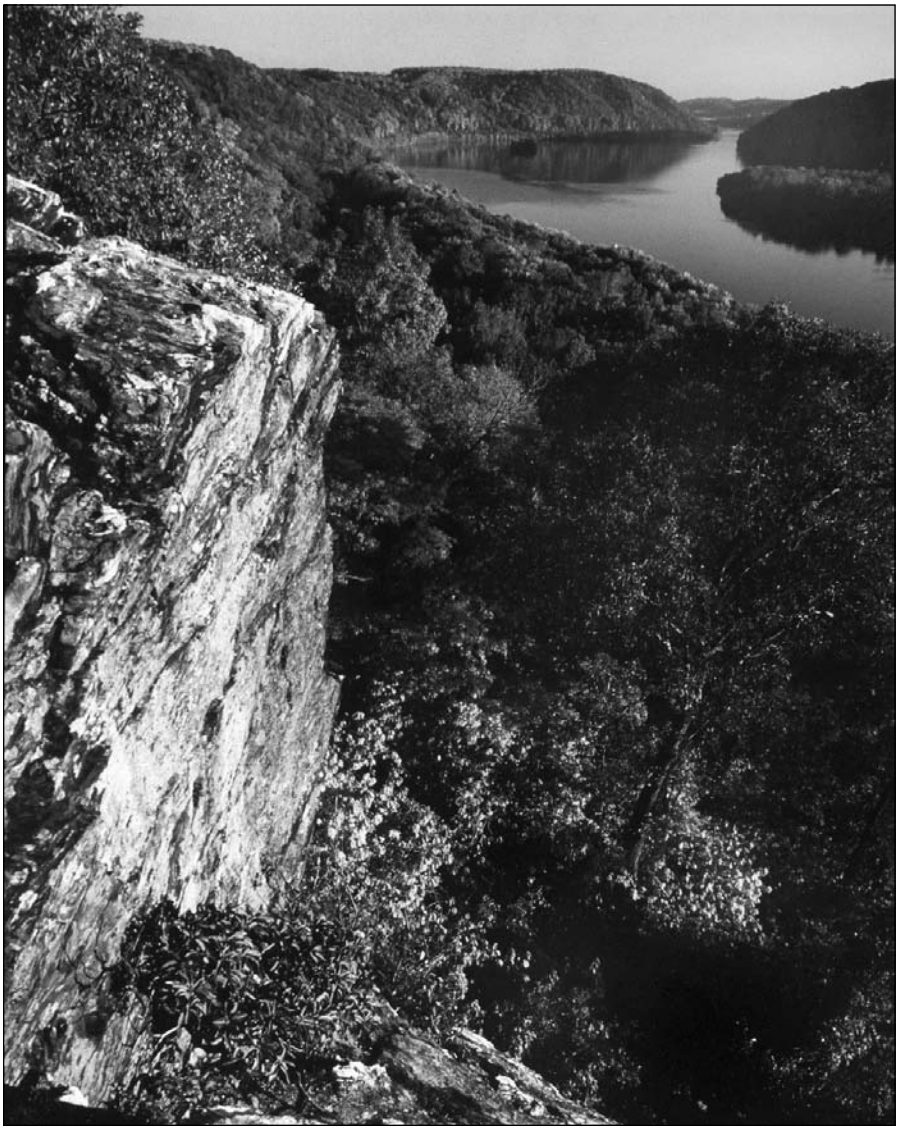
Tree planting, urban gardening, and other types of greening projects inspire neighborhood and community groups to change the environment of their streets—"neighborhooding," giving a new understanding of and character to their neighborhood and to the city as a whole. The simple act of planting a tree, along with larger projects of civic environmentalism, has positive effects on the environmental, economic, and social elements of community. Trees, parks, greenways, and other public landscapes are not just pretty amenities; they should be viewed in their importance to the overall development of community.

BENEFITS OF ETHICAL RESPONSIBILITY

Preservation of natural resources is an extension of human sensitivity and concern for the natural world. It is an attempt to bring our species and nature into some sort of reasonable balance and improve the relationship of people and nature.

Natural Resources and Community: The Importance of Open Space

Recently, more attention has been given to the idea of conserving natural resources in open space and greenways during community growth and development. Open space is more than traditional parks and golf courses. Open space found within and around our cities and towns is highly diverse, ranging from healthy natural systems to urban woodlots and vacant lots. When planned for and managed, open space and greenways can be used to conserve large-scale and healthy natural systems, as well as high-quality human recreational opportunities.



People, whether liberal or conservative, are concerned about open-space conservation in growing places.

Open Space and Planning

Open space cleans the water we drink and recycles the air we breathe. It is the trails we jog and walk and bicycle, the beaches we use on a hot, summer day and the scenery we see on the way. We all call it open space, but it is land and water, from rural forests, fields, wetlands, lakes, and streams to vacant urban land. Open-space lands serve numerous functions: provide resources, economically useful for agriculture, livestock, grazing, and forestry. Undisturbed wetlands are vital to fisheries and water quality. The scenic beauty of open lands attract tourists. Open space provides direct health and safety benefits: they help recharge groundwater aquifers, undeveloped watersheds protect the quality of public drinking supplies, conservation of unstable hillsides and floodplains prevents the loss of life and property damage, forested lands cleanse the air and moderate temperatures. Open space provides recreational opportunities. At the national, state, and local and private levels, open space preserves ecological resources, animal and plant habitat, wilderness, unique and threatened species, and ecosystems.

—New York Area Regional Plan Association

In many of our towns and cities, open space continues to be ignored during development and urbanization. Today, solitude and silence are luxuries for many urban dwellers. Open space provides health and happiness to crowded populations. The quality and quantity of healthy, attractive, and usable open space around and in urban areas reflects the quality of the planning process used in guiding and regulating growth.

In open space, land is preserved for public good much as a library holds books. The 1987 Presidential Commission on the American Outdoors stated, "We found in America a love of the land and a shared conviction that it is our legacy for the future. Future development is robbing

future generations of the heritage which is their birth right." Opportunities for open-space creation are eliminated by uncontrolled growth and urban sprawl. Sensible land-use decisions that guide suburban growth and create a balance between land consumption and preservation are critical for developing healthy open-space systems.

Open-Space Plan

Open space is planned for and managed through an open-space plan. Typical chapters of an open-space management plan include community background; physical inventory and analysis of parks and open space; operational inventory and analysis of administration and personnel; prioritization of aquisitions and operations; standards and best practices for administration, equipment, and recreation programming; recommendations for administration, facilities, and equipment; and a strategic implementation plan that includes funding, ADA requirements, and public education and participation.

SOURCE: The Multi-Municipal Recreation, Park and Open-Space Plan: For the Pennsylvania Boroughs of Aldan, Colwyn, Darby, East Lansdowne, Lansdowne, and Yeadon.

Issues Concerning Open Space

The velocity and pattern of land development (sprawl) in America leaves few stretches of open land and decreased opportunities to preserve, acquire, and link open spaces.

Existing parks and open-space systems have not kept pace with growing populations. Planners are of the opinion that thirty acres of open space should be provided per one thousand people, but this goal is often not met.

Nature does not meet municipal boundaries, and local municipal planning for open space is limited in planning and administrative scope and ability by a lack of cooperation and coordination between jurisdictions and other partners.

Open space and greenways can be planned to protect large-scale natural systems and high-quality human recreation.

Declining municipal budgets and funding and financial depression have limited the ability of municipalities working alone to manage and maintain open space and other natural resources. In many places, open-space conservation does not become a high-profile political issue until land development is well underway. Preservation opportunities shrink as acreage is lost or fragmented by growth, and land prices increase in a competitive real estate market.

Defining and developing a balance between the preservation of natural and cultural heritage and essential economic growth and development can be difficult. Many regulatory and nonregulatory tactics and tools can be used to preserve and establish open space in spite of the enormous economic and social land-use pressure found in and around growing areas. Developing ideas and philosophies of open-space preservation and acquisition early in the formal development of comprehensive plans and regulatory policies is extremely important.

What Is Open Space?

In general, the term "open space" is used for land areas that are intentionally left in forest or field, unbuilt and undeveloped. Open space is undeveloped land that has been purposely set aside for passive recreation, habitat preservation, and buffering of the city from surrounding use. Typically, it is an outdoor area that is open to freely chosen and spontaneous activity, movement, or exploration of a significant amount of people. There are two important concepts of open space: passive recreation and accessibility of people.

What Is a Greenway?

A "greenway" is a linear corridor of land that serves as a linkage between natural resources and human-made features. Greenways can be either land or water based and often follow old railways, canals, ridge tops, rivers, and stream valleys.

Management Basics for Open Space

The following are management principles and guidelines for successfully preserved open space. More detailed strategies and tools for planning and purchasing open space are provided in the following chapters.

- Funding for management is a major consideration.
- Biocentric systems should be supported in management objectives and policies. Management philosophy and policy should emphasize the natural integrity and health of the space while allowing for human use and enjoyment. A concept of nondegradation should be developed and implemented.
- Compromise, creativity, and alternative practices (e.g., prescribed burning) may be needed to manage both biocentric systems and public safety.
- Goals, objectives, and strategies of management should be incorporated into a management plan.
- Planning and management should be done in cooperation with adjacent landowners.
- The management of people can become a major component of stewardship (e.g., law enforcement, regulation of entry). Regulations and law enforcement should be applied to a level adequate to preserve and protect both public safety and the resource.
- The carrying capacity of the parcel in terms of humans and wildlife should be known and understood.
- Multiple-use trails used by hikers, bikers, and equestrians have been successful with good signage and education through docent and other programs.
- Public education and participation can be used to reduce law enforcement, increase public support, and decrease vandalism and other detrimental impacts.

Regionalization or Multimunicipal Cooperation as a Strategy

- Working together in larger partnerships offers advantages in today's economy.
- Build stronger funding capabilities by creating a special district or authority with taxing or funding authority.
- Provide better funding for large-scale purchases and ability to connect purchases through appropriate linkages. Increased economies of scale can be realized through greater efficiency of economics in purchases, contracting, and overhead.
- Coordinated planning between jurisdictions creates a more ecologically based, coherent plan for land acquisition and management.
- Increase political clout to cross municipal boundaries as natural resources do.
- Develop larger citizen coalitions and broad-based support such as more consistent programs of public education, awareness, and participation.

Cities like Pittsburgh, Pennsylvania, Boulder, Colorado, and Thousand Oaks, California, are dedicated to protecting and managing their open space and greenways.

CHAPTER 3

Ecological Considerations for Community Forest Management

When trees, open space, and the green infrastructure of natural resources are put into an ecological context, four important principles should be considered—conservation, sustainability, connectivity, and diversity.

- Conservation: using natural resources to meet the needs of people without degrading resource integrity
- Sustainability: managing, protecting, and restoring natural resources to maintain their health and viability in perpetuity
- Connectivity: maintaining or creating interconnected parks or habitat, as well as people working toward common goals
- Diversity: managing a wide variety of flora and fauna and involving a broad range of people and interest groups

Land is a community of climate, soil, water, plants, and people. Conservation, sustainablility, connectivity, and diversity are management principles.

Ecological conservation is not a new idea. A forester named Aldo Leopold was a source of inspiration more than sixty years ago. He was convinced that land is a community made up of climate, soil, water, plants, animals, and people, and that people have large impacts on this community depending on the decisions they make. The basis for conservation for Leopold is this dictum: "A thing is right when it tends to preserve the integrity, stability, and beauty of the natural world. It is wrong when it tends otherwise." When planning and managing development and other land uses that affect the natural world, Leopold insisted on (1) setting specific conservation standards for areas through careful observation, historical study, and scientific research; (2) monitoring and evaluating the effect of a use on a natural area; and (3) making required changes and adjustments to protect ecological health.

By planting and managing community trees, restoring riparian areas, preserving greenways and open space during development, and providing proper forest stewardship, people continue to make decisions that affect ecological health. People can continue to help care for the health of natural resources by remembering conservation, sustainability, connectivity, and diversity. The following guidelines relate to the principles of conservation and sustainability:

- Understand and consider all the values of natural resources when making development decisions. They are more than just beautiful.
- Establish regional plans and systems to protect large-scale resources and landscapes.
- Develop comprehensive management plans for street trees, open space, and other natural resources that include clear authority and responsibilities, adequate funding, review of performance, and community involvement.

- Use cluster, open-space, conservation subdivision, or other innovative development design.
- Attempt to manage invasive species and restore areas to native conditions.
- Design landscapes that can be maintained in a sustainable fashion. Where possible, cluster several trees and other vegetation instead of planting individual trees. Consider native groundcovers and other alternatives for turf.
- Select native and nonnative species for planting that are well adapted to local climate and soils and tolerate urban stress.
- Optimize plant environments by providing adequate space for roots and soil conditions that meet water and oxygen requirements.
- Organize pruning schedules and other maintenance to provide the best plant care.
- Provide proper maintenance to young trees.
- Use (approved) chemical or biological pesticides only when the threat of severe damage is imminent.
- Plan and complete projects that are accessible and benefit everyone in the community.

What Is Green Infrastructure?

The definition of green infrastructure is broad. It has been defined as an interconnected network of natural areas and other open spaces that conserves natural ecosystem values and functions, sustains clean air and water, and provides a wide array of benefits to people and wildlife. Green infrastructure is the ecological framework for environmental, social, and economic health—in short, our natural life-support system.

Principles of Green Infrastructure

Connectivity is key. Green infrastructure should be grounded in sound science and land-use planning theory and practice. It should function as the framework for both conservation and development. Green infrastructure should be planned and protected before development. Like roads, it is a critical public investment that should be funded up front. Green infrastructure requires long-term commitment and making connections to activities within and beyond the community. It respects the needs and desires of landowners and other people.

SOURCE: Mark Benedick and Edward McMahon, *Green Infrastructure: Linking Landscapes and Communities* (Washington, D.C.: Island Press, 2006).

The following guidelines should be considered as they relate to connectivity and diversity:

- Consider the impacts of your actions and programs on all parts of your municipality and neighboring municipalities.
- Network with others and build joint partnerships between municipalities and other organizations. Consider participating in regional associations and other broad-based groups.
- Encourage the involvement of people of all ages and interests in making decisions about natural resources and their ecosystems. Be sure to involve broad representation of individuals and groups in decisions and activities.
- Communicate regularly with both municipal officials and citizens.
- Plant a wide variety of species throughout the community forest while permitting some patches of uniformity for design purposes. Select plants that are compatible with the realities of the place, the various interests of people, and the health of all desirable organisms.
- Preserve viable natural landscapes that provide wildlife habitat, recreation, and corridors to multiple areas and jurisdictions.

Water quality and better stormwater management is a growing concern in populated areas.

Encourage the involvement of people of all ages in decision making and projects.

CHAPTER 4

The Roles of Planning Commissions, Tree Commissions, and Environmental Advisory Councils

The goal of any community forestry program should be to ensure that trees and other natural resources receive proper planning and care. For this reason, concerned citizens should work to establish recognized municipal programs and policies that can be sustained through changes in personnel, lean budgets, and periods of growth and indifference toward natural resources. The mere presence of open space and trees is no guarantee that they will endure. Natural resources must be planned for and incorporated into growth in the same way streets, schools, and other community assets are. And, public trees, parks, and open space need annual maintenance to remain healthy and safe. Besides elected officials, three volunteer municipal commissions play important roles in planning for and maintaining public landscapes: the planning commission, the tree commission, and the environmental advisory council.

Commissions provide a link between citizens and municipal officials and staff. They are an important voice in democratic government.

Planning Commissions

A distinctive feature in planning in America is the volunteer planning commission. These groups are a by-product of the nineteenth-century civic improvement association, formed to increase the beauty and function of post–Industrial Revolution cities. Article II of the Pennsylvania Municipalities Planning Code authorizes the creation of municipal planning agencies through ordinance. Volunteer planning commissioners are appointed and then approved by vote of the governing body. All members shall be residents of the municipality and a certain number must be citizens, not officers or employees of the municipality. Today, planning commissions are important and have responsibility and authority within municipal government. The following are typical powers of planning commissions found across America:

- Prepare the comprehensive plan (growth-management plan) for the municipality
- Prepare and present a zoning ordinance and make recommendations on amendments to the governing body of a municipality
- Prepare, recommend, and administer subdivision and land development and planned residential development regulations
- Review comprehensive plan and ordinances
- Do such acts and make such studies as necessary
- Present to governing body an environmental study
- Submit to governing body a recommended capital improvements program (expenditures on parks, roads, libraries)
- Prepare and present a water survey to governing body
- Hold public hearings
- Promote public interest and understanding of planning

These volunteer commissioners inform elected officials about what people want and need in community life and what the community's best long-range interests are. They also review and comment on subdivision and other development proposals in relation to the content of a municipality's comprehensive plan, land-use regulations, and the wishes and desires of leaders and citizens.

Many planning commissions are bogged down in the many subdivision and other plans they must review and comment on. Others carry out this responsibility but also have the time to plan (e.g., review portions of the comprehensive plan and capital budgets every year, author reports on important areas of community

growth). Planning commissions provide a link between the citizens of a municipality and decisions regarding growth and development. Given their authority to prepare and amend comprehensive plans, zoning, and other ordinances and their role in subdivision and land development plan review, the important part they can play in natural resources conservation should be clear.

Tree Commissions

Street and park trees require yearly attention to maintain their beauty, health, and safety. The responsibility for annual care should be clearly defined and then implemented in an orderly, dependable way. A logical step in developing any community tree program is to organize a municipal tree commission.

Normally, a tree commission is established by enacting a street tree ordinance (discussed in Chapter 5). Pennsylvania law provides for the formation of tree commissions within state-enabling legislation found in borough and township codes. For example, the borough code authorizes a borough council to function as the municipal tree commission or allows the council to establish a separate commission made up of concerned citizens. The code states that "the commission is authorized to plant, remove, maintain, and protect shade trees on the streets and highways in the borough." Cities and townships have similar provisions in their respective codes. Beyond the responsibility for trees within the public right-of-way, tree commissions can be given additional authority. These responsibilities can include control over all publicly owned trees (such as trees in parks) or review of and recommendations about subdivision and other development plans that involve tree removal and landscaping.

Ideally, tree commissions are made up of dedicated people with various backgrounds and talents. People with specific knowledge of forestry, arboriculture, horticulture, or landscape architecture can be very helpful. It is also important to include citizens such as bankers and developers who have a genuine concern for a community's trees but limited technical expertise. Having a broad-based membership helps keep a commission focused on the concerns of the general public, builds community support, and provides different talents the commission can use. The success of a tree commission, especially in rural places, depends on the enthusiasm of its members and continued support of elected officials and the public.

Elected officials can assign tree commissions various powers and responsibilities. A commission's power may range from absolute decision-making control over all tree-related matters to serving as an advisory body to the director of public works and elected officials. In looking at the responsibilities and politics of municipal government, the most successful commissions are those acting in an advisory capacity. Elected officials are put in place to make political decisions; tree commissions are not.

Commissions should involve local people in projects and educational opportunities.

Initially, the commission should concentrate its efforts on high-priority actions such as conducting an inventory of street and park trees, managing tree risk through tree removal and pruning, planting trees, and building a positive relationship with the local press. The commission should also work on developing a comprehensive tree plan and building public participation and support. Tree commissions can gain support for a tree program by involving the public in various important endeavors:

- Developing a community tree plan
- Developing an annual work plan and budget for tree care
- Identifying and removing hazardous trees
- Designing tree plantings
- Holding public hearings and reviewing permit requests
- Soliciting funds, including grants and donations
- Developing or reviewing a street tree ordinance
- Maintaining close relations with local utility companies

Judicative or Not?

Planning commissions can be more or less judicative (i.e., both review and approve subdivision applications) depending on the wishes of the elected officials. Whether decision making or advisory, tree commissions in Pennsylvania are judicative because they have the authority to hold public meetings and vote on permit requests to remove and plant public trees. On the other hand, environmental advisory councils most often play no direct role in permit approval. Members of a planning commission or environmental advisory council can serve as members of a tree commission, but meetings, public notice, and other processes must be conducted separately.

Because community trees often come under the jurisdiction of several agencies and organizations, tree commissions should coordinate their activities with other concerned groups such as a municipal design review board, park and recreation board, or a local land conservancy. This involves taking the time to foster cooperation between municipal departments, homeowners, nonprofit groups, contractors, utility companies, the press, and developers. For instance, property owners and other citizens want to be consulted on major decisions about "their trees," particularly those decisions concerning removals or plantings. Tree commissions can reduce community conflicts and reach a consensus by providing useful forums, such as official public meetings, to discuss planting and removal actions and proposals.

Unfortunately, municipal officials are not always supportive of a community tree program. If this happens, those concerned must work to gain support for their programs. Remember, most leaders and residents do not fully understand the benefits of trees and other natural resources. Work diplomatically with community leaders by educating them about the many economic and other benefits of public landscapes. Community leaders and officials should be included in the early stages of planning for a tree commission. Organized groups such as beautification committees, garden clubs, or park commissions can generate interest in a tree program, but the support of municipal officials is essential for the establishment and operation of a tree commission.

Tips for Working with Elected Officials

- Include elected officials early in discussions and decision making.
- Understand the financial realities of your proposals and requests.
- Find out the position of all the elected officials before a hearing and be prepared. Try to meet with officials personally before a public hearing for discussion.
- Communicate the good things you do regularly throughout the year.
- Include elected officials in positive opportunities such as tree plantings, Arbor Day celebrations, and dedications.
- Include elected officials in positive press opportunities.
- Be organized when making presentations. Know the financial realities of your requests.
- Be respectful and friendly. Your objective should be to make friends and allies.
- Listen to questions and comments and prepare thoughtful replies.
- Use letters to follow up on unresolved issues and thank officials for their help and support.

Environmental Advisory Councils

Title 53 of Pennsylvania Consolidated Statutes, and enabling legislation found in other states, provides for the establishment of environmental advisory councils. The governing body of a municipality or a group of two or more municipalities may by ordinance establish an environmental advisory council to advise local government agencies, including the planning commission, parks and recreation board, and elected officials, on matters dealing with the protection, conservation, management, promotion, and use of natural resources. Below are the overall powers and duties of these councils:

- Identify environmental problems and recommend plans and programs for the promotion and conservation of natural resources and the natural environment
- Make recommendations about the use of open land areas
- Promote a community environmental program
- Keep an index of all open areas, public or private, for the purpose of obtaining information on the proper use of these areas
- Advise planning commission, recreation and park board, and elected officials about the acquisition of both real and personal property in matters concerning natural resources and the environment

Basically, an environmental advisory council promotes long-term natural resource conservation and information about the environmental consequences of land-use planning, regulation, growth, and development. Specific responsibilities that an environmental advisory council can undertake include interacting with the planning commission in the development of conservation, open space, or other resource elements to a comprehensive plan; interacting with the planning commission in subdivision and other land-development review; assisting with the development of conservation subdivision, riparian area, and other natural resource protection ordinances; assisting with the development of stormwater management plans and ordinances; assisting in the acquisition of open space and greenways; completing an environmental resource inventory and green resource map for the municipality; promoting local food production and distribution; providing public education to increase the understanding of natural systems; promoting multimunicipal partnerships for resource acquisition and management; and helping develop a municipality plan and implement environmental or green systems for buildings, vehicles, and other services.

CHAPTER 5

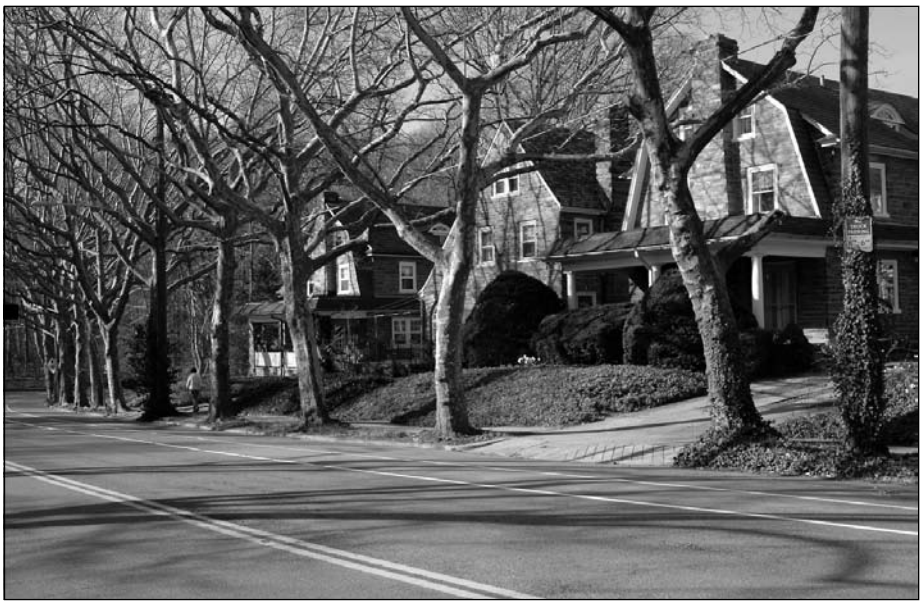
Enacting a Municipal Street Tree Ordinance

When a municipality realizes that its street and park trees are valuable public assets, the need for a street tree ordinance to authorize tree management and protection should become obvious. A well-designed tree ordinance ensures fair and consistent operation of a community tree program and thus enhances and protects the public's investment in their community forest.

Zoning, subdivision and land development, tree preservation, and other regulations all affect the use of private property. This chapter addresses municipal street tree ordinances, which deal mainly with trees and landscapes found on public property. However, street tree ordinances can affect private property when they impose sections based on the police power (protection of public health, safety, and welfare and nuisance) that require the removal of trees on private property that are infected by insects or diseases or threaten the safety of the public right-of-way.

Zoning and Street Tree Ordinances: Working Together

In order to stop damage and destruction of public trees and landscapes, some municipalities have added provisions to their zoning and subdivision and land-development ordinances that require that public street and park trees (1) be accurately identified on submitted construction plans and (2) be protected by fencing and monitoring during construction. The provisions also require that the removal or pruning of any tree be authorized by permit with the municipality being reimbursed for the value of a public tree that is removed to accommodate development. The value of a removed tree can be determined by using one of the amenity tree assessment protocols approved by the Council of Tree and Landscape Appraisers. One example of a protocol is replacement value. This is simply the cost of replacing the removed tree with a tree of similar size and condition and providing care to the replacement tree until established.



A well-designed tree ordinance ensures fair and consistent operation of a community tree program.

Street tree ordinances authorize and regulate a municipal street tree program. Some ordinances apply only to street trees, while others include park and other public trees. Tree ordinances can

- legalize a tree program through authorization of a municipal tree commission;
- establish a permit review, approval, and appeal process for tree removal, planting, and pruning;
- specify and ordinize arboricultural standards for tree planting, pruning, and other tree work; and
- ensure that the people who perform work on the trees are well qualified.

If a proposed ordinance is considered an unneeded interference with privacy and property, it will cause opposition and conflict. One of the largest problems in obtaining approval for a new ordinance is explaining it in a thorough manner

so that it will not be misunderstood by officials or the public. Support from the community is crucial to the passage and acceptance of any ordinance. Thus, input from all parties, pro and con, should be sought when planning and enacting an ordinance. Including developers and businesspeople in the planning process will also help them understand, comply, and cooperate with the ordinance. A review of model street tree ordinances may generate ideas for a new tree ordinance or prompt a reevaluation of an existing one.

Ordinances and a Local Planning Process

All new ordinances should meet local desires, needs, and abilities. Although model ordinances can be used, ordinances should go through a local planning process and must meet specific legal requirements. The planning process could include review of existing ordinances from other places; formation of an ad hoc committee; review and comment by citizens, leaders, and business people; and marketing. Legal requirements for ordinance enactment may include notices in newspapers, reviews by adjoining municipalities or counties, reviews by planning commissions, public hearings, vote of elected officials, and recording.

