

THE FUTURE OF URBAN FORESTRY¹

by Fred Bartenstein

The city manager or mayor looks at forestry as one of a growing number of urban services local government can provide to satisfy demands of taxpayers. Policing, street lighting, waste collection, libraries, fire prevention and suppression, building inspection, street maintenance, water, airports, correction, zoning enforcement and public health are but a few of the other services that must be considered when dividing tax receipts each year.

When money is plentiful, city governments are in the enviable position of being able to please almost everyone. When money is tight, as is usually the case, there are two choices — perform less service or manage more efficiently. The latter choice, management, implies prioritization. When citizens are asked to rank the importance they place upon existing services, safety services (such as police and fire) invariably come first, followed closely by public utilities (such as water and streets) and environmental control (such as waste collection and housing inspection). Amenity services usually place last.

Due to a difficult regional economy and a heavy reliance on voted wage and profit taxes, Dayton has been through a series of boom and bust cycles. We have learned that prioritization of services, even when done by citizens, can profoundly miss the point of what is actually expected of local government. For example, knowing that citizens rate policing as an important service *tells* us very little about how much, what kind, or, more importantly, *to what end* policing is valued. If perception of safety in the neighborhoods is desired, adding detectives or improving communications may be less effective than increasing the level of lighting, providing employment opportunities for teenagers, or establishing neighborhood watch programs.

In order to manage with less and respond effectively to citizen needs, we have had to learn not to

concentrate on the service organization, but on the end results. A policy goal-setting process (begun in 1975) resulted in a set of five targets the Dayton City Commission hopes to achieve with its tax dollars. These are economic vitality, neighborhood vitality, maintenance of Dayton's unique character, leadership in intergovernmental affairs and preservation of the urban infrastructure. Budgeting for service delivery under these goals requires a rethinking of most traditional urban services and some evaluation of how well each service responds to the newly expressed needs.

Let's look at urban forestry within this planning environment. What is urban forestry? How did we get in this business? To what needs or desires does it respond? Municipal forestry practice has traditionally focused upon needs of the city's trees. When asked what the trees do for the city or its people, foresters tend to respond with general statements about beauty and the backlog of citizen requests for tree maintenance. It has been easy for urban managers, given these responses, to justify passing responsibility for tree care to individual property owners who appear to have the most to gain from trees and their benefits.

Why cities service trees

At some point in the urban past there must have been a reason for trees entering the ranks of municipal services. Dayton thinks it is important to take a long look at the urban forest and how it got there, and attempt to calculate the benefits it provides today and might provide in the future.

Two conflicting trends have been at work throughout the history of the cities and urban forestry in America. The first is the desire to change and modernize. Josiah Royce, a 19th century American philosopher, described the city builder in this way:

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*"In founding new cities and in occupying new lands, he first devotes himself to burning the forests, to levelling with ruthless eagerness the hill slopes, to inflicting upon the land, whatever its topography, the unvarying plan of his system of straight streets and of rectangular street crossings. In brief, he begins his new settlements by a feverish endeavor to ruin the landscape. Now all this he does not all because he is a mere materialist, but . . . because mere nature is, as such, vaguely unsatisfactory to his soul, because what is merely found must never content us."*¹

The second major trend emerges from the Jeffersonian rural ideal and its corollary — that cities are inherently unhealthy to the human body and soul. Andrew Jackson Downing, Frederick Law Olmsted and the landscaping movement proceeded from the assumption that "Man's essential unity with God was reflected in his relation to the natural world around him."²

Early advocates of urban forestry reflected a missionary assurance of their social purpose. During the War of 1812, troops quartered in Dayton were set to work by one of Dayton's founders, building a levee and planting elms and maples throughout its length. A later historian observed; "Whether Daniel Cooper had any legal right or not, this was a fine fore-sighted, public spirited thing to do."³ The same historian describes the work of another founding father: "With the vision of making our city like the elm-embowered towns of New England, (John) Van Cleve surrounded the courthouse with elms, and when they got to the age when the green limbs lifting to the sky framed the classic pillars in their foliage, an editor, who thought that to have trees in the city made it look countrified, kept at it in his paper until the elms fell victim to a municipal axe and are no more."³ John H. Patterson, the paternal industrialist who founded National Cash Register Company, and who led Dayton into becoming the first large city to adopt the progressive city manager form of government, was an ardent advocate of landscape gardening as a civic movement.³ Patterson was largely responsible for the hiring of Dayton's first city forester in 1917.³

