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Part Two: From City Parks to Regional Green Infrastructure

Peter Harnik

Robert L. Ryan

Michael C. Houck

Anne C. Lusk

William D. Solecki

See next page for additional authors

Authors

Peter Harnik, Robert L. Ryan, Michael C. Houck, Anne C. Lusk, William D. Solecki, and Cynthia Rosenzweig

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As access to "country" beyond metropolitan areas gets ever more distant and frustrating, existing parks and other preserved greenspaces within reach of the four-fifths of Americans who live in metro areas become increasingly vital. Accordingly, Part II addresses one of William Whyte's favorite topics: city parks and regional greenspaces. Who better to open this section of the book than Peter Harnik, one of the founders of the Rails to Trails Conservancy and now director of the Green Cities Program based at the Washington, D.C., office of the Trust for Public Land. Harnik's essay is based on his seminal research on the nuts and bolts (e.g., design, management, finance) of urban park systems across the United States.

Robert L. Ryan, professor of landscape architecture at the University of Massachusetts Amherst, complements Harnik's broad overview with his essay on how local residents may "adopt" parks in their vicinity, thereby helping maintain the greenspace itself while emotionally "bonding" with the park as part of their daily urban living experience. Thus, parks may contribute to local "sense of place" as the focus of maintenance and improvement efforts that in turn bring people into enjoyable contact with one another (a cardinal Whyte principle).

Michael C. Houck is a key "mover and shaker" in Portland, Oregon's ongoing quest to preserve and extend one of the nation's best-known regional greenspace systems. At the Portland Audubon Society since 1982 and more recently through his Urban Greenspaces Institute, Houck champions a wide spectrum of initiatives to save farmland, restore streams and wetlands, protect endangered species habitat, and expand existing parks and greenways. As his contribution demonstrates, Houck is a consummate networker with a strong grounding in the historical and natural science contexts of regionalism in Portland and elsewhere.

Urban parks and greenspaces in Whyte's day were traditionally designed to foster sedentary relaxation amid aesthetic surroundings, with active recreation largely confined to playgrounds and athletic fields for the young and fit. In light of today's obesity crisis, urban open spaces must provide opportunities for vigorous outdoor recreation and physical fitness for an aging and culturally diverse public. Anne Lusk, an experienced public health researcher, offers practical advice on the design of urban greenspaces and linear corridors to encourage such activities as running, cycling, skating, tennis, rock climbing, and other energetic outdoor pastimes.

Geographers William D. Solecki and Cynthia Rosenzweig are longtime collaborators studying the actual and potential effects of environmental change in the New York metropolitan region. Scarcely as cohesive as the Portland, Oregon,

region (or Chicago for that matter), New York City nevertheless has a long tradition of "large-vision" urban greenspace plans dating back to Olmsted's Central Park. Since 1928, the Manhattan-based Regional Plan Association (RPA) has tried to foster a broad functional and perceptual sense of "regionalism" within its tristate, thirty-one-county planning area. RPA's "Regional Greensward Plan" and its "H$_2$O: Highlands to Ocean" program (Hiss and Meier 2004) represent the latest chapter of this chronicle. Solecki and Rosenzweig jump one step further with their concept of a New York Urban Biosphere Reserve in relation to the UNESCO international network of biosphere reserves.

Reference

Hiss, T., and C. Meier. 2004. *H$_2$O: Highlands to ocean.* Morristown, NJ: Geraldine R. Dodge Foundation.

Among their many functions, parks in cities serve as gathering spaces where people may participate in shared civic experience including demonstrations, celebrations, and grieving. (*Top*) A gathering in Jackson Park on the Chicago lakefront to protest the Vietnam War, circa 1970 (a NIKE anti-aircraft battery was hidden behind the chain-link fence). (*Bottom*) The Vietnam Memorial on the Mall in Washington, D.C. (Photos by R. H. Platt.)

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The Excellent City Park System

What Makes It Great and How to Get There

Peter Harnik

The Changing Roles of City Parks

The total area covered by urban parkland in the United States has never been counted, but it certainly exceeds one million acres. The fifty largest cities (not including their suburbs) alone contain more than 600,000 acres, with parks ranging in size from the jewellike 1.7-acre Post Office Square in Boston to the gargantuan 24,000-acre Franklin Mountain State Park in El Paso. The exact number of annual visitors has not been calculated either, but it is known that the most popular major parks, such as Lincoln Park in Chicago and Griffith Park in Los Angeles, receive upwards of twelve million users each year, while as many as twenty-five million visits are made to New York's Central Park annually, more than the total number of tourists coming annually to Washington, D.C.

What makes a park system "excellent"? From the very beginnings of the urban parks movement, dating back to the Olmsted parks of the second half of the nineteenth century, there has been interest in this question. At first, attention was focused on individual parks; later the inquiry was expanded to what constitutes greatness for a whole network. Each analysis, however, was confined to a limited view of parks, looking at an isolated factor such as location, size, shape, plantings, uses, or historical integrity. No analysis addressed the creation of a *park system* as a singular entity within a city infrastructure.

Today's older city park systems are being revisited in light of twenty-first-century demands and demographics; likewise many cities, counties, and regional park authorities and environmental organizations are piecing together new kinds of parks and systems of greenspaces under such rubrics as greenways, conservation areas, areas of special significance (ecological, geological, or cultural), and environmental education centers (figure 1). With 80 percent of people in the United States now living in metropolitan areas, there is renewed interest in understanding more precisely the relationship between cities and the open space within them. What factors lead to all-around park excellence?

Beginning in 1859, when Frederick Law Olmsted, Calvert Vaux, and more than

Figure 1   New use for an old fountain: Bryant Park in New York. (Photo by R. H. Platt.)

three thousand laborers created Central Park, a wave of enthusiasm for urban "pleasure grounds" swept the nation. Thousands of parks were constructed and millions of words were written about their features and attributes. During the height of the city park movement, from about 1890 to 1940, great efforts were made to plan for parkland, to understand the relationship between parks and surrounding neighborhoods, and to measure the effect of parks. Leaders in Boston, Buffalo, Seattle, Portland (Oregon), Denver, Baltimore, and elsewhere proudly and competitively labored to convert their cities from drab, polluted industrial cores into beautiful, culturally uplifting centers. They believed that a well-designed and maintained park system was integral to their mission.

Inspired by boulevard systems in Minneapolis and Kansas City, and by Olmsted's "Emerald Necklace" in Boston, many cities sketched out interconnected greenways linking neighborhoods, parks, and natural areas. Careful measurements were made of the location of parks and the travel distance (by foot, generally) for each neighborhood and resident. The field of park research was supported by the federal government through the National Conference on Outdoor Recreation, which provided funding for data collection, research, analysis, and dissemination. During the early twentieth century, the purpose and design of parks metamorphosed, but these areas remained so important to cities that even during the Great Depression many park systems received large influxes of money and attention through the

federal government's relief and conservation programs. A case in point was the renovation of the New York City parks under the direction of Robert Moses as City Parks commissioner during the 1930s (Caro 1986).

After World War II, the nation's attention turned toward the development of suburbs, and commitment to the parks and public spaces of cities began to wane. There was even a naïve assumption that private suburban backyards could replace most of the services provided by public city parks. Many of the ideas regarding the role of parks in city planning and community socialization were lost. More important, ideas about measuring park success, assuring equity, and meeting the needs of changing users languished. Between 1950 and 2000, many of the nation's urban park systems fell on hard times. Few cities provided adequate maintenance staffing and budgets, and most deferred critically needed capital investment. Many parks suffered from overuse, revealing trampled plants and grass, deteriorated equipment, erosion, and loss of soil resiliency and health. Others declined from underuse and resulting graffiti, vandalism, invasion of noxious weeds, theft of plant resources, and crime.

The decline was camouflaged. In the older northern cities, general urban deterioration grabbed headlines and made parks seem of secondary importance. In the new cities of the South and West, low-density development made parks seem superfluous. Intellectual inquiry into traditional city greenspace dwindled to almost nothing. An exception to this dismal trend beginning in the 1960s was a growing interest in "urban ecology" and the value of restoring and preserving wetlands, deserts, forests, and grasslands within and near cities for their ecological values and benefits (e.g., McHarg 1968; Spirn 1984; Platt, Rowntree, and Muick 1994).

Every pendulum eventually swings back, and the effort to revive city park systems has slowly gained momentum. When the Trust for Public Land (TPL) was founded in 1972, it was the first national conservation organization with an explicit urban component to its work. At the same time, fledgling neighborhood groups began forming to save particular parks, either through private fundraising or through public political action. There arose a new appreciation of the genius and work of Frederick Law Olmsted, and in 1980 the Central Park Conservancy was founded. In that same year, pioneering research by William H. Whyte resulted in the publication of *The Social Life of Small Urban Spaces* (1980) and the formation of the Project for Public Spaces, Inc. in New York City. The rise of the urban community gardening movement and the spread of park activism to other cities led in 1994 to a $12 million commitment by the Lila Wallace–Reader's Digest Foundation and the creation of the Urban Parks Institute and the City Parks Forum. Meanwhile, city park directors formed their own loose network through the Urban Parks and Recreation Alliance.

Beginning around 1995, many older cities such as Chicago, Boston, Washington, D.C., and Cleveland started to bounce back from years of population loss and fiscal

decline, partly owing to "gentrification," the return of suburban empty nesters and young professionals to restore older urban neighborhoods (with consequent displacement of the low-income households occupying them). With new residents and a greater sense of optimism, these cities and other places like them began to seek to reestablish a competitive edge by reviving and expanding their municipal assets such as parks, museums, sports stadiums, and performing arts centers. Elsewhere, in fast-growing Sunbelt cities such as Charlotte, Dallas, and Phoenix, planners were belatedly trying to create vibrant downtowns and walkable neighborhoods for a more cohesive urban identity. In both old cities and new, there is rising interest in the use of parks to promote urban vitality (figure 2), an interest that has been encouraged by the smart growth and New Urbanist movements since the mid-1990s.

By the mid-1990s, after years of creating parks, TPL became concerned about the woeful lack of basic information about city systems. TPL initiated a research program to collect data and revisit old ideas about parks and cities. Statistics regarding land ownership, recreational facilities, and budgets were assembled for the first time in more than fifty years. This research led to the book *Inside City Parks*

Figure 2   Old use for a new building: Frank Gehry's outdoor concert venue at Millennium Park in Chicago. (Photo by R. H. Platt.)

copublished by the Urban Land Institute and TPL (Harnik 2000), which examined and compared the park systems of the twenty-five largest U.S. cities. The book generated a storm of publicity for places given the highest and lowest rankings and also stimulated leaders of many other cities to ask to be included in future studies. At the same time, a number of correspondents suggested that the research was too restricted. The breadth and depth of a park system, they said, cannot be determined by simple statistics on acreage, recreation facilities, and budgets. It was time to determine exactly what factors make for a truly excellent city park system.