Ordinance Objectives

The development of a street tree ordinance, like any other public policy, should follow a planning process that addresses these broad objectives: provide equity for all (treat alike); be of an efficient manner (most benefit for cost); improve public security (safety, welfare, quality of life); and impede personal liberty as little as possible. Most debates and conflicts over ordinances and other public policy boil down to concern for at least one of these objectives.

Around the country, street tree ordinances have existed for many years. For example, an ordinance protecting trees along all public streets in Emlenton, Pennsylvania, was dated May 24, 1899. It fined people a sum ranging from five to fifty dollars for hitching any beast of draught or burden to any tree or shrub in any public street or alley. At that time, fifty dollars was a large sum of money, so the high value of community trees to Emlenton was clearly established.

The authority of local governments to enact tree and other ordinances is based on the police power of government and then enhanced by various state-enabling statutes. Without such state-enabling legislation, most local governments would not have the authority to enact tree ordinances. An example is Article XXVII of the Pennsylvania Borough Code, which permits the enactment of street tree ordinances and shade tree commissions. It gives local government the authority to plant, remove, maintain, and protect municipal trees. Another statute is Article XXX (Parks, Recreation Centers, Shade Trees, and Forests) of Pennsylvania's First Class Township Code. Sections 3020-3048 of Article XXX deal with the formation of shade tree commissions, planting and protection of street trees, and other community forestry authorities.

Provisions of a Street Tree Ordinance

To ensure that public trees will be properly cared for, street tree ordinances usually contain most or all of the sections listed below. The comments and examples are intended to help in drafting or revising a tree ordinance. Municipalities should understand and plan for their own particular needs and abilities and not rely only on model ordinances from other places. The brief examples may be expanded to provide all the necessary ordinance details.

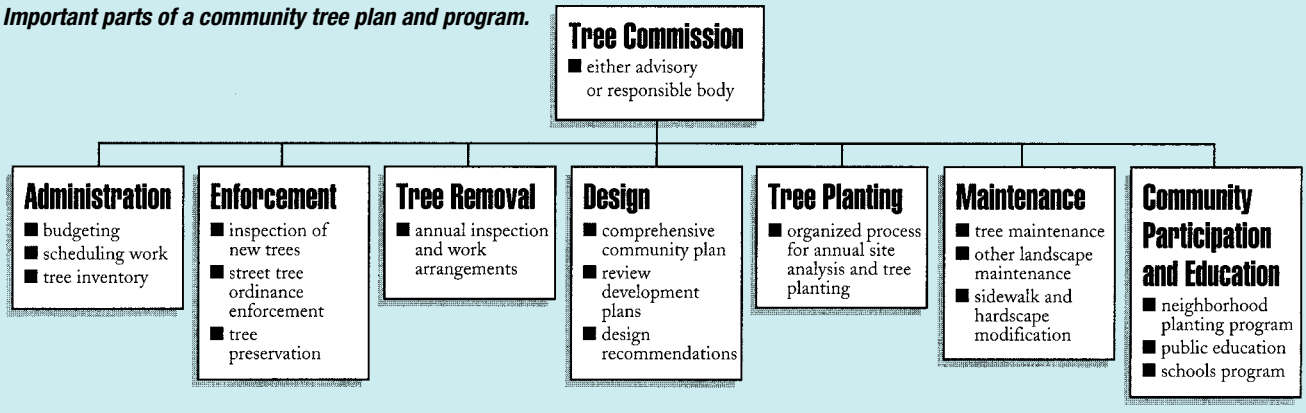
LOCATION

Defines section in municipal code where ordinance should be placed (public works, parks and recreation, planning).

PURPOSE

Clearly describes the purpose of the ordinance, why it is needed, and the various ways the municipality will

Important parts of a community tree plan and program.



What Is Police Power?

Police power is the authority/responsibility of government to protect the health, safety, welfare, and morals of all people. Police power is an inherent authority of a democratic state to govern and regulate affairs and ensure the welfare and best interests of citizens. If police power is used unjustly, a "taking" can occur. Taking is a problem of overregulation that goes too far as to result in confiscation of private property without fair payment or process. The definition of "too far" or "taking" can change with the political and judicial philosophy of an area or the country.

Funding: Municipality or Property Owner

A tree ordinance must be drafted to resolve a controversial issue. The main responsibility for street trees (planting, pruning, and removal) must be assigned to either the municipality or adjoining property owners. Second, the role of the tree commission must be designated either as advisory to the elected officials or as a group with decision-making authority to make final permit decisions and control work on public trees.

Experience has shown that it is more effective for a municipal department to take some level of financial responsibility for the management of the shared assets of public trees. This situation usually works better than delegating all financial responsibility to property owners, some of whom know little about, or can afford, proper tree care.

Commissions: Advisory or Decision Making

Experience has also shown that advisory tree commissions are more effective than those with total decision-making authority. In Pennsylvania, by state statute, advisory commissions can be a judicative body that reviews and approves permits, but their decisions can be appealed to the public works director, borough manager, and/or the elected officials. Decision-making commissions are also judicative, but the elected officials have given their authority away to the commission; thus, the commission's permit decisions are appealed to the Court of Common Pleas in Pennsylvania.

benefit from it. It justifies the need for and use of an ordinance and ties it into the police power. Example: "It is the purpose of this ordinance to promote proper planting, maintenance, and removal of public trees, shrubs, and other vegetation . . . and to protect the public health, safety, and welfare by providing for the regulation of street and park trees of Sylvania."

DEFINITIONS

Legal and technical terms found within the ordinance are defined. A term such as "pruning," for example, is defined to allow common understanding and enforcement of ordinance.

ESTABLISHMENT OF TREE COMMISSION

The establishment of a tree commission is a common provision in a municipal tree ordinance, although it also can be done in a separate ordinance. The following examples of commission responsibilities are sometimes expanded to include detailed information on other activities such as fund-raising, contracting for services, or development of a community tree plan.

Membership

A tree commission is hereby created that shall consist of five members, all of whom shall be residents of the borough. At least two of the members shall be experienced in forestry, horticulture, plant pathology, entomology, landscape architecture, or related fields.

Terms of Office

The members of the commission shall be appointed for terms of three years and these terms shall be staggered so that one member's term expires each year. A vacancy on the commission that occurs for reason other than the expiration of a term shall be filled for the unexpired portion of the term. A member may remain on the commission after expiration of his or her term until a replacement is duly appointed or qualified.

Officers and Records

Members of the commission shall elect annually a chairman, vice chairman, and such other officers as they may determine necessary. All officers shall be eligible for reelection. The commission shall keep a written record of its meetings and actions in accordance with the law. The commission shall provide council with minutes and annual reports or other reports of its activities as may be requested or required.

Compensation

The members of the commission shall serve without pay but they may be reimbursed for actual authorized expenses within the funds budgeted for such activities by council.

Commission Responsibilities and Duties

For commissions with decision-making authority: "The commission shall have exclusive custody and control of the shade trees in the municipality, and is authorized to plant, remove, maintain, and protect trees along streets and other public property within the municipality." For an advisory commission: "The commission shall study and make recom-

In Pennsylvania, recent court decisions indicate that municipal ordinances cannot dictate the type of pruning utilities perform on street trees. This is under the jurisdiction of the state Electric Energy Commission.

mendations to the borough council on all matters affecting trees within city streets, including ordinances and permits for the placement, removal, care, and protection of trees."

Authorized Activity

This section defines the activities that the borough, township, or city tree commission has the authority to perform. It is important to clearly define the rights and powers of the municipality, individual property owners, and utility companies. This section can be quite long because it defines the details involved with each activity. These authorities can include adopting policies, rules, and regulations; selecting and planting new trees and replacement trees in public areas; annually identifying, inspecting, and removing hazardous trees on public and private property; caring for and maintaining public trees; conducting and maintaining tree inventories; developing a tree management plan; and providing for public education and participation.

Utility Pruning and Street Tree Ordinances

In one recent case, a Pennsylvania court sided with an electrical utility company in a dispute over a municipal street tree ordinance. The municipal ordinance set levels for the amount and type of pruning that could be done by utility companies on public trees under utility lines. The court found that the state Electric Energy Commission's authority outweighed the authority of the municipality in this case, and the municipality could not dictate through ordinance the type of pruning that could be done. However, it was ruled that a municipal ordinance could mandate that the utility apply for a permit and contact the municipality before pruning began.

COMMUNITY TREE PLAN

This provision can be included in ordinance or not. It mandates the creation and maintenance of a management plan and all plan elements (administration, tree risk management, maintenance, public education, design, and maintenance standards and guidelines).

PERMITS AND FEES

A permit is required for the planting, removal, and maintenance of public trees. Example: "Upon approval of the tree commission, the department is authorized to issue permits for certain work on borough trees by persons not borough employees. Permits will be required for the following acts within the public right-of-way: tree removal, tree planting, and tree pruning (or other activities). Permits shall be in writing and shall specify the work permitted and the time period, not exceeding one year. All work shall be performed in accord with the Department of Public Works' 'Standards and Specifications for Arbor Work.'" In larger municipalities staff may review and approve permits and the tree commission act as the first appeals board.

Municipalities can take a number of actions regarding required permits. Some municipalities place all the financial burden on property owners for street trees. In this case, property owners must obtain a permit and then pay for purchase and planting of a tree as well as maintenance, tree removal, and repair of any damage to sidewalks. Other municipalities share these burdens with property owners; for example, the municipality may cover the cost of removing and pruning trees, while the property owners pay for planting new trees. The City of Pittsburgh splits the cost of sidewalk replacement 50-50 with property owners. This is the exception, not the rule.

Placing the burden for street trees on property owners (planting, pruning, removal) can be done not only for monetary reasons but also in an attempt to shift liability away from a municipality for their street trees. Ultimately, when a municipality creates a right-of-way, it is responsible for the safety of that right-of-way.

Some municipalities go so far as to allow street trees to be planted only on private property (away from the public right-of-way) in an attempt to shift liability and costs. Still, the bottom line is that the municipality is responsible for the safety of its right-of-way, and any tree (whether on private or public property) that affects the safety of the right-of-way through failure may open the municipality to legal action. Furthermore, these types of taxing strategies (placing the burden of a public asset on individual property owners) drives people away from supporting street trees and hurts any chance of obtaining the many public benefits of successful community tree program.

Emergency personnel performing their duties are not required to obtain a permit.

AUTHORITY AND PERMIT PROCESSING

These provisions define the permit processes regarding the planting, removal, and maintenance of public trees. Can permits be approved by staff, or must they be reviewed and approved by the tree commission? Smaller municipalities with tree commissions use these commissions to review and approve permits for tree removal and planting as needed or at least once a year. These previsions also define permit-filing fees and standards for completed applications, including materials such as an arboricultural/horticultural report or a letter of justification from applicant. Permits usually have no cost or are reasonably priced.

Such provisions also define the ability to approve or deny permits, including findings that must be made in decision making (e.g., tree is unsafe because of decay) and attached conditions for approval (e.g., tree can be removed with replacement or payment to municipality for value of removed tree). A common condition of a tree-planting permit is that the tree will be selected from a planting list approved by the municipality.

APPEAL PROCEDURE

This provision establishes an appeal procedure for permit approval or denial or an order to perform work (such as removal of a hazardous tree or limb on private property). One example is an appeal to director of public works and then borough council. Time lengths for appeals and compliance differ from place to place and are an important consideration.

MAINTENANCE

Standards are set for all facets of community forestry maintenance (planting, pruning, irrigation, pest control, and fertilization). This portion of an ordinance (Rules of Arbor Work) is usually attached in the appendix of an ordinance. By attaching in the appendix, the content is still ordained, but technical changes can be made by staff and commission without going through the process of amending an ordinance, including notice, public hearing, and vote of elected officials. A whole new ordinance does not have to be reenacted. Arboricultural standards can and should be very detailed and include American National Standard Institute standards for pruning and maintenance and International Society of Arboriculture Best Management Practices for tree pruning.

PUBLIC SAFETY

The public safety provision sets standards for hazardous tree removal and removal of traffic and other obstructions on public and private property.

NUISANCE AND CONDEMNATION

This section defines legal and economic procedures of municipality to cause the removal of hazardous or nuisance trees on private property, such as trees infected by Dutch elm disease or emerald ash borer, or hazardous trees threatening the safety of the public right-of-way.

NONLIABILITY OF CITY

This provision establishes that nothing within the ordinance shall be deemed to impose a liability.

INSURANCE AND BONDING FOR TREE WORKERS

To reduce the liability exposure of a community resulting from tree work, this section requires that the persons or firms involved in the care and maintenance of public (and sometimes private) trees have insurance and/or bonding to certain levels. Example: "For persons engaged in tree trimming, cutting, pruning, and removal activities for a fee or as a business, the applicant shall be required to demonstrate possession of liability insurance covering the activities involved in minimum amounts of $300,000 for bodily injury or death and $100,000 for property damages." Some municipalities have tied this provision into the requirements for obtaining a business license.

PROHIBITED ACTIVITIES AND VIOLATIONS

A street tree ordinance should list prohibited activities, including those that are illegal or legal only with a valid permit. Such activities can include removal, planting, or pruning of trees without a permit, damaging trees during construction, pruning roots more than 2 inches in diameter, and vandalism.

INTERFERENCE

The interference provision prohibits interference with municipal forester in the performance of duties.

ENFORCEMENT AND RESTITUTION

This section describes violations and the fines and other costs of violating the provisions of an ordinance. Enforcement is usually a misdemeanor citation. It also defines ability of community to seek restitution for tree destruction or damage. Restitution would mean payment to the municipality for the value of a tree destroyed or damaged in addition to any fines from criminal enforcement. This section also authorizes certain municipal officers to act in enforcement (forester, city manager, police). Examples: (1) "Any person violating the provisions of this ordinance shall upon conviction before a justice of appropriate jurisdiction, be liable to pay costs of prosecution and a fine." (2) "Any person willfully damaging or destroying a publicly owned tree will be liable to provide restoration to the municipality for the value of the tree as defined by the Council of Tree and Landscape Appraisers' Guide for Plant Appraisal."

ENACTMENT AND EFFECTIVE DATE

The enactment section of the ordinance gives the document legal status and requires the signatures of the appropriate municipal official and witnesses.

The butcher parks the same way he prunes! Detailed arboricultural standards should be included in an ordinance as Rules of Arbor Work.

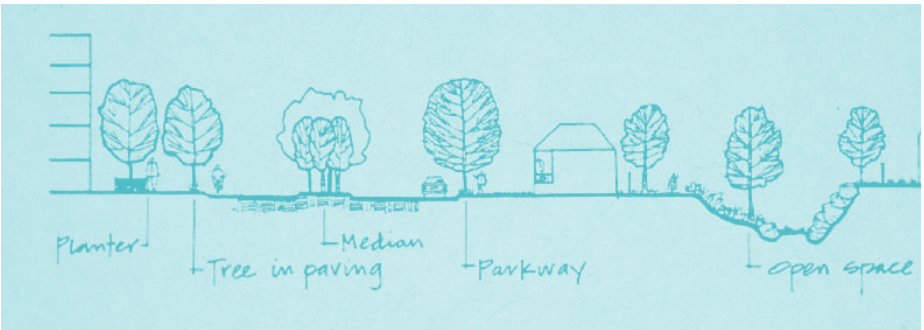
Why Plan for Growth and Development?

The purpose of planning is to take appropriate actions today that will avoid costs in the future. Four "public costs" that may result from not planning for community development and growth are (1) direct mistakes that take municipal revenues to correct (e.g., cost of landslides, fire, flood, and stormwater); (2) indirect mistakes that cause added municipal expense (e.g., cost of increased public safety and education over taxes provided by new development); (3) loss-of-value mistakes that cause property to depreciate (e.g., poor maintenance of public trees and parks); and (4) failure to secure private investment (e.g., not providing an attractive, healthy place for people and business). Land-use plans and regulations should not be simply borrowed from other municipalities; they should be developed by using a localized planning process.

Municipalities are creatures of the state, which has sovereign power over them. States pass the authority for planning and land-use regulation to local government through state constitutions and enabling legislation. In Pennsylvania, the enabling document for planning and regulation is the Pennsylvania Municipalities Planning Code, Act of 1968, P.L. 805, No. 247, as reenacted and amended through February 2005 by Acts 99 and 206 of 2004. In most cases, state-enabling legislation in the United States, at a minimum, empowers municipal governments to plan for and govern development through comprehensive plans and zoning, subdivision, and other ordinances. It also enables the reservation and acquisition of land for public purposes, as well as the establishment of planning departments and commissions.

Steps in the Planning Process

1. Put together the planning group including all those interested, important, and impacted.
2. Mutually agree on identification of problems and issues.
3. Perform information gathering, research, and analysis to provide definitive understanding of problems and issues.
4. Develop vision, goals, and objectives for alleviating problems and optimizing opportunities.
5. Develop and evaluate alternative methods (strategies and actions) to attain agreed-upon goals and objectives.
6. Prioritize and recommend appropriate courses of actions from alternatives, including implementation strategies.
7. Evaluate strategies and actions taken to implement progress toward agreed-upon goals and objectives.
8. Adjust strategies accordingly to take into account changing circumstances and success in reaching vision, goals, and objectives.



Whether found in landscaping or open space, trees and other natural resources can be conserved in development by using land-use planning and regulation.

In many growing places, urban sprawl is fragmenting and destroying forests and other resources.

Dillion's Rule

In 1869, the U.S. Supreme Court established a doctrine describing municipal governments as "mere tenants at the will of the state legislature." This doctrine has been reaffirmed in judicial decisions over the years. As such, "a municipality may exercise power, and no others, that are granted in express words, those necessary or fairly implied to express powers, or those essential to the declared objectives and purposes; not simply convenient, but indispensable." Pennsylvania and many other states are governed under the doctrine known as Dillion's Rule. Simply, a municipality cannot pass ordinances that are more restrictive than state and federal legislation unless this authority is specifically granted. Also, the structure of the municipal government, its ability to collect and spend taxes, and its ability to borrow are all authorized by the state.

Using Planning and Regulation to Conserve Natural Resources

In general, states, counties, and municipalities have the power to enact and enforce laws to regulate land use. Land-use regulations, such as zoning and subdivision and land-development ordinances, are based on the concept of "police power," which again is governments' authority and responsibility to promote and protect public health, safety, morals, and general welfare. The greatest challenge to any land-use regulation is to effectively demonstrate that it truly does promote or protect one or more of these components. Police power is a general authority of government to govern. This power cannot be used arbitrarily, capriciously, or unreasonably. It also cannot be confiscatory.

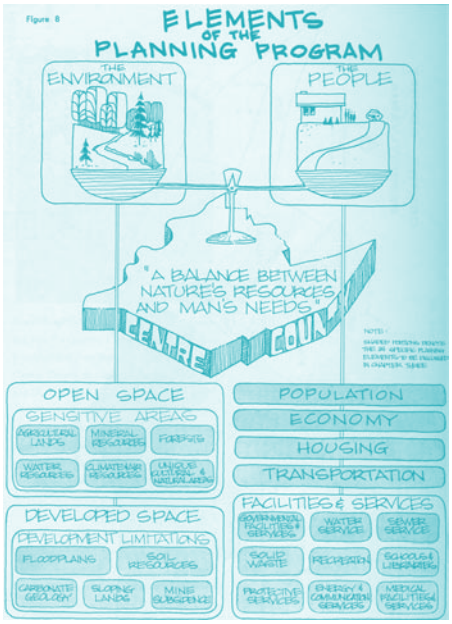
The ability of government to regulate the use of private property is associated with the "takings" issue. A "taking" is a problem of government overregulation that goes so far as to result in confiscation of private property without payment of compensation or due process. U.S. Supreme Court Justice Oliver Wendell Holmes in *Pennsylvania Coal Company v. Mahon 260* (1922) wrote, "The general rule at least is, that while property may be regulated to a certain extent, if regulation goes too far it will be recognized as a taking." The beauty of this ruling is the ambiguity surrounding the term "too far." Because of the Supreme Court's unwillingness to become the "super legislature," too far continues to be defined on a case-by-case basis. This approach reinforces the importance of a place-based and local nature for land-use regulation established by individual municipal governments through a democratic planning and electoral process.

Both regulatory and nonregulatory planning strategies and tools can be used to conserve natural resources such as riparian areas, woodlots, trees, and open space in community growth and development.

PLANNING TOOLS

Natural Resource Inventory

In defining and conserving the natural environment, the following resource categories can be used to gather information for comprehensive and other plans: significant wildlife habitat, scenic areas, riparian corridors, recreational resources and corridors, productive forest resources, woodlands, special landscapes, wetlands, floodplains, historical and cultural resources, open space, vulner-



Comprehensive plans consider the future of people, transportation, economy, housing, public safety, public services, and natural resources.

able landscapes, moderate and steep slopes, viewsheds, contiguous blocks, and corridors for the passage of wildlife and other natural elements.

Comprehensive Plan

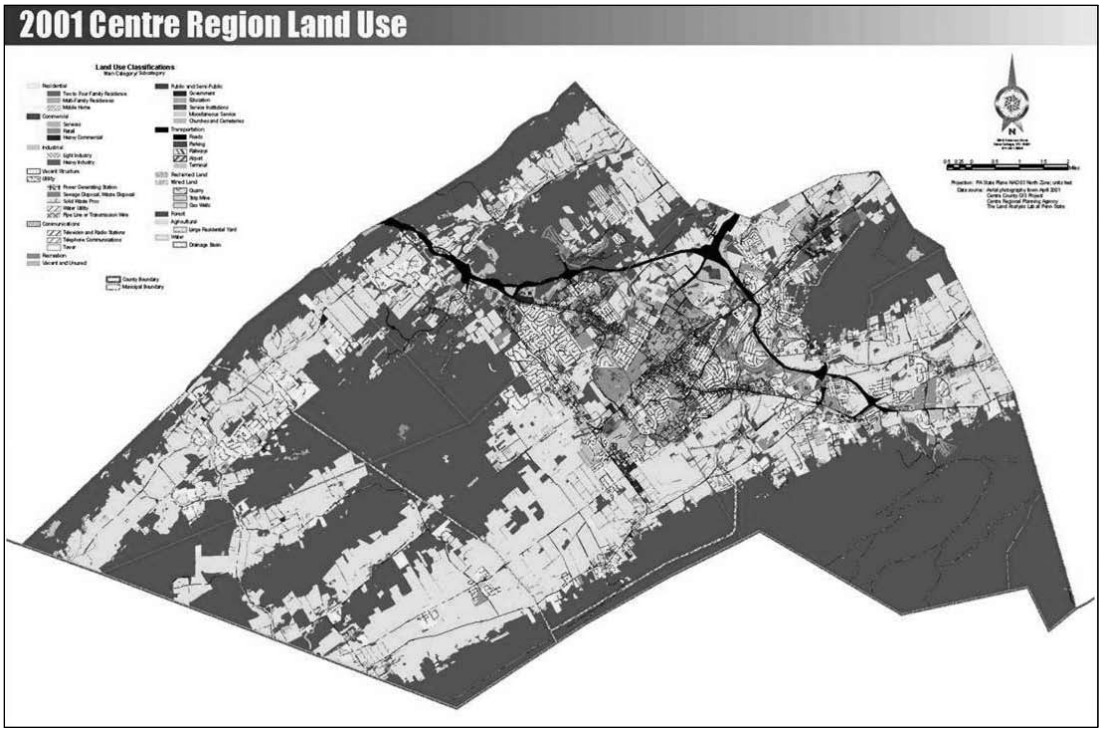
A comprehensive plan is a growth-management plan. In Pennsylvania and other states, it is adopted by resolution of the elected officials. It is not an ordinance and is not enforceable as such. This plan contains information and policy that serves several purposes: to illustrate and discuss the nature and form of future community development and growth; to provide a logical basis for all land-use ordinances (e.g., describes justification for the use of police power); to provide overseeing policy for the review of subdivision and other development applications; and to provide land-use and other maps to guide future land use (e.g., the land-use map is the basis for zoning map). A comprehensive plan has a number of important sections:

1. Historic and background information
2. Economic, social, and environmental resources
3. Vision, goals, objectives, and policies for community development
4. Plan elements
   a. Land-use element—provides basis for the placement of residential, commercial, and other development and for zoning map and ordinance
   b. Transportation element—future roads, public transit, greenways
   c. Community facilities element—future schools, police/fire stations, sewer, water
   d. Revitalization element—contains information, policy, and specific recommendations for brownfield, infill, and redevelopment and should include landscaping as part of the strategy
   e. Conservation, open-space, or natural resources element—conservation of natural environment and future open space and parks
   f. Special elements such as viewsheds and waterfront areas
5. Plan implementation—long-term capital budget, strategies for bond issues, referendum, donation, and enterprise

Conservation and Open-Space Elements

In addition to natural resources, conservation elements can discuss green roofs and alternative building strategies, alternative energy and transportation systems, recycling, xeroscapes and water conservation, solar design, waste management, and other green issues. Open-space elements typically define in a comprehensive manner the implementation of an open-space program or system. Typical sections of an open-space element are the overview of the general plan for conservation, the roles and function of open space, identification of important open-space areas and connections, classification and prioritization of open-space protection, and acquisition and implementation tools. Implementation tools can include state and federal programs, acquisition of fee (full title) and less-than-fee title (development rights and conservation easements) of land, preferential tax assessments, bond issues and other public funding, and zoning and subdivision and land development ordinances.

SOURCE: The City of Thousand Oaks, California, *Comprehensive Plan: Conservation and Open-Space Elements*.



One element of a comprehensive plan is the land-use map. This map is the basis for a logical and legal zoning map and ordinance.

Zoning can be used to protect vegetation and soils found on steep slopes. This can have positive impacts on stormwater and water quality.

If the natural environment is not considered in a comprehensive plan, it will not be adequately or correctly addressed in zoning or other ordinances, development application review, or economic strategies, such as capital budgeting and bond issues, that are used to implement other growth management policies expressed within the plan.

MULTIMUNICIPAL PLANNING

Municipalities have been working together for many years through water and sewer, police, fire, and recreation authorities and districts. They have not shared the same level of interest in cooperating in land-use planning and regulation. Natural resources do not conform to municipal jurisdictions, and strong watershed or regional coordination is crucial for conserving viable natural resources systems. It is also crucial for providing high-quality human recreation experiences. Many believe that multimunicipal cooperation can also provide for more efficient administration of land use and more efficient and orderly development. The implementation of a multimunicipal comprehensive plan and zoning ordinance can provide a clearer understanding of how and where healthy, larger-scale natural landscapes (e.g., a stream running through four municipalities) will be conserved. In many states, multimunicipal planning and zoning does not negate individual municipal plans and ordinance administration. Municipalities may take part in a number of different planning scales if they desire.

REGULATORY TOOLS

Zoning

Zoning ordinances, which regulate the use of land and structures, are designed to protect the health, safety, and welfare of the public, as well as to guide a community's growth. Zoning ordinances first divide all the land within a municipality into some number of districts and then provide regulations that apply either to the entire municipality or to the individual zoning districts. The ordinance's two parts—the text and the zoning map—regulate the type and density of development. Zoning ordinances may be used to control development in areas subject to flooding or to preserve the historic or natural features of an area.