Those familiar with midwestern cities will recognize "practicality" as the dominant

characteristic of our manufacturing economy and civic traditions. In full recognition of the political weight "practicality" would carry in gaining its acceptance, the 1911 City Park Plan, commissioned by Patterson and fellow industrialists and completed by the prestigious Olmsted firm, stressed the benefits of tree-lined boulevards to real estate developers.⁴ The largest part of today's urban forest in Dayton was planted by land developers in the first decades of the twentieth century — men who would never have invested in vegetation unless assured of its contribution to the sales potential of their subdivisions.

A unique synthesis was forged between "modernism" and "naturalism" trends in the first decades of this century as other utilitarian values were found to justify urban forestry expenditures. In Dayton, gardening was touted as a cure for juvenile delinquency and as a method for increasing citizens' involvement and pride in the neighborhoods. Public tree plantings reflected the city's desire to appear progressive and modern. The urban forest was also championed in the early 20th century for its contributions to public health. A "green lungs" plan for Chicago proposed the interspersing of dense development with open space for improvement of air quality. The Ohio Department of Education exhorted schoolchildren in a 1912 Arbor Day manual: "Don't forget that an adequate number of street trees mitigates the intense heat of the summer months, and diminishes the death rate among children . . . don't forget that the air of basements and cellars is rendered less humid by the removal of surplus water from the surrounding soil through the medium of roots and foliage."⁵

Two major developments occurred as the 20th century entered middle age which effectively aborted the further development of "Environmental Urban Forestry" and greatly diluted the zeal of the "Urban Naturalists." Refinement of air-conditioning technology in the 1930's revolutionized the city's vulnerability to extremes of temperature and humidity.¹ Mass production of the automobile provided large segments of metropolitan populations with the option to locate in rural and suburban environments richly endowed with natural settings. The limited and ex-

pensive green elements foresters and landscape gardeners could import to the dense urban core offered little competition to the half-acre lawn.

Air-conditioning and widespread access to the automobile weakened the constituency for urban forestry and placed upon municipal foresters the "caretaker" role in which we know them today. As the cityscape changed under economic and social pressures, a series of incremental decisions were made in which the existing urban forest began to disappear without replacement. Urban renewal, street widenings, demand placed upon open space for active forms of recreation, absentee ownership, and new municipal concerns for safety, operating efficiency and capital intensive maintenance, all conspired toward removal of trees. As urban officials became more sophisticated in managing resources for maximum productivity and cost efficiency, the urban forest tended to be viewed more as a liability than an asset.

Municipal tree issues in the '50's, '60's and '70's pitted the "practical men" and "progress" against emotional, poetic, or downright recalcitrant bands of garden clubs, preservationists, and civic beautifiers. Despite occasional victories, the net result was almost invariably fewer trees in the city.

Are municipal trees valued?

There is a direct parallel between recent efforts of historic preservationists to document the economic and energy benefits of building restoration and the task faced by advocates of urban forestry in the 1980's. In order for urban forestry to survive, a case must be made for the contributions of urban forests to urban survival. This case must focus on needs and issues relevant to urban dwellers and not on the needs of trees and the difficulties they face in a modern city. Like old buildings, trees stand their best chance for survival if they are valued for their contributions to a city's physical, economic and social welfare. These values must be understood and translated into costs and benefits before forestry can effectively compete for scarce tax dollars.

A modern municipality will probably not choose, or be able, to fully care for all the trees in the city.

Given a set budget and forced by a lack of policy to spread it equally over a massive inventory of street and park trees, urban foresters are no longer even "caretakers" — they are "morticians." Trees demanding first attention will be those that are dead, blown down, or overgrowing street lights, sewers and utility wires. With limited budgets, the rate of removal will almost invariably exceed that of replacement. A lack of care for the existing healthy stock only increases the death rate. Inexorably, our cities are moving toward the logical end of "no forest."