To study this question—"What makes an excellent city park system?"—TPL convened a multidisciplinary group of twenty-five urban and park experts for an intensive two-day meeting in Houston in October 2001. This workshop yielded a list of seven broad measures that make the greatest difference in defining a successful system. TPL's goal for this project is to re-create the kind of framework that existed in the early part of the twentieth century to sustain city parks as valued components of a vital urban community

Seven Measures of an Excellent City Park System

1. Mission Statement and Updates

Park systems do not just "happen." Wild areas do not automatically protect themselves from development, outmoded waterfronts do not spontaneously sprout flowers and promenades, and flat ground does not morph into ball fields. Even trees and flora of the desired species do not spontaneously grow in the right places. Interested citizens must identify the goals of the park system, including functions to be served, management, and landscaping. The parks department must then use that mandate as a basis for its mission statement and the definition of its core services.

Most big-city park agencies have a legislative mandate and a mission statement, but about 20 percent of them have not formally defined their core services. A failure to develop this definition and to check periodically whether it is being followed can lead to departmental drifts due to political, financial, or administrative pressures. Having a strong concept of mission and core services, on the other hand, can stave off pressures to drop activities or add inappropriate tasks.

To inform the public, the department should regularly publish an annual report summarizing its system and programs and showing how well it fulfilled its mandate. Less than half of big-city agencies publish an annual report, and most of the reports provide "soft" concepts and images rather than precise information, such as number of activities held, number of people served, and other specific outcomes and measurable benefits. Few agencies give a comprehensive budgetary report, and fewer still look honestly at challenges that were not adequately met and how they could be tackled better in the future.

2. Ongoing Planning and Community Involvement

To be successful, a city park system needs a master plan. A plan is more than an "intention"; it is a document built on a process, demonstrating a path of achievement, and expressing a final outcome. The department's master plan should be substantiated thoroughly, reviewed regularly, and updated every five years. The agency should have a robust, formalized community involvement mechanism, which means more than posting the document on a website and hoping for feedback. The ideal master plan should have at least the following elements:

- An inventory of natural, recreational, historical, and cultural resources
- A needs analysis
- An analysis of connectivity and gaps
- An analysis of the agency's ability to carry out its mandate
- An implementation strategy (with dates), including a description of the roles of other park and recreation providers
- A budget for both capital and operating expenses
- A mechanism for annual evaluation of the plan.

Philadelphia Green and Philadelphia Parks Alliance

There may or may not be brotherly love in Philadelphia, but there certainly is love of parks. The city has 138 "friends of parks" organizations: two of them operating on a citywide basis and the rest focusing on one particular park or playground.

The largest organization is Philadelphia Green, a division of the venerable Pennsylvania Horticultural Society, which began in 1974 as a community vegetable gardening project and today is an urban greening powerhouse with a staff of twenty-eight and a budget of $4 million. Philly Green partners with private and public groups to landscape and maintain public spaces downtown and along gateways such as the road to the airport, but the main thrust of its work is in neighborhoods. There the multipronged program is growing crops, instilling pride, teaching skills, developing microbusinesses, stopping illegal dumping on vacant lots, refurbishing parks, and stimulating the redevelopment of blighted neighborhoods. Twice a year, the group organizes massive cleanups called "Spring into Your Park" and "Fall for Your Park." All told, Philly Green has helped plan and implement more than 2,500 greening projects in the city.

The other citywide organization, Philadelphia Parks Alliance (PPA), is more explicitly advocacy-oriented, pushing for more funding and for better stewardship of the large Fairmount Park system. Formed in 1983 by Sierra Club activists, the group incorporated separately and now has a $300,000 budget and a staff of three. With a quarterly newsletter, annual meetings that include many of the local park groups around the city, and a "Green Alert" mailing list of 550 leaders, PPA is at the center of the campaign it calls "A New Era for Philadelphia's Parks." Some 136 organizations help maintain their local parks by removing trash, programming activities, helping with special projects, organizing celebrations, watching out for problems, and showing up at City Hall every year at budget hearing time.

Although five years may seem a short lifespan for a plan, it is startling to realize how rapidly urban circumstances change. In TPL's survey, about two-thirds of agencies surveyed were operating under out-of-date master plans, and some were relying on plans formulated before the rise of computers and geographic information systems, not to mention dog parks, mountain bikes, ultimate Frisbee, girls' soccer leagues, skateboard courses, and cancer survivors' gardens, among other innovations.

The ability of good planning to build community support was demonstrated recently in Nashville where in 2002 Mayor Bill Purcell initiated a yearlong parks and greenways process, the first such citywide conversation in the one-hundred-year history of its parks. Upon completion, resident support had been so solidified that the city council enthusiastically funded a $35 million capital spending plan, the largest Nashville park appropriation ever.

Although most park agencies have plans, too often they never reach fruition because key elements are trumped by other agencies or private interests. Visions of a new waterfront park, for instance, may be for naught if the transportation department has its own designs on the same parcel. Any park plan (and its implementation strategy) should be coordinated with plans for neighborhoods, housing, tourism, transportation, water management, economic development, and education and health, among other factors. Ideally, the agencies will reach agreement; if not, the issue should go to the mayor or city council for resolution, with plenty of public involvement and support from propark advocates.

As confirmation of its involvement with the community, the department should have formal relationships with nonprofit conservation and service-provider organizations. These arrangements may or may not involve the exchange of money, but they should be written down explicitly and signed, with clear expectations, accountability, and a time limit that requires regular renewal. Having formal relationships not only enables a higher level of service through public-private partnership; it also provides the agency with stronger private-sector political support if and when it is needed.

Finally, no city can have a great park system without a strong network of park "friends" groups, private organizations that serve as both supporters and watchdogs of the department. Ideally, a city will have one or two organizations with a full citywide orientation, assuring that the system as a whole is well run and successful, and also scores of groups that focus on an individual park and its surrounding neighborhood, concentrating on everything from cleanliness, safety, and quality to programming, signage, and special fund-raising.

3. Sufficient Resources to Meet the System's Goals

Obviously, a park system requires a land base. Yet the size of that base is not an immutable number: big-city systems range in size from almost 20 percent of a

city's area down to 2.5 percent, and from more than 45 acres per one thousand residents to just over 3 acres per thousand. Although there is no ordained "optimum" size, a city's system should be large enough to meet the goals outlined in its mission statement and master plan.

Despite the truism "If you don't measure, you can't manage," many cities do not have accurate figures on their systems. Every agency needs to know the extent of its natural and historical resources—land, flora, buildings, artwork, waterways, paths, roads, and much more—and have a plan to manage them sustainably. It is important to publish these numbers annually to track the growth (or shrinkage) of the system over time. Ideally, the agency should be able to place a financial value on its holdings and should have a plan to pay for replacing every structure in the system.

Because it is so much more expensive to create and operate "designed" landscapes (constructed parks that are mowed or regularly cleaned up) than natural landscapes (those that are left alone, except for the occasional trail), it is valuable to know the system's allocation between these two categories, both actual and planned. The TPL survey reveals a large range: some urban park agencies consist entirely of designed lands and no natural properties at all, whereas others have as little as 10 percent designed and 90 percent natural.

Newer systems in younger cities have more potential for expansion of parks' area than older systems in mature, nonexpanding cities, although older cities can nevertheless increase the size of their park systems as well. Since the 1970s, for instance, the amount of parkland in Denver and Seattle grew by more than 44 percent each. Conversely, some "new cities" have fallen behind in the effort to add parkland. Even though the Colorado Springs park system grew in acreage by 185 percent between 1970 and 2002, the city itself grew even more—206 percent during the same time—yielding a slight net loss over the period.

Even cities that are considered "all built out" can use redevelopment to increase parkland. Outmoded facilities like closed shipyards, underutilized rail depots, abandoned factories, decommissioned military bases, and filled landfills can be converted to parks. Sunken highways and railroad tracks can be decked over with parkland. Denver is even hard at work depaving its old airport to restore the original land contours and create what will be the city's largest park.

In New York City, the Department of Parks and Recreation collaborated with the Department of Transportation to convert 2,008 asphalt traffic triangles and paved medians into "greenstreets" or pocket parks and tree-lined malls that are then maintained by community residents and businesses. In other cities, school systems and park departments are breaking down historic bureaucratic barriers and signing joint use agreements to make school athletic fields available for neighborhood use after school hours.

In addition to land, the parks and recreation department needs, of course,

The Chicago Park District: Increasing Landholdings, Assuring Revenue

Despite its world-famous lakefront system, Chicago has a shortage of parkland in the rest of the city. Under the leadership of Mayor Richard M. Daley, however, the metropolis has embarked on an ambitious and thoughtful effort to acquire additional land to more equitably serve its residents. Called the CitySpace Plan, it is a joint program of the Chicago Planning Department, the Chicago Park District, the Forest Preserve District of Cook County, and the Chicago Public Schools.

Finding that 63 percent of Chicagoans lived in neighborhoods where parks are either too crowded or too far away, CitySpace in 1993 set out to methodically gain open space in five ways:

- Convert asphalt schoolyards and portions of school parking lots to grass fields
- Create trails, greenways, and wildlife habitat alongside inland waterways such as the Chicago River and Lake Calumet
- Convert vacant, tax-delinquent private lots into community gardens
- Redevelop abandoned factories into mixed-use developments that include parkland
- Build parks on decks over rail yards.

Before plunging into this formidable task, the planners carried out a detailed analysis of virtually every square foot of the city, identifying both community needs and each parcel of public and private open space. They also worked with more than a hundred other government agencies and civic, community, and business organizations to reach a full understanding of the many economic and regulatory processes that tend to stimulate (or prevent) the creation of parkland. By the end of the study, the CitySpace team was able to use the complexity of Chicago's bureaucracy to its advantage instead of being stymied by it. Among the action steps developed were specific strategies to acquire funding, to obtain abandoned, tax-delinquent properties, to mandate open space in special redevelopment zones, and to change zoning laws.

The outcome has been impressive. Since 1993, under guidance of the plan, Chicago has added 99 acres to its park system, 150 acres to its school campus park network, a 183-acre prairie for a future state open space reserve, and two miles of privately owned but publicly accessible riverfront promenade. The city has also leased ten acres along the Chicago River and provided permanent protection of forty community gardens. The total cost of this increase has been in excess of $30 million.

One reason the Chicago Park District has been able to afford land acquisition in a staggeringly expensive market is that the agency is authorized to receive a portion of the city's property tax. This guaranteed source of revenue not only shields the Park District from city council politics and cutbacks, but it also enables the agency to issue bonds because lenders know that repayment is guaranteed from tax revenue.