Traditional zoning provides standards for the height of buildings, the percentages of a parcel that may be developed, the density of development, and the use of land (e.g., residential, commercial, industrial, institutional, agricultural, rural resource, open space). Zoning is not planning but an implementation tool of a municipality's comprehensive plan. One phrase found in many state-enabling statues is that zoning

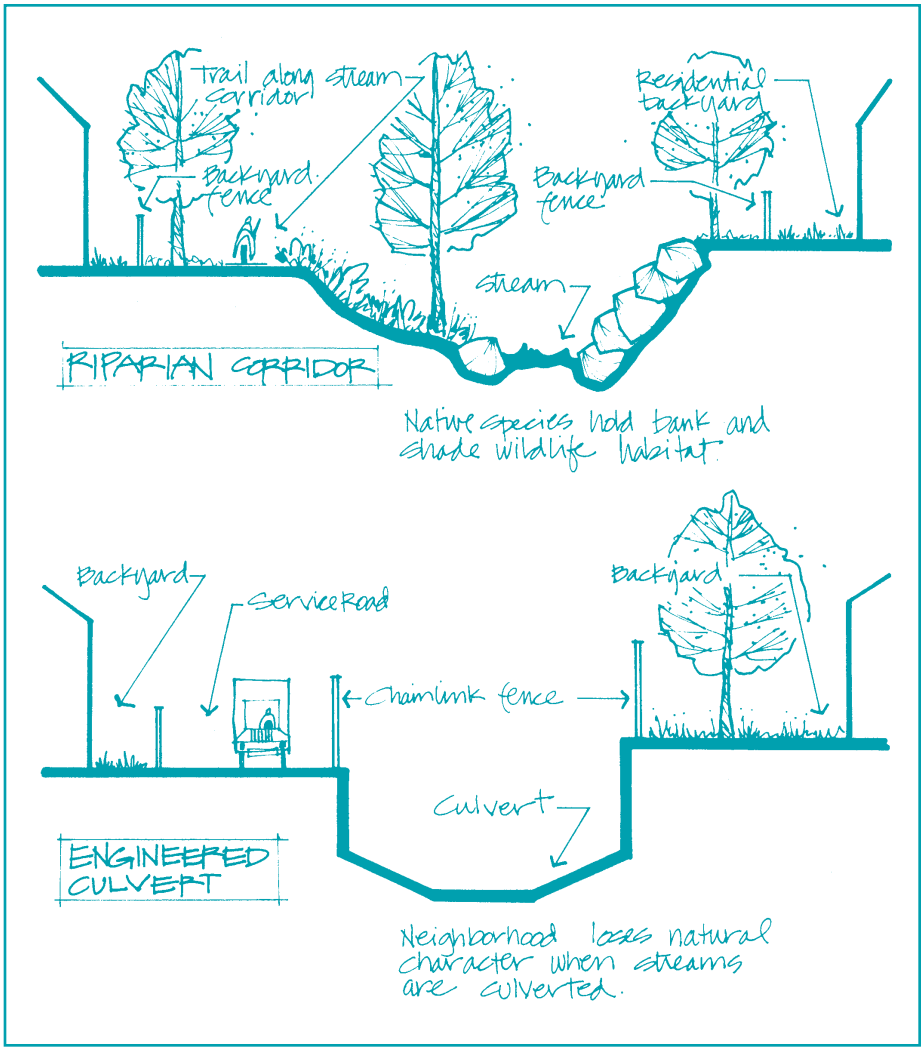
Zoning ordinances can preserve worthy trees during development. If serious about protecting trees during construction, chain-link fences should be used.

An Example of State Statutes: Multimunicipal Planning and Regulation in Pennsylvania

Article III (Comprehensive Plans) and Article VI (Zoning) of the Pennsylvania Municipalities Planning Code contains language that somewhat promotes multimunicipal planning and zoning. But the real authority to allow joint or multimunicipal planning and zoning is found in Article VIII-A (Joint Municipal Zoning) and Article XI (Intergovernmental Cooperative Planning and Implementation Agreements).

Basically, Article 8-A promotes planning and zoning in a multimunicipal or cooperative fashion. It authorizes one or more municipalities to enact, amend, and repeal joint zoning ordinances and adopt a joint comprehensive plan. A joint zoning ordinance must be based on a joint comprehensive plan developed by a joint planning commission and adopted by each partnering municipality. The zoning ordinance must also be enacted by vote of the elected officials in each of the municipalities zoning together. A joint zoning hearing board can be established to administer the joint ordinance, or, alternatively, individual zoning hearing boards can administer the ordinance for properties within that jurisdiction.

Article XI essentially authorizes formal agreements between municipalities for joint planning and zoning. These agreements are highly negotiated and formal, and the regulatory responsibilities and financial obligations and gains are spelled out in the agreement. While municipalities may develop multimunicipal plans and zoning without entering into implementation agreements, the state does provide certain incentives to enter into agreements. One incentive is that municipalities using implementation agreements for planning and zoning do not have to zone for each recognized land use within each municipality; rather, they have to zone for each land use within the area of the agreement. For example, there can be one "heavy industry" and one "mining" zone instead of three if three municipalities enter into an agreement.



Zoning can be used to define and protect natural riparian areas and corridors.

ordinances shall be "prepared in accordance with a comprehensive plan."

In 1916, Edward Bassett, a New York attorney, defined zoning as "the regulation by districts under the police power of the height, bulk, and use of buildings, and the use of land, and the density of population." Under this principle, the reasonable use of zoning has survived numerous court challenges. In many states, including Pennsylvania, zoning ordinances can be used for protecting and conserving natural resources such as riparian areas, woodlots and trees, water, and open space. They can also be used to encourage economy and ingenuity in development. This translates into using zoning to provide for creative and efficient development, which includes the use of clustered density and conservation development.

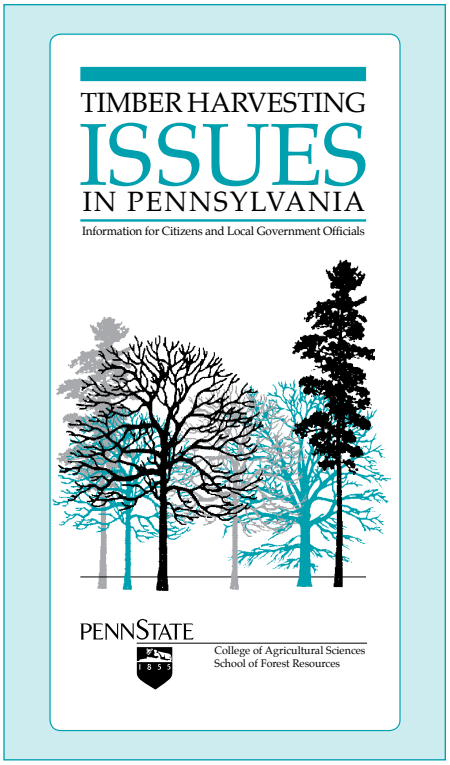
Rare, landmark, or native trees can be preserved through ordinances that regulate tree removal and damage. Waterfront areas, woodlots, and other natural landforms within a municipality can also be protected. Tree-protection ordinances are complicated by the fact that they concern trees that stand on private property. Tree removal should not be banned but placed within the development application review process through a permit requirement.

Zoning Administration in Pennsylvania

Planning commissions and elected officials must be part of any zoning ordinance development and enactment, but the municipal zoning hearing officer and zoning hearing board are responsible for the administration and enforcement of the ordinance. Appeals made on decisions by the zoning officer go before the zoning hearing board and are appealed to the Court of Common Pleas. In Pennsylvania, elected officials have no direct vote in zoning permits and appeals except in the case of a curative amendment or suit against the zoning ordinance.

Many zoning tools can be used to implement a comprehensive plan and conserve natural resources.

- *Existing-use zoning.* The legal use of a parcel is based on the use the parcel is now in (e.g., rural resource, forest resource).
- *Overlay zoning.* Additional zones of special regulation are drawn over an existing zoning district to provide special protection to areas with unique challenges and benefits (e.g., standards for riparian area conservation). Parcels in overlay zones are regulated by two different sets of zoning: the underlying zone of the district, such as residential, and the special considerations of the overlay.
- *Conservation or cluster-development zoning.* Sets the groundwork for conservation subdivision by providing for smaller lot sizes, clustered development, and conservation of a certain percent of open space (often near 50 percent of the parcel). The ordinance allows developers to decrease lot size and increase density in one area of development in exchange for open-space conservation in another.
- *Lot-size averaging.* Instead of enforcing a minimum-size parcel for development (such as a one-acre minimum), a mix of large and small sizes can be used. This allows developers flexibility in designing a subdivision, presumably so lots are arranged more prudently and the amount of open space or natural features, such as steep slopes or woodlots, are maximally preserved.
- *Sensitive-area ordinance.* Used to regulate and oversee the removal of vegetation and destruction of wooded areas, as well as to limit grading on steep slopes, well heads, and other areas considered environmentally sensitive.
- *Steep-slope ordinances.* Used to regulate the amount of grading, vegetation clearing, and development on different percentages of slope. Steeper slopes would have more protection.
- *Tree- or woodlot-preservation ordinance.* Protects worthy single trees and groups of trees from removal and damage during development. These ordinance mandate that trees must be inventoried and identified on development plans; development be designed to conserve percentages of tree canopy or worthy individual trees; trees are protected during development by fencing and monitoring; and replacement trees are provided for trees removed by permit. The following is an example of a tree-protection ordinance standard: "Site plans or development plans shall accurately show the location and size of existing trees. Trees to be saved and removed during development shall be indicated on the site plan. A permit must be approved for the removal of applicable trees. . . . Trees to be preserved during construction shall be fenced at the dripline."
- *Timber-harvest ordinance.* Provides reasonable standards and regulations based on accepted silvicultural principals or best management practices for timber-harvest operations (e.g., harvesting technique, timber operations within riparian and wetland areas, road and landing construction, hours of operation).
- *Riparian buffer zone ordinances.* These ordinances usually establish multiple riparian buffer zones extending away from the top of the stream bank. In each zone, certain permitted uses are authorized. As an example, Zone 1 is a 25-foot setback from stream where trails and other passive uses are authorized, and Zone 2 is a 75-foot setback where timber harvesting following best management practices and residential development under certain conservation conditions can occur. The length and restrictions of a zone can be increased depending of the degree of slope in the riparian area and the quality or worth of the waterway.
- *Planned residential/unit development (PRD/PUD).* Occurs when a parcel of land is developed as a single unit with designated and intermixed areas for residential, commercial, recreational, and open-space land uses. In a PRD, zoning and subdivision and land development ordinances are used to assemble development together into a single large plan with an emphasis on multiple use and open-space conservation (often near 50 percent of parcel).



In Pennsylvania, forestry is a land use that can be regulated by reasonable county and municipal zoning ordinances.

- *Stormwater-management ordinance.* These ordinances deal with stormwater discharge volume control. Engineering and land-use tools are used to encourage infiltration into groundwater so that water quality and peak-rate discharges after development are the same as they were before development. Tools that can be mandated through ordinance include permeable paving, bioretention areas, and limits on the square footage of impermeable surfaces that can be placed on a developed parcel.
- *Growth boundaries or areas.* Development follows the provision of water, sewer, and roads. A growth boundary, or public service boundary, is established through zoning and other tools to provide for orderly development and limit development of certain types, including in most cases large-sale subdivision, commercial, and industrial. They are characterized by a firm, long-term (typically twenty years) commitment to high-density development within the boundary, and rural preservation outside the boundary. To allow for compact development within the boundary, municipalities must commit to infill housing and other dense development. Also, to limit large-scale residential development outside the growth boundary, the provision of public water and sewer may be restricted. Growth boundaries often work in association with transferable development rights that allow the purchase of development rights outside the boundary and development of these rights within the growth area.
- Municipalities can also consider zoning ordinances that protect wetlands (zones similar to riparian areas), floodplains (restrictions on the amount and type of development and land use), and wellheads (restrictions on the amount and type of development and land use), as well as those that protect water supply in areas not served by a water system that draws its water from a nonlocal source.

Trees as a Streamside Buffer

In a forested stream buffer, rain and sediment that runs off the land can be slowed and filtered in the forest, settling out sediment nutrients and pesticides before they reach the streams. Infiltration rates ten to fifteen times higher than grass turf and forty times higher than planted fields are common. Excess nutrients are taken up by the tree roots and stored in leaves, limbs, and roots. Through a process called denitrification, bacteria in the forest floor convert harmful nitrate to nitrogen gas, which is released harmlessly into the air.

Subdivision and Land Development Ordinance (SALDO)

Article V, section 501 (Grant of Power) of the Pennsylvania Municipal Planning Code states that a municipality may regulate subdivisions and land development within the municipality by an ordinance. Subdivision ordinances can exclude certain types of land development, promote flexibility, allow for economy and ingenuity (such as clustering and lot averaging) in the layout of subdivisions, or require the placement of trees and landscaping, construction of sidewalks, or the dedication of street and utility right-of-ways.

A subdivision ordinance is a general ordinance that regulates subdivision application processing, lot layout and design, and development safety and quality. Subdivision ordinances work with zoning ordinances to implement the comprehensive plan and conserve natural resources. For example, a zoning ordinance might describe the density, lot sizes, and percent of open space required in a conservation subdivision; the subdivision ordinance would then distinctly describe the design requirements and standards to complete the conservation subdivisions. Landscape ordinances are often found within SALDO ordinances. These ordinances are used to set standards for landscape architecture such as the landscaping of parking lots and developments and for landscape maintenance after construction. Here are two examples of a landscaping standard:

1. Plant materials shall be capable of healthy growth in their specific location and capable of producing the desired effect.
2. Parking-lot setback areas required by the zoning ordinance shall be landscaped with trees, shrubs, and groundcovers as required in the Shadeville Community Tree Plan or Shadeville Guide to Landscape Specifications. In addition, trees shall be installed in parking-lot planter areas to achieve an ultimate canopy coverage of 50 percent for solar control of paved areas within fifteen years of installation.

Landscape Ordinances

These increasingly popular ordinances usually mandate minimum amounts of landscaping for new developments such as buildings, parking lots, and streets. Builders must submit a landscape design plan in addition to their building plans. The landscape plan and species lists must adhere to the requirements of the ordinance and be approved by a landscape architect. In general, the cost to install a landscape is approximately 2 percent of a developer's total project costs. Builders are not necessarily opposed to landscape ordinances because they recognize that landscaping provides increased property values and business interest.

How Zoning and Subdivision and Land Development Ordinances (SALDO) Work Together

Subdivision and other development are guided by both zoning and SALDO ordinances. The authority to control land use is in zoning, which speaks about who gets what, where, and how. A SALDO ordinance talks about permit process, subdivision layout and design, and bonding of required improvements. A SALDO ordinance would refer to or repeat a zoning ordinance when discussing provisions that affect the use of private property.

Differences Between Zoning and SALDO Ordinances

Subdivision Ordinance	*Zoning Ordinance*
Application process and requirments	Location of uses
Lot layout and design	Density of use
Street design	Percent open space, riparian setbacks
Standards for tree and woodlot conservation	Building heights
Water and sewer provision	Setbacks and yards
Required improvements (sidewalks, landscaping)	Dimensions of lots
Financial guarantees and bonding	Building coverage and bulk

NONREGULATORY TOOLS

Municipalities interested in conserving open space and other natural resources should consider using a variety of nonregulatory techniques in addition to regulatory methods. Using public and private funds to purchase property for natural resource conservation is popular with both conservative and liberal people in growing places. Less-than-fee simple acquisition is protection of the natural environment by easement, where the easement buyers purchase (e.g., through referendum and bond issue) only those land rights that need to be protected (e.g., development rights). This concept allows owners to cash in on development values while land is conserved and managed as open space. Full-fee acquisition is where the total bundle, or all property rights, is purchased. Tax incentives, such as lower property taxes (tax based on use rather than development value), can be granted for individuals who hold their land in open space for a period of time under contract with state government. Other incentives can include increased development density, decreased development and impact fees, and relaxed development standards (e.g., amount of parking and street width) to help developers conserve natural landscapes. It is also important to empower residents through public forums, committees, education, training, volunteerism, and opportunities for understanding and participation.

Web Resources

American Planning Association:
planning.org

Conservation Fund:
www.conservationfund.org

Developing and Evaluating Tree Ordinances:
www.phytosphere.com/treeord/index.htm

Green Infrastructure:
www.greeninfrastructure.net

GreenPlan Philadelphia:
www.greenplanphiladelphia.com/node/31

Living Memorials:
www.livingmemorialsproject.net

Planning the Urban Forest:
www.planning.org/forestry

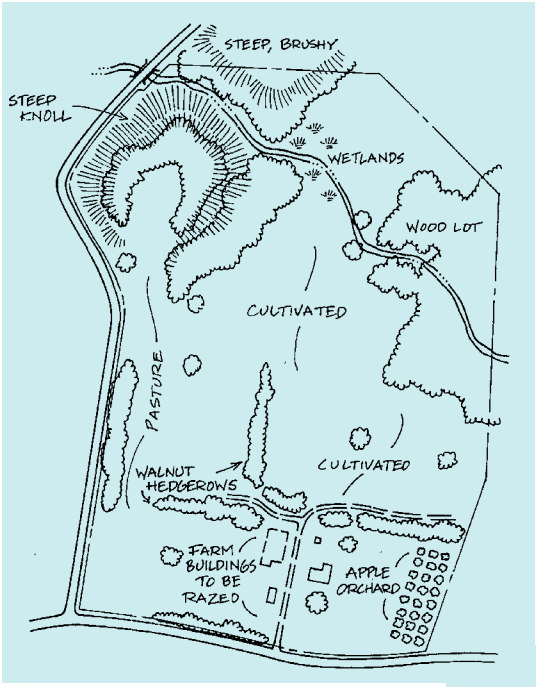
Preserving Trees in Development:
pubs.cas.psu.edu/FreePubs/pdfs/uh122.pdf

Smart Growth:
www.smartgrowth.org

Tree Ordinance Guidelines:
www.isa-arbor.com/publications/ordinance.aspx

CONSERVATION OR CLUSTER SUBDIVISION

Zoning and subdivision and land development ordinances (SALDO) work together to create conservation subdivisions. Zoning provides for increased density on smaller lots and the protection of open space, vegetation, steep slopes, wetlands, and riparian areas. SALDO ordinance requires a natural resource inventory, placement of natural features on a development plan, protection of resources during development, provision of landscaping in development, and design of streets and other developmental infrastructure. The SALDO ordinance repeats or references the zoning ordinance when considering resource protection or any other criteria that restrict the use of private property.



A natural resource inventory identifies all important natural characteristics of a site.

Cluster development can be used to protect development densities while preserving woodlots, meadows, and riparian areas.

Traditional subdivision design provides for the maximum number of minimum-sized lots and does not consider preserving woodlots or other natural features.

CHAPTER 7

Conducting a Tree Inventory

Many communities have public street and park trees, a shade tree commission, and plant trees, but how many actually know what the resource looks like, the condition it is in, the benefits it is providing, and how effective their program has been? Whether you are managing a retail store or natural resources, an inventory is critical. Without an inventory of the resource, you don't know what you have, what condition it is in, and what kind of work is needed to maintain or manage it for the future. An inventory also helps you better document the many benefits that trees are providing the community.

A street or park tree inventory provides information for the planning, design, planting, maintenance, and removal of trees. It provides useful information to justify starting and managing a tree program and funding an existing program. An inventory of a community's public trees and planting spaces is a prerequisite for making sound decisions.

A community that operates a tree program without an inventory may question the need for one. Previous decisions may have been based on tradition rather than an accurate assessment. A tree inventory can quantify the answers to many important questions. For example, an inventory can provide the location of hazardous trees, the number of trees located within the public right-of-way, the value of street and park trees, and the number of available planting sites. In addition, an inventory can help identify insect or disease problems, pruning needs, and work and budget priorities.

With this information, tree commissions and staff can better plan and prioritize tree removals, maintenance work, and plantings. They can also determine the value of their municipality's trees, which can help emphasize the program's importance. An inventory can be used to monitor tree conditions and quickly and accurately answer management questions, such as where and how many trees should be planted in a year. Over the years, changes in a community forest can be seen in the number, age, condition, and species of trees. A well-maintained inventory can be used in cases of liability to demonstrate that there was no negligence in the inspection or care of these trees. An inventory will also improve the chances of receiving grants and other assistance by providing documentation of the extent and worth of street and park trees.

With the help of computer programs such as CityGreen, STRATUM, and UFORE, we can now begin to quantify the value community trees and canopy cover. These computer modeling programs produced by American Forests and the USDA

Tree inventories identify needed work and help document the many benefits trees provide.

Both inventories and annual inspections are used to identify tree risk.

Tree Condition = Health + Structure

Tree condition is a combination of both tree health and structure. Annual growth, leaf size and color, and formation of wound wood are examples of health. Cavities, decay columns, poor branch unions, and heavy horizontal branching are examples of structure. Even in good health, trees can have very poor condition ratings because the circulatory system of a tree (phloem and zylem) found under the bark is working, but major decay columns are found within roots, trunks, and branches.

Forest Service Research Stations enable us to illustrate to elected officials and other decision makers the value of green infrastructure. We can now document the monetary values of the amount of energy saved, stormwater reduced, carbon sequestered, air pollution removed, and property value enhanced. Once dollar values are presented for the benefits provided, public trees may begin to be viewed as a necessary component of the community instead of a nicety that can't often be afforded.

The following sites provide information about computer-based tree inventory programs:

www.americanforests.org/productsandpubs/citygreen

www.itreetools.com/applications/tipda_stratum.shtm

www.itreetools.com

secure.isa-arbor.com/store/Best-Management-Practices-Tree-Inventories-P275C4.aspx

www.umass.edu/urbantree/publications/palmarticle.pdf

www.na.fs.fed.us/urban/infore-sources/inventory/index.htm

www.na.fs.fed.us/spfo/pubs/uf/utrmm

Inventory Process

The development process for a tree inventory can be divided into four phases: planning, implementation, application, and maintenance.

PLANNING

Determine if you will be conducting a window-shield, drive-around inventory or a complete, walking, full inventory of 100 percent of park or street trees and street-side space. This is dependent on the staffing and monetary resources you have and the information you want to collect. If you are planning to use the inventory on a continual basis, then a complete inventory is needed. If you are trying to paint a picture, or snap shot in time, of the resource, a window-shield inventory will probably work, but it will not be able to tell you all the important information you need.

Driving in a car with one or two people recording the data is faster and more comfortable, but a more thorough, accurate, usable inspection of trees requires walking. A driving or "windshield" inventory does not allow the recorders to notice all indicators of tree health or safety. The windshield method is better used for a general overview of trees and quick estimates of tree numbers, planting vacancies, or special problems such as topped or diseased trees. Regardless of whether they walk or ride, data gatherers must have good knowledge and training to identify tree types, recognize planting sites, and evaluate tree condition and removal and pruning needs.

- Identify the types of information needed and how that information will be used.
- Assess the availability of computers and software.
- Assess the requirements for labor, equipment, and funding. Consider using handheld PDAs (Palm Pilots, Pocket PCs, or hand-held PCs) to collect data in the field. If they are available, they can be programmed

Well trained and supervised volunteers can complete street and park tree inventories.

to allow for quick data entry and input. Are you going to use GIS or global positioning equipment? Many computer-based inventory systems are compatible with Access and Excel. Using computers saves the time and effort of logging data from paper sheets.

INVENTORY IMPLEMENTATION

- Seek advice from professionals such as municipal foresters, arborists, extension urban foresters, or state foresters on how to train volunteers and implement the inventory. It has been shown that well-trained and supervised volunteers can be used for street and park tree inventories. It is best to bring a qualified individual that has experience conducting inventories to provide the necessary training needed for volunteers or staff.
- Look for opportunities. Are there college or upper-level high school students available to complete the inventory as part of their required course work?
- Conduct training for gathering the data. Training can vary in length depending on tree-identification skills. A minimum of several (three to five hours) of training are needed for most volunteers.
- One person should manage the project. This person will ensure that data-collection teams do not overlap and collect data on the same streets, duplicating efforts. Maps of the community will be needed, as well as clipboards, data collection sheets, or PDAs
- Collect the data on paper or handheld computer. Two- to three-person crews are the most efficient for inventory. One person records the information and views the top part of the tree, while the others collect addresses, measure the tree, and look at the bottom portion of the tree. Using three people allows a recorder and two people working on either side of a street.
- Input and store the data in a computer. Make sure someone is managing the data and backing up computer data to ensure it is not lost.

COLLECTING DATA

The only way to acquire the information needed for management is by inspecting the trees and recording the information. Designing an appropriate inventory method requires making several decisions. Those conducting the inventory must decide how much of the community will be inventoried, which areas will be completed first, who will collect the data (volunteers, interns, staff, or consultants), and what information is needed. Once these decisions are made, members must determine how to use, store, and analyze the information. They also must decide who will be responsible for organizing and maintaining the information.

A required standard data form will simplify the collection of data and allow several people to help with the inventory. A page can be used for each street (both sides of the block) so that tree species, planting spaces, and trees in poor condition can be located and readily found on that street.

GUIDE FOR ASSIGNING CONDITION CLASS OF TREES
Condition = health and structure

CONDITION	BRANCHES	FOLIAGE	ROOTS AND TRUNK
Good	Dieback limited to less than 10 percent of smaller branches.	Normal for species in size and color. Crown density is normal.	Less than 20 percent of trunk or roots has any decay. No decay fungus mushrooms present.
Fair	Dieback includes 10–20 percent of smaller branches and 1 to 2 large, dead branches.	Reduced in size. Lighter in color than normal. Crown density is sparse.	20–33 percent of trunk or roots has decay. Decay fungus mushrooms may be present.
Poor	Dieback includes more than 30 percent of small branches, 3 or more major branches.	Greatly reduced in size and yellow. Crown density is very sparse.	More than 33 percent of trunk has decay or is hollow. Decay fungus mushrooms may be present. More than 33 percent of roots removed or decayed.

Most Commonly Collected Data Used in a Tree Inventory

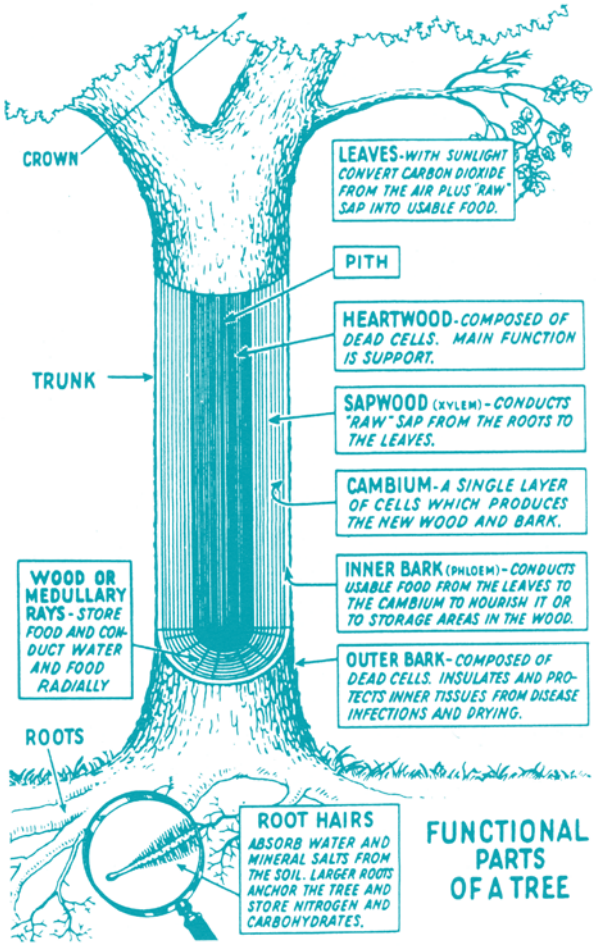
- Location of the tree (by street name and block or building number)
- Type of tree and its abbreviation (If the species cannot be determined by data collectors, this field can be left blank for someone else to identify instead of incorrectly identifying a tree.)
- Diameter of the tree's trunk
- Condition of the tree (good, fair, poor, dead/dying) (If the condition cannot be determined, this can also be left blank for more experienced people to determine.)
- Any trees that need to be pruned, removed immediately, or require any other urgent work
- Location and size of potential planting sites for new trees and the size of tree that fits that site (Future planting space is often overlooked, as many focus on the existing trees and their condition. Future planting space—and suitable size of tree—are critical information in determining the stocking of the forest, canopy cover, and direction of any future planting programs.)
- Potential constraints on planting spaces such as utility wires, lines of vehicle site, and narrow tree lawns
- Location and extent of tree damage to sidewalks and curbs
- Comments on urgent and other issues

SUMMARIZING AND USING DATA

A personal computer offers an efficient means of managing and manipulating tree-inventory data. A tree-inventory program is simply a database with individual data files for every tree. Computerized systems can be easily maintained and changes can be made as soon as tree removals, maintenance work, and plantings occur. More important, the computer allows the user to quickly organize and tabulate the data into a variety of graphs and reports. Tree-inventory software is available from resource consultants and other organizations such as cooperative extension and the state bureau of forestry. You can also download free software such as MCTI from the USDA Forest Service at www.itreetools.com.