In order for urban forestry to survive, clear reasons for healthy trees to exist must be stated, and stated in terms relevant to today's citizens. Furthermore, policies must be developed which permit forest managers to maximize benefits, minimize costs and demonstrate how trees can compete with other urban services as an efficient response to the needs and desires of city dwellers. Public policies which require ministrations to all trees in all places can never afford managers a shot at the "main chances" for urban forestry.

With the assistance of the USDA Forest Service and researchers in the forestry profession, Dayton is beginning to develop a body of knowledge and strategy which could radically alter perceived values and the management of our urban forest. Drawing upon the city's policy goals and the tools of cost benefit analysis, the Dayton Project is seeking to develop a comprehensive strategy for urban forest activity.

Dayton's foremost goal, shared with most other older cities, is economic vitality, which could also be stated as economic *survival*. Trees will probably never be a primary tool for economic development, but to the extent they attract jobs or residents, trees can play an economic role. The image of a community is an important aspect of its attractiveness to the investor. An attractive urban forest might play a role in the calculation of the amenities a given place offers.

If a city wished to use trees strategically to enhance investment, it might give first attention to the airport, interstate highway approaches, industrial opportunity areas, and the central business districts. Seattle noticed a substantial in-

crease in lease rates and a decrease in vacancy on a commercial street planted with trees in preparation for the 1962 World's Fair. Similar, but unplanted, parallel streets displayed no significant change.⁶ A city might likewise use trees as a cost-effective means to soften or hide unattractive features. Several years ago, the New York Port Authority installed 79,393 trees and other plants in the parking and terminal drive areas of the Newark International Airport.⁷ The effect is striking and improves the world traveler's first reaction to the Jersey meadows. There has been almost no research into the impact of trees or tree programs on investor choice, nor has there been careful evaluation of the economic results of major landscaping efforts.

A second policy goal for Dayton and other cities is neighborhood vitality. In view of a monumental investment in housing stock, public infrastructure, and public services, cities are fighting to keep their residential neighborhoods viable and competitive. Mature trees are an asset older city neighborhoods often have which cannot be found in newly developing areas. Not only are these trees a public asset, in their contribution to resident evaluations of a neighborhood's desirability, attractiveness and uniqueness, they are also a private asset to the extent they contribute to property values.

There was been little quantification of the contribution trees make to an urban dweller's satisfaction with his neighborhood, the effect trees have on decisions to live in a given place, or exactly what impact they have on property values or the willingness of financial and insurance institutions to support urban investments. As aging forests decline and begin to disappear, it would be useful to know to what extent dissatisfaction and disinvestment follow. Dayton has a program called "Neighborhood Initiative," in which neighborhoods compete for \$75,000 public investments, matched by comparable improvements to private property. Trees have consistently been the most requested public improvement in the program. This choice, made independently by the neighborhoods, underscores the assumption that trees do play a role in neighborhood vitality although that role is not well

understood.

If a city were to attempt strategic management of its forest for neighborhood vitality, it might identify and concentrate on those areas where a mature forest is the most distinctive element of a neighborhood's character. The city might also seek to link forestry improvement with other programs targeted in a given neighborhood, or at least ensure that new efforts are not undermined by forest decline. A city might seek ways to get residents interested and involved in forest management decisions for their neighborhoods, perhaps to the extent of special assessments, or direct participation in tree care.

In some neighborhoods trees are not valued, and may even represent a liability. In particular cases, trees may be disliked for their lack of geometric symmetry or their interference with architecture or scenic views. Senior citizens may find it hard to contend with leaves or other litter trees generate. These preferences should be taken into account in forest management decisions. In some areas, reduction or even elimination of trees might represent a contribution to neighborhood vitality.

A third policy goal for Dayton is maintenance of the city's unique character. The downtown area, the rivers, certain historic structures and other landmarks, and heterogeneity in terms of race, ethnic background, culture and economic level are considered distinctive characteristics worthy of preservation and promotion by the local government. This goal also presumes the maintenance and enhancement of public amenities, which offer rewards from living in the city which transcend those available from everyday working and home life. Public amenities include cultural institutions, parks and other recreational facilities, a high quality of educational opportunities, entertainment and nightlife.

The urban forest can offer amenity value beyond its contribution to other goals. Landscaping can enhance the appeal of the city's architecture, topography, landmarks and distinctive natural features. Trees can bring form, color and movement to an inanimate cityscape. They can draw the eye to desirable views and screen those which are undesirable. A well developed and

managed urban forest can be an amenity asset without regard to its component parts. The resident or visitor looking out over a green city will note, and probably value, that characteristic.