"The CitySpace Plan enabled us to focus our acquisitions in the geographical areas of need," said Bob Megquier, director of planning and development for the Park District. "It may be a slow and costly process, but at least we know that we are putting our resources in the right places."

Only a handful of other city park agencies have a charter that mandates receipt of a portion of the property tax, and most of them are among the better-funded departments. Chicago Park District, for instance, spends $123 per resident, more than all but four of the big-city park agencies.

sufficient public revenue for land management and programs. Such funds entail both an adequate operating budget and a regular infusion of capital funds for major construction, repairs, and land acquisition. A detailed survey of the fifty-five largest cities showed that in fiscal year 2000, the "adjusted park budget"—the amount spent by each city on parks operations and capital, minus everything spent on such big-ticket items as zoos, museums, aquariums, or planetariums—came to an average of $79 per resident. Although that figure is probably not high enough considering that every system is far behind its needs, in current dollars this figure may be considered a minimum level.

Moreover, there should be an effective, complementary private fund-raising effort, one that serves not only signature parks but also the whole system. Although private efforts should never be designed to let the local government "off the hook," they can be valuable in undertaking monumental projects or in raising work to levels of beauty and extravagance that government on its own cannot afford. Private campaigns are also effective in mobilizing the generosity of corporations, foundations, and wealthy individuals who otherwise would not contribute to government agencies.

Excellent park departments not only receive adequate funding, but also spend

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Phoenix: A High Level of Stewardship

"Stewardship" involves land, money, planning, public participation, commitment, awareness, and volunteerism. Phoenix represents excellence in stewardship.

The Phoenix Parks and Recreation Department starts with an excellent planning process during which it inventories resources and plans how to protect them, analyzes geographical and user needs, reviews gaps in the system's connectivity, and sets forth budgets and an implementation strategy.

Through good fortune and good skills, the agency has been allotted a generous budget that allows it to maintain a large staff, including more than forty foresters, horticulturalists, and landscape architects, to assure good planning and nature management. The agency's maintenance budget amounts to more than $11,000 for every acre of "developed" parkland, a very high level.

Volunteerism is also strong in Phoenix parks. In 2001, more than 22,000 volunteers donated more than 200,000 hours of work. In addition, there is a private Phoenix Parks and Conservation Foundation through which citizens and businesses can make donations for specific projects. Past efforts have included the Japanese Friendship Garden, the Irish Cultural Center, and a cancer survivors' park. The foundation recently assumed the role of a land trust, holding land donations and receiving mitigation funds on behalf of the parks department from such agencies as the U.S. Army Corps of Engineers.

In 2001, Phoenix ranked first overall in a comprehensive national study that measured how well U.S. cities deliver government services to local citizens. The Phoenix parks department ranked at the top of its class also.

their money wisely and commit themselves to effective stewardship. Outstanding stewardship means having enough qualified natural resources professionals to properly oversee the system and manage the work of pruners, mowers, and other laborers. Moreover, because a system rarely has enough paid staff to accomplish all its goals, the excellent park department has a high-visibility, citizen-friendly marketing program whereby members of the public can understand the stewardship of the system and become involved, if they wish.

Finally, park departments must track their expenditures accurately and be able to report them to the public usefully and understandably. Most agencies have the raw information but too many of them do not provide it; numbers are either difficult for politicians, reporters, and the general public to obtain or the statistics are put forth incomprehensibly.

4. Equitable Access

The excellent city park system is accessible to everyone regardless of residence, physical abilities, or financial resources. Parks should be easily reachable from every neighborhood, usable by those who are handicapped or challenged, and available to low-income residents.

Most cities have one or more very large unspoiled natural areas. By virtue of topography—mountain, wetland, canyon, stream valley—they are not, of course, equidistant from all city residents. But *created* parks—squares, plazas, playgrounds, neighborhood parks, ball fields, linear greenways—should be sited in such a way that every neighborhood and every resident are equitably served. Preferably, people and parks are no farther than ten minutes apart by foot in dense areas or ten minutes apart by bicycle in spread-out sections. Moreover, it is not enough to measure access purely from a map; planners must take into account such significant physical barriers as uncrossable highways, streams and railroad corridors, or heavily trafficked roads. Also, the standard for acceptable distance should not be based on an idealized healthy adult, but rather on a senior citizen with a cane, a parent pushing a stroller, or an eight-year-old riding a bicycle. Unfortunately, the TPL survey found that most cities do not know how many residents live unreasonably far from a park.

Cities should also ensure park access by a wide range of challenged persons, including those who are elderly, infirm, blind, or confined to a wheelchair. Access includes, for example, appropriate surfacing materials, ramps, signs, and handicapped parking.

Finally, agencies must ensure equitable access for those who cannot pay full price. Although it is acceptable to charge appropriate fees for some park facilities and programs, agencies should consciously plan for the approximately 20 percent of residents who cannot afford such fees, using such alternatives as scholarships, fee-free hours, fee-free days, or sweat-equity volunteer work.

Denver Parks: No More than Six Blocks from a Park

In Denver, more than nine out of ten residents live within six blocks of a park. This statistic is impressive not only because of the accessibility that it represents but also because Denver has obtained such data. "Geography is everything," explains Susan Baird, manager of the Master Plan Process for Denver Parks and Recreation. With park access as the project's focus, Baird worked with consultants on a geographic information system analysis that went beyond a neighborhood analysis all the way to a building-by-building study. Researchers used a computer model to draw a six-block-radius circle around each traditional park or protected natural area. They did not count any of the city's numerous parkways, maintaining that although the parkways are visual amenities, they are not directly usable as parks.

According to Baird, "The goal wasn't just any six blocks. We said that it needs to be a *walkable* six blocks, meaning that people can get to the park without having to cross a highway, railroad track, or body of water. Crossing a six-lane road is not access." Thus, the Denver team truncated circles wherever they crossed barriers, further clarifying which residents did not have good enough access. Funding for the analysis came from capital appropriations for the master plan.

At eleven acres per one thousand residents, the total amount of parkland in Denver is not extraordinarily high, primarily because the city does not have any huge parks comparable to those in Philadelphia, Kansas City, Los Angeles, and many other places. Denver, however, more than compensates for size with distribution. It is also committed to improvement: Denver Parks and Recreation hopes to tighten the radius down to four blocks, or about one-third of a mile once the six-block criterion is achieved.

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5. User Satisfaction

By definition, the excellent city park system is well used. Having high usership is the ultimate validation that it is attractive and that it meets people's needs. High attendance also increases safety because there are more "eyes on the park." (See the essay by Robert L. Ryan in this volume.)

Knowing the level of park use requires measuring it, not only for an estimate of a gross total but also to identify users by location, time of day, activity, and demographics. In addition, finding out the satisfaction level requires asking questions, not only of users but of nonusers as well. These efforts must be carried out on a continuing basis using standardized methodology to discern trends over time.

The TPL study found that an overwhelming number of city park agencies are unaware of their parks' total usership. Not having this number severely reduces an agency's ability to budget and to request adequate funding from the city council. Most departments can track their paying users, such as golfers playing rounds, swimmers using pools, and teams renting fields, but those users are only a tiny fraction of the true total. The lack of basic information is in stark contrast to, for instance, the transportation department, the school system, or the welfare department, which can all make strong, factual cases to justify their budget requests.

As for satisfaction, most agencies rely on informal feedback such as letters of complaint or messages relayed back by the staff. This process is unbalanced and ineffective, and it does not provide the agency with clear direction. It therefore tends to result in a park system that meets the efficiency needs of the provider rather than the comfort needs of the user. (For instance, some park agencies "solve" the problem of dirty bathrooms not by cleaning but by permanently locking them.)

It is difficult to count all passive users of a system accurately. Repeated observation, selective counts, and extrapolations over time, however, can provide meaningful data. Chicago takes aerial photos of large events and then uses a grid to count participants. The city also sets up electronic counters to measure the number of users passing a given point.

6. Safety from Physical Hazards and Crime

To be successful, a city park system should be safe: free both of crime and of unreasonable physical hazards, from sidewalk potholes to rotten branches overhead. Park departments should have mechanisms to avoid and eliminate physical hazards as well as ways for citizens to report problems easily.

Crime, of course, is dependent on a large number of factors that are beyond the reach of the park and recreation department, such as poverty, drug and alcohol use, population demographics, and lack of stabilizing neighborhood institutions. Yet the park agency has some control over other factors, including park location, park design, presence of uniformed personnel, presence of park amenities, and availability of youth programming. Ultimately, the greatest deterrent to crime is the presence of large numbers of users.

Park visitors are also reassured if they see uniformed employees. Even if the number of actual police or rangers is quite small and their rounds infrequent, the perception of order and agency responsibility can be extended simply by dressing all park workers and outdoor maintenance staff in uniform.

Similarly, well-run youth recreation programs have been shown to decrease delinquency and vandalism. Austin, Texas, for instance, created what it called the Social Fabric Initiative, a multilayered program that includes a summer teen recreation academy, a neighborhood teen program, an art-based program called "Totally Cool, Totally Art," and a roving leader program that sends trained staff into neighborhoods with vans, sports equipment, and art projects. The excellent park system takes it even further by tracking youth crime by neighborhood over time.

Because parks and their surrounding neighborhoods are interrelated, basic to any safety strategy is the accurate, regular collection of crime data within as well as in nearby neighborhoods. (Only about half the surveyed agencies currently collect such data and, of those that do, most have no strategy to use the information.) Another valuable piece of information is the ratio of male to female users in each park because a low rate of female users may indicate that the park feels unsafe.

7. External Benefits of Parks to the City

Benefits of a park system should extend beyond the boundaries of the parks themselves. In fact, the excellent city park system is a form of "natural infrastructure" that provides many "ecological services" (Daily 1999) to the city as a whole:

- Cleaner air, as trees and vegetation filter out pollutants
- Moderation of microclimate and reduction of the "urban heat island"
- Cleaner water, as roots trap silt and contaminants before they flow into local water bodies
- Reduced health costs through opportunities for physical fitness
- Improved learning opportunities from "outdoor classrooms"
- Increased urban tourism with resulting increased commerce and sales tax revenue
- Increased business vitality based on attraction of good parks
- Natural beauty and respite from traffic and noise.

City parks do not exist in a vacuum. Every city is a complex and intricate interplay between the private space of homes and offices, the semipublic spaces of shops, and the fully public space of parks, plazas, streets, preserves, and natural areas. The goals are a park system that enriches cities and cities that nourish their parks.