Performing periodic inventory updates is necessary to monitor the progress of street and park trees. In larger municipalities, maintaining a street tree inventory should become an annual, monthly, or even weekly activity. A rotational schedule should be developed so that a portion of the community is inventoried each year. This will result in a total inventory update every five to ten years. Community workers can take the opportunity to update the tree inventory as they complete work in different areas. For example, new inventory data could be collected in conjunction with tree-pruning work. Maintaining the tree inventory will keep the data updated, which will in turn provide reliable and useful records of community trees.

Enlisting the help of leaders and citizens in the tree inventory is a good way to get them excited about a community tree program. The information that is gathered can be used to start a municipal tree commission, justify budget requests, and develop a tree plan that will guide future management decisions and activities. After the inventory has been completed, the results should be shared with municipal leaders and local residents. This will help them understand what work is needed to provide safety and preserve and improve their community forest.



There are many parts of a tree that must be understood in a tree inventory. Experienced arborists may be needed to clarify problems identified by volunteers.

Street ____ Block #______

From Cross Street ________________________ Area ______________ Page ______ of ______

To Cross Street ________________________ Collected By: ______________________

Address #	Side of Lot	Tree Site #	Site Type	Lawn Width, feet	Utilities	Species	DBH*	Maintenance	Condition	Clearance	Walk Damage	Site Condition	Tree Size	Comments

Side of Lot
Blank=Front
S=Side
M=Median

Planting Site Cond.
G=Good
F=Fair
P=Poor

Tree Site #
# of Site at Address

Sidewalk Damage
Y=Yes
N=No

Utilities
0=None
H=Overhead
U=Underground

Maintenance Needs
0=Plant
1=Remove
2=Structural prune
3=Clearance prune
4=Training prune
5=Clean/Thin
6=Mulch
7=Stake
8=Fertilize
9=Remove suckers
10=Insect/disease

Clearance
0=None
S=Sign
T=Traffic
W=Walkway

Tree Size
0=None
L=Large
M=Medium
S=Small

Condition of Tree
G=Good
F=Fair
P=Poor
D=Dead

Site Type
T=Tree lawn
M=Median
U=Undefined
S=Sidewalk

***DBH** is Diameter at Breast Height, measured 4.5' above ground.

The data fields found on this inventory sheet can be programmed into Excel, Access, or other computer programs.

CHAPTER 8

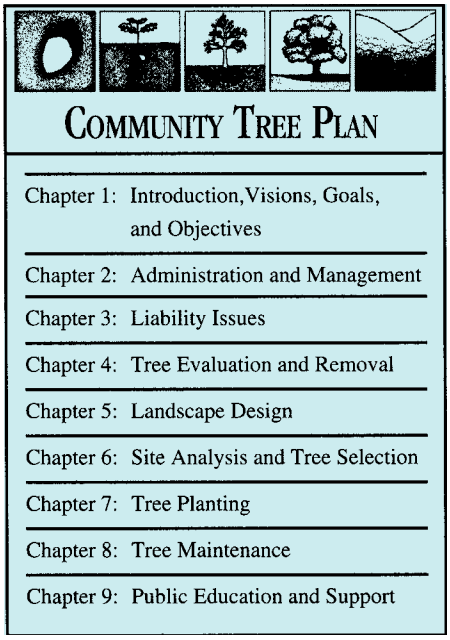
Creating a Community Tree Plan

The tree plan is a means of logically thinking about and implementing a public tree program. It describes a community's street and park trees and how they are to be managed to attain stated goals. The plan also provides a cost-effective approach to managing public trees. When faced with tight budgets and competing priorities, a community may be tempted to neglect its trees. In the long run, however, ignoring or neglecting public trees is more costly than following the goals, objectives, and strategies that a proactive and comprehensive tree plan provides.

The principal purpose of a community tree plan is to guide the management and maintenance of a community tree program, including tree removal, pruning, planting, funding, volunteer opportunities, and other important work. The plan should assist a community in achieving the greatest benefits from its public trees at the lowest cost. A good plan does not have to be long, complicated, or expensive. The key is to tailor the plan to meet the needs of the trees and the desires and abilities of the community. The tree plan should be consistent with the street tree ordinance and should be approved by resolution of the elected officials of the municipality.

When developing a tree plan, several important issues must be taken into consideration. A community must decide its vision for the program, the benefits it hopes to achieve, how it wants its various neighborhoods and places to look, and how the program will be funded. Tree problems must be identified and the details of work and maintenance must then be decided. The tree plan typically is developed by the tree commission, sometimes with assistance from a consultant, extension educator, or state forester.

Creating a tree plan will help the members of a tree commission and other concerned citizens understand the current condition of the community forest and shape its future. The commission should identify any issues, such as places in need of landscaping, that are specific to the community and then promote a discussion on these ideas. They should also review tree plans from other communities. The new plan should be reviewed by interested officials and residents before it is submitted for official approval.



Community tree plans guide the management and maintenance of a community tree program.

Community Tree Plans and the Comprehensive Plan

Some community tree plans have been incorporated as community forestry elements, or chapters, of a municipality's comprehensive plan. Along with natural resource conservation, open space, and other environmentally oriented chapters, a community forestry element can help provide a sound focus for resource conservation as a place grows.

Goal-Oriented Management

- A vision statement is about where you want to go. It is a broad statement of intent that will guide a program.
- Goals are also about the future; they force us to move toward a vision. They are statements of intent that provide stepping stones for progress.
- Objectives are about now. They are realistic and attainable elements of a program such as finding program funding. They allow a focus of work to be placed on any important program element.
- Strategies are the day-to-day and month-to-month tasks that move objectives forward and, ultimately, allow a program to reach its goals, thereby fulfilling its vision.

Using a Plan to Set Direction

The following discussion sketches the typical outline of a community tree plan from introduction to specific strategies for guiding the work to be done.

INTRODUCTION

A description of a community and its forests provides a basis for the community tree plan. This section should include information on the history of the community, the tree commission, the community's trees and parks, and any other information—important places, topography, soils, and climate—that will help set the stage for the tree plan.

VISION

The vision statement describes how the community wants its landscapes to look and function in the future. This brief paragraph describes the desired outcomes of the plan and can include sentiments about the importance of a community's trees and natural resources in terms of attractiveness, sustainability, people's health, safety, economic prosperity, and provisions for future generations.

GOALS

The vision statement should be translated into goals—broad statements of intent that define the ultimate desired achievements of the program. These goals should be reasonable and long term. For example:

- Provide for a safe and healthy environment
- Improve community beauty, image, and pride
- Enhance reputation, commerce, and business
- Increase the quality and accessibility of a community's natural resources
- Decrease a community's exposure to liability

OBJECTIVES

When the broad goals of the tree plan have been discussed and agreed on, the objectives and projected dates for achieving them should be defined. Objectives describe the specific functions and requirements that are necessary to accomplish the plan's goals and, ultimately, its vision. The objectives should be developed for major program functions such as administration. The objectives should be explicitly stated to allow for monitoring progress. Each objective becomes a chapter of the community tree plan. Within each chapter, the strategies, actions, and standards are organized to guide the daily and monthly operations of the program. Consider the following types of objectives:

- Effective administration
- Managing risk and reducing municipal liability
- Annual analysis and removal of hazardous trees
- Quality design
- Proper planting, site analysis, and preparation
- Proper tree selection and purchase
- Proper tree planting
- Proper maintenance
- Adequate funding
- Community education and participation

Effective Administration

Like the gray infrastructure of streets and utilities, trees are an essential part of a community's green infrastructure and should be administered effectively. The responsibility for administering a community tree program must be clearly defined and carried out on a regular basis. These responsibilities often are divided among elected officials, a tree commission, and municipal employees in various departments.

The size and complexity of a municipality will determine how to organize the tree program. In a small community, a tree commission has the entire responsibility. A large community may employ a city arborist or forester to coordinate work among a tree commission, municipal departments, and the public. Many variations of these organizational structures are possible. To ensure good program administration, the community tree plan should provide strategies that clearly assign responsibilities and define procedures.

Plans can discuss landscape designs for downtown areas and other public places.

Strategies for involving children and youth are important.

Here are some examples of effective administration strategies:

- All public trees will be inventoried periodically by the tree commission and the inventory will be used for developing annual work plans and budgets.
- The tree commission will be responsible for the annual removal of hazardous trees, planting of new trees, and review of permit requests and landscape plans. Permits for the pruning, removal, and planting of all trees within the public right-of-way will be required.
- The tree commission will hold an advertised public meeting at least once a year to review tree removal and planting permits. Other requests will be heard during the commission's advertised work sessions.
- A consulting arborist or urban forester will be hired for periodic review and advice.
- Maintenance standards included in this plan (or in a street tree ordinance) will be enforced by the tree commission.
- An annual work plan and budget will be completed and submitted to elected officials.
- An annual report will be made to elected officials describing completed work, work to be completed, and required funding.
- Utilities must notify the municipality prior to pruning municipal trees.
- The tree commission will work with the media to place one positive piece or press a year.

Community tree plans provide overall guidance to the long-term administration of public trees, which then must be translated into effective actions. Annual work plans for tree removal, tree maintenance, tree planting, periodic inspections, task scheduling, securing funding, and public education and involvement should be used to schedule the work required to meet plan's objectives and goals. By using an annual work plan and a budget based on this plan to prioritize and schedule tasks for the upcoming year, a tree program can become more efficient and avoid crisis management.

Tree plans provide detailed policies and standards for managing tree risk.

Managing Risk and Reducing Municipal Liability

While most community trees cause few problems, there are situations that pose significant liability concerns. These include hazardous trees or limbs that could damage property and cause injuries or even death, trees that block required traffic site lines, or tree roots that raise sidewalks or invade segmented pipes. In Pennsylvania and other states, the Municipality Subdivision Torts Act limits the amount of damages for which a municipality can be liable. Ultimately, however, a municipality has the responsibility for maintaining a safe public right-of-way once it has created one. The human and financial impact of these problems can far outweigh the costs that a municipality would have incurred in providing proper, proactive care.

The liability associated with trees can best be avoided by clearly assigning the responsibilities for tree inspection and care and then documenting that this responsibility is regularly met. Municipalities and other property owners are expected to conduct annual work, including yearly tree inspections, removal, pruning, and other maintenance. Some communities attempt to divert all liability of street trees to adjacent property owners while retaining regulatory authority over anything done to the trees. While this may reduce municipal costs, it does not entirely eliminate municipal liability for tree or branch failure. Because a municipality is responsible for a safe right-of-way, it is the opinion of some solicitors that a municipality cannot

"hide" behind a street tree ordinance that makes it the duty of a homeowner to keep the right-of-way safe. At most, the property owner shares liability with the local government. Other communities choose to do nothing regarding their community trees, perhaps not realizing that inaction may not be a successful defense against negligence.

The following strategies written into the tree plan can help reduce exposure to liability and strengthen a court case:

- A tree inventory will be completed and maintained. Dates of inspection, condition of inventoried trees, and pruning and other maintenance needs will be recorded.
- Annual inspections of community trees should be completed and accurate inspection records should be kept.
- Hazardous tree branches should be removed as they become known.
- Only trained, certified, and insured professionals who follow good arboricultural practices should be hired for any work on public trees.
- Personnel will be trained in safe procedures, first aid, and safe equipment use.
- Visual clearance for intersections, traffic signs, and signals shall be maintained.
- Requests by property owners and others should be responded to promptly.

Managing Municipal Trees and Parks on a Shoestring Budget

The following are suggestions to help management when faced with tight budgets and concerns about spending:

- Determine if the management and maintenance of public landscapes can be part of broader programs such as a county or regional stormwater management plan.
- Encourage and allow tree commissions and environmental advisory councils to raise funding through grants and donations.
- Encourage and allow the formation of a nonprofit friends of the urban forest group to seek funding through grants and donations.
- Consider whether municipalities working together can reap savings through economies of scale. Consider working with other municipalities to contract tree removal and maintenance work. Well-thought-out contracting can achieve a larger, more competitive scale of work that offers reduced costs.
- Consider using a joint-powers agreement to form a regional park or street tree authority.
- Work with other municipalities or hire a consulting urban foresters to perform annual evaluations of street and park trees or to oversee special projects.
- If homeowners are responsible for the costs of street tree removal and required pruning, municipalities can facilitate the contracting of these services at larger scales, reducing costs to homeowners.
- Municipalities can facilitate contracting the repair of sidewalk panels citywide, reducing the cost of these repairs to individual homeowners and businesses.
- Pruning and other maintenance of young trees can be provided by volunteers, reducing the cost and scope of future work.

Simplified Risk Assessment

Tree risk assessment must be done by an experienced arborist using proper diagnostic tools and techniques. Here is an example of the type of thought that goes into the process of assessing tree risk:

a. On a scale of 1 to 10, estimate the probability of failure of the part of tree in question—limb, whole tree, roots.

b. On a scale of 1 to 5, estimate the consequences of failure, including possible targets, frequency of use of target area, and type of use in target area.

c. Add those two estimates to yield an overall risk rating.

Risk Rating:

13–15 = critical risk—failure is imminent and injury or damage is inevitable

10–12 = high risk—failure and personal and property damage are likely, especially during storms

7–9 = moderate risk—failure, injury, and damage are somewhat likely

Below 7 = low risk—failure, injury, and damage are unlikely

Landmark grove of vertical trees contrasts with round-shaped street trees.

Designs for neighborhoods, important streets, and entry ways can be provided in plans.

Annual Analysis and Removal of Hazardous Trees

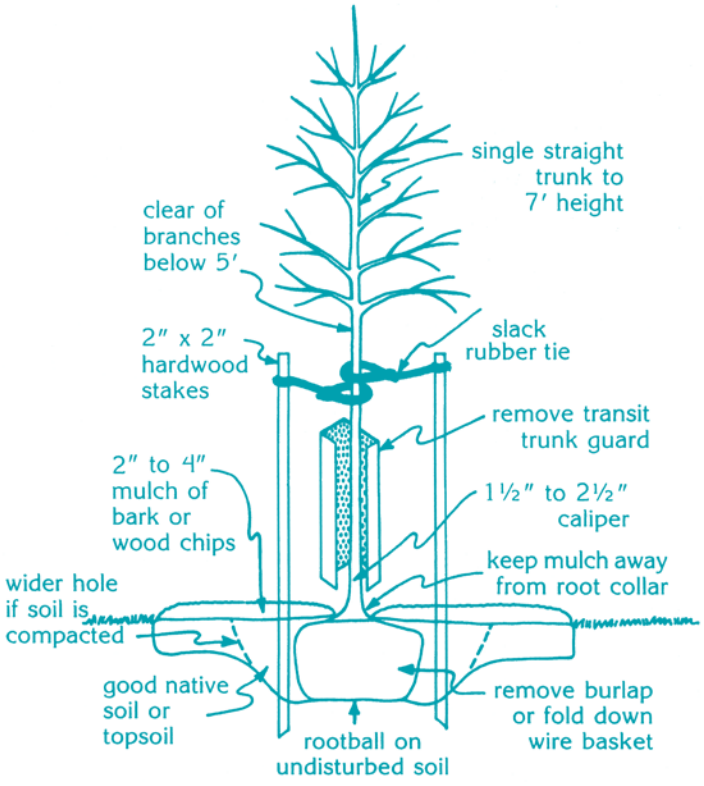
Tree-removal standards placed in a community tree plan help ensure that unsafe, undesirable, or unhealthy trees will be removed in a consistent, logical, and safe manner. They also ensure that trees that are healthy and in good structural condition will not be indiscriminately removed. Here are some examples of tree-removal strategies:

- All public trees will be inspected annually in late summer to identify potentially hazardous trees and needed removals will be scheduled in fall or winter. Trees will be removed only in accordance with objective tree-removal criteria and a clear process of evaluation and public notice. However, all dead, dying, or other trees in a hazardous condition will be removed immediately upon orders from a specified authority.
- Stump removal will occur within six months of the removal of any public tree.
- Whenever large tree sections are being cut, which may endanger people or property, the sections shall be secured by ropes and lowered safely.
- The use of climbing spurs or spikes shall be permitted only in the process of removing a tree.
- Every street tree removed will be replaced, space and safety permitting, with an appropriate tree not likely to cause the same problem for which the original tree was removed.
- Tree removal is often a dangerous activity. Adequate precautions should be taken to ensure public and worker safety and avoid property damage.

Quality Design

The community tree plan should address some important questions about landscape design, including the kinds of neighborhood and other landscapes that are present, their function, and their attractiveness; how the landscapes should look and function in the future; and how the landscapes should be protected or modified to create the desired result. Design strategies can include the following:

- Important landscapes, such as business districts, neighborhoods, and main entrances and exits, will be identified and considered in tree and flower planting.
- Traditional landscapes, such as neighborhoods with large trees, will be preserved through tree planting. An overall image of the municipality will be developed through the coherent planting of trees along streets.
- The final selection of trees and their placement for a landscape shall be made in the field while considering the many elements of that landscape.
- The tree species chosen for planting, besides meeting design criteria, must be biologically adapted to site conditions and well suited for the level of care it will receive.



Detailed tree planting standards and diagrams are placed in plans.

Species and Age Diversity

Diversity in species and age is your greatest defense against catastrophes such as Dutch elm disease and storm damage. Overall, the community forest should contain a diversity of tree species and age. As a general rule, at least three compatible tree species will be mixed on individual streets. No more than 15 percent of the total street tree population will be composed of any one species. Older, declining trees in poor condition will be removed each year and replaced with newly planted trees.

Proper Planting Site Analysis and Preparation

The proper placement of trees affects the health of the trees, the beauty of the landscape, and the amount of conflict that may be caused. Tree placement and species selection also involve maintenance costs and public safety considerations. The size and shape of mature trees determine both the appropriate spacing between trees and the distances that trees should be placed from street intersections, signs, lights, curbs, sidewalks, buildings, utilities, and driveways.

The use of structural soils and proper planting pits are discussed in plans.

It is difficult to codify standards for all the situations that may be encountered in selecting and placing trees. Therefore, a thorough site analysis is essential. The following are examples of site analysis and preparation guidelines:

- Species and locations shall be approved by the tree commission to avoid interference with vehicles, pedestrians, signs, and utility lines, both overhead and underground.
- Before any final decisions regarding tree species and planting techniques are made, all planting sites will be evaluated in the field for soil conditions, safety concerns, and limits of the growing space, including utilities, sidewalks, and curbs.
- Rubble and poor soils will be removed from a planting site and replaced with a fertile topsoil.
- Specially designed planting pits, which increase the amount of available soil and root growing area, will be used when trees are planted in sidewalks, patios, and parking lots.

Proper Tree Selection and Purchase

After a planting site is understood by a proper analysis, a suitable tree species should be selected for the spot and high-quality nursery stock should be purchased. The following are strategies for tree selection and purchase:

- Trees to be planted will be selected from an approved tree planting list found in the appendix of the tree plan. The tree list will identify trees for different areas such as downtown, neighborhoods, and parks. It will also identify trees for different planting areas (small, medium, and large).
- Planting materials shall conform to the latest version of the American Standards for Nursery Stock (American National Standards Institute [ANSI] Z60.1, 2004). Trees to be planted should be of standard quality or better.
- Street trees shall be at least 1 ⅓ inches in caliper, 8 to 10 feet in height, free of branches in the lower 5 to 7 feet, and have a single, straight trunk to 7 feet.

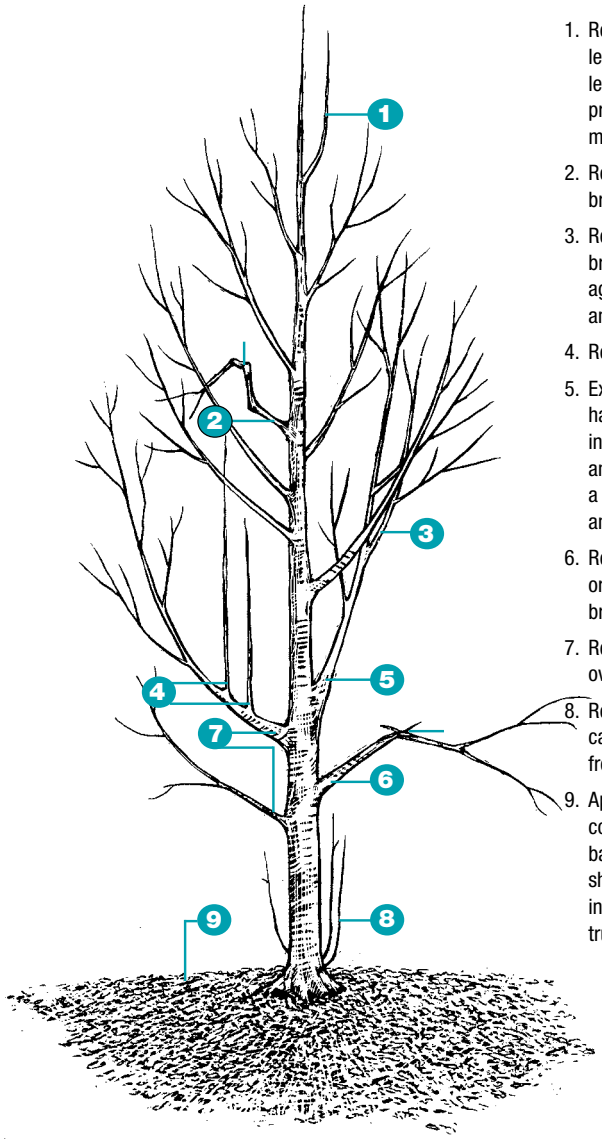
The two biggest killers of newly planted trees are poor irrigation and being planted too deep. Plans should provide standards to avoid these.

Proper Tree Planting

To obtain the best possible survival and health of newly planted trees, standards should be provided in the tree plan for planting techniques. These can best be expressed as general guidelines with references to technical publications.

A great deal of information about the size of planting pits, staking, and other planting practices has been developed by the National Arbor Day Foundation and the International Society of Arboriculture. Examples of standards to guide tree planting include the following:

- Trees of the proper mature size will be planted in the given planting area. No trees will be planted in tree lawns less than 2 feet in width or in planting pits less than 5 feet long by 5 feet wide.
- The use of pervious paving, structural soils, and other engineering techniques will be considered.
- No tree should be planted within 50 feet of a major intersection or within 20 feet of a fire hydrant, a driveway, or a light pole.
- Excavated plant pits that will be left open when work is not in progress or will pose hazards to pedestrians or vehicles shall be adequately barricaded with qualified warning devices.
- After a balled-and-burlap tree has been positioned at the proper depth in the pit, the burlap and twine shall be removed from around the trunk and removed or tucked down into the planting hole. Plastic burlap or other synthetic materials shall be completely removed from the tree and the pit. Tree baskets may remain on the root ball, but the top ring of all wire baskets shall be removed.
- When possible, mulch will be placed around trees in a 3-foot circle and at a 3-inch depth to protect trees from lawnmower damage and competition by turf; mulch will be kept away from the trunk.
- Newly planted trees will be irrigated weekly during droughts in the growing season for three years.



1. Remove a competing leader. Cut back the less vigorous branch to prevent the development of two leaders.
2. Remove any malformed branch.
3. Remove any crossing branch. It may rub against and damage another branch.
4. Remove water sprouts.
5. Except for trees that have naturally ascending branches, remove any branch growing at a sharp or unnatural angle.
6. Remove any broken or badly damaged branches.
7. Remove lower branches over time.
8. Remove suckers, which can take energy away from desirable growth.
9. Apply 2 to 3 inches of composted mulch at the base of the tree. Mulch should be kept 2 to 3 inches away from the trunk of the tree.

Tree must be maintained when young. Plans provide standards for pruning, mulching, irrigation, and other young tree maintenance.

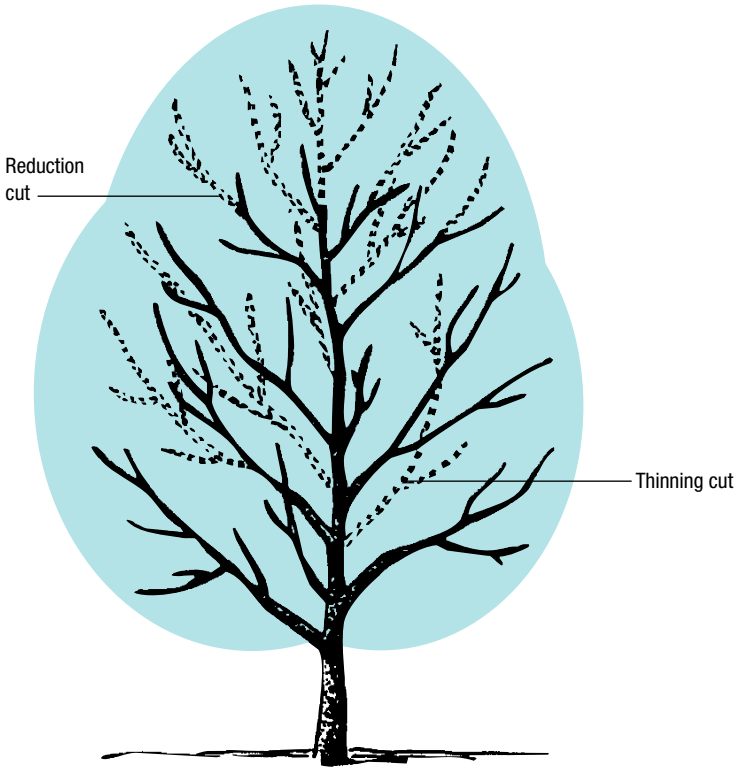
Proper Tree Maintenance

After planting an appropriate species at a site that can support adequate growth, maintenance practices such as mulching, watering, and pruning should be employed for three to five years. If trees are pruned properly three or four times during the first twenty years, they will need less frequent and less costly pruning in later years. Pruning promotes sound structural development of a tree's trunk and branches. The most important period for pruning occurs when the tree is young. Pruning large trees is costly and usually consumes a large part of any tree program's budget. By prioritizing the proper planting and pruning of young trees, a substantial savings can be realized by the entire tree program.