Measurement of aesthetic appeal is a difficult prospect as is development of management guidelines to maximize amenity values. A lack of aesthetic appeal in modern cities may reflect the difficulty of defining and managing for that characteristic.

Until more is known, the most a city can do to strategically enhance forest amenity is ensure its planners are well endowed with design skills. A forest manager, in prioritizing resources for amenity, might concentrate on identified landmarks, the city's most distinctive features (such as downtown or the rivers) and views from high places and major transportation corridors. Special attention might also be given to trees which have acquired landmark status by their age, location, rarity, or role in history.

A fourth policy goal in Dayton is urban conservation, or the wise and efficient use of resources. While objectives under this goal speak to preventive maintenance of the city's capital plant, they also cover energy conservation and protection of the urban environment. The least understood benefits of the urban forest are those offered to city health and liveability. In principle, urban vegetation should help moderate humidity, reduce the speed and volume of water runoff, reduce air pollution concentration, and absorb enough solar radiation to substantially reduce energy demand for space cooling. In addition, vegetation can contribute to the comfort of individuals by providing shade, windbreak, sound absorption, and an alternative to heat-radiating concrete and asphalt surfaces.

Environmental benefits of trees

In Germany, the Netherlands, and other parts of the world, the beneficial climatological effects of the urban forest are considered in land use policy.¹² As land becomes more scarce and energy costs rise, citizens become more aware of the temperature and quality of air in cities. Cities in competition for economic development and residents are becoming more conscious of

climate and its impact on their viability.

The Dayton Climate Project, begun in 1976, is evaluating and applying methods for enhancing urban liveability through modification of the city's surfaces and structures. Early in the project, trees were recognized for their potential contributions to the urban climate, and the relative ease with which their configuration can be modified within the existing cityscape. In late 1979, Dr. John Flynn, a forest meteorologist, was stationed by the USDA Forest Service in Dayton for 18 months to organize existing knowledge and recommend strategies for the use of trees in urban climate enhancement.

It is too early to give foresters much guidance in how the urban forest might best be managed for environmental benefit. At this point, it can only be that more trees are better, and that for better air quality and reduced summer air temperatures, effort should be concentrated in the city's upwind sector. Cost-benefit ratios are not known, but it would be valuable to calculate effects of an urban forest on a city's energy budget, and for air quality planning, the amount of pollution reduction that could be attributed to the existing urban forest. In areas of the city where pedestrian comfort is important (such as the central business district and neighborhood play areas) urban foresters can easily demonstrate obvious benefits of trees and other vegetation.

I have identified four areas in which the urban forest can offer strategic response to urban needs. Before an urban forest management strategy can be complete, however, it must include mechanisms for comparing the efficiency of forest strategies to other methods for enhancing a city's economic vitality, neighborhood vitality, unique character and physical environment. There must also be consideration given to the costs an urban forest imposes on the local government, its citizens and other urban services.

Cost:benefit ratios

Control of management costs must be addressed in any urban forest strategy. An entire city's budget could be spent in pursuing just one of the goals mentioned above. A workable urban forest plan must allocate the expenditure of

dollars, time and personnel to produce the most effective package of benefits at a defensible cost. The best way to defend forestry-related expenditures would be to demonstrate how they achieve a desired result at less cost than alternative means for achieving that result. This approach cannot be pursued without the reliable data which has so far been lacking in the urban forestry field. We can, however, apply common-sense criteria when prioritizing urban forestry expenditures. The two most important questions might be "Who pays?" and "Who benefits?"

Trees on private land provide the greatest benefit to property owners. It has traditionally been the property owner who chooses, installs, maintains, and replaces private trees. Public benefits, however, clearly result from these private investments. It might be far more efficient for the local government to provide educational information, technical advice, or even assistance in the purchase, planting and maintenance of private trees than it would for a city to achieve equivalent results through the installation and permanent management of public trees.

In Dayton, street trees are legally the responsibility of adjoining property owners. We have learned that except in rare cases (usually in high income, owner-occupied neighborhoods), the quality and consistency of maintenance is not sufficient to ensure survival of our street tree stock. Private street tree replacement has been almost non-existent. The economies of scale available to a large tree manager make common maintenance far more cost-efficient.