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The Role of Place Attachment in Sustaining Urban Parks

Robert L. Ryan

Sustaining urban parks requires developing a constituency of dedicated park users, neighbors, and stewards. Urban parks that do not have a cadre of local residents who have "adopted" them are subject to vandalism, neglect, and even destruction. Yet there are strategies for planning, designing, and managing parks in a manner that builds an attachment between people and their parks. Several research studies on urban parks and natural areas illustrate the factors that influence people's attachment to these precious urban natural areas. An important part of this work is to expand the definition of traditional park users, as studied by William H. Whyte (1980, 1988), to a broader group of concerned citizens, including those who live and work near urban parks, volunteer stewards, and even those who simply pass by these green spaces on their way to work or home.

The goal of this essay is to help park planners, managers, and advocates create successful urban parks and open spaces by fostering an attachment between urban residents and their parks. Expanding the definition of urban parks is an important part of this effort. In addition, the following key questions are addressed here:

- What factors might lead people to develop an attachment to an urban park?
- How can park managers, advocates, and planners nurture, understand, and respect this relationship between people and parks?
- What strategies might be useful for building an attachment between people and parks?
- How can park managers develop parks that serve a diverse set of park users and avoid the domination of park use by a particular set of users (e.g., drug traffickers, teens, or dog walkers).

Benefits of Urban Parks

Urban parks and open spaces are essential for the ecological health of urban environments (Platt, Rowntree, and Muick 1994). These urban greenspaces include traditional parks as well as other public greenspaces such as nature preserves, plazas, and cemeteries. "The Humane Metropolis" relies on its city and regional parks to provide vital ecological benefits, including cleaning air and water systems, cooling the urban heat island, and providing wildlife habitat (Spirn 1984; Hough 1994). It is estimated that even densely populated New York City retains 27 percent of its land, or approximately 17,000 acres, as parks and open space, and the majority of

this land is in a "natural" undeveloped condition as forests and wetlands (Benepe 2002).

For many urban residents, however, parks and open space provide much more than environmental benefits. Parks are perceived as an essential part of the quality of life in densely populated urban areas (Harnik 2000). From the very beginning, urban parks were designed for human leisure and recreation (Hough 1994). Whyte documented the importance of smaller parks and plazas to urban dwellers in his groundbreaking book, *The Social Life of Small Urban Spaces* (1980). Urban parks and other greenspaces provide restoration from the mental fatigue caused by modern urban life (Kaplan, Kaplan, and Ryan 1998). The psychological benefits of urban greenspace have just begun to be explored during the past few decades. Urban parks and trees have a special importance to urban residents. People have a strong attraction for urban parks and trees (Dwyer, Schroeder, and Gobster 1994). Moreover, people may develop an emotional attachment to urban parks and natural areas, with profound implications for the design and management of these areas (Ryan 1997, 2000, 2005).

This strong appreciation for urban parks and other conservation land has prompted a groundswell of public support for land acquisition in the face of ever-expanding urban sprawl. In 2001, voters across the United States approved more than $1.7 billion in new conservation funding (Trust for Public Land 2002). The public's appreciation for parks and open space has also been manifested in a proliferation of private nonprofit park conservancies, land trusts, and foundations that raise money for park maintenance and improvement. For example, the Central Park Conservancy has taken over management of the park from the City of New York and raises an estimated $15 to $20 million annually for park maintenance and renovation (Benepe 2002). The public has also responded by volunteering time to park stewardship programs. It is estimated that the more than 70,000 volunteers in New York City Parks donated an estimated one million hours in service (Benepe 2002).

Unfortunately, not all urban parks are well loved or cared for; many urban parks are neglected, forgotten places. As of December 2002, the New York City Parks Department had reduced its staff to two thousand, compared with six thousand employees in 1970, in the face of budget cuts, and this dilemma was shared by many other city park systems (Lutz 2002). Underused and underfunded, parks become dangerous places that urban residents fear, continuing the cycle of neglect. For urban parks to become sustainable, they need a group of dedicated citizens (park users, neighbors, and volunteer stewards) who are willing to protect, nurture, and advocate for them.

Urban Park Studies: Creating Measures of Success

At the heart of successful park planning, design, and management is an understanding of what the public wants in its urban parks. As noted by Whyte (1988, 109), however, the public is often overlooked when parks are designed: "It is difficult to design a space that will not attract people. What is remarkable is how often this has been accomplished." Whyte used behavioral observation of people in urban parks and plazas in New York City to understand the factors that constitute a successful urban plaza. He focused primarily on the physical features within these spaces. He observed that those plazas that provided ample seating and, if possible, movable chairs that allowed people to create their own seating arrangements were the most heavily used. Other important factors included creating a comfortable microclimate, such as sunny areas, trees for shade, and water features. Small lawn areas for informal seating and sunbathing were also well used. Visibility of the park from nearby streets was important to create a sense of safety. Cafés and other opportunities to purchase food also generated more activity and park use. Whyte's insights have helped in the creation and redesign of many urban parks, including the award-winning renovation of Bryant Park in New York City. Whyte, like the majority of park researchers, equates "successful parks" with the number of users; the more crowded a park, the more successful. (See Jerold S. Kayden's essay in this volume.)

Although park use is one measure of success, simply observing the number of people in a park does not reveal what the public enjoys about either the park or what meaning it has for them. Some researchers have proposed that people develop an attachment for places, an emotional bond between themselves and a particular place (Shumaker and Taylor 1983).

In Ann Arbor, Michigan, urban park users with a strong attachment to their nearby parks were eager to show them to other people and would experience some sense of loss if these parks were changed adversely. Moreover, park users who had a strong attachment for their nearby parks were more willing to become advocates for them in the political arena (Ryan 1997, 2000, 2005). People's love for place is often an unspoken but powerful motivation for intervention in the planning arena. Whyte had several places dear to his heart. The rolling countryside of Chester County, Pennsylvania, where he was raised, was under siege from urban sprawl in the postwar years and became the inspiration for his book *The Last Landscape* (1968), a seminal treatise on open space planning and conservation. His love for the vibrant, chaotic, and inherently unplanned use of sidewalks in New York City inspired his work on urban streets and plazas.

Park planners and managers need to understand what factors might lead people to develop an attachment to urban parks. Whyte was correct in his intuition that park use is an important measure of success; it is also an important factor in

Figure 1   Bicyclists in Chicago's Lincoln Park. (Photo by Robert L. Ryan.)

creating an attachment between people and place. Attachment to urban parks may manifest itself in people having an emotional connection or strong affinity for the place itself, as well as feeling that a particular park is the best place to engage in recreation activities such as walking or biking (figure 1). A study of rail-trail users in three urban areas (Dubuque, Tallahassee, and San Francisco) found that those who were frequent trail users and who lived closer to the trails expressed a stronger attachment than those who did not (Moore and Graefe 1994). As Whyte also ascertained, the physical features of an urban park have a profound effect on whether people will use the park or not; thus, the physical attributes of a park may also be key factors in creating an attachment between people and place. Research has found that people may develop strong attachments to certain trees or woods (Dwyer, Schroeder, and Gobster 1994). It is important to know what other physical features contribute to developing an attachment for urban parks.

Research on What Causes Attachment to Urban Parks

A study of three urban parks and natural areas in Ann Arbor, Michigan, provides insights into what factors may contribute to people's attachment for urban parks (Ryan 1997, 2000, 2005). In particular, this study focused on the influence of park

use (i.e., experience) and the place itself (i.e., the physical attributes of the place) on the public's attachment to these parks. An important contribution of this study was to expand the traditional definition of park user, as used by Whyte and other recreation researchers, beyond simply those who are physically using a particular park to a broad range of people who have some type of experience with the park. The 328 participants in the Ann Arbor urban parks study included those involved in park design, those who maintain the parks (park staff and volunteers), recreation users (many of whom also lived near the parks), and those whose only use of the parks was visual enjoyment while passing by.

Using photos of individual parks, the survey sought to ascertain patterns and frequency of usage as well as the respondents' opinions on park design and management. The survey found that all these different types of users had an attachment to their nearby parks, including those who only viewed them from their home or car, without entering the park. This last category in particular, park neighbors and passersby, is most often missed in park studies and research. The type of experience people had in the park had an effect on the strength of their attachment to it. Local people, especially those who lived near the parks, had a stronger attachment to these particular parks than did either the park staff or volunteers. The more frequently people used the park for walking, biking, and other types of recreation, the stronger their attachment was for that place. People who volunteered in the parks expressed an attachment to their volunteer sites. A subsequent study also found that park and natural area volunteers also expressed greater appreciation for local natural areas in general (Ryan, Kaplan, and Grese 2001). Thus, it appears that encouraging park use in many different forms helps foster an attachment between the public and their urban parks.

Physical features within parks also influenced the level of attachment to parks. Certain parks were more "loved" than others, as were certain places within each park. For example, a riverside university arboretum in one park elicited much higher attachment ratings locally than did a restored prairie area. Park staff and volunteers, however, also appreciated the more overgrown areas of the parks where native vegetation was being encouraged. The study found that the more that people knew about the benefits of native plants and ecosystems, the stronger their appreciation for native plantings versus ornamental plantings, a significant finding for park planners and managers seeking to enhance the biodiversity in urban parks. Volunteer programs and other educational outreach programs can help improve the public's acceptance of native landscaping. Other findings from that study (Ryan 2000, 2005), however, suggest that native plantings must be designed and managed in a manner that fits with the public's expectations. Strategies for incorporating native plants in a manner that is appreciated by the public are discussed later in this essay.

Various types of users viewed park management differently. Those who only

viewed the parks from home or street preferred traditional management: neatly mown lawns and clipped shrubs. Park neighbors were also concerned that increased development in the parks, such as building additional parking areas or visitor centers, would bring more outsiders to the parks and increase traffic. Many of the more active users—walkers, bikers, and bird-watchers—wanted park managers to let nature take its course. Park volunteers and staff preferred management to promote native species, such as removing nonnative trees and shrubs and using controlled burns to enhance native grassland areas and woodland understory plants. These conflicting preferences tend to complicate park management. Park planning and management must involve diverse types of users and try to reconcile diverse needs.

Strategies for Nurturing Attachment to Urban Parks

Strategies for promoting a connection between the public and their parks include (1) understanding existing park features and uses, (2) improving visibility and perceptions of safety, (3) incorporating design features that promote park use, (4) providing opportunities for the public to adopt their parks as part of volunteer stewardship programs, and (5) making small-scale improvements. These strategies are discussed in turn.

Understanding Existing Park Features and Uses

Using the physician's motto "Do no harm," park planners, designers, and managers need to respect the attachment that people may have for existing parks or features within them, including those features not planned or officially promoted. As Whyte revealed in his research, there may exist urban parks and plazas that already function very well for their users in diverse ways. Particular specimen trees or other features may already be "sacred" places to local residents. Behavioral mapping, as employed by Whyte, helps us understand how an existing site is currently being used. This technique has been refined by the New York–based Project for Public Spaces, Inc. (2000a). For example, a vacant urban lot may be used by local bird-watchers who appreciate the variety of species that use successional vegetation. Interviews and surveys of park neighbors, users, volunteers, and staff, however, are also needed so that we can understand the deeper meaning that these places have for local people and can understand why some places are used, whereas others are not. Local people often have insights about a particular park that are difficult for professional park planners and managers to ascertain. Drawing on this local knowledge is the key to designing a park that does a better job meeting the open space needs of the community (Kaplan, Kaplan, and Ryan 1998; Project for Public Spaces 2000a).