Enforcing standards for pruning and other tree care is crucial in providing correct and consistent plant health care. The International Society of Arboriculture has developed pruning standards for trees. The standards are divided into four categories: crown cleaning, crown thinning,

crown rairing, and crown reduction. Crown restoration, pruning for views, and other pruning are considered speciality pruning. Other helpful sets of standards to consider and include are the ANSI Standards for Arboricultural Operations—Pruning, Trimming, Repairing, Maintaining, and Cutting Brush—Safety Requirements (ANSI Z133.1, 2000) and the ANSI Standards for Tree Care Operations—Tree, Shrub, and Other Woody Plant Maintenance–Standard Practices, Pruning (ANSI A300(Part 1), 2001, Pruning). These safety and pruning standards are designed specifically for tree care operations and should be incorporated into your standards for tree care. Some examples of maintenance standards that can be included within a tree plan are as follows:

- All tree work will be performed in accordance with current American National Standards Institute and International Society of Arboriculture Best Management Practices that reflect the best knowledge of tree care.
- A training program for municipal employees involved in tree maintenance will be established.
- A rotational pruning schedule will be established so that every mature tree will be treated every 10 to 12 years. Tree pruning will be done after new leaves have hardened, after leaf fall, or in the dormant season.
- To reduce long-term maintenance, newly planted and young trees will be provided with correct pruning, staking, and mulching and will be irrigated during periods of hot, dry weather. The maintenance of newly planted trees in the first five years will be given priority over older trees except in the case of hazard.
- Pesticides for controlling diseases, insects, or weeds shall be applied only by qualified applicators in conformity with label instructions and precautions such as notification and signing. Cooperative extension shall be consulted for the most recent recommendations on effective materials and methods.



Plans provide standards for mature tree maintenance. Reduction and thinning cuts and other proper standards must be used.

Adequate Funding

One thing many municipalities have in common is a limited budget. Traditionally, the budgets for public trees and parks are the first to be cut when money becomes tight. Many municipalities simply cannot afford a community tree program. As a result, creativity and energy are needed to find funds to support public trees and landscapes. Below are some strategies for funding to be included in a plan:

- An annual report, work plan, and budget will be used to inform elected officials of the commission's work and funding needs.
- An annual meeting will be held to discuss the commission's work and funding needs.
- News articles and releases will be used to explain worthy activities, including planting, tree removals, pruning, and funding needs.
- A "remembrance tree" program will be used to raise money for tree planting on streets and in parks.
- Local civic organizations and businesses will be contacted annually to discuss their participation and support of commission activities.
- Community, family, and corporate foundations will be identified and considered for support of commission activities.
- State and other government grants will be identified and considered for support of commission activities.

Community Education and Participation

Methods of educating the public and encouraging participation by volunteers are important parts of a community tree plan. Examples of strategies for public education and participation for a tree plan include the following:

- Residents, civic organizations, and environmental groups will be

offered opportunities to participate in tree planting and maintaining public flower beds.

- Educational materials concerning trees and other natural resources will be provided to schools, particularly grades three through ten.
- Arbor Day and Earth Day will be celebrated—with the involvement of public officials and school children—as reminders of the importance of the community forest.
- Workshops on tree planting and care and other educational programs will be provided for community residents.
- Contacts with commercial arborists and the electric utility company will inform them of community expectations for the quality of work on public and private trees.

Arbor Day, tree plantings, and other ideas for citizen participation and education are discussed in plans.

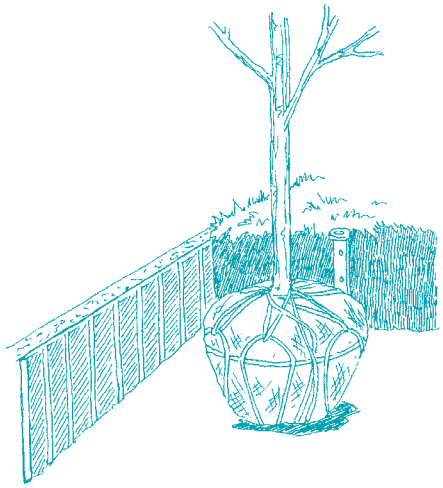
Managing Sidewalk Problems

Allow the temporary use of asphalt ramping and grinding as people save their money for sidewalk repairs.

For economies of scale, city coordinates and bids out all required sidewalk repairs at once. Residents pay less per panel with larger jobs.

- Use proper tree selection and planting, including plastic root barriers.
- Allow smaller width sidewalks, acceptable under ADA, and curving sidewalks around trees.
- Explore alternative materials such as rubber sidewalks and permeable concrete.

Sidewalks can be curved around trees to avoid concrete damage.



Installing plastic root barriers, as well as planting the right-sized tree in the right-sized planting area, reduces sidewalk damage.

Good Web Sites for Community Forest Management

American Forests:
www.americanforests.org

American Forest City Green:
www.americanforests.org/productsandpubs/citygreen

Arboricultural Standards:
www/isa-arbor.com/publications/publications.aspx

Delaware Valley Planning Commission:
www.dvrpc.org/asp/pubs/publicationabstract.asp?pub_id=MIT015

Management Plan:
www.na.fs.fed.us/urban/inforesources/mgmtplanguide/mgmtplanguide.shtml

Managing Tree Risk:
www.na.fs.fed.us/spfo/pubs/uf/utrmm

National Arbor Day Foundation:
www.arborday.org/index.cfm

Public Works Managers:
data.memberclicks.com/bbatch/396920/Urban Forestry-4.pdf

Tree Commissions:
www.dcnr.state.pa.us/forestry.pucfc/publications.html

Tool Kit for Municipal Arborists:
www.isa-arbor.com/related/SMA_UAA_Toolkit.aspx

Tree Links:
www.treelink.org

Urban Forestry Index (UFind):
www.urbanforestryindex.net

Budgeting

A community tree program will be in competition for funding with other important municipal projects and services. To compete successfully, a proposed budget should accurately estimate the program's annual costs. It should also clearly justify the need for annual and long-term funding for the program. Obtaining funds from municipal leaders can be difficult. Here are some points to remember:

- Budgeting happens every day of the year. Communicate the good things you do to elected officials regularly and include them in tree planting and other positive opportunities. Key decision makers and the public should be kept well informed about the program's accomplishments and needs.
- Citizens are reluctant to support new programs or increased taxes. Without an increase in revenues, municipal managers cannot provide new services unless they cut others. To obtain funding, the officials must be persuaded that a community tree program is a wise investment. Most municipal officials are not familiar with the benefits or technical details of community forestry, so the budgeting process should be educational as well.
- Sound information is crucial in developing good budgets. Annual work plans should be used to calculate the program's costs. You must understand the financial reality of your request as it fits the constraints of the municipal budget.
- A cost-effective community tree program will better compete for scarce budget dollars. The program's costs can be reduced through sound administrative practices such as employee training, accurate record keeping, preventive maintenance, and selection of well-adapted trees for planting. Contracting out services can also be cost effective. For instance, a consulting arborist or community forester can be hired part time, on a retainer, or on a cost-sharing basis with surrounding municipalities. These costs could be lower than paying a full-time salary.
- Remember to include the public in your program. Grassroots public support can help generate funding. Clearly document the value of the community forestry program by developing good relations with the press and service organizations.
- Accurate records of work and expenditures can provide convincing information on the need for funding. The budget for a tree program should adapt to the changing needs of a program as work is accomplished and the program becomes established. New programs may need larger proportions of a budget dedicated to tree maintenance, tree removal, and public education. Established programs may dedicate more funding for tree planting as progress is made in the removal and maintenance of trees neglected in the past.

The following suggestions can be used when developing annual budget plans. The percentages, which are samples from established programs, should be modified for the particular needs of a community's street or park trees.

- About 20 percent of the budget should be allocated for tree removal. If there are trees that need to be removed, this should be made a budget priority.
- About 40 percent should be allocated for tree maintenance activities such as pruning, watering young trees, mulching, or controlling insects and diseases.
- Public safety and caring for existing trees should take priority over planting new trees. Too many communities make the mistake of planting new trees while neglecting older, more valuable trees.

Annual inspections and work are done to keep trees safe and healthy.

Annual Work Schedule for Community Trees (Each dot in chart below = one week/month. Circle dot(s) to show when work will be done.)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Example: Work to be done first two weeks of May.	....	....	....	....	(..).	....	....	....	....	....	....	....
1. Planning and administration												
a. prioritize work to be done	....	....	....	....	....	....	....	....	....	....	....	....
b. organize activities	....	....	....	....	....	....	....	....	....	....	....	....
2. Tree planting												
a. survey potential planting sites	....	....	....	....	....	....	....	....	....	....	....	....
b. decide locations, species, and cultivars	....	....	....	....	....	....	....	....	....	....	....	....
c. notify adjacent property owners	....	....	....	....	....	....	....	....	....	....	....	....
d. announce and hold public hearing	....	....	....	....	....	....	....	....	....	....	....	....
e. order trees	....	....	....	....	....	....	....	....	....	....	....	....
f. inspect and tag trees in nursery	....	....	....	....	....	....	....	....	....	....	....	....
g. receive, inspect, and store trees	....	....	....	....	....	....	....	....	....	....	....	....
h. plant trees, prune, stake, and water	....	....	....	....	....	....	....	....	....	....	....	....
i. water trees periodically	....	....	....	....	....	....	....	....	....	....	....	....
3. Tree pruning												
a. survey trees, decide which to prune	....	....	....	....	....	....	....	....	....	....	....	....
b. arrange for crew, equipment, and supplies,	....	....	....	....	....	....	....	....	....	....	....	....
or arrange for service contract	....	....	....	....	....	....	....	....	....	....	....	....
c. supervise pruning and disposal of wastes	....	....	....	....	....	....	....	....	....	....	....	....
4. Tree removal												
a. survey trees, decide on removals	....	....	....	....	....	....	....	....	....	....	....	....
b. notify adjacent property owners	....	....	....	....	....	....	....	....	....	....	....	....
c. announce and hold public hearings	....	....	....	....	....	....	....	....	....	....	....	....
d. arrange for crew, equipment, and supplies,	....	....	....	....	....	....	....	....	....	....	....	....
or arrange for service contract	....	....	....	....	....	....	....	....	....	....	....	....
e. supervise removals	....	....	....	....	....	....	....	....	....	....	....	....
f. grind stumps, reseed	....	....	....	....	....	....	....	....	....	....	....	....
5. Public relations and funding												
a. report to municipal officials	....	....	....	....	....	....	....	....	....	....	....	....
b. prepare news releases	....	....	....	....	....	....	....	....	....	....	....	....
c. arrange news and TV coverage of events	....	....	....	....	....	....	....	....	....	....	....	....
d. submit Tree City USA application	....	....	....	....	....	....	....	....	....	....	....	....
e. submit grant applications	....	....	....	....	....	....	....	....	....	....	....	....
f. develop education programs	....	....	....	....	....	....	....	....	....	....	....	....
g. hold Arbor Day ceremony	....	....	....	....	....	....	....	....	....	....	....	....
h. conduct youth education	....	....	....	....	....	....	....	....	....	....	....	....
6. Other tasks												
a. water trees during drought	....	....	....	....	....	....	....	....	....	....	....	....
b. fertilize deficient trees	....	....	....	....	....	....	....	....	....	....	....	....
c. control diseases and insects, as needed	....	....	....	....	....	....	....	....	....	....	....	....
d. collect leaves and recycle	....	....	....	....	....	....	....	....	....	....	....	....
e. clean up storm breakage	....	....	....	....	....	....	....	....	....	....	....	....
f. conduct training, professional development	....	....	....	....	....	....	....	....	....	....	....	....
g. train tree workers	....	....	....	....	....	....	....	....	....	....	....	....

Annual work plans are the basis for an annual budget.

Annual Community Tree Budget Worksheet

_____
MUNICIPALITY AND YEAR

Materials		
Trees (Multiply number of trees _____ by the average cost per tree $_____.)	$_____	
Stakes, soil, mulch, fertilizer	$_____	
Pesticides/herbicides	$_____	
Computer inventory software	$_____	
Administrative and public education materials (paper, copies, brochures, educational books)	$_____	
Other	$_____	
Materials subtotal		$_____
Equipment and buildings use		
(Divide total cost by years of service life and add maintenance, utilities, and fuel costs.)		
Office space	$_____	
Equipment storage/building	$_____	
Climbing gear	$_____	
Pruning tools, chain saws, handsaws	$_____	
Trucks/aerial lifts, backhoe/front-end loader, leaf collection equipment, chipper, stump grinder	$_____	
Spray equipment	$_____	
Equipment rental (types _____)	$_____	
Other	$_____	
Equipment and building subtotal		$_____
Services (municipal, volunteer, and contracted)		
Salaries and fringe benefits (based on % of employees' time spent working with trees)	$_____	
Tree board volunteer time	$_____	
Labor (paid or volunteer) or total cost of services		
(When using volunteer labor, estimate the wage based on task.)		
Planting (Multiply hours_____ by average wage $_____.)	$_____	
Pruning (Multiply hours_____ by average wage $_____.)	$_____	
Removal of trees and stumps (Multiply hours_____ by average wage $_____.)	$_____	
Tree inventory (Multiply hours_____ by average wage $_____.)	$_____	
Emergency storm damage cleanup (Multiply hours_____ by average wage $_____.)	$_____	
Mulching, watering, fertilizing (Multiply hours_____ by average wage $_____.)	$_____	
Leaf and branch cleanup (Multiply hours_____ by average wage $_____.)	$_____	
Leaf composting (Multiply hours_____ by average wage $_____.)	$_____	
Insect control (Multiply hours_____ by average wage $_____.)	$_____	
Utility pruning and other services (Obtain estimate from company and pro-rate per year.)	$_____	
Consultant services	$_____	
Educational programs	$_____	
Delivery/transportation charges	$_____	
Administration: (permit review, grant writing, Arbor Day planning, site inspection, etc.)	$_____	
Memberships in tree organizations (state council, ISA, etc.)	$_____	
Other	$_____	
Services subtotal		$_____
Other		
Unpaid insurance claims for damaged trees	$_____	
Grant funds expended, if not included above	$_____	
Total expenditures (Use this amount in Tree City USA formula.):		$_____

An annual budget, no matter how small, should be presented to local officials by tree commissions and environmental advisory councils.

Only about 20 percent of the annual budget of an established program should be allocated for new tree plantings.

- Administrative activities are an integral part of every tree program and should receive about 20 percent of the budget. When starting a program, much more of the budget should be dedicated to obtaining authorization, gaining legislative and public support, and educating the public.

Contracting

WORKING WITH CONTRACTORS

When contracting for any service, even if the contractor is licensed or certified, always ask for references and a list of completed projects. Any landscape professional will be happy to discuss their training and experience, but you need to ask.

Tree removal, pruning, and planting can be performed by municipal employees, commercial contractors, volunteers, or a combination of these. The decision to employ municipal crews or hire contractors depends on a municipality's available resources (i.e., money, experienced personnel, equipment). For example, larger municipalities can better afford to employ full-time tree crews, which can provide flexibility in work scheduling and quick responses for homeowners and emergency situations. Smaller municipalities, however, may find that hiring a contractor can be more cost effective. The specialized equipment, expertise, and seasonal nature of tree work make contracting an attractive alternative. Contracting avoids the long-term commitment of funds that are required for crews and equipment. It also transfers the costs of supervision, training, and liability to the contractor.

INSTALLING CONTRACTORS VERSUS MAINTENANCE CONTRACTORS

It is important to understand the difference between installing contractors and maintenance contractors. Some contractors specialize in installation only (construction and planting), while others are geared toward landscape maintenance. The knowledge, training, and equipment can vary greatly between these two groups, which can affect a newly installed project, especially during the guarantee period. If an installing landscape contractor who is not set up for maintenance is responsible for the project during the guarantee period, your project may suffer as a result. Be sure your contractor is prepared to maintain your project, or subcontract to one who can.

INSURANCE

Choose contractors who are insured for both liability and workers' compensation, and request a copy of their insurance certificates. Some contractors do not carry insurance because of the expense. Liability for damage done by uninsured contractors or injuries incurred by their crew is likely to fall back on the owner of the site.

GENERAL CONTRACT SPECIFICATIONS

Contract specifications must be developed that tell a bidder exactly what is required in terms of work, equipment, and materials. Low bids of inferior quality and reputation should not be accepted. Specifications for contracting tree work should include

- minimum qualifications of the contractor;
- the detailed purpose and scope of the contract, including safety standards, responsibilities, planting and pruning standards, and the desired quality of services and materials;
- the contractor's responsibility for supervision, labor, tools, equipment, work hours, traffic control, and cleanup;
- the requirements for licenses, permits, bonding, insurance, and workers' compensation; and
- the requirements for inspection and reporting, contract changes, penalties for damage and defective work, bonding, and default procedures.

TREE PLANTING CONTRACTS

For a tree-planting contract, specifications should also include the date and means of tree delivery; plant quality, quantity, size, and identity of each species and cultivar (American National Standards Institute Nursery Standards); tree storage means and responsibilities; the amount and type of site preparation before planting; type of tree pruning at planting; type of staking, tying, and removal of stakes; the removal of tree wrap, burlap, fasteners, and baskets; the requirements for mulching and irrigation; and the amount and length of bonded guarantee for tree survival and establishment. A municipality can request that bids be priced in various ways, including the following.

Unit Bids

The work price is requested per unit of work, such as per tree planted, block of trees pruned, or number of stumps removed.

Time and Materials

Work price is based on crew and equipment cost per hour plus the cost of materials.

Lump Sum

A price is requested for the completion of the total job.

CHAPTER 10

Designing Public Landscapes

When creating any new space for public use such as parks or gardens, developing green streetscapes and commercial corridors, or refurbishing existing public landscapes, you should enlist the services of a professional landscape designer such as a landscape architect. This person should be knowledgeable about the requirements of your project, including municipal regulations and necessary documentation, and be able to analyze the current conditions of the site. A good landscape designer will also understand the need for site preparation, soils, and how to match the appropriate tree and plant species to a site's conditions and limitation for growing.

What Is a Landscape Architect?

In its broadest sense, landscape architecture deals with design of the open space between buildings, including everything from perceiving and experiencing the space to the plants, trees, pathways, and other landscape elements that fill the space. Landscape architects are adept at working at many difference scales, from residential to regional.

A landscape architect (LA) usually holds an undergraduate and/or graduate degree in landscape architecture. Landscape architects are generally knowledgeable about ecology, geology, hydrology, horticulture, grading, stormwater management, construction practices, site analysis, and best landscape management practices. Most LAs can perform any or all of the following tasks: site analysis, conceptual design, design development, construction documentation, including written specifications and bid documents, construction and installation oversight, and monitoring of plants during the guarantee period. Landscape architects have a wide range of knowledge, but not all LAs are experts in all areas of the discipline.

A registered landscape architect (RLA) has passed a state licensing exam. While a nonregistered landscape architect may be able to perform most of the tasks outlined above, construction documents must be sealed by an RLA for liability reasons and for permitting in most cases. If your project is not going to the construction document phase, an RLA may not be necessary. Depending on the type of project, the seal of a professional engineer may be acceptable or preferable. You should research potential LAs for your project and search for a good match between the type of work and the experience and expertise of the designer.

The basic concepts of landscape design (order, unity, and rhythm) are used to make attractive and functioning places.

Basic Design Principles

Familiarity with the basic concepts of landscape design—order, unity, and rhythm—is helpful when working with a landscape architect.

Order is the overall organizing principle. The location and size of

structures, trees, and "hardscape" elements (sidewalks and other paved surfaces, retaining walls, plazas, benches) would all be considered in the organization of the site. Order can be created through symmetry, asymmetry, or "massing." Symmetry is when things are equally balanced, like two candles on the dining room table. Asymmetry is an intentional weighting of one element over another, like a flower arrangement on one side of the table and the two candles on the other. Massing is just what it sounds like—groups of similar things placed together that read as one, like a group of candles together. Consider all elements of the design: what is fixed and what can be moved; what are the different possibilities for arrangement?

Unity is the relationship between the elements in the design. Structures and plant choices affect the unity of a design by providing a sense of harmony or discord. Focal points, dominant elements, and repeating forms are at play here. Consider groupings of odd numbers (threes, fives, sevens, etc.) and repeating patterns.

Rhythm deals with time and movement. One does not perceive the design all at once but moves through it by experience and exploration. Envision how the two-dimensional plan will be experienced in three-dimensional space.

Site Considerations

SCALE AND PROPORTION

Think about the human scale of the space. For example, is the sidewalk wide enough for two people to pass each other comfortably? What lighting is available for pedestrians? What is adjacent to the site? Is the space open or enclosed? For street tree and container plantings (small container plantings don't work—no one waters them and they soon become trash collectors with dead trees), consider the dimensions of the street. Consideration should also be given to placement of trees in relation to doorways, shop signs, front windows, stairs, and car doors. Many times, small, low-growing trees are planted that will mature right into the shop signs and cannot be pruned up well for clearance, while the selection of a large or medium tree would allow for pruning the tree's crown to grow above shop sign visibility.

SUN, SHADE, AND WIND

Consider the hours and the quality of sun and shade at the site (also consider shading from buildings in a downtown area). Does it receive morning or afternoon sun? Is it direct or reflected light? Does the planting receive full western afternoon sun? Is the site open and windy? Does a nearby roadway add to windy conditions? (Windy conditions can dry out plants and cause leaf tatter.) Some trees, like little leaf linden, will not do well in hot, dry planting areas, others, such as ginkgo and honey locust, do better.

SOIL

Have a soil test completed and determine the soil composition and structure (percentage sands, silts, and clay). Is the soil compacted? Conduct a bulk density test or use a penetrometer to measure compaction. Will it need to be amended? Will you need to bring in new top soil? If soils are to be replaced, consider using Cornell University Structural Soil under sidewalks and other hardscapes to allow for deeper rooting of trees. Consider the possibility of salts from roadways and pavement due to snow removal.

Structural and Other Designed Soils

For more information on Cornell University Structural Soil, visit the Cornell University Urban Horticulture Institute at www.hort.cornell.edu/department/faculty/bassuk/uhi.

Made Soil

Made soil is soil found in commercial, residential, or other development that is different from a natural soil found in undeveloped or uncultivated places. A made soil can change in fertility, compaction, pH, and drainage in very small distances. Soil maps provide little if any information about these soils, and only pH testing and other site-specific analysis will provide useful information.

Landscapes add greatly to the quality of life in the places we live.

STRUCTURES AND UTILITIES

Are there utility lines or wires above or below ground? If above ground, select trees that will fit underneath or choose another location for trees. Underground utilities must be located and marked before beginning any work.

Plant Selection

To ensure the long-term health and viability of your landscape, you need to choose plants suitable for the location. Plants must be selected that will tolerate the growing conditions of the site such as soil pH, drainage, compaction, heat loads, deicing salts, and drought conditions. Consider the proper sizing of plant material (both at installation and mature size).

Selecting Excellent Trees for Planting

Utilize resource materials such as Penn State's *Landscape Factsheets* (www.dcnr.state.pa.us/forestry/pucfc/publications.html); Cornell University's *Recommended Urban Trees: Site Assessment and Tree Selection for Stress Tolerance*, downloadable from www.hort.cornell.edu/department/faculty/bassuk/uhi; or USDA Forest Service's Northern Trees Web site (orb.at.ufl.edu/TREES/index.html) to help review and select trees for a given site.

The Design Process

The design process begins with meeting the designer, usually a landscape architect, to discuss the project and develop a proposal, including a scope of work. The scope of work outlines everything that will be included within the project. It specifies the program elements (described below), what work will be performed by whom, drawings and documents to be produced, the schedule, and budget.

INFORMATION GATHERING

The designer will develop a base map and do a site inventory and analysis. Regional weather, soil type, underlying geology, and microclimates all play a role in determining the site conditions, as do local zoning and municipal regulations.

DESIGN DEVELOPMENT

Design development includes discussion of what program elements you would like to see included in this project. Program elements are ornamental planting beds, paved gathering areas, outdoor seating, street trees, playgrounds, container plantings, and so forth.

The design-development phase is an opportunity for the designer to understand your vision of the final product and refine the design. There is usually a series of meetings between the client and designer during which the designer presents a plan based on the input you have provided. (The scope of work will outline how many meetings take place during this phase; you will be billed for additional time beyond this.) The client has an opportunity to make changes or additions during this phase. While a few changes are typical, too many changes will drive up the original cost.

CONSTRUCTION DOCUMENTATION

Construction documents are the "blueprints" for the contractor who will actually build the project. These may include drawings of existing conditions, a demolition plan, design plan, layout plan, planting plan, and numerous other details. Because of the complexity found in downtown and other "busy" places, it is absolutely necessary to walk the project area before any plans are finalized.

Once the construction documentation is in hand, you have all the necessary information to build the project. A cost estimate for building the project is usually provided by the landscape architect and will serve as a guide during the bid process. For the most competitive pricing, solicit at least three bids.

BUILDING AND INSTALLATION

A project manager should be selected to oversee the work, making sure the design and construction adhere to project specifications. Make sure the planting specifications are up to

Trees and plants provide people an important connection to nature in our cities.

date and fully detail how the plant installation will be completed. In order to ensure that quality plants are used by your contractor, it is best to inspect and tag the plant material in the nursery or a landscape holding yard before they are installed. Plants that do not meet the American National Standards Institute ANSI Z60.1–2004 American Standard for Nursery Stock should be rejected. Someone familiar with the design typically serves as the project manager, usually the landscape architect. When installation is complete, there is an initial walk-through to "accept" the project. Most landscape projects have a guarantee period of one year. The installing landscape contractor is typically responsible for the landscape during this time. If any plants die during the guarantee period, it is the responsibility of the installing contractor to replace them. At the end of the guarantee period, there is another walk-through, which serves as the "final acceptance" of the project.

Other Landscape Professionals

Other landscape professionals include landscape designers, landscape contractors (for maintenance and installation), certified arborists, and horticulturists. For instance, you may need a certified arborist to do a tree survey of your existing tree collection. Or you may hire a landscape maintenance contractor to water and maintain your plantings.

A certified arborist is certified by the International Society of Arboriculture (ISA) to care for trees. An arborist is knowledgeable about tree species, proper pruning techniques, soil types, plant biology, and management practices. An ISA-certified arborist can be hired for selecting and planting trees, creating an inventory of existing trees, assessing risk, protecting construction, and pruning or removing trees. In addition, an arborist can provide a tree healthcare program, including monitoring and treatment for pests and disease, utilizing information about weather and growing conditions, and employing beneficial insects to maintain the health of woody material.

It is important to hire only a certified arborist with a valid ISA certification number. This will ensure that your job adheres to the proper ISA standards and safety regulations. To check on an arborist's certification, visit the ISA Web site at www.isa-arbor.com.

No official licensing requirement currently exists for landscape contractors, landscape designers, or horticulturists in many states, but some professional organizations offer certification. Certification is usually based on completion of course work and testing.

Landscape Architecture and Arboricultural Professional Societies

American Nursery and Landscape Association:
www.anla.org

American Society of Landscape Architects (ASLA):
www.asla.org

Association of Professional Landscape Designers:
www.apld.com

International Society of Arboriculture (ISA):
www.isa-arbor.com

Pennsylvania/Delaware Chapter of ASLA:
www.landscapearchitects.org

Pennsylvania/Delaware Chapter of ISA:
www.penndelisa.org

Designing with Trees

Trees must be selected so they work well in the environment in which they are being planted. Will the trees be planted in sidewalk or parking-lot cutouts? Will trucks be driving under the limbs? Is the tree being planted to reduce the effects of wind or provide shade? Does the site's nearness to a natural open-space area suggest the use of native trees to maintain harmony? Is there a need for a burst of fall color? These are just some of the issues to consider when choosing a tree that will meet the needs of people and place.

Trees are important and shared symbols of dignity, peace, and beauty for many people.