Neighborhoods which desire a high level of tree care should be encouraged to create benefit-assessment districts which would provide for shared or totally private funding through a management contract with the city, or a private tree service. The case for such assessment districts can be made by demonstrating the "new profit" a property owner could realize through contributions of trees to his real estate's value, and the savings in cost and effort available to him through the district. The local government should limit its financial responsibility to those areas in which the private sector cannot act, or in which public benefits clearly outweigh the costs of pro-

viding forestry service.

There are resources that can be tapped to stretch the public dollar, or ensure continuation of an otherwise threatened forest amenity. These are the corporate and voluntary sectors, which stand to reap promotional or intrinsic rewards from "adopt a block," "adopt a tree," or "adopt a park" programs. Partnership with local government to ensure survival or enhancement of public landscaping is not a new idea. Frederick Law Olmsted's 1882 pamphlet, *Spoils of the Park*, documented New York City's failures to adequately repair drains, provide police supervision, control vandalism and avoid the death and overgrowth of Central Park's vegetation. A private Central Park association has been active since 1902 in supplementing municipal maintenance of that priceless resource.²

A cost-effective management strategy would also seek opportunities for the forest to help pay its own costs. Wood products such as firewood, Christmas trees, pulp, leaf mulch, and even raw building materials might be profitably investigated and developed by urban forest managers, depending upon local conditions and markets.

Control of management cost implies the design and redesign of vegetation systems to require the least possible maintenance for the level and type of benefit desired. Areas in which masses of vegetation are planted for their effect on air temperature or air quality do not require the level of care given to landscaping aimed at increasing economic vitality of a city's commercial core. Forest investments are typically long-term in their cost and benefit implications. An excellent case can be made for placing a high priority upon planning and design, and ensuring the capacity of personnel assigned to those functions. Enhancement of the local urban forest management environment is one of the greatest contributions researchers and state and federal governments can make to the control of urban forestry costs.

Develop management strategies

An urban forest management strategy which defines how trees can best serve urban needs and how management costs can best be controlled is still missing one very important dimension, and

one which has resulted in numerous setbacks for the urban forest in the recent history of cities. That dimension is the control of external costs. Urban forest managers must develop the ability to anticipate, control, and in some cases justify the costs trees impose upon citizens and other public services.

The most critical area of concern in controlling external cost is that of public safety. Public safety has been previously mentioned as one of the highest priority concerns for urban dwellers. There can be no question that trees pose a hazard to the occupants of a speeding automobile. Under certain conditions they can create a fire risk that would not otherwise exist. Trees and other vegetation can also reduce the ability of police to provide surveillance of public spaces or neighborhood streets. Urban forest plans, through anticipation and control of safety risks, can avoid conflict within city bureaucracies or in public forums, without substantial reduction in the many benefits the trees provide.

Similarly, urban forest managers must include in their cost-benefit calculations impacts upon utility service, street sweeping, storm sewers, street lighting and other municipal services. Urban forest plans should demonstrate that benefits or income provided through the program offset costs elsewhere in the public service network.

Another element which needs to be considered in the control of external costs is the potential for negative impacts upon citizens and businesses. Blockage of signs, views, and architecture is one kind of negative impact. Also to be considered is the time and money spent in raking leaves, repairing windstorm damage, or repairing the utility services damaged by trees.

In Dayton and other cities, existing urban forestry programs can be evaluated for their contribution to the city's economic vitality, neighborhood vitality, unique character and

liveability. We can also evaluate how well existing programs control management and external costs. Calculations of cost and benefit, and the resulting prioritization of resources, at this point can only be educated guesses until more is known about the urban forest and its measureable impact. Educated guesses, however, should improve public satisfaction and our day-to-day management of the forest within existing resources. Educated guesses and well conceived programs might even increase the number of dollars allocated to urban forestry.

In the future, the competition for public funds and citizen demand for efficient use of those funds will require urban forest managers to equip themselves with more than guesses. The research task is substantial, but in my view absolutely essential to the survival of urban forestry. That survival will rely less upon new knowledge of how to care for trees than it will upon new knowledge of how trees help to care for people.

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