Because attachment to a park is strongly associated with use of it, park planners and managers need to develop ways to encourage park use by diverse groups

(Whyte 1988; Kaplan, Kaplan, and Ryan 1998; Marcus and Francis, 1998), which requires an understanding of user needs. For example, groups that recreate in extended families need larger picnic areas and shelters. Other groups may require accessible nature trails and boardwalks.

Improving Visibility and Safety

Enhancing the visibility of parks from nearby homes and streets helps establish visual connection to the larger public realm. People who rarely venture into a park may nevertheless develop a sense of attachment to it. The beautiful maple tree outside one's office window or the park view from one's apartment offers respite from the harried urban world (figure 2). Furthermore, neighbors and park users are the self-appointed guardians of many urban parks, and they will protest negative changes to their parks, such as removing trees, paving over parkland, or intrusions by private commercial interests.

   Conversely, park users may gain a sense of safety within the park if they can see nearby homes and streets. For example, before the renovation of Bryant Park in

Figure 2   Boston's Commonwealth Avenue Park. Homes within view of a park may enhance a sense of safety for park users. It is also important, however, to use canopy trees and other screening devices to provide park users with some sense of enclosure from surrounding urban land uses. (Photo by Robert L. Ryan.)

New York City, large hedges surrounding the park made it difficult to see who was using the park. The park was perceived as an unsafe place and became the haven for drug dealers and other criminal activity. One of the key changes to the park's successful renovation in the 1980s was removing these hedges and increasing visibility from nearby streets and office building (Project for Public Spaces 2000a).

Of course, promoting visibility between a park and its environs conflicts with affording privacy and refuge from the outside world. Providing a sense of enclosure is often a key element in creating a place that people enjoy (Kaplan, Kaplan, and Ryan 1998). In busy urban areas, a canopy of large trees can provide screening from nearby buildings, yet still allow visibility from nearby streets. The placement of low shrubs and fences is another strategy to delineate a park space while still allowing visual access. In areas where taller screening, such as walls or hedges, is needed to hide unsightly views or buildings, gateways or breaks in screening elements can provide visibility from key vantage points as well as act as entries to the park and orient new visitors (Kaplan, Kaplan, and Ryan 1998).

Park Design Features That Promote Use

Some design features that foster attachment to parks include the following:

- Providing a variety of seating options
- Creating comfortable microclimates
- Incorporating well-designed water features
- Responding to the needs of a diverse range of users
- Increasing park activity with food vendors and festivals
- Promoting volunteer stewardship activities.

Some of these design strategies were discussed earlier when reviewing Whyte's work. For example, providing a variety of seating options allows for different-sized groups to meet, including individuals, couples, and larger groups. Movable chairs are especially appreciated because they allow people to customize their own seating arrangements. Comfortable seating options are also important. For example, benches with backs and armrests are easier for the elderly and those with disabilities to use. Creating comfortable microclimates for seating within an urban park is essential to ameliorate the temperature extremes of the urban environment. Shelter from strong winds and sunny areas can extend park use in colder climates. Shade is important in warmer climates and during the summer months. Whyte (1988) also found that well-designed shady plazas were also heavily used in the cooler months of the year.

The importance of landscape features such as trees is important in urban park and plaza design. Vegetation, however, must be used in a manner that creates a preferred setting rather than an overgrown, densely planted, or chaotic design. The presence of water is an attraction in many parks, but like the use of vegetation, the

Figure 3   Allowing park vendors and food kiosks is one strategy to increase park activity and use as shown here along San Francisco's waterfront. (Photo by Robert L. Ryan.)

quality and design of water features can influence people's attraction to it. Whyte (1988) suggests that water features in urban plazas should allow people contact with the water, dangling their feet in fountains or even splashing around in them, yet many urban plazas discourage this type of activity. The quality of the water and the edge treatment are key to the public's appreciation for water features (Kaplan, Kaplan, and Ryan 1998). Eroded stream banks are not preferred by the public, neither are overgrown or polluted appearing water bodies, even if the algae bloom is natural in occurrence. Likewise, natural-edged water features with vegetation are generally more preferred than hard-edged water bodies.

In general, parks with more activity have increased usage, which in turn can increase perceptions of safety within the park. Food vendors and other kiosks attract the public to parks and can generate revenue for park maintenance (Project for Public Spaces 2000a, 2000b). Increased activity can also come from festivals and other seasonal activities such as farmers' markets and concerts in the park (figure 3). Designing a park for a diverse range of users can also increase park activity. For example, creating spaces that respond to the needs of children, teens, adults, and the elderly can foster park use at different times of the day. Providing for a range of park uses from active recreation (e.g., sports fields and playgrounds) to passive recreation (e.g., bird-watching, picnicking, and walking) can increase the

diversity of park uses and potential park stewards. Single-purpose parks such as sports fields have a narrow clientele. Successful urban parks, such as Central Park, have found ways to incorporate sports fields in a manner that still allows other more informal uses.

Volunteer Stewardship Activities

In addition to encouraging traditional use of urban parks, another strategy for nurturing an attachment between people and parks is to create opportunities for the public to participate in park design and management. Volunteer stewardship programs have become a driving force in revitalizing urban parks in the United States (figure 4). There is preliminary research to suggest that continued participation in volunteer activities, particularly in environmental stewardship programs, promotes a sense of attachment and increased appreciation for urban natural areas (Ryan, Kaplan, and Grese 2001). Although additional research is needed to understand how other volunteer activities, such as flower plantings and urban gardening, promote an attachment and a sense of ownership by local residents, there is ample anecdotal evidence to suggest that getting the public involved in hands-on management and improvements to local parks and other urban open spaces creates the local stewards that are essential for the survival of urban parks (Project for Public Spaces 2000b). Tree-planting projects and other horticultural activities require an ongoing commitment by local volunteers to maintain and nurture these plantings. Watering, pruning, and weeding require that volunteers are frequently working in the parks, thus increasing the activity that helps make parks safe. The results of these labors—new trees and flowers where there were previously weeds or vacant lots—show the public that someone cares about these places. From volunteers' perspective, as the investment of time and energy increases, so might their attachment and sense of ownership for the particular park or garden in which they are volunteering.

Volunteers, both temporary and long term, are strongly motivated by the opportunity to learn new knowledge and skills (Grese et al. 2000; Ryan, Kaplan, and Grese 2001). Providing opportunities for volunteers to learn more about the cultural and natural history of the parks in which they are working can help encourage volunteer participation. Volunteer activities as well as educational programs can also help increase the public's appreciation and acceptance of environmental restoration efforts.

Research suggests, however, that the public's appreciation for native landscaping requires more than simply environmental education. Native plantings should exhibit a sense of intentional management. Landscape architect Joan Nassauer (1995) proposes that "cues to care" be used with native plantings to improve the public's acceptance for them. These cues to care include mowing the edges of native grass areas, pruning shrubs and trees, using more intensive native flower plantings, and

Figure 4   Volunteering in urban parks can increase the public's stewardship of urban parks while also providing many tangible park improvements. In this photograph, volunteers in Ann Arbor, Michigan, are helping to restore a natural area within an urban park by removing non-native invasive shrubs. (Photo by Robert L. Ryan.)

placing fences, birdfeeders, and other landscape elements in the park that signify human presence in the native landscape. Research in urban natural parks in California (Matsuoka 2002) and southeastern Michigan (Ryan 1997, 2000) has shown an increased appreciation and perception of safety where native plantings appear intentionally managed. Such management activities—native flower plantings and pruning—can also involve park volunteers in stewardship of native landscape plantings within urban parks.

Small-Scale Improvements

Finally, small-scale, incremental improvements help nurture an attachment between people and their parks. Because the public may already have an attachment to certain aspects of a park, small changes allow managers and planners to gauge the public's response before making changes that could be perceived as catastrophic

by park users and neighbors (such as major tree cutting or burning of prairie areas). The idea of using park improvements as small experiments requires that managers are able to track the effect of design and management changes on the public's use of a park, perceptions of safety, aesthetic appreciation, and other variables that may be important (Kaplan, Kaplan, and Ryan 1998). By understanding the positive and negative effect of park improvements, park managers and designers are better able to practice adaptive management that can respond to the changing context of urban parks, a necessity because park users, neighborhoods, and resources are often in a state of flux.

Small-scale changes have an additional benefit of showing immediate, tangible results to urban residents who have often been waiting quite a long time to see some improvements in the face of urban park decline and neglect. Urban greening projects undertaken by such groups as the Pennsylvania Horticultural Society's Philadelphia Green program, the Horticultural Society of New York, and the Greening of Detroit have transformed many vacant lots, alleys and other public spaces into valuable community gardens and parks using this principle. (See the respective websites of these organizations for more information: www.pennsylvaniahorticul turalsociety.org/pg, www.hsny.org, and www.greeningofdetroit.com.) The added benefit of many of these urban greening projects is that they have also engaged the community in creating these spaces. Research has shown that volunteers in environmental stewardship programs are motivated by the ability to see some tangible results to the environment that result from their efforts (Grese et al. 2000; Ryan, Kaplan, and Grese 2001). Urban greening projects also show visible results of civic improvement. For example, the Horticultural Society of New York's Read and Seed program creates children's gardens in front of public libraries for inner-city children to enjoy as part of their summer reading program (Smith 2002). These small-scale improvements to urban parks and other public spaces can create tremendous positive effects with small amounts of time and energy.

The public develops strong attachments for many urban parks and natural areas. Affection for parks is a powerful stimulus to preserving, sustaining, and restoring urban parks and conservation areas. Park designers and managers, however, can only tap into this force if they incorporate multiple viewpoints into planning and management decisions. The public perceives urban parks through different lenses: as a green view outside one's window, a beautiful park on the drive to work, a place to plant and nurture, or a place to recreate and relax. There is a strong need to expand the definition of park users beyond conventional ones such as dog walkers, children in playgrounds, and parents with strollers. Only then can the wealth of experience, as well as opinions, about how these parks should be improved and managed be captured. Sustaining urban parks requires increasing opportunities for the public to volunteer in maintaining, expanding, and improving these valu-

able resources. At the same time, encouraging park volunteers opens another avenue for people to develop ownership and attachment for their nearby parks.