Essentials of Evaluating Planting Sites

Climate and Weather
Temperature extremes
Moisture
Light
Wind

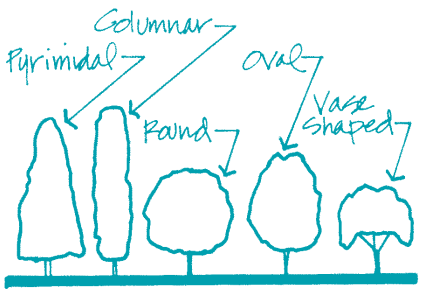
Soil
Compaction
Drainage
Structure
pH
Fertility
Salinity
Contamination and pollution

Growing Space
Cubic volume of soil available
Space available for trunk and crown
Placement of utilities
Conflicts with sidewalks, curbs, streets
Conflicts with pedestrian and vehicle traffic

Functional Desires
Design themes, sense of place
Existing flora and fauna
Climate modification
Noise reduction
Screen or view enhancement
Pedestrian and vehicle traffic considerations
Erosion control
Wildlife habitat

Properly designed tree planting can also reduce a variety of problems. Large-growing shade trees planted on the east and west sides of a building can reduce cooling costs by 20 percent. Similarly placed plantings along parking lots and streets can shade pedestrians and automobiles. Rows of densely planted trees can reduce wind speeds in the immediate area. Planted along streets, large trees can reduce automobile speeds by creating an enclosed feeling. Properly planted along roads, trees and shrubs can reduce snow drifting and catch particulates and dust from traffic.

After the characteristics of the site (soil pH, soil depth and fertility, sun, and heat) and the tolerances of the tree (salt, drought, heat, poor



Many shapes and sizes of trees can be used for design.

soils, wind, pollutants) have been considered, the aesthetic character of the trees to be planted must be evaluated. Aesthetics is not an entirely subjective matter. Trees have a number of visual characteristics that will help determine appropriate species selection.

Visual Characteristics of Trees

Scale refers to the size (small, medium, large) of the tree as reflected by height and the diameter of the canopy, as well as the limb and trunk size. Choosing a large-scaled tree for the site can bring a large building or street down to human scale.

Form is the shape and architecture of the canopy. Each form is best suited for certain uses. Forms include vase (American elm), pyramidal (little leaf linden), round-headed (sugar maple), spreading (plane tree), and columnar (English oak and European hornbeam). The most distinctive forms, such as tall pyramidal or narrow columnar trees, must be used carefully since they are often not common to the areas being planted or to the people viewing them. For that reason, they are often reserved for formal plantings and allees. Spreading or round-headed trees are often the best suited for many tree plantings. Even without leaves, some trees, such as London plane and sycamore, provide interesting and beautiful forms in the winter.

Trees are known for the color of their spring, summer, and fall foliage. Strong color effects can be achieved by using trees with colorful bark (London plane tree and paper bark maple). Leaf color can vary from season to season. Unusual color combinations (sweet gum and ginkgo) can create striking effects.

In this context, texture refers to the size of the foliage. Large-leafed species (katsura, cucumber tree, and hickory) are referred to as coarse textured, and small-leafed ones (honey locust) as fine textured. The density of foliage must also be considered. The deep shade created by Norway maples and other very dense-canopied trees causes problems for growing other plants and places being too dark for people's enjoyment.

Using Trees for Natural Design Ideas

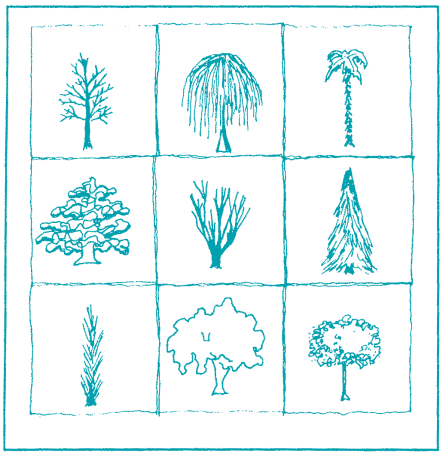
The community forest should be used to reinforce people's connection to the natural world.

- Link woodlands from surrounding natural areas into the city by creating "green fingers" of trees and other vegetation.
- Use native tree species whenever possible. Many times they can be better suited to local soils and climates. They have a recognized place in the natural and social history of an area.
- Use a variety of tools to explain the forest to its inhabitants. Create tree walks and offer docent-led and self-guided tree walks. It is important to "open up the forest to people."
- Plant for wildlife as much as possible.

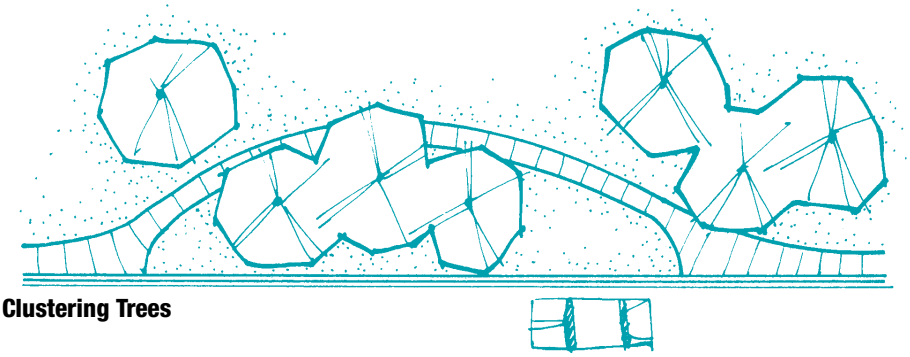
General Guidelines for Designing with Trees

The following design guidelines can be applied to the renovation of existing areas as well as new construction. By applying proper site analysis, choosing trees that will do well where they are planted, and choosing trees that offer characteristics to complement human needs, a more effective relationship between use and design, along with a reduction in maintenance problems and conflict, can be realized.

- Select trees adapted to the environmental conditions of the site. You must understand soil, climate, space, and other characteristics of the planting area.
- There is a connection between the visual characteristics of trees and architecture. Seek to harmonize with existing and future "built" elements.
- Understand and satisfy any functional reasons for planting.
  - — Energy conservation
  - — Wind reduction
  - — Air pollution abatement
  - — Noise reduction
  - — Shading
  - — Screening objectionable views
  - — Traffic calming
- Extend and complement the native tree species of the area.
- Use native species in planting areas where they will grow and live.
- Use native species where they might naturally occur (parks and open spaces).



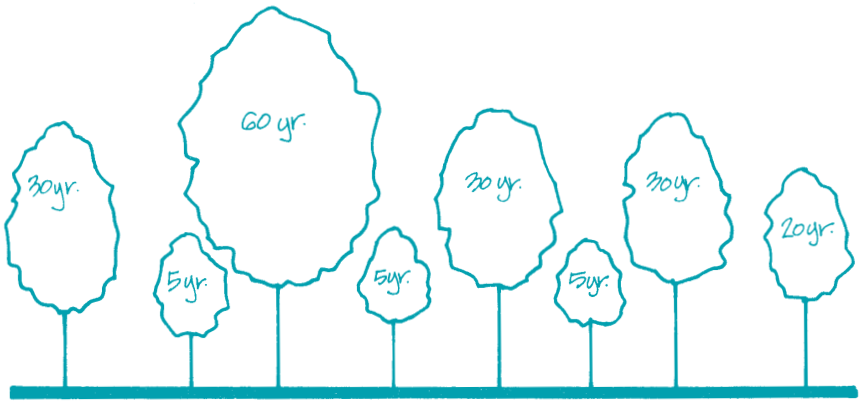
Many species and cultivars of trees provide desired tolerances and characteristics.



Clustering Trees

Working with engineers early on can help provide alternatives to straight-lined tree plantings.

- Use nonnatives in sidewalk cutouts and other places for which many native species are not well adapted.
- Use nonnatives of a similar form, texture, and color of natives.
- Use special care when modifying conditions near established trees that are to be protected.
- Understand and map how existing trees fit on a development site before construction begins.
- Develop and enforce tree protection zones that keep construction far enough away from trees, tree roots, and soils.
- Use chain-link fencing to protect trees from construction equipment and material storage.
- Understand, respect, and emphasize a place's geographic setting.
  - — Frame, but don't block, views to the surrounding hills and into the city.
  - — Use accent species, such as ginkgo, in the foreground of such views.
  - — Use vertical species, such as dawn redwood, as focal points in valley areas.
- Complement the natural topography.
  - — Use round-headed trees in hilly areas.
  - — Where ridgeline development occurs, use round-headed trees to help blend structures into the ridge.
- Complement existing trees and other vegetation.
  - — New tree forms should be compatible with existing ones.
  - — Horticultural requirements of new trees should be consistent with old for healthy growth.
  - — Extend and replicate historical and landscape patterns.
  - — Use trees to create a variety of spatial experiences. Allees, bosks, clusters, and groves are all traditional ways to use trees to form "outdoor rooms." Trees can be used to create small, enclosed spaces or to emphasize the feeling of openness, as when a huge lone tree is used to punctuate a large open space. Trees define both horizontal space, as a wall of trunks, and vertical space, as a leafy roof.
- Use a diversity of similar species to avoid overplanting of any one species.
  - — Use two to three alternating species on any one street.
  - — Use alternating species in neighborhood on a block-by-block basis.
  - — Intermix smaller accent species (red bud, dogwood, cherry, tree lilac, ruby red horse chestnut) in the dominant tree grid, as understory species, or to highlight key buildings or intersections.
  - — Do not plant more than 15 percent of any one tree species.
- Plant to attract and support birds and other desired wildlife.
  - — Plant wildlife-attracting species in sizable numbers and with some continuity throughout the community. Isolated patches are less effective.
  - — Protecting or planting a diversity of plants and landscape types is best for ecological health (woodland, shrubby edge, meadow).
  - — Protect and enhance stream corridors with dense plantings of native trees and understory plants.



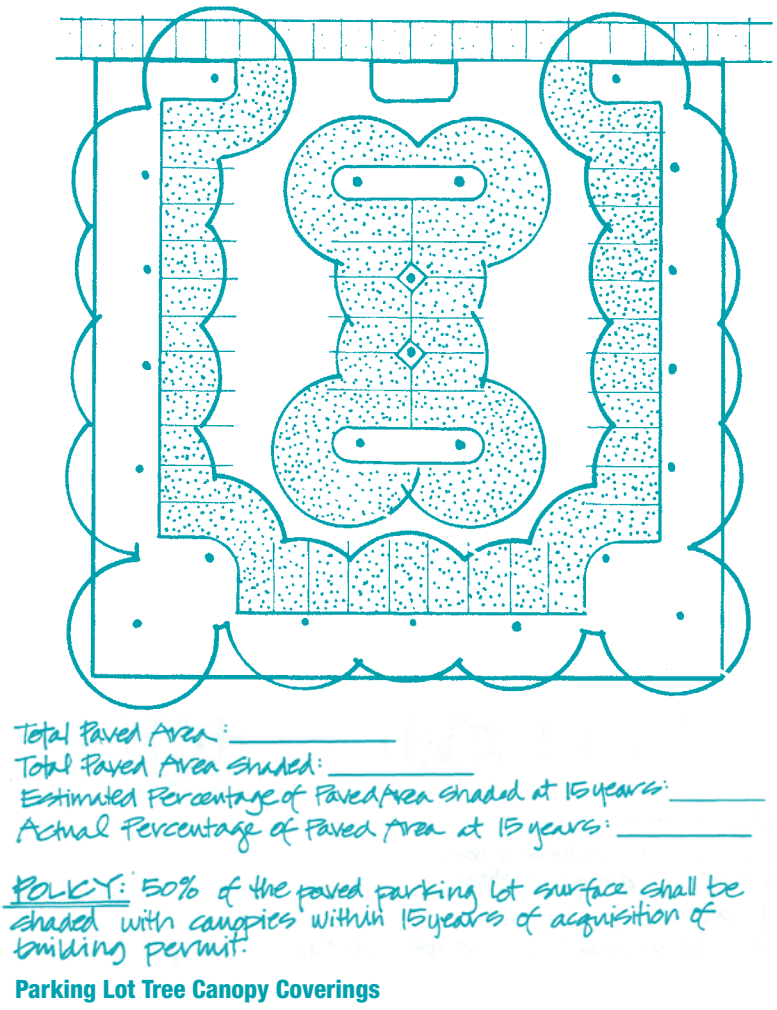
Age and species diversity are the biggest defense against catastrophe and provide for sustainable community forests.

Design Guidelines for Streets

The diversity of street types within a municipality calls for a diversity of design treatments. These guidelines apply specifically to the conditions found along most major streets.

- Create "gateways" to welcome those entering the city on major thoroughfares.
- Use a repetition of dominant species to make a strong, lasting impression on motorists. Consistent use of species for major streets will also reinforce the distinct character of each.
- Mark major intersections with special plantings.
- Use informal, naturalistic tree groupings along highway and other open/rural corridors rather than straight-line planting.
- Use large trees to create a canopy of foliage over head and bring wider roads to human scale. With repetition, fall color and attractive branching patterns are appropriate for higher-speed streets where subtle effects are not noticeable by drivers.
- Protect views of surrounding open space, historic or memorable structures, and other important elements. Trees can be used to frame views of signs and other structures but should not obstruct them.
- Screen objectionable views, including large parking lots, with trees.
- Plant trees to shade sidewalks and bike lanes.

Trees are used to help put large buildings into human scale, making places less overwhelming and more comfortable.



Parking Lot Tree Canopy Coverings

Parking lots can be designed to incorporate trees for both shade and stormwater management.

Hidden Design Opportunities

Street tree plantings are only one way to help reforest a city. Besides the other predictable places to plant trees, such as parks and schools, there are other places to extend the community forest.

- Vacant lots or other types of undeveloped or unused land can be turned from community eyesores into pocket parks, mini woodlots, or food-producing fruit and nut groves.
- Stream corridors are a neglected place for extending the forest, restoring habitat for riparian species, and creating a network of walking paths throughout the community.
- Corporate and institutional holdings are another landscape where a good public image can be accomplished with groves of trees—sometimes at substantially reduced costs in mowing and other maintenance.
- Parking lots can be unsightly, cover acres of land, and contribute substantially to the heat and stormwater runoff of a city. Properly planting trees in new or old parking lots can help make places better looking and cooler. Trees can also attract people to businesses.

Reclaiming Vacant Lots

Whether on a bustling city street or in a small town, vacant lots are cause for public concern. They make neighborhoods look desolate and forgotten, diminish the quality of life for residents, and send a message to outsiders that the community is in decline. Over time, the lots become host to illegal activity and dumping grounds for trash and debris.

Although blight is not quickly or easily remedied, major change can and will occur if government agencies, community organizations, and environmental groups combine their resources to work toward common goals.

Land should be an asset, not a liability, so the key is to reclaim and repurpose vacant lots in a way that contributes to the surrounding community. One option is for the land to be developed for housing or a commercial venture, boosting the local economy and encouraging future investment. A second option is to preserve the space for a park, playground, or community garden.

Vacant lots are considered a problem in many cities. Their potential is often ignored.

The Philadelphia Green Story

The tips and techniques presented in this chapter are based largely on the successful partnership of the Pennsylvania Horticultural Society (PHS), Philadelphia city government, and various community organizations. Coupling the resources and financial leverage of city government with PHS's community presence and years of hands-on revitalization work through its Philadelphia Green program set the stage for lasting change. As part of Mayor John Street's Neighborhood Transformation Initiative, the team orchestrated not only the interim management of existing vacant lots but also planned for new open space as a way to retain residents and businesses and to attract new housing and commercial investment. One particularly successful site is North Philadelphia's "Ridge on the Rise." There, Philadelphia Green partnered with neighborhood organizations to address blight and economic decline by transforming abandoned office buildings and notorious dumping sites into safe and accommodating open space. Further improvements such as colorful art installations, gateway improvements, and street tree plantings helped spark reinvestment in the area. The partnership between PHS and the City of Philadelphia (a nonprofit intermediary and local government) can serve as a model for other cities and towns seeking to remedy the devastating effects of abandoned vacant land. It shows how each can build on the strengths of the other. A manual detailing Philadelphia Green's approach to vacant land management can be found online at www.pennsylvaniahorticulturalsociety.org/garden/vacantmanual.html.

Either route demonstrates an interest in an area and an advance against blight.

Such renovations require time, energy, and funding, but restoring vacant land provides quite a return on investment. Aesthetically, socially, environmentally, and economically, the benefits are tremendous.

Forming Partnerships

It's essential to involve members of the surrounding community in the vacant-land-revitalization process whenever possible. Have them assist in selecting sites that will create a positive visual impact on well-traveled corridors in order to call attention to the project. Incorporating their contributions and hearing their concerns also allows community members to feel a sense of ownership that will safeguard the investment and help ensure the long-term preservation of the work.

When considering project sites, rely on local government to resolve matters of land ownership and identify the parcel's legal owner. If the owner cannot be determined or is unreachable for some reason—common occurrences when dealing with vacant land—the municipality can often step up and approve the renovation project.

The Revitalization Process

To fully reclaim vacant land, it's best to remove all trash, grade the soil, plant grass seed, and install trees. If vandalism and loitering are problems, erect a simple fence (something that shows ownership without being obstructive). This work can be contracted out or performed by a team of volunteers. However, if there is major debris on the site (such as the remnants of a building or subsurface debris), it is best to hire professionals. Since reclaiming land is a socially conscious and environmentally responsible cause, perhaps a landscaping team could be persuaded to perform their work at a discounted rate.

Simply clearing and greening a vacant lot might not seem revolutionary, but it is a large stride in the right direction. Even if it isn't a permanent solution, the newly improved lots can at least serve as attractive placeholders until another use can be determined. Creating a parklike setting reveals the potential of the land to become something more and may attract investors.

Renovating the land is just the beginning, however. Ongoing maintenance is essential to prevent the parcel from reverting to its former state. Again, volunteers are a terrific asset for keeping the spaces clean, but consider hiring contractors to fully guarantee lasting results. Routine maintenance makes economic sense, too, as scheduled cleanings are more cost effective than sporadic large-scale efforts.

The Benefits of Clean and Green

One way to buck the trend of declining tree canopy in many parts of the state is to use vacant land as a site for mass tree plantings. Trees may start small, but in a few years the investment will begin to pay dividends. Not only does planting trees help remedy the larger issue of deforestation, but on a local level, people will appreciate having a shady spot for picnics and recreation.

The benefits of creating pockets of clean and green open space are many and varied. The most obvious advantage is visual: open spaces are appealing and provide relief from congested surroundings. A second benefit is economic: investment in greening yields significant financial returns. Finally, community greening helps build social capital and community capacity, reduce crime, provide neighborhood gathering places, and improve health by offering recreational opportunities.

With partnerships and work, vacant lots can be revitalized, helping people and the places they live.

The Green Advantage

Studies conducted at the University of Pennsylvania's Wharton School demonstrate the economic impact of vacant-land restoration and management. The first, focused on Philadelphia's New Kensington neighborhood, found that an investment of approximately one million dollars in tree planting and vacant-lot stabilization resulted in property value gains of four million dollars and twelve million dollars, respectively. The second study analyzed the citywide effects of greening and associated public investments. The findings showed that derelict vacant land decreased the value of neighboring houses by 20 percent, while green and well-maintained formerly vacant land not only recaptured the initial decrease but increased the worth of adjacent homes by 17 percent, for a total gain of 37 percent.

SOURCE: Wachter, Susan, and Kevin C. Gillen. *Public Investment Strategies: How They Matter for Neighborhoods in Philadelphia—Identification and Analysis*. Philadelphia: The Wharton School, University of Pennsylvania, 2006.

Revitalizing vacant lots and other civic environmental projects are strong tools in building community capacity and development.

The Role of Trees and Forests in Stormwater Management

Stormwater: A Growing Concern

As our landscapes develop, stream health can deteriorate. What we do to the land affects both the quantity (volume) and quality (pollutant levels) of water in our streams and rivers. The land area through which any water moves, or drains, to reach a stream or river is called a watershed.

As we remove forest canopy and other vegetation and replace it with the impervious surfaces of roads, parking lots, driveways, homes, patios, pools, and even grass, we immediately affect watersheds and receiving streams (or lakes). With an increased amount of impervious surfaces, more water travels on the surface. As this stormwater runoff travels to the rivers and streams it collects pollutants and increases both in volume and speed. More impervious surfaces not only increase the volume of runoff, it also shortens the amount of time it takes the water to get to the stream. These increased peak flows lead to flooding, stream bank erosion, widening of streams, sediment deposited in streams, loss of fish habitat, and decline in water quality. In Pennsylvania there are more than 12,200 miles of polluted streams and more than 3,000 miles of streams are impaired by stormwater runoff.

Trees and Stormwater Management

Trees and forests play an incredible role in moderating and reducing stormwater in several ways and removing or filtering pollutants that would otherwise wind up in our waterways. Trees and forests filter and regulate the flow of water, in large part due to their leafy canopy, intercepting rainfall and slowing its fall to the ground and the forest floor. They act as an enormous sponge, typically absorbing up to 18 inches of precipitation (depending on soil composition) before gradually releasing it to natural channels and recharging groundwater. A study in a North Carolina watershed showed the mean soil infiltration rate went from 12.4 inches per hour to 4.4 inches per hour when a site was converted from forest (duff layer on soils) to suburban turf.

Average interception of rainfall by a forest canopy ranges from 10 to 40 percent by volume depending on species, time of year, and pre-

Many developments increase peak flows and stormwater management costs.

Healthy streams in urban areas are important. Green engineering can be used to protect our streams and reduce stormwater costs.

The large impermeable surfaces of parking lots and roofs cause large stormwater management costs.

cipitation rates per storm event. In urban and suburban settings a single deciduous tree can intercept from 500 to 760 gallons per year; and a mature evergreen can intercept more than 4,000 gallons per year. Even young, small trees help. In a recent USDA Forest Service study, a single small tree (callery pear) that was only 9 years old was able to intercept 58 gallons of stormwater from a 0.5-inch rain event (67 percent of the rain that fell within the canopy). Interception slows rainfall and also allows water to evaporate from leaves.

A study in the 1980s of the existing tree canopy in Dayton, Ohio, found that stormwater runoff was reduced by 7 percent and could be increased to 12 percent by planting more trees. In a more recent UFORE Hydro study conducted by the USDA Forest Service of the Toby Creek Watershed (a suburban area of Wilkes-Barre), a 54 percent existing tree canopy cover was able to reduce stormwater runoff by 11 percent. One USDA Forest Service researcher has stated that planting large canopy trees over impervious surfaces such as parking lots or streets has a tremendous ability to reduce stormwater because they work to reduce peak flows in urban settings.

Trees and forests absorb and use tremendous amounts of water for growth, thereby consuming stormwater. In deciduous forests, an average of 24 inches of an annual 40 inches of rainfall is taken up by trees through evapotranspiration, or the movement of water from the ground through the tree and leaves, evaporating back into the environment. Evapotranspiration also serves to cool and modify surrounding temperatures. If the forest is removed or harvested, the water used by vegetation drops to 14 inches and stream flow increases to receive 26 inches of the annual 40 inches of precipitation.

Removal of Pollutants: Phytoremediation

Plants, especially woody plants, are very good at removing nutrients (nitrates and phosphates) and contaminates (such as metals, pesticides, solvents, oils, and hydrocarbons) from soil and water. These pollutants are either used for growth (nutrients) or are stored in wood. In a University of Georgia study, a single tree growing roadside removed 60 milligrams of cadmium, 140 milligrams of chromium, 820 milligrams of nickel, and 5,200 milligrams of lead in a single growing season. Studies in Maryland showed reductions of up to 88 percent of nitrate and 76 percent of phosphorus after agricultural runoff passed through a forest buffer.

Yale University studies of residential lawns have shown overuse of chemical fertilizers with more than 100 million tons applied to lawns annually, and synthetic pesticides with over 80 million pounds applied

Green engineering, which increases water inflitration into soils, reduces stormwater and makes places more attractive.

to lawns annually. Excess nutrients from lawns and agricultural fields is one of largest sources of non-point-source pollutants affecting water quality in our streams, rivers, lakes, and the Chesapeake Bay.

Parking lots, one of our fastest-growing land uses, have become a major cause of water-quality and stream degradation. Non-point-source pollutants such as petroleum hydrocarbons, nitrates, and heavy metals (cadmium, copper, lead, and zinc) from brakes and rusting automobiles all wash into our waterways. Even a small rainstorm (less than 0.5 inch) will cause a "first flush," washing these pollutants into streams. The runoff from one acre of paved parking generates the same amount of annual runoff as 36 acres of forest, 20 acres of grassland, a 14-acre subdivision with 2-acre lots, and a 10-acre subdivision with half-acre lots. One inch of rainfall on an acre of parking lot produces 27,000 gallons of stormwater. The planting of trees in parking lots, especially in bioretention areas where stormwater flows, can have a positive impact on water quality and work to reduce flooding and stream impairment.

Streamside or Riparian Forest Buffers

Stream health depends on the presence of woody vegetation along its banks. Riparian forest buffers filter sediment and pollutants during storm events and remove nitrogen and phosphorus leaching from adjacent land uses. Woody root systems provide stability to the bank, shade and modify stream temperatures, provide aquatic and wildlife habitat for many species, and reduce stream velocity and downstream flooding. Riparian buffer widths vary from 50 feet, providing some bank stability, to 250 feet, as well as flood mitigation and wildlife habitat. Increased impervious surfaces and unmanaged stormwater continue to erode stream banks and fill streams with sediment.

Trees and Forests: Best Management Practices for Stormwater

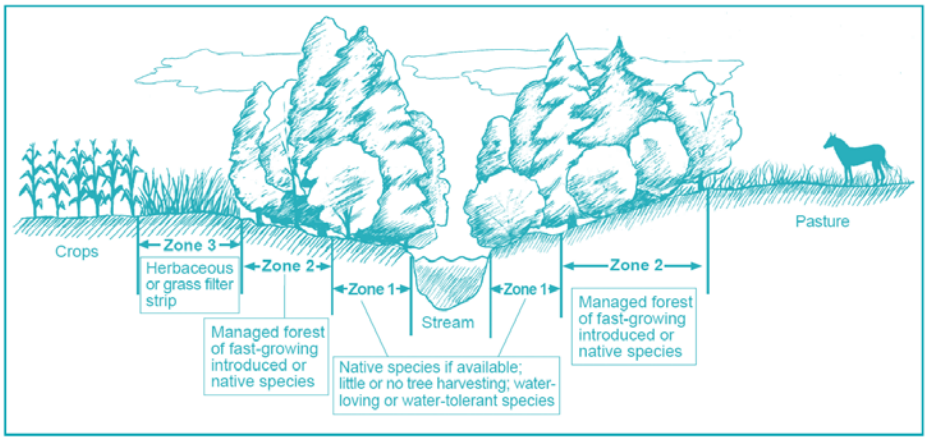
Historically, stormwater management strategies have focused on detaining large volumes of water in basins that had little to no effect on removing the pollutants in the stormwater. The engineering goal now is to protect water quality and work to put stormwater back into the ground as it falls. One of the ten principles for new stormwater management is "preserve and utilize the natural systems of soil and vegetation to decrease impermeable surfaces."

Nonstructural best management practices include protecting/conserving existing forests and riparian areas, clustering or concentrating new construction to minimize site disturbance, using conservation subdivision design and low-impact development techniques, minimizing soil compaction and grading, revegetating and reforesting disturbed areas using native species, and reducing impervious cover such as streets and parking lots. Then there are structural best management practices that promote infiltration of stormwater, such as the development of rain gardens or bioretention areas where trees and vegetation play an active role. Trees and vegetation are also being incorporated into newly designed or retrofitted stormwater basins to promote pollution and sediment removal. Other strategies include green roofs, rain barrels or

Stormwater Management Guidelines

Manage stormwater as a resource. Preserve and utilize natural features and systems. Manage stormwater as close to the source as possible. Protect and restore the hydrologic balance of surface and groundwater. Disconnect, decentralize, and distribute sources and discharges. Slow runoff down—don't speed it up. Protect and reclaim water quality. Integrate stormwater management into initial site design.