Nurturing public spaces is a job that is never finished (Project for Public Spaces 2000a). Rather than seeing this task as a negative, it can be seen as providing myriad opportunities for engaging the public with their parks. Creating and sustaining urban parks provide a lifetime of challenges for those who love the precious urban green spaces that define a humane metropolis.

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Respecting Nature's Design
in Metropolitan Portland, Oregon

Michael C. Houck

> *Instead of laying down an arbitrary design for a region, it might be in order to find a plan that nature has already laid down.*
>
> William H. Whyte, *The Last Landscape*

> *The belief that the city is an entity apart from nature and even antithetical to it has dominated the way in which the city is perceived and continues to affect how it is built. The city must be recognized as part of nature and designed accordingly.*
>
> Anne Whistin Spirn, *The Granite Garden*

Securing Urban Green Infrastructure

Henry David Thoreau's aphorism "In wildness is the preservation of the world" has driven the conservation agenda in the United States for over a century. The emphasis has been, first and foremost, the protection of wilderness, pristine habitats, and agricultural lands in the rural landscape. If we hope to succeed in protecting rural resource lands in the twenty-first century, a new corollary to Thoreau's mantra might be "In livable cities is preservation of the wild." We must commit significantly more attention and resources to the protection and restoration of natural resources in the urban landscape as a strategy for protecting farm, forest, and other rural resource lands. By creating livable urban communities, we will build public support for a smart growth agenda. Through higher density, compact cities will promote enhanced protection of the rural landscape from urban sprawl. The quid pro quo, however, must be the protection and, where necessary, restoration of a vibrant urban green infrastructure of healthy streams, fish and wildlife habitat, parks, and recreational trails where the vast majority of our population lives: namely, in our cities.

In 1982, when I began my work as Audubon Society of Portland's urban naturalist, local planners believed that Oregon's land use program did not contemplate protection of natural resources inside our Urban Growth Boundary (UGB). The UGB, they believed, was to halt urban sprawl and to protect farmland and forestland outside the city. In fact, the argument has been made that protecting fish and wildlife habitat and too much open space inside the UGB was antithetical to good urban planning. Accordingly, the Portland metropolitan region has more than three hundred miles of streams that have been placed in underground conduits,

and more than two hundred miles of streams and rivers are "water quality limited" or polluted, according to the state's Department of Environmental Quality. The steelhead trout and chinook salmon are listed as threatened under the federal Endangered Species Act, and the cutthroat trout is likely to be listed soon.

Developing a Regional Parks and Greenspaces System

In 1989, the lack of natural resource protection, park deficiencies, and incomplete trail systems stimulated establishment of a "Cooperative Regional System of Natural Areas, Open Space, Trails, and Greenways, for Wildlife and People" in the Portland-Vancouver metropolitan region. This initiative built on earlier efforts of many regionalists, including the Olmsted brothers (John Charles and Frederick Law Jr.), Lewis Mumford, and the Columbia Region Association of Governments (CRAG), the predecessor to Metro. John Charles Olmsted, in *Report of the Park Board, Portland, Oregon, 1903,* wrote: "While there are many things which contribute to the beauty of a great city, unquestionably one of the greatest is a comprehensive park [system]" (Olmsted 1903, 14). He urged the integration of natural areas in a comprehensive park system that would "afford the quiet contemplation of natural scenery [with] rougher, wilder and less artificially improved [parks]." He also presaged interest in urban waterway and watershed management by noting: "Marked economy may also be effected by laying out parks, while land is cheap, so as to embrace streams that carry at times more water than can be taken care of by drain pipes. Thus, brooks or little rivers which would otherwise be put in large underground conduits at enormous public expense, may be attractive parkways" (Olmsted 1903, 20).

These themes were echoed in the 1971 CRAG regional open space plan: "For many persons in the city, the presence of nature is the harmonizing thread in an environment otherwise of man's own making. . . . Comprehensive planning should identify floodplains, wetlands, scenic, wildlife and recreational [areas]. Development should be controlled." The report also called for bistate cooperation between Oregon and Washington, a concern earlier expressed by Mumford in a 1938 speech to the City Club of Portland. According to CRAG, "It is yet to be seen whether the Portland-Vancouver urban community and the states can muster the drive, inspiration, the legal tools to develop a regional park and open space program." The jury is still out on this question, although significant progress has been made in the past decade.

Most significantly, the CRAG report for the first time called for the integration of Olmsted's comprehensive and connected park system with Mumford's regional approach to establish a regional open space program that would "relieve the monotonous and the mechanical by preserving and enhancing those environmental features that have already stamped the region with their unique form and charac-

ter, which make it a very special place to live, the rivers, streams, and flood plains; high points that overlook the cityscape" (CRAG 1971, 3).

As recently as 1988, with a few notable exceptions, the Portland region had implemented few of the recommendations set forth by the Olmsteds, Mumford, or the CRAG report. What changed that dynamic was the merging of interests of park and natural area advocates with regional trail advocates. In 1984, the Audubon Society of Portland advocated for the establishment of a metropolitan wildlife refuge system. The timing was propitious, given that Metro had just initiated a regional park resources inventory. Portland Audubon Society, the 40-Mile Loop Land Trust, and other park and greenspace advocacy groups successfully argued that the region needed a new, regional perspective in natural resource protection and management.

The ideal agency to provide such a regional perspective was Metro, the only directly elected regional government in the United States. All twenty-five cities and three counties within its jurisdiction must, by law, amend their comprehensive plans to conform to regional regulations, developed through painstaking consensus-building among stakeholders.

An important first step toward a regional natural areas system was the production of a four-county, bistate natural areas map through collaboration of Audubon, Metro, and Portland State University's Geography Department. The map covered 364 square miles on the Oregon side of the Columbia River and 145 square miles in Clark County, Washington. As of 1990, 29 percent or 108,000 acres, of the region remained undeveloped, and of that total, only 8.5 percent was publicly owned. Nearly half of that was in Portland's 5,000-acre Forest Park. The knowledge of the scarcity of publicly owned land, combined with the prospect of more than a million new metropolitan residents by 2040, generated widespread political and popular support for a regional greenspaces program.

Another step was the arrangement of site visits by forty Portland and Vancouver elected officials, park professionals, and park and greenspace advocates to the California East Bay Regional Park District. The East Bay District, which serves Contra Costa and Alameda Counties (Oakland/Berkeley area), had recently passed a $225 million bond measure; meetings with their staff stimulated interest in similar efforts for Portland.

Public support was also generated by several "Country in the City" symposia held at Portland State University. Experts in regional and greenspace planning such as Dr. David Goode, then director of the London (U.K.) Ecology Unit, Tony Hiss, author of *The Experience of Place,* and Charles E. Little, author of *Greenways for America,* spoke at these events. The result was a groundswell of support from urban stormwater management agencies, park providers, and land use advocates to develop a more comprehensive approach to natural resource management in the Portland-Vancouver metropolitan region.

With support from Senator Mark O. Hatfield, then chair of the U.S. Senate Appropriations Committee, and Congressman Les Aucoin, Congress in 1991 appropriated $1,134,000 for the greenspaces program. The regional office of the U.S. Fish and Wildlife Service (FWS) administered the funds, and FWS field staff were assigned to work with Metro to ensure that the nascent greenspaces program remained true to its ecological focus. Other partners included the National Marine Fisheries Service, the U.S. Environmental Protection Agency, and the Oregon Department of Fish and Wildlife.

In 1992, the Metro Council adopted the *Metropolitan Greenspaces Master Plan,* which had the following goals (Metro Council 1992, 1):

1. Create a cooperative regional system of natural areas, open space, trails, and greenways for wildlife and people in the four-county metropolitan area.
2. Protect and manage significant natural areas through a partnership with governments, nonprofit organizations, land trusts, interested businesses and citizens, and Metro.
3. Preserve the diversity of plant and animal life in the urban environment using watersheds as the basis for ecological planning.
4. Establish a system of interconnected trails, greenways, and wildlife corridors.
5. Restore green and open spaces in neighborhoods where natural areas are all but eliminated.[1]

A 1992 bond measure failed by an 8 percent margin, owing primarily to a lack of campaign funding and political commitment. A second levy was approved by more than 63 percent of the region's voters in May 1995. This levy produced $135.6 million, 75 percent going to Metro for regional parks and the rest to local park systems, although both the regional and local shares were to be spent exclusively on natural area acquisition and trails. Metro's land acquisitions included fourteen regional "target areas" and six trail and greenway project areas. As of April 2005, more than 8,200 acres of land had been purchased, donated, or protected with conservation easements, well exceeding the original target of 6,000 acres. A second bond for $220 million is planned for the fall of 2006.

Local Park Initiatives, Portland Parks, and Recreation

Significant progress has been made at the local level as well. In the same period that a regional greenspaces initiative was being launched through Metro, much was changing in the City of Portland's Parks and Recreation Bureau. Oaks Bottom Wildlife Refuge, a 160-acre wetland in the Willamette River floodplain in the heart of downtown Portland, was designated as Portland Park's first official urban wildlife refuge (figures 1 and 2). Portland has since added 902 acres to its natural areas program, and the Portland City Council added $300,000 for natural area maintenance in 2001.

In 2001, a new Portland Parks Vision 2020 Plan stated:

> The city's parks, natural areas and recreation programs are among the essential elements that create a livable, dynamic and economically vibrant city; . . . Linking parks with greenways, trails and paths provides greater recreational benefit; Portland Parks will promote regional strategies to protect natural resource values of wildlife corridors, including: integrating trail planning with Metro Title 3 Water Quality and Goal 5 Protection programs; [and] recreation planning with Portland's "River Renaissance" and with Portland's "River Recreation" Plans. (Portland Parks and Recreation 2001, 30)

Thus, for the first time since the 1903 Olmsted master plan, natural resources and natural resource management were seen as equal with and complementary to recreational facilities and neighborhood and community parks.

Regional Growth Management

Oregon's land use planning program has been extremely successful at containing urban sprawl. Between 1990 and 2000, Portland's metropolitan population expanded by 31 percent, while urbanized land increased by only 3 percent. By contrast, Chicago's regional population grew by 4 percent between 1970 and 1990 but its urbanized land area increased by 46 percent. Kansas City's population grew by 29 percent during the same period, and its land consumption was 110 percent.

The primary objectives of Oregon's planning program have been to protect prime farmland and forestland outside the UGB and to reduce infrastructure costs through compact urban form. The challenge is not whether to hold a tight urban growth boundary to protect these lands, but how to simultaneously maintain quality of life *inside* the UGB. Unfortunately, the manner in which local jurisdictions have applied the state planning goals has led to an inequitable distribution of parkland, loss of natural resources, degraded water quality, and disappearance of fish and wildlife habitat throughout the region.