SOURCE: Pennsylvania Department of Environmental Protection, *Stormwater Best Management Practices Manual*, www.dep.state.pa.us/dep/deputate/watermgt/wc/subjects/stromwatermanagement/BMP%20Manual/.htm.



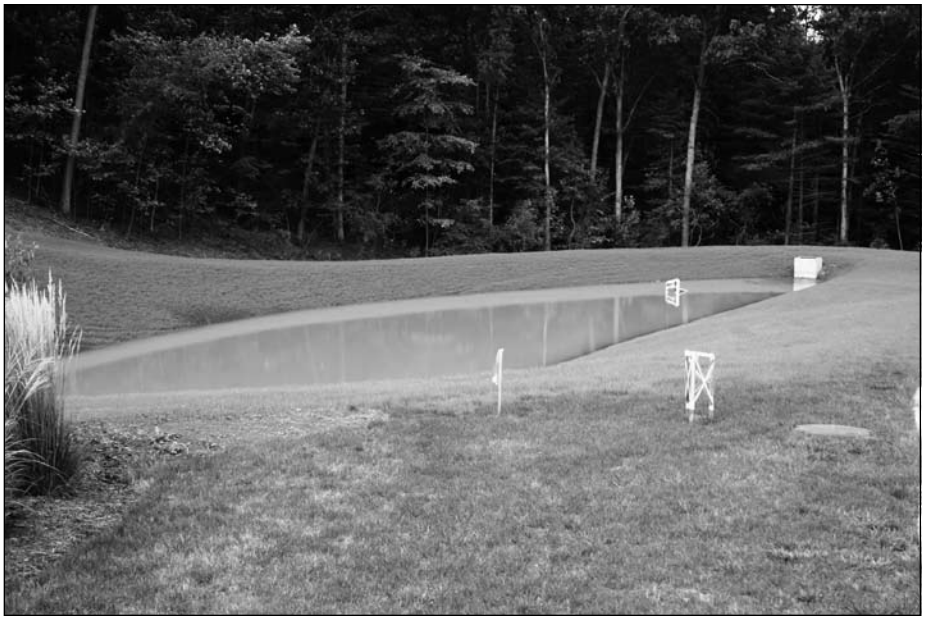
USDA, NATURAL RESOURCE AND CONSERVATION SERVICE

Riparian areas filter and protect water quality. Zoning and subdivision and land development ordinances can be used to define and protect riparian areas during development.

cisterns, vegetated infiltration swales, constructed wetlands, and riparian buffer and floodplain restoration. Given the costs and legal issues of stormwater, many growing municipalities are using zoning and other ordinances to protect riparian areas and set limits for impervious surfaces and peak flows in development.

In older existing communities, increasing tree canopy cover along streets, in yards, and in parking lots can help. Where growing space permits, planting large-canopy trees provide the most benefit, about 8 times that of small maturing trees.

The role of trees and forests in managing stormwater and protecting water quality is just beginning to be understood by some engineers, planners, and community leaders. One of the most powerful statements that help support this came from the Chesapeake Bay Executive Council in 2006 and reads: "Forests are the most beneficial land use for protecting water quality, due to their ability to capture, filter, and retain water, as well as air pollution from the air. Forests are also essential to the provision of clean drinking water to over 10 million residents of the watershed and provide valuable ecological services and economic benefits including carbon sequestration, flood control, wildlife habitat, and forest products."



There are better alternatives to traditional store-and-drain stormwater basins.

The green engineering of bioretention areas and permeable paving can be used to increase water infiltration, increase water quality, and decrease stormwater costs.

Helpful Web Sites

Alliance for the Chesapeake Bay Program:
www.acb-online.org/pubs.cfm

Center for Watershed Protection:
www.cwp.org

Natural Stream Channel Design:
www.nrcs.usda.gov/technical/stream_restoration/

Stormwater Managers Resource Center:
www.stormwatercenter.net

Urban Watershed Forestry Manuals:
www.na.fs.us./watershed/pdf/Urban%20Watershed%20Forestry%20Manual%20Part%201pdf

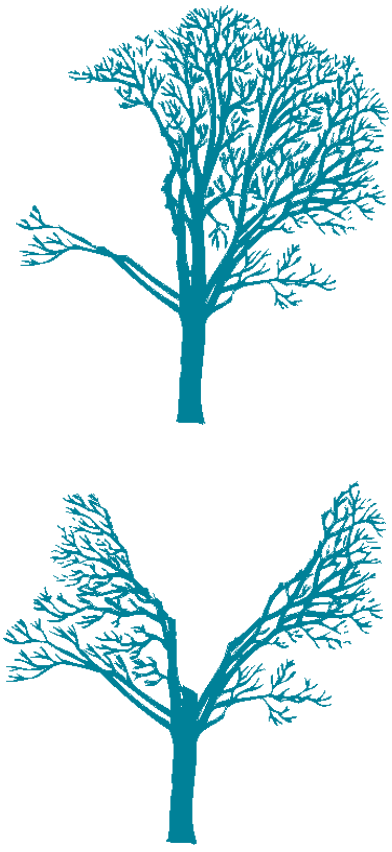
Working with Utilities

People depend on reliable, uninterrupted electrical service. The branches from trees near electric lines can interfere with this service, especially during storms. Unfortunately, many trees near utility lines and poles have been excessively pruned. This often disfigures the trees and compromises their health and structural integrity. In addition, improper pruning and tree removal angers citizens and has led to serious conflicts between communities and utility companies. In the United States, utilities spend more than one billion dollars annually on tree pruning. These costs are then passed on to consumers.

Many of the problems, misunderstandings, and conflicts associated with a utility company's tree work can be reduced or eliminated through better communication, planning, tree maintenance, and education. By planting smaller, compatible tree species in the proper locations, tree pruning and removal by utilities can be minimized or avoided. Directional pruning and other improved pruning methods can minimize the adverse effects on tree health, structure, and appearance. Finally, communities and utilities should work together to ensure that the municipality will be notified before pruning or removal and that the trees will be pruned or removed in a proper manner.

Tree commissions should establish rules that only allow certain tree species (those with a mature height of 30 feet or less) to be planted under overhead distribution lines. Practices such as tunneling under roots and direction pruning should be encouraged. Commissions should meet with the local utility forester and their tree-pruning contractors to discuss these methods.

In general, burying utility wires does not provide a practical solution to tree-trimming problems. In older residential neighborhoods, the expense to bury the wires would be prohibitive and the necessary excavation would damage the roots of existing trees. Once installed, the underground installations would require maintenance and the excavations for repairs would also damage tree roots. Underground-utility installations are usually feasible only in new developments, where they have become common. For these reasons, trees should be planted far enough away to permit utility equipment access and to keep the roots clear of future excavation. The tree commission should work with the planning commission to encourage the use of underground utilities and mandate adequate tree lawns during new and reconstructive street and sidewalk installations.



Direction pruning using reduction and thinning cuts is now being used by many utilities.

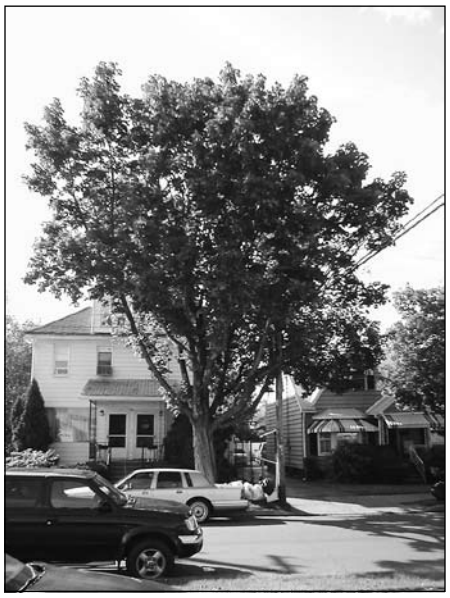
Guide for Working with Utilities

- Meet with utility representatives and discuss their input and suggestions whenever ordinances and rules are established or changed.
- Encourage or require utilities to communicate with municipalities before removing or pruning trees.
- Require permits for utility clearance and maintenance work.
- Encourage utilities to offer a tree-replacement program to compensate for eliminating nuisance and hazard trees.
- Encourage utilities to educate arborists and contractors through training sessions, meetings, correspondence, and on-site job inspections.
- Involve community residents by holding public meetings prior to large clearance or maintenance projects.

Aerial Distribution Lines (Electric, Phone, Cable)

Utility services that are distributed through overhead wires are subject to interruption when tree branches touch the wires or when storms cause trees to fall onto the wires. Utility companies are mandated by the state to prune trees to maintain vital electric services and ensure public safety. Federal, state, and local safety standards require that only certified line-clearance tree workers may perform work where electrical hazards exist. Local shade tree commissions should establish rules that require utilities to contact a municipality before performing any tree pruning or removal, ensure that only qualified individuals will work where electric utilities are present, and ensure that the crews will practice proper pruning methods.

View from down the curb of a directionally pruned tree.



View from across the street of a directionally pruned tree.

Internal decay caused from topping a tree. Reduction and thinning cuts avoid this.

Underground Utilities (Electric, Gas, Water, Sewer)

One of the surest ways to damage and possibly kill a tree is by severing its roots, especially roots over 2 inches in diameter. This can happen during excavation to install or repair underground utilities. Planting locations should consider gas, water, and sewer pipes to avoid damage to tree roots. When selecting planting locations, people should be aware of surface indications of underground pipes, such as manhole covers or covers on access pipes or valves. The intrusion of roots into pipes is a potential problem only when segmented pipes (such as clay sewer pipes) are present.

Tree commissions should establish rules to protect trees located near excavation sites. A few simple rules, such as a permit requirement for root pruning of street trees, can minimize root damage, protect trunks, and eliminate overhead limb damage. Additionally, contractors should be required to contact the local utilities prior to any excavation within the public right-of-way and utilize the One-Call program for locating underground utilities.

Getting Organized

By building a strong group of committed citizens to help with tree planting and care, you'll save money and improve the survival rate of the trees. By nurturing people's interest and investment, you can count on these citizens to become advocates for trees and parks.

This section is designed to encourage the development of citizen tree stewardship in your municipality and help in the coordination of volunteer-driven community tree plantings and care. If your municipality has a shade tree commission or environmental advisory council, one of these groups might spearhead such an effort. Explore a variety of community resources such as the following to find volunteers.

PEOPLE

Identify and involve local movers and shakers, decision makers, and other people in your community. The number one reason people volunteer is because they are personally asked.

Many people love planting trees and working on their neighborhoods.

ORGANIZATIONS

Identify community and nonprofit groups, churches, and schools that could provide support in the form of people and meeting space. Seek and publicly acknowledge support from local banks, utility companies, and other organizations for special projects.

OTHER GOVERNMENT AGENCIES AND POLITICIANS

Identify and contact state legislators and county departments using your municipality's resources as leverage to attract additional funds, influence, skills, and other resources.

Recruiting Volunteers

FLYERS

Be brief and to the point. Focus on the four Ws: who, what, when, and where. Photos, graphics, and colorful paper attract attention.

MEDIA

Brief, clear, concise public-service announcements and press releases can reach a lot of readers. Build a personal relationship with editors and reporters.

SPECIAL EVENTS

Combining work sessions and clean-ups with fun, food, and music is a highly visible way to keep veteran volunteers and attract newcomers. Be prepared with a sign-in sheet or hold a raffle to obtain new volunteers' names, phone numbers, and addresses.

PHONE CHAINS

Encouraging volunteers to call one another not only shares the responsibility but is also an opportunity for them to get to know each other better. Preexisting, collaborative groups often have their own phone chains; activate them.

COMMUNITY CANVASSING

Distribute flyers and invitations door to door. People are likely to volunteer when asked by someone they know or recognize.

ASK, ASK, ASK!

People tend to volunteer when someone asks them. If one person isn't able to help, ask if she or he knows someone else who might be interested.

Working with Your Volunteers

DELEGATE RESPONSIBILITIES

Although it may seem easier to do everything yourself, learn to share the work. Volunteers have a lot to offer and they appreciate the opportunity to contribute their skills, time, and energy. The more people get involved, the more they have a stake in making the project successful. Delegating helps avoid burnout and resentment from those eager to work.

SEEK SUPPLIES AND MATERIALS

Identify, patronize, and ask local restaurants, bakeries, print shops, stationery stores, photocopying centers, and other businesses to donate supplies and offer their services. Approach business owners and managers for contributions. Be sure to thank them publicly for support.

KEEP YOUR VOLUNTEERS HAPPY

People volunteer for many different reasons. Some want to do something positive for their community; others want to keep busy, learn new job skills, or find a new job.

CREATE VOLUNTEER JOB DESCRIPTIONS

Having clear job descriptions helps volunteers understand tasks, expectations, and opportunities. Matching volunteers' interests with the work helps keep them happy. A satisfied, long-term volunteer is likely to bring friends along to help next time.

REWARD VOLUNTEERS

Being a volunteer is hard work. Everyone appreciates being thanked for a job well done, so be generous with praise and thoughtful rewards. Make sure volunteers feel special and valued.

Give volunteers jobs they can complete. Make sure volunteers feel special and valued.

How to Delegate Responsibility

1. Determine the goal, identify the tasks, and agree on ground rules together.
2. Assign tasks.
3. Set deadlines.
4. Hold scheduled meetings and allow time for people to report on progress.
5. Provide additional leadership if the task isn't being completed.
6. Supply people with the resources they'll need such as good instructions, tools, and partners.

For information on volunteer programs go to the Pennsylvania Horticultural Society's Web site at www.pennsylvaniahorticulturalsociety.org/phlgreen/treetenders.html.

Ways to Say "Thank You"

- Serve food at meetings.
- Organize a potluck dinner celebration.
- Award certificates.
- Give hats or T-shirts to build group identity.
- Provide ongoing training.
- Ask volunteers to be spokespeople at media events.
- Include volunteers' names and photos with press releases.

Fund-Raising with Volunteers

Although many volunteers do not like to fund-raise, their efforts to bring in more resources will help you purchase and plant new trees, pay for services such as sidewalk cuts and tree pruning, buy mulch or tools, and organize special events like Arbor Day. In addition, fund-raising events are good opportunities for recruiting more volunteers.

Funding Sources for Volunteers

INDIVIDUALS

Encourage the volunteers to approach family, friends, and neighbors for contributions. If they cannot provide money, perhaps they will volunteer their time.

COMMUNITY INSTITUTIONS

To start the process, ask volunteers to approach churches, colleges, parent-teacher organizations, and community groups (e.g., Kiwanis, garden clubs).

LOCAL BUSINESSES

Have them ask home and garden centers, hardware stores, print shops, bakeries, delis, and so forth for cash donations or in-kind services. Sometimes receiving donuts or tools can be more beneficial than a cash contribution, depending on your circumstances.

LOCAL POLITICIANS

Contact state legislators and city council members.

LOCAL CORPORATIONS

Approach banks, utility companies, fuel companies, and other locally based corporations such as pharmaceutical companies.

Volunteer projects should be fun and rewarding. Remember to celebrate and to say thank you.

Other Volunteer Fund-Raising Options

ONGOING FUND-RAISING

Sources may include direct mail, door-to-door canvassing, raffles, dedications, and bake/candy sale. Keep an ongoing list of contributors and add their names to a potential volunteer file for a follow-up mailer.

EVENT FUND-RAISING

Special events are a great way to raise money and generate publicity. These events can be as varied as a community flea market, spaghetti dinner, tour of community houses and gardens, and concerts (with local talent from schools, churches, and other groups). Additional events that go hand in hand with those events are a 50/50 raffle or a silent auction.

CHARGE A FEE FOR SERVICE

Ask the recipients of the newly planted tree to contribute to part of the cost. For example, asking the homeowner to contribute $25 toward a tree that costs $100 could save 25 percent on the overall cost of the project.

COLLABORATE WITH OTHER ORGANIZATIONS

Look to team up with several organizations such as a civic association, local school, or church to strengthen the volunteer group. Help the volunteer group determine if it should seek 501(c)(3) tax-exempt status.

Advocacy by Volunteers

As municipal leaders, you may ask volunteers to contact other officials for financial or legislative support. A personal visit with an elected county or state official or a member of Congress is a particularly effective way to emphasize interest in an issue or legislative bill. Sending personal letters can have significant impact on elected officials who know that votes can be won or lost by their response or lack thereof.

Advocacy:
Tips for Meeting an Elected Official

- Make an appointment. State the subject of discussion and the time needed and identify persons attending.
- Select a spokesperson and agree on the presentation.
- Know the legislative facts related to your position.
- Present the facts in a positive and concise manner
- Relate the positive impact from the legislation and state the problems it corrects.
- If you are opposing legislation, highlight the negative impact. If possible, have an alternative approach.
- Provide accompanying fact sheets.
- Encourage questions and discussion.
- Ask for favorable consideration.
- Thank the official for his or her courtesy and time and leave promptly.
- Make sure you follow up with a thank-you note.

Advocacy:
Tips for Writing an Elected Official

- Be polite, informative, and concise. Keep the overall letter to one typewritten page and stick to a single subject or issue. State your purpose in the first paragraph and use the rest of the letter to support your position.
- Direct the approach to the legislator's committee assignments, interests, and background.
- If the subject is related to a bill, cite it by name and number.
- Be factual and support your request with information about the legislation and its possible impact. Avoid emotional and philosophical arguments.
- If the volunteer group opposes a piece of legislation, say so, indicate the adverse effects it would have, and then offer alternatives.
- Ask for the legislator's views but do not demand support.
- Be sure all names and addresses are legible.

Working with Youth Volunteers

Try to involve children in any tree-care projects that are undertaken in your municipality. Kids can undo a lot of tender loving care very quickly if they don't have a personal connection to the community-greening effort. But once their positive energy is mobilized, they'll feel strongly about improving their own communities. In addition, their unlimited stamina and limber backs are wonderful resources. In short, put them to work! Be sure to make it fun and give them plenty of positive reinforcement.

WHERE TO FIND YOUTH VOLUNTEERS

Schools

Community groups that are interested in working with schools will find many opportunities to interact with budding environmentalists. There are likely trees already growing on school property that a volunteer can help a classroom "adopt." Trained volunteers can also show the students how to identify, care for, and observe the trees. In addition, many teachers are currently searching for activities to satisfy requirements mandating that students complete a community-based service-learning project in order to advance to grades five and nine and to graduate from grade twelve. An ideal service-learning experience combines academic content with hands-on activity, and many tasks relating to tree care readily fit the bill. Some suggestions for long-term service-learning projects include involving older students in a neighborhood tree-inventory project or using student help to research, plan, and implement the planting of new trees.

After-School Programs

Contact community schools about enriching their after-school program with some of these same activities. Establishing a youth group during this period has the advantage of not competing with a teacher's instructional time during the day. Consider enlisting student help to patrol their schoolyard and pick up litter, for example.

Other Youth Groups

Take advantage of the resources of organizations that already have extensive experience working with youth, such as Boy Scouts, Girl Scouts, and 4-H.

Volunteers may need training and supervision. The best way to get volunteers is to ask them personally.

Activities to Try with Schools

1. Read one of the many excellent children's books about trees to a class.
2. Sponsor a class of children on a field trip to a nearby arboretum or park or a "walking field trip" to see community trees.
3. Assist with the planning and implementation of an Arbor Day celebration.

Community Forestry Opportunities for Volunteers

With proper training and supervision, volunteers can perform many valuable tasks.

- Plant trees along streets, parks, school grounds, and riparian areas
- Maintain community trees by watering, cultivating, mulching, simple pruning, and removing guide wires and stakes
- Form shade tree commissions, develop master plans, write or revise ordinances, conduct tree inventories, help develop tree planting lists, recommend removal of hazardous trees, sponsor workshops, or champion community forestry programs
- Promote the acquisition and preservation of parks and open spaces
- Organize and participate in fundraising projects, such as garage sales, raffles, auctions, craft shows, bake sales, or house and garden tours
- Organize, publicize, and promote special community events such as Arbor Day and Earth Day celebrations
- Clean up litter, debris, and even abandoned automobiles
- Develop and maintain trails and form patrol and advocacy groups to improve accessibility and appearance of riparian areas, greenways, and open spaces
- Communicate with and persuade public officials, legislators, government agencies, and local residents about the need for trees, green spaces, and other natural resources

Care and Handling of Volunteers

There are many ways to keep people engaged and enthusiastic about volunteering for your community projects. Consider these tips for running a successful volunteer day.

- Be on time and start promptly; don't let volunteers hang around aimlessly waiting for things to begin. Be prepared with meaningful tasks and all the supplies you need.
- Convey enthusiasm and appreciation. Start a sign-in sheet (name, phone, address, and e-mail if possible, but respect requests for privacy). Greet and welcome volunteers and have them explain why they are there. Give a brief orientation and describe your organization. Tell everyone why the project is important and what the goals are.
- Describe tasks and review safety and personal needs such as restrooms. Encourage initiative and creativity as much as possible. Reinforce, thank, and encourage throughout the project. Make it fun! Use rewards, such as food, certificates, or T-shirts. Leave time for reflection, thanks, and recruiting for future projects.
- Send a follow-up thank-you letter or call.

Training and Supervision

Adequate training and supervision are essential for safe and productive work by volunteers. Complete and clear instructions are a basic component of training. Training should take into account both the demands of a project and the varied experiences of each volunteer. Good training should stress the importance of quality work and safety. The volunteers should be asked about their training needs and qualified volunteers should be included as trainers. When supervising volunteers, use the same principles and courtesies that are used in supervising professional staff. Staff should be reassured that volunteers will not replace them but will enable additional accomplishments that would otherwise not be possible. Supervisors should be especially diplomatic when criticizing volunteers. However, they should not be afraid to reprimand or remove any disruptive volunteers.

CHAPTER 16

Funding Trees, Parks, and Open Space: Businesses, Corporations, and Private Foundations

This chapter will help you gather the financial support your commission or organization may need in responding to this question: How can you raise funding to conserve trees and other natural resources in public areas?

There are three kinds of "knowing" required to advance funding for trees and parks in your community. First, you must be able to speak confidently about your commission or organization, its interests, and what it can do. Next, you have to find out about potential funders—who they are, what they are likely to fund, how to approach them, and what to say. You are looking for a match between the interests of funders and your own interests and abilities. From there, you want to figure out a project that will garner support from both the community and those potential funders. For each type of project, you will frame a specific proposal to a particular candidate funder. This proposal must describe your potential project in a compelling and concise way. Eventually, you will get support. Just keep trying. Keep writing proposals.

Remember, fund-raising is an ongoing activity. It is not something that temporarily occupies an organization or individual. We are trying to rebuild our community environments along more sustainable lines one step at a time.

In the reality of shrinking municipal budgets, public/private partnerships are becoming more important for managing parks and other public landscapes.

Know Yourself and Your Community

You must be able to convey to potential funders who you are, who you represent, what your commission or organization does, and what need in the community you are uniquely equipped to fill. When you approach a potential funder, you will not be speaking on your own behalf but for a organization. This multiplies your influence because you represent some concerted effort by a group of like-minded others. First, you need to make sure that this is correct—that your organization is indeed like minded about the effort. A positive can-do attitude is important. You have something of value to offer and you must be able to explain this in a compelling manner. It is your unique combination of product and service, an important investment in and for the municipality. You have many reasons to be enthusiastic, and you want to share your project idea with those who have the funding to assist you. Your first task, then, is to find out how conservation of trees, parks, and open space is organized in your community.

Funding References

You may find The Grantsmanship Center Web site (www.tgci.com) useful and interesting in your pursuit of funding. Below are other useful references:

Carlson, M. *Winning Grants Step by Step*. Support Centers of America. San Francisco: Jossey-Bass, 1995. A complete workbook for planning, developing, and writing successful proposals. Order from Jossey-Bass at 350 Sansome St., San Francisco, CA 94104.

Kiritz, Norton J., and Jerry Mundel. *Program Planning and Proposal Writing*. Los Angeles: The Grantsmanship Center, 1988. A concise 12-page booklet that can be ordered from Publications, The Grantsmanship Center, PO Box 17220, Los Angeles, CA 90017.

Kiritz, Norton J. *Program Planning and Proposal Writing*. Expanded version. Los Angeles: The Grantsmanship Center, 1990. This is the expanded 48-page version of the 12-page booklet mentioned above. Can be ordered from Publications, The Grantsmanship Center, PO Box 17220, Los Angeles, CA 90017.

Corporate Giving Directory. A comprehensive profile of American corporate foundations and corporate charitable giving programs. Published by the Taft Group.

Know the Funder

In this section we describe the several categories of funders with whom you should familiarize yourself:

- your local government
- small privately owned businesses
- local civic organizations
- community, family, and corporate foundations
- major corporations that have local factories and branches, such as banks
- individuals

Municipal, county, state, and the federal government are discussed in more detail in Chapter 17 on municipal funding for open space. This chapter will concentrate on businesses, civic organizations, and foundations that typically like to support activities in their own backyards. Community foundations are limited to some geographic area, such as a county or city.

With all of these funding sources, your tasks are pretty straightforward:

- Identify possible supporters or compatible interests among local businesses, civic organizations, and foundations serving your community.
- Try to identify those among your group who know key individuals inside any of these organizations.
- If possible, have the "knowers" contact the organization about their funding programs and your project.
- Alternatively, select the most likely funding candidates and call or write describing your potential project and asking for information about their giving programs.
- Review the funder's information and, if you feel there is a match, submit a letter of request or proposal, following their guidelines. Then follow up.

The first task is the key. You may find revealing clues in local newspaper articles, annual reports of local businesses and foundations, foundation guides at a local library, or by talking directly with individuals affiliated with local organizations.

In pursuing these tasks, it helps if members in your group know key individuals within these institutions, such as the business owner or plant manager, members of boards of directors, key employees, or key foundation administrators. Use these contacts to build personal relationships.

YOUR LOCAL GOVERNMENT

Before undertaking any environmental project along your local streets, in parks, in vacant lots, or along streams, you should contact the municipal manager and work with your local government. They bear the prime responsibility for planning, maintenance, and improvements and should be consulted early. First, they may be able to assist you in your application work. Second, they may be able to make in-kind or other appropriations from general funds. Lacking funds, they may still be able to make grant-in-kind contributions of labor, equipment, and services. Such in-kind contributions are important indicators of project support and can be used as an attractive match on grants from other sources.

LOCAL PRIVATELY OWNED BUSINESSES

Owners of local businesses will give you the fastest reply. They typically live in the community and may already be involved in one or more civic activity. In your requests, match your project with their interests and abilities and distinguish between your requests for donations of cash on the one hand, and time, supplies, or equipment on the other. Thus, landscaping and tree service owners will be more likely to donate their time for a weekend tree-planting project where they agree to bring digging equipment or supply trees at cost. The contributions of local businesses are also valuable as an in-kind match, which larger corporations and foundations use to judge a project's degree of community support. Other local businesses, including hardware stores and building supply firms, may be more able to donate supplies such as wooden stakes or mulch. Contractors might be willing to supply a truck to haul soil. Banks and other service firms may be able to donate cash. For small community projects, donations in the range of $100 to $500 should be your targets. Your general strategy should be to

get support from a number of local businesses and give these businesses recognition for their support.