The failure of most local governments to protect urban natural resources is corroborated by Oregon's *State of the Environment Report* (State of Oregon 2000, 108):

> The annual rate of conversion of forest and farmlands to residential and urban uses has declined dramatically since comprehensive planning land use planning was implemented during the 1980s. *However, these laws were not written to address ecological issues, such as clean water or ecosystem function within urban growth boundaries. In order to meet the economic and social needs of humans, native vegetation and habitats may be destroyed and converted to buildings and paved surfaces.* (emphasis added)

Although the report's conclusion is debatable on both technical and legal grounds, it is functionally correct. The problem has not been the state land use planning program, but rather that local jurisdictions have implemented the program in a manner that has virtually ignored urban natural resource protection. The plan-

Figure 1 Discovering the wonders of urban nature. (Photo by M. C. Houck.)

Figure 2 Oaks Bottom Slough, Portland, Oregon's first designated urban wildlife refuge. (Photo by M. C. Houck.)

ning program, if implemented in a manner that seeks to protect natural resource values, can be used effectively. Metro, the City of Portland (through its Healthy Portland Streams efforts), and the City of Wilsonville have shown that if the political will, sufficient resources, and staff expertise are there, planning works to protect natural resources.

In 1994, the Region 2040 growth management planning process challenged the region to develop

> an integrated, multiobjective floodplain management strategy . . . which recognizes the multiple values of stream and river corridors including: enhanced water quality, fish and wildlife habitat, open space, increased property values, education, flood reduction, aesthetics, and recreation. An interconnected system of streams, rivers, and wetlands that are managed on an ecosystem basis and restoration of currently degraded streams and wetlands are important elements of this ecosystem approach. (Metro Council 1997, 9)

Metro took a page from Ian McHarg's *Design with Nature* (1968) in declaring more than 16,000 acres as "unbuildable," including wetlands, floodplains, two-hundred-foot buffers bordering streams, and slopes exceeding 25 percent. This action was consistent with McHarg's approach to subtract sensitive lands from the regional plan before determining the region's "carrying capacity" for homes, roads, and other infrastructure. Thus, Metro did not include the "unbuildable lands" when it calculated the acreage inside the UGB necessary to meet the region's development needs; such areas were simply placed out of consideration for future development. In 1996, Metro in its landmark greenspaces resolution called for expansion of the UGB if necessary to accommodate growth rather than sacrificing unbuildable lands within the UGB.

In 1998, Metro sought to protect the 16,000 acres of "unbuildable" lands by adopting "Title 3 of the Urban Growth Management Functional Plan," which affords *minimal* floodplain protection by requiring "balanced cut and fill" in floodplains if they are allowed to be developed. Title 3 also requires that fifteen-foot to two-hundred-foot vegetated corridors be protected along streams for water quality purposes. These regulations were challenged unsuccessfully at the Oregon Land Use Board of Appeals by Washington County, the cities of Tualatin and Tigard, homebuilder and real estate associations, and others.

Coalition for a Livable Future

Coalition for a Livable Future (CLF) was formed in 1994 by the Portland Audubon Society, 1000 Friends of Oregon, Community Development Network, Bicycle Transportation Alliance, Urban League of Portland, Ecumenical Ministries of Oregon, and others. Myron Orfield, a state legislator from the Minneapolis–St. Paul region, helped catalyze the formation of the coalition in 1994. He argued, based on

his research on urban decay around the United States, that urban sprawl leads to the "hollowing out" of core cities, leaving behind pockets of poverty. Orfield found similar, albeit less extreme, trends appearing in the Portland metropolitan region.

CLF currently has more than sixty nonprofit organizations working in the Portland-Vancouver metropolitan region. They include a core group (1000 Friends of Oregon, Citizens for Sensible Transportation, Audubon Society of Portland, Willamette Pedestrian Coalition, Urban League, Bicycle Transportation Alliance, and the Community Development Network) that has been joined by suburban affordable housing representatives, stream and watershed groups, neighborhood associations, food policy advocates, and mainstream conservation groups like the Sierra Club and Oregon Environmental Council. CLF's stated mission is "to protect, restore, and maintain healthy, equitable, and sustainable communities, both human and natural, for the benefit of present and future residents of the greater metropolitan region." The focus of the coalition is to influence public land use, transportation, housing, economic, and environmental policies through advocacy, research, and public education. It has working groups on natural resources, food policy, transportation reform, urban design, religious outreach, economic vitality, and affordable housing.

Affordable Housing

In advocating affordable housing, CLF seeks to refute the contention that housing costs are a function of a tight Urban Growth Boundary, which is routinely blamed by the homebuilders for driving up the cost of land and housing, and regional land use planning. CLF's position is supported by a report from the Brookings Institution (2002) citing dozens of academic studies that undermine the contention that housing price increases in the Portland region have outstripped the national average. Mary Kyle McCurdy, urban development specialist for 1000 Friends of Oregon, states that "this report demolishes the tired argument that urban growth boundaries are to blame for a supposed crisis in housing affordability."

Public Transit

The coalition also works on transit issues. According to Tri-Met, the Portland regional transportation agency, there has been $2.9 billion of transit-oriented development—everything from apartments, mixed-use high-density developments to office buildings— along the existing east and west side rail lines since the opening of east side MAX (light rail line). Examples are Orenco Station in the city of Hillsboro to the west of Portland and infill mixed-income apartments on the east side. Tri-Met's average daily boardings are just under 300,000 a day, with MAX totaling more than 70,000 riders a day. MAX ridership has tripled in its fifteen-year history. Each weekday, MAX eliminates 48,000 car trips from the greater Portland roads; its ridership is increasing at about 5 percent a year.

Congressman Earl Blumenauer, who represents the Portland area, stated in his address "Portland: Ground Zero in the Livable Communities Debate" (Blumenauer 2000, 3): "Transit usage has increased 143 percent faster than the growth in population, and most critical, it has increased 31 percent faster than growth in vehicle miles traveled since 1990. For seven consecutive years, every month has shown an increase in transit ridership over the previous year. No other region can make that claim."

Farmland Protection

According to 1000 Friend's Robert Liberty, "The Oregon planning program (by) mandating urban growth boundaries around every city in the state [has protected] 40,000 square miles for farming, ranching and forestry (Accomplishments of the Oregon and Metro Portland Planning Programs 1998). Blumenauer concurs:

> From the top of a tall building in downtown Portland, you can see Sauvie's Island, prime farmland, a 10-minute drive to downtown Portland, flat and buildable. There is virtually the same amount of land in agriculture now as 25 years ago, which but for our land use planning laws, would have all been lost. In Washington County next to Portland, despite the addition of 40,000 people between 1982 and 1992, annual farm income increased 57 percent. At the same time, neighboring Clark County in Washington State lost 6,000 acres and farm incomes rose only 2 percent per year. Metropolitan Portland is the largest agricultural producing metropolitan area in Oregon.
>
> Some of our claims and accomplishments are overblown and we have fallen short of the mark in some areas. The mythic UGB is a prime example. It is not as powerful as it could have been. We placed too much emphasis on simply protecting farm and forest land, rather than creating livable communities. (Blumenauer 2000, 2)

Urban Design: Building It Greener, Lighter, Cheaper, and Smarter

Landscape architect Patrick Condon of the University of British Columbia has introduced Portland to his concept of making cities *greener, lighter, cheaper, and smarter,* as opposed to gray, heavy, expensive, and dumb, the manner in which most of our cities are built. His concept involves promoting high-density urban development while simultaneously reducing the effects of imperviousness on urban waterways, integrating the green infrastructure with the built environment. It is the final stage of achieving livable, compact urban form. We can protect all the streams in the metropolitan region, we can establish fish and wildlife management areas, and we can restore degraded aquatic resources. All that work, however, will have been for naught if we do not address the severe hydrologic impacts of urban stormwater on urban aquatic systems.

Effective imperviousness should be reduced by at least 10 percent, the threshold at which streams begin to "fall apart" owing to stormwater runoff, according to the

Center for Watershed Protection in Maryland. Compared with other regions of the United States, Portland's rainfall comes in smaller amounts spread out over longer periods. More than four-fifths of Portland's rainfall events are less than 0.5 inch, which affords the opportunity to capture and infiltrate much, if not all, of the water that would otherwise be conveyed by sewer pipes to the nearest stream.

Approximately 40 percent of all stormwater runoff in the Portland metropolitan region comes from transportation facilities. To address that issue, Metro has developed a design manual, *Green Streets, Innovative Solutions for Stormwater and Stream Crossings,* that focuses on design solutions that aim to reduce these stormwater effects on streams as well as the physical effects that road projects have on the riparian ecosystem. Elements of green streets include a system of stormwater treatment within rights of way, reduction of the volume of water piped directly to streams and rivers, incorporating the stormwater system into the aesthetics of the community, and minimizing effects of streets on streams or wetlands.

Furthermore, the City of Portland is rewriting its stormwater codes to reduce the effects of future development on aquatic systems and to promote the use of green roofs and ecoroofs in urban stormwater management.

Damascus Area Community Design Workshop

In late 2002, the Metro Council decided to expand the Metro urban growth boundary by more than 12,000 acres in response to state-mandated planning regulations that require a twenty-year land supply for housing and other development needs be provided inside the region's UGB. As areas near the UGB in Multnomah and Washington counties consist largely of either high-quality farmland or land that is topographically inappropriate for urbanization, Metro looked first to partially developed areas as Damascus in rural Clackamas County, in the southeast quadrant of the region when considering where to expand.

The Damascus area is an unincorporated community of approximately five thousand people located about twelve miles southeast of downtown Portland. The area is characterized by large-lot rural residential lands, small-scale nurseries, forested buttes, and significant fish and wildlife habitat. Transportation access to the rest of the region is poor. The Damascus Area Community Design Workshop was a community-based effort by the Coalition for a Livable Future to create a regional model for livable, equitable, and environmentally sound urban development in this possible UGB expansion area. The workshop applied design principles for urbanization that use land efficiently, protect and restore fish and wildlife habitat areas, protect natural stream flow, provide for a fair share of the region's new jobs, and include ample housing and transportation choices in every neighborhood. The workshop broadened the range of choices to be considered in designing newly

urbanized areas, informed decisions to be made by Metro and Clackamas County officials as they consider a UGB expansion, and provided a model that can be adapted by other community design efforts in Oregon and other states. Recently, Damascus citizens voted to incorporate into the region's twenty-fifth city, and a planning process is under way that integrates most of the Coalition's Damascus Design Workshop recommendations into their vision for what they want their community to look like in the future.

When considered cumulatively, all these efforts hold great promise to create a just and sustainable metropolitan region. Passage of a property rights–fueled measure (Measure 37), which would require compensation or waiver of environmental regulations, in the fall of 2004 casts a long shadow over such efforts, however. As we go to press, Oregon's Marion County District Court has ruled Measure 37 unconstitutional. Creative local and regional planners and legal challenges will, I believe, prevail. The result will be a metropolitan region worthy of the lofty visions that John Charles Olmsted, William H. Whyte, Lewis Mumford, and Anne Whistin Spirn have envisioned.