LOCAL CIVIC ORGANIZATIONS

Getting sponsorship from well-known local organizations is also important. Contact your Chamber of Commerce, downtown improvement association, Rotary, Elks, or other civic improvement groups for their cosponsorship. Their support can be more than just verbal. Get their help with funding, providing volunteers, or contacting local firms and local foundations. Usually, one to four connections may help you obtain financial support for a small project. For larger projects, such as youth summer-employment initiatives, the members of these organizations (businesses) can be important allies in providing financial and organizational backing. It is easy to imagine a summer youth project focused on maintaining public trees and trails sponsored by the members of a downtown business association in conjunction with a local community foundation. In fact, this is how nonprofits in Pittsburgh and Philadelphia organize teen summer employment—by creating a consortium in which businesses, foundations, and social-service agencies work together.

COMMUNITY, FAMILY, AND CORPORATE FOUNDATIONS

Foundations often lean to specific projects with wide community or regional impact. They make their support within broad categories such as education, culture, civic improvement, health, or the arts. Rarely will you find "environment" among these categories or anything as specific as tree planting or environmental restoration. In a review of ninety-six corporate foundations in Pennsylvania that stated they fund "environmental initiatives," ninety-five had only a one-word descriptor: "general." These same corporate foundations had extensive paragraphs describing their educational, cultural, or civic improvement initiatives. Less than 5 percent of corporate foundation giving goes to projects explicitly labeled "environment," but they know the environment is important to everyone. It is up to you to make the links between environmental projects and the more generally funded projects concerning education, civic improvement, and the welfare of youth.

Foundations typically like to support specific projects, and this orientation makes it difficult for some nonprofits to support general operations, a paid staff, secretary, membership expansion, newsletter and mailing expenses, and other overhead costs. There are some foundations that will fund general operations without tying their support to a specific program or project, and you should always be on the lookout for these. In understanding foundations, you may find three dimensions useful: source of wealth, size, and geographic focus.

Source of Wealth

Foundations may be categorized by the source of their wealth—the community at large, the personal wealth of an individual or family, or the profits of a private corporation. Community foundations (e.g., The Pittsburgh Foundation) derive support from the contributions of local individuals and businesses. Family foundations (e.g., The Heinz Endowments) are based on the wealth of their founders who left bequests in their wills. Interest from the bequest funds specific projects and the cost of administrative staff. Often you will find on the board of directors family members who carry on the philanthropic vision of the founder. Corporations may give directly or through a corporate foundation (e.g., The Westinghouse Foundation). Call any company and ask whether it has a community giving program and supports local charitable activities. You may be put through to the community relations officer or the director of the corporate foundation. If the answer is no, ask if the company has a charitable giving program for community projects. Usually, you will be asked to send a brief letter describing your project and the support requested.

Local civic organizations often help in community improvement projects.

Size

Large foundations have several staff members, pursue specific programmatic initiatives, give many grants, and exert substantial influence in their sphere of interest. In addition to projects within the community, they will often fund projects across a region or state. Their application and reporting requirements can be extensive, but they can respond quickly (within a month or two). Small foundations may have only a director and secretary and fund a more limited type of proposals for smaller amounts of money.

Geographic Focus

Community foundations fund projects only within a given geographic area, usually a given municipality, city, or county. Family foundations often have a strong interest in their locale but will follow the vision of the founder and fund projects wherever there is a compatible match with this vision. Corporate foundations tend to fund projects within the communities of their employees. Thus, cast about within your membership for employees of local firms, these individuals can be valuable allies in making your case to the company. Companies also tend to support, and in some cases mandate, the volunteer efforts of their employees. Thus, when undertaking a project, try to involve the employees of local companies as volunteers in your effort! Give prime attention to any corporation whose home office or a branch is in your community.

More often in our global economy, the home office is elsewhere, and you will be contacting a branch plant or subsidiary. In this case, you will usually require the support of the local plant manager, who must recommend your project to the corporate foundation wherever it may be. More time is required for your request to be reviewed, so take this into account when planning your project.

What Foundations Don't Support

Regardless of their source of wealth, size, or geographic focus, foundations often set restrictions on what they can support. Usually, a careful reading of the foundation's annual report or grant guidelines will reveal what the foundation funds or doesn't fund. You can get copies of these reports and guidelines by writing to the company. There is also a great deal of foundation information at your local library and online. Be aware of what foundations do not support. For example, some foundations do not support capital projects—that is, building acquisition or improvement programs (e.g., hospitals, homeless shelters).

Identifying Businesses and Foundations in Your Community

Initially, your group may consider just a few potential donors in thinking about local businesses and foundations to contact. Below are some sources for information about businesses and foundations in your community:

- Local corporate directories available through the Chamber of Commerce
- Yellow Pages of your phone directory
- The business section of your local paper
- Foundation directories at libraries and online

Making Contact with Businesses and Foundations

Your general strategy will be to secure funding support from several sources for several types of projects. For every contribution you collect, you may have to talk with ten potential contributors. With individuals and small businesses, you will be presenting your case directly to the person who has to make the decision, usually the owner of the business. With large businesses and foundations (whether corporate or family), you will find that there are procedures to be followed—an application that has to be filled out in a specific way, time frames to contend with (e.g., the board that makes decisions meets quarterly), reporting and accounting requirements, and other steps. In that case, your appeal is indirect, i.e., to a committee or individuals unknown to you. With corporate foundations, often the plant manager has to make a recommendation to the home office or the company foundation, so your first point of contact should be with this person.

In all situations, your position is helped immeasurably if you or someone on your commission or from your organization knows the business owner (in the case of a foundation, the foundation manager, a program officer, or a board member). In the case of a large company with or without a company foundation, knowing an officer of the company (e.g., president or treasurer), a board member, or the plant manager is important.

This search is best done in a brainstorming session with the people in your organization or commission. In this brainstorming session, simply have each person think of local companies they know and the key individuals within these companies they know. Make a list. What you are aiming for here is a direct, personal link to a business owner, corporate employee or manager, foundation staffer, or board member. What you want is access to a sympathetic ear, an inside champion, one who can guide you more firmly to support for your project.

Personal Contact Is Important

Remember the personal touch. Try to contact the right people within the funding organization to talk about your proposal. Try to build a personal relationship with the staff. Often, the best and fastest results are obtained by personal contact—a call or visit to local businesses, organizations, and foundations. For small amounts of money (less than $1,000), this is the way to go.

Preparing a Proposal Letter

With larger businesses or community or corporate foundations and for larger amounts of money (more than $2,000) you will most likely be required to prepare a proposal letter. Sometimes there are guidelines, which you should follow carefully. Other times you will be asked merely to prepare a brief one- or two-page letter of inquiry. If your letter piques staff interest, you will then be asked to submit a full proposal.

But how do you make those one or two pages count? Start by recognizing that the individual to whom you are writing is busy. Lay out your project quickly, emphasize the benefits to a group of people, point out its importance to both the funder and the community, mention support from other groups, and finish with a strong close and a specific request. Avoid whining, appeals to mercy, or the specter of dire consequences. Concentrate on important benefits, needs, and past success. The following letter outline can be used to contact a local company. In outline form, the letter should do the following:

1. Paragraph one acknowledges your initial phone or personal contact.
2. Paragraph two summarizes the project and why the company should be interested.
3. Paragraph three states the benefits of your project.
4. Paragraph four identifies support and partners already garnered.
5. Paragraph five makes the appeal for the company's financial or volunteer support.
6. Paragraph six closes with a definite follow-up.

Other letters can be longer, such as those being sent to a corporate foundation that has a specific format to be followed in sending a letter of inquiry. Often corporate foundations may request (1) a description of the project; (2) a statement of the request; and (3) a description of the applying organization. In addition, foundations may want a copy of the IRS nonprofit letter and financial information. It is important to complete this writing assignment in an engaging and arresting manner. Remember, you are competing for attention, so the opening lines must stand out.

Seven Factors That Help Proposals Succeed

1. Do the necessary homework—read the annual report and other public documents of the foundation.
2. Find a convincing way to relate the objectives of the proposed project with the objectives of the foundation.
3. The proposal is well done—clear, free of jargon, emphasizes solutions instead of unduly dwelling on problems, notes past success and partnerships.
4. The letter is persuasive and indicates board support as well as other key support (local officials, state agencies, nonprofit partners, professional organizations) for the project.
5. The capability of the people who will do the proposed work is clearly described and it is made apparent that the people can excel at the task.
6. The proposed task can be carried out successfully within the time schedule and budget. The task should match the resources.
7. State that some measurable accomplishments will be made with foundation support and, where feasible, the work or impact of the project lives on after foundation support ends. Propose to evaluate the success or failure of the project.

Presenting Your Proposal

If any funder, especially corporate or private foundations, is interested by your letter and contacts you, then you will most likely have to prepare a presentation—your case for support. One way to think your presentation is to prepare a script or an outline and try it out on a friend. This means being prepared to talk about your organization, your past work and success, your project, the public benefit of the project, how the project benefits the funder, what support you are seeking, the support and partners you already have or expect to have, the total amount you require, and the amount of the contribution you are seeking from that particular person or organization.

At some point in your presentation you will arrive at the request for support. In sales, this is called the "close." Here is a simple one for local businesses:

"We are looking for the support of ten local companies at an average of $500 each. We already have three companies who have committed a total of $2,500 toward the $5,000 we need for the project. Would you be willing to be the fourth company?" Replies yes. "Great! What would you like to have listed as your commitment?" Replies $600. "Thank you!" Continue with, "I will send you a letter of confirmation today. When we have all the commitments, I will call you confirming the amount and informing you where to send the check. May we use your company's name if other companies ask who else is supporting your project? We will not release the size of your contribution, only the total of our campaign to date."

Writing Your Proposal

At some point in your search you may be asked to prepare and submit a written proposal. This is almost always the case with family or corporate foundations. Often, these foundations have specific procedures they

want applicants to follow, even a specific form they will ask you to fill out and submit. Your next step, then, is to prepare a written proposal. There are many good reference sources on writing a proposal (see the Funding References box on page 73). Consult these and try your hand at a proposal. Be simple, direct, and concise. Speak from your heart. Foundation staff must go through hundreds of these requests. You must get their attention without wasting their time. Using the actual grant guidelines of a prospective funder to organize your ideas in a proposal is both a humbling and exhilarating experience. You will find that the writing discipline sharpens your thinking about a project's actual merits and feasibility. Do not be bothered by rejections. Try other foundations and projects. Try again next year and the following year. As your programs grow and collect media coverage, you will have more successes and partners to talk about in your next application. Foundations like to be associated with winning programs—allies in the local community who know how to get good things done.

Common Project Ideas

Groucho Marx once said, "I have a lot of ideas . . . and if you don't like those, I have a lot more." No doubt, you and your group have a lot of ideas. Your task is to whittle these down to a few good ones that are attractive to possible funders. Therefore, this section focuses on examples of a few good ideas that are often pursued and funded.

COMMUNITY TREE CARE PROJECTS

It is pretty easy to organize support around a tree planting or care project for a park, school yard, or other public place. Contractors are often willing to donate their time and a backhoe to dig the holes. Nurseries may be prepared to provide trees and mulch at a discount. Scout troops can provide enthusiastic hands to plant, water, stake, and mulch the planting sites. Local companies may be willing to provide cash support in the range of $250 to $1,000 each. A budget of $5,000 organized on the above basis can add ten to fifty trees to your community, depending on the need for site preparation and availability of volunteer labor.

TEEN SUMMER EMPLOYMENT

Tree planting, trail building, and other environmental restoration projects provide employment opportunities and work skills for your community's youth. They also help engender community services and civic pride. A few summers ago, community leaders in Pittsburgh organized forty-eight teens into six groups (Teens for Greens), which trimmed and maintained more than five hundred trees, planted forty-four new trees, created four gardens, and reclaimed a vacant lot for a community park. Teens saved $50,000 in labor and rescued $750,000 worth of recently planted trees from neglect. This effort was supported by a grant from the USDA Forest Service.

Collecting a budget to cover wages, tools, materials, and supplies is important, and this money can be raised locally. Based on the Pittsburgh experience, we estimate that the per-teen cost for an eight-person team, including adult supervision, technical support, educational materials, and supplies, is around $3,000 for a ten-week summer program. The cost of trees and other materials would be additional.

DEMONSTRATION ARBORETA

Demonstration arboreta can exist in parks and school grounds. One high school arboretum covers several acres and contains approximately ninety different species and varieties. A start-up budget for a fifty-tree arboretum would probably run around $25,000, but that includes everything—design and tree selection, trees, labor, materials, supplies, kiosk, and annual monitoring. This could be spread out over three years so that you "grow" the site without excessively burdening your group and supporters in one year. Local community and corporate foundations are good candidates to contact about such a project.

Nonprofits like the Pennsylvania Horticultural Society, Friends of the Pittsburgh Urban Forest, and the Pittsburgh Parks Conservancy are providing management and maintenance of public landscapes.

SMALL EDUCATIONAL WORKSHOPS

One of the easiest ways to build interest in your community is to organize a workshop on a topic of interest to your organization or commission. These can be as simple as an evening talk, a Saturday morning bus tour, or a demonstration. While a small fee collected at the door will go some distance to defray organizing costs and refreshments, you may require a bit more to pay for a speaker's travel costs and fee. Usually, $1,000 to $2,000 will carry you through an attractive event, and this can be raised with a few small donations. Try your local electric utility on this idea. Contact corporate foundations that have an interest in education.

LARGER EDUCATIONAL PROGRAMMING

Many foundations, corporate or family, like to support education in one form or another. Your group may want to hold a series of workshops over a longer time period on a topic or theme of interest to your members and the public (for example, riparian habitat restoration or sustainable community design principles). You may need help covering speaker and material expenses so that the registration fee will not prevent people from attending. A budget for an educational program with three separate events would be around $5,000 depending on the cost of speakers and their travel.

LIVING TRIBUTE PROGRAM

Some municipalities and organizations collect contributions to a tree fund in the name of an individual or to celebrate a wedding or birth. Other municipalities (e.g., State College, Emlenton) have Remembrance Trees programs. This is a way of attaching the name of a person, living or deceased, with a particular tree. Donors give funds of at least $250 to purchase and plant the tree.

ENVIRONMENTAL ENHANCEMENT PROJECTS

Municipalities and organizations can become involved in larger environmental enhancement and acquisition projects. These usually have multiple partners and unfold over several years. One example is to use groups of "Teen-Rangers" or "Tree Tenders" to control invasive plants, plant trees and shrubs, and do other work to restore a riparian area along a stream or river. A project like this requires coordination, planning and design, training, supervision, materials, and equipment. Another example is to use volunteers to construct a trail system through a municipal watershed. Along with planning and constructing the trail, educational brochures and a docent program consisting of trained individuals prepared to give guided tours could also be developed. Budgets for these types of projects can be quite large (tens of thousands of dollars) and span multiple years.

OPEN-SPACE AND NATURAL RESOURCE ACQUISITION PROGRAMS

Municipalities, counties, and organizations can become involved in larger open-space-acquisition projects. These usually have multiple partners (e.g., municipality, county, conservancy, state, local nonprofits). They require large amounts (hundreds of thousands of dollars) and more sophisticated types of funding such as municipal referendum, bond issue, and larger foundation and state grants. They require excellent planning and administration and often some amount of public relations and marketing. Buy-in and support from a wide variety of partners, including local and state officials, businesspeople, and environmental organizations, is needed.

Acquiring and managing natural places today is a responsibility that ensures a high quality of life and environment for future generations.

Land development and conversion is occurring at a fast rate in Pennsylvania and other states. Recently, Pennsylvania ranked fifth of the fifty states in the development of forested and other open land but forty-eighth in population. Given a trend of more land consumption with less population growth, municipal and county governments have turned to both regulatory (zoning) and nonregulatory (acquisition of land and conservation easements) to preserve natural resources in open space.

Municipalities can conserve open space in different ways. Nonprofit organizations such as conservancies can purchase property using grants and donations from foundations and state government. They may receive donations of land from individuals. Conservancies can also act as the purchasing agent for state agencies, allowing more flexibility in time of purchase and other considerations. Some people donate land simply for philanthropic reasons; others do so to enjoy tax deductions associated with giving. Municipalities can also regulate for open-space conservation in development, and, at times, developers may be willing to negotiate larger open-space conservation for incentives such as increased development density. Increasingly, however, landowners wish to be paid for their land or conservation easement, and voters, both conservative and liberal, are more willing to use public funds for these purchases, especially in growing places.

Why Invest in Open Space?

Open-space conservation is a key component of state and local smart growth strategies. Smart growth is growth that costs society less now and in the future. It is also becoming a strategy in protecting forest products and tourism industries and landscapes. In well-planned places, municipal officials are paying more attention to the placement, conservation, and development of open space.

Open Space and Taxes: The Central Bucks County School District Study

One question often asked is whether conserving open space will remove much-needed income from public tax roles. In 2000, Pennsylvania's Central Bucks County School District reported that the cost to educate a public school student was $7,526 per year. It was also expected that, on average, about 0.83 additional student would live in each home of a new residential development. The average income generated from residential development in real estate tax revenues and earned income taxes was expected to be $3,377. This would mean an annual gap, or shortfall, of $3,149 per household between the tax revenue provided by new development and the costs of new students to the school district. It was also estimated that the increased costs to the public for education with the development of a 100-acre farm would be $273,834 per year. With this educational cost, a number of economic studies showed that it was cheaper for the school district to purchase the property or development rights for the 100 acres than to pay for the increased costs of education over ten years. Other economic studies have shown that conserving open space can actually save municipalities money in terms of providing education and other public services.

Financing Open Space

Funding for open-space acquisition can come from various private and public sources. States can fund conservation through direct acquisition of property or development rights, tax benefit programs that tax at a current land-use rate rather than development potential, or by providing direct funding to municipal and county governments. Many times

municipalities find it necessary to use a combination of funding sources to purchase open space, especially in the competitive and costly real estate markets of growing places. This means considering grants as well as funding raised through municipal taxes and bonds. The possibility of raising funds for park and open-space projects depends on a number of factors, including the type and velocity of growth and development, the economic health and borrowing history of the municipality, the skill at which referenda and other techniques are presented to the community, and the will of elected officials and residents.

In developing and growing states, voters continue to demonstrate solid and increased support for the acquisition of open-space properties and developmental rights. In spite of recent trends throughout the United States favoring reduced taxes and government spending, public spending on open-space conservation has gained popularity with a wide variety of voters, especially in growing places.

Public Spending for Land Preservation

A poll of Pennsylvania voters conducted by the Trust for Public Land in 2002 revealed that a solid majority of state's residents favor public spending for land preservation. This type of attitude has been found to be true across the United States in growing places, conservative or liberal.

Municipalities and counties in growing places across the United States have successfully used referendum and bond issue to finance the acquisition and management of open space and greenways.

Pennsylvania's Act 153 of 1996: An Example of State Support

Pennsylvania's Act 153 of 1996 gives local government the power to acquire open space for the following purposes: protection of water resources and watersheds; protection of forest for timber production; conservation of farmland, parks, and recreation; conservation of natural and scenic resources; preservation of sites of historic, geological, or botanic interest; and promotion of sound planning through the creation of buffers between communities.

Under the act, municipal government may levy a tax on real estate or earned income above existing limits in order to purchase development rights on open-space lands, but only if they first receive referendum approval from the voters. The act also lays out the rules of acquisition. Properties may be acquired in fee (full cost) and resold after restrictive easements or covenants have been placed, but they may not be acquired through condemnation. If the municipality decides to sell land or development rights, it must first receive voter approval. Land or development rights to be purchased must be identified in a resource, recreation, or land-use plan recommended by the planning commission and adopted by the elected officials of the municipality. If the municipality has no planning commission, the plan can be recommended by the county planning commission and approved by the elected officials of the municipality. Act 153 also authorizes local school boards to freeze property taxes on lands whose development potential has been eliminated by purchase of conservation easement.

Ideas for Municipal Funding

- Private partners
- Real estate and reality transfer taxes
- Municipal portion of state utility and motor fuel taxes
- Tax-increment-financing district where municipality takes-on department and services the department from a certain portion of real estate or other taxes from an area or project

The Role of State and Federal Government

State and federal grants and initiatives can come and go depending on current administrations and are most often aimed at certain types of actions rather than places. You may have do some research to find out exactly what is available. State Bureaus of Forestry and Natural Resources often offer grants for tree planting, tree maintenance, and environmental planning and education. Bureaus of Parks and Conservation offer grants for local parks, recreation, land conservation, and trail and river conservation. They also provide grants for land acquisition and transaction costs. State Departments of Agriculture provide funds for easements on agricultural land by municipalities and counties. State Departments of Environmental Protection offer funds to municipalities for open-space planning and implementation and innovative stormwater management. The federal USDA Forest Service or Environmental Protection Agency offers funding for land acquisition through several programs, including the Conservation Resource Enhancement Program, Land and Water Conservation Fund, Forest Legacy, the North American Wetlands Conservation Act, and the Cooperative Endangered Species Conservation Fund.

Options for Municipal Funding of Open Space

Municipalities can use a number of different options for financing open space and other environmental initiatives. They can use funding provided by current tax and other revenues, borrow through bonds and commercial lenders, or combine both options using the dedicated revenue from tax or other revenue sources as a basis for, and to pay off, debt incurred through a bond issue or other source. Municipalities may want to investigate the benefits of developing an open-space agency or authority either alone or with other municipal partners. An agency or authority may allow more flexibility in raising and spending funding than can be found within the municipality structure alone.

PAY AS YOU GO

A municipality spends revenues from a dedicated tax or other funding source. Property taxes, earned income taxes, real estate transfer taxes, budget surpluses, or revenues from municipal businesses, such as a water or sewer authority, may be considered. Usually, these revenues are small and can change as leadership changes.

PROPERTY TAX

Property taxes can be measured in "mills," where one mill equals one dollar of tax for every $1,000 of assessed property value. In many places, property tax revenues are collected and used by three entities: the school district, the municipality, and the county. Property taxes can provide a relatively stable stream of income, but there may be a great deal of competition for their use. Given a municipality's debt and revenue condition, property taxes can be raised by small amounts to handle administrative and other costs. The generation and use of property taxes is overseen by state statutes, and major increases require a referendum. Numerous voters in municipalities have approved property tax increases that are directly dedicated to open-space acquisition, especially in areas undergoing rapid growth. Any revenues from property tax (or any stable revenue stream) dedicated to open space can also be used as the basis for determining the amount of, and in paying off, an open-space bond issue.

EARNED INCOME

In Pennsylvania, the Local Tax Enabling Act (P.L.1257, No. 511) provides the limits and regulations for the use of earned income tax. The revenue from this tax on earned income can decline with economic turndowns or in places with a large population of retirees. In some places, the amount of earned income tax that can be collected is capped by the state. But in states like Pennsylvania, state legislation (PA Act 153 of 1996) authorizes voters to approve the levy of increased earned income tax above the state limit exclusively for the purpose of financing open space. As with property taxes, this revenue could be used as a basis for servicing a bond issue.

REAL ESTATE TRANSFER

A real estate transfer tax is levied on the sale of property, increasing with the value of property being sold. Costs are usually divided between buyer and seller. Applying or increasing this tax can be difficult in the face of opposition from real estate interests. In Pennsylvania, this tax is limited to 1 percent. Revenues from this tax can be dedicated to open space.

Other Options for Open-Space Funding

In some states, local option sales taxes, special assessment districts, hotel/motel taxes, and impact fees on development have been used. Impact fees that hold a developer financially responsible for some portion of community impacts (e.g., increases in costs of education, police and fire, recreation, and road, sewer, and water) are illegal in Pennsylvania and some other states.

BONDS AND OTHER BORROWING

Municipalities can borrow using bond issues or bond pools and from commercial lenders, but they must do so under a rigid set of state and other regulations. In many states, municipal borrowing is not only

overseen by the state, it is also affected by the ability of a municipality to provide a stable stream of revenue, the amount of debt already accrued by a municipality, and the debt limit set by the state for a municipality. One of the major opportunities of a bond issue is that it can provide a large amount of money quickly to purchase open space in a competitive and rising real estate market. Also, costs are spread out over a long time frame and are borne by current and future beneficiaries. Drawbacks of a bond issue include the accruing of financing charges and convincing voters of the merits of incurring debt.

Municipal governments often issue bonds to raise large amounts of money, but in some cases the interest rate on a bank loan may be lower than that on a bond. It may be cost effective to finance small amounts of debt (up to $2 or $3 million) through a commercial lender since the transaction costs for issuing a bond are significant. A municipality also needs to consider how much it can spend in the immediate future. If large amounts of money are raised through bonds but not spent, then the funds may sit in an account, earning less interest than what is being paid on the debt. A municipality may wish to borrow in phases over time as needed or seek a line of credit from a bank.

Given the complexities of borrowing, municipalities interested in bonds and other debt should seek advice from an experienced lending professional. Remember that any debt raised by the municipality must eventually be paid for using municipal tax or other revenue source. The tax and other impacts of borrowing must be understood before it is done.

Municipal Debt Limits

Pennsylvania and other states set limits on local government debt using the concept of a "borrowing base." A municipality's borrowing base is the average annual revenue over the last three years. Under Pennsylvania's Local Government Unit Debt Act (Title 53, Part VII, Subpart B, Chapter 180), the debt limit for townships and other municipal governments is 250 percent of their borrowing base unless voters approve additional debt.

Is a Referendum Required?

A referendum is not required if the proposed financing does not put a municipality over its statutory debt or tax limits. However, referenda are often used even if the financing is below debt or tax limits as a test of the public's will. In Pennsylvania, authority to conduct a referendum and incur electoral debt is found in Act 153 and the Local Government Unit Debt Act. It may be prudent to follow the more specific provisions of Act 153 when financing open space.

THE REFERENDUM PROCESS

The method for placing a referendum question on a ballot is set forth in state statutes such as the Pennsylvania Election Code (P.L. 1333, No. 320). First, the elected officials of the municipality or county must pass an ordinance to have the question placed on the ballot. For tax measures, the ordinance is filed with the county board of elections at least thirteen Tuesdays before the next primary or general election. The question for the approval of a dedicated tax must be phrased in the following words: "Do you favor the imposition of a [describe the tax in millage or rate] by [local government unit] to be used to [purpose]?"

For a debt referendum, the question must be submitted to the county board of elections at least forty-five days in advance of the election and be phrased substantially as follows: "Shall debt in the sum of [amount] dollars for the purpose of financing [describe purpose] be authorized to be incurred as debt approved by the electors?"

It is also necessary to publish election notices in local newspapers and legal journals beginning no earlier than three weeks but no later than two weeks before the election. For both tax and debt referendum questions the purpose section of the question should be written carefully so that the intent is clear to the voters. An example might be "for the acquisition of land and conservation easements for open space, recreation, and the preservation of farmland."

Successful referenda that approve the acquisitions of open space and conservation easements are handled as any popular election campaign. They need to have a well-developed message and election strategy. There are many steps to a successful referendum, especially when they might be competing with organized opposition or other referenda on a ballot. A campaign should be organized and support built through the use of advertisement, education, and citizen committees. To achieve the attention necessary for success, a referendum may have to be staffed. They will also require budgeting and fund-raising.

Advice for a Successful Referendum Campaign

This is a process taking part in the political arena. Anticipate the same amount of work, fund-raising, organizing, debate, and conflict as you would for any other political campaign.

- Organize early. Allow at least six months. One year is better.
- Prepare your message. Keep it simple and stick with it.
- Focus on the benefits of the referendum that voters will identify with.
- Build broad support early on. Keep local officials informed and supportive.
- Build personal relationships with editors, reporters, and elected officials.
- Anticipate organized opposition.
- Fund-raise early.

APPENDIX A

Additional Resources

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