Note

1. In March 2005, the newly appointed Greenspaces Policy Advisory Committee adopted a new vision for the creation of a comprehensive regional, bistate parks, trails, and greenspaces system. This document goes far beyond the original 1992 Greenspaces Master Plan in calling explicitly for a regional, bistate Biodiversity Protection and Management Plan and urging that the Portland region's work be linked to similar efforts in urban communities throughout the Willamette River Valley. In March 2006, Metro Council referred a $220 million bond to the region's voters for a November 2006 vote. This bond will allow the purchase of an additional 5,400 acres of natural areas, inside and outside the region's UGB.

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Promoting Health and Fitness through Urban Design

Anne C. Lusk

Sixty-five percent of the U.S. population is now overweight, and the resulting negative health consequences include premature death, cancer, heart disease, diabetes, stroke, and other chronic diseases (U.S. Department of Health and Human Services 1996, 2000). This rise in obesity is a result of poor diet and physical inactivity or an energy imbalance from an increase in caloric intake and a decrease in physical activity. In 2002, 25 percent of Americans did not participate in any physical activity during the preceding month (Centers for Disease Control and Prevention 2002), and in 2003, 38 percent of students in ninth through twelfth grades viewed three or more hours of television a day (Centers for Disease Control and Prevention 2004). Physical activity provides a variety of physiological and psychological health benefits; therefore, recommendations were made for thirty to ninety minutes of moderate physical activity most days of the week (Pate et al. 1995; Department of Health and Human Services and Department of Agriculture 2005). Interventions, such as the provision of facilities or the creation of programs, can be effective ways to combat obesity by increasing levels of physical activity (Kahn et al. 2002). Certain changes to urban forms could enable the physical activity as a routine part of the day (Handy et al. 2002; Sallis, Kraft, and Linton 2002; Killingsworth et al. 2003). A critical element of a "humane metropolis" is therefore to alleviate personal discomfort, depression, and poor health through encouraging outdoor physical activity and exercise within the urban environment. This essay is concerned with what urban design features would be the most "humane" and encourage more people to engage in physical activity.

The Nineteenth-Century Sanitary Reform Movement

The building of dwellings to accommodate the astronomic increase in urban populations in the industrializing nations during the nineteenth century lagged far behind demand. Overcrowding to inhuman levels was ensured by the prevailing building practices of the times. Unfettered by any public regulations, tenement building was a joint result of (1) the need to be within walking distance to employment and to family members and (2) the builder's greed for profit. Thus, dwellings were minute in size and packed together, with space left unbuilt only to the minimum extent necessary to provide physical access to each unit (Platt 2004, 99). One result of this pervasive overcrowding and lack of fresh water, daylight, and

drainage was a series of epidemics that ravaged most European and North American cities during the early nineteenth century, including New York City.

Beginning in the 1830s, the progressive reformer Edwin Chadwick conducted the first studies of sanitary conditions in the industrial slums of England. Through crude geographical surveys and the new science of statistics, he related the spatial incidence of infectious disease to overcrowding and sanitary deficiencies. A series of reports that he prepared for the Parliamentary Poor Laws Commission laid a basis for the eventual adoption of Great Britain's first public health act in 1848. Chadwick's work in turn inspired comparable investigations by public health reformers in other cities, notably including New York City. In 1845, John H. Griscom published a landmark report entitled *The Sanitary Condition of the Laboring Population of New York* that was directly modeled on Chadwick's work. Based on his own studies of slums in lower Manhattan, Griscom called for a wide range of improvements, including a public water supply, parks, and public control of building design and occupancy. The New York (State) Metropolitan Health Act of 1866 was the first major U.S. law in this field (Platt 2004, 105). (The U.S. federal government would play no major role in urban environmental issues until a century later.)

City Form, Neighborhoods, and Parks

In 1895, the New York State legislature appropriated $5 million to condemn certain tenements and create small parks in the crowded slums of Manhattan. The population at the time was not necessarily overweight, but people were in desperate need of more sanitary conditions than those available in a city that was 30 percent more crowded than Prague, Europe's least livable city (Scott 1969). The social reform movement, through physical environmental determinism, thus sought to improve the health conditions of the poorest residents by providing some greenspaces and playgrounds amid the tenements of Five Points and its environs described by Jacob Riis as "the wickedest of American slums" and the "foul core of New York's slums" (quoted in Page 1999, 73). The demolition of buildings and creation of parks introduced health-inducing sunshine, fresh air, and open space to the immigrant population.

New York's Central Park, designed in the 1850s by Frederick Law Olmsted and Calvert Vaux, is said to have been fashioned after Birkenhead Park in England and designed for the masses who had no access to the healthy outdoors (Rybczynski 1999). Olmsted wrote about the need for urban inhabitants to escape unhealthy urban congestion, and, if they did not possess funds to leave the city, they should have places for respite and relaxation within reach of their homes (Olmsted 1865).

Central Park at the time, however, was still distant from the "huddled masses" of the Lower East Side, requiring the poor either to pay for a horse-drawn omnibus or

walk an hour or more each way along muddy thoroughfares. Moreover, the paths in Central Park were designed for carriages, bridle riding, or walking. Because riding in a carriage was sedentary, the only real physical activity in Central Park would have been horseback riding or walking. The walks, especially by women with long skirts, might have been more apt to be taken passively on narrow paths or within the greenswards rather than on the many bridle paths that were dominated by horses. The park was not designed for bicyclists because the basic bicycle was not invented until the 1870s and reinvented in 1890 when pneumatic tires and a chain drive were added. Thus, Central Park, until modified for more fitness-oriented uses in the later twentieth century, was largely a scenic amenity for the higher classes of the city with little contribution to the fitness of the general population.

Olmsted also designed residential developments with park components, most notably Riverside, a suburban community near Chicago built in 1869. Olmsted's plans for Riverside included sidewalks, macadam roads, provisions for street cleaning, convenient transportation, and access to bakeries and stores. The best land was to be set aside as public grounds that included playgrounds, commons, and village greens. Privacy and control of the yard would be bequeathed to each individual homeowner, but there would also be communal space for play and socializing (Olmsted 1868; Fisher 1986). These communal spaces were then available to the residents wealthy enough to own homes in the developments; they were not considered public parks for all the residents of Chicago.

The English progressive reformer Ebenezer Howard launched the garden city movement in Great Britain and the United States with his famous tract, *To-morrow: A Peaceful Path to Real Reform* (published in 1898 and reissued in 1902 as *Garden Cities of To-morrow*). According to Lewis Mumford in his preface to the 1965 republication, *"Garden Cities . . .* has done more than any other single book to guide the modern town-planning movement and to alter its objectives" (Mumford 1965, 29).

Based on a population size of 30,000 per community, garden cities were to have as dominant features parks, tree-lined avenues, and public gardens (Ward 1992). Such ideal towns were to incorporate manufacturing, retail, and outdoor exercise facilities. They were to be surrounded by "greenbelts" of agriculture and forestland, but connected to a large metropolis by train. Pure garden city models were rarely actualized, but the ideological imprint remained. Howard's theory influenced the design of two prototype garden cities, at Letchworth and Welwyn, both near London. Through the advocacy of his disciples, the garden city movement influenced the British postwar "New Town" program, but with very different results from the small Victorian suburbs of Howard's concept.

Howard's ideas influenced the development of a few garden cities in the United States, most notably Radburn, New Jersey, designed in the 1920s by Henry Wright and Clarence Stein. Radburn included homes with living rooms facing long,

connected parks with a bicycle path. This path connected to the schools and play-ground areas and featured bridges so that path users did not have to cross traffic. The vast postwar growth of suburbs in the United States, however, were emphatically oriented toward the automobile, with little provision for outdoor exercise other than school fields and playgrounds.

In 1929, New York's master builder and power broker Robert Moses created Jones Beach as an oceanside park built within reach of Manhattan for the working middle class unable to afford vacation homes in the country. The park included bathhouses, restaurants, expanses of beach, and vast parking lots and was accessible by two landscaped parkways and a train. Although during the Depression few people had cars, access was intended to be largely for those arriving by private car. Moses's parkways had overpasses built too low to allow buses, suggesting he did not want the "teeming masses" from the inner city to be flocking to his new parks (Caro 1974).

At about the same time, planner Clarence Perry, who grew up in another of Olmsted's planned communities, Forest Hills, Illinois, wrote the landmark *Plan for New York and Its Environs* for the New York Regional Plan Association. Among its proposed neighborhood design principles, the plan called for limited community size, inclusion of local shops, and the establishment of small parks and recreation spaces (Perry 1929). The early neighborhoods that followed these principles included communities such as Levittown on Long Island, started in 1947 and Park Forest, started in 1948. Such planned suburbs allocated homes, shopping, schools, and recreation to separate districts, often isolated from one another. They did, however, provide sidewalks on both sides of all the streets for easy access to destinations, an element sadly omitted from many more recent subdivisions. Levittown included village centers with a few retail stores, but it was difficult to combine the tasks of shopping with recreation. The chain-link-fenced recreation fields were usually distant from the commercial districts.

Individuals in communities such as Levittown who benefited most from open spaces without accompanying store traffic were the adjacent property owners who had long expanses of maintained parkland for a year-round view. Owners of property adjacent to Central Park also have views of magnificent parkland without storefronts on their personal sidewalk street fronts. The combination of stores and parks is beneficial because it allows people to "trip chain," or combine a leisure trip to the park with a purposeful trip to the store. In 1887, Mulberry Bend Park in New York City achieved the goal of providing pleasure with purpose in a park bordered by shops as seen in photographs by Riis (Alland 1975). The Central Park and Levittown decisions to not combine parks and shopping were based on economic and not physical activity reasoning because residences that bordered parkland could demand a higher premium.

Travel Corridors and Destinations for Walking and Cycling

In the late 1960s and early 1970s, urban planners specializing in behavioral design started writing about the built environment and perceptions of users. Kevin Lynch, Donald Appleyard, and John Myer developed symbols in their book *The View from the Road* and were able to identify what Lynch characterized as the paths, edges, districts, nodes, and landmarks as part of through-travel landscape analysis viewed from a car (Appleyard, Lynch et al. 1966). Lynch, in his book *The Image of the City,* wrote of the benefits of designing a path that provided a "classical introduction-development-climax-conclusion sequence" (Lynch 1960, 99). In *The Last Landscape,* urbanist William H. Whyte (1968, 325) conjectured that "people take much longer walks if they can see the building they are heading to." This visible building could be considered a "landmark" in Lynch terminology.

A Pattern Language by Christopher Alexander and others (1977) offered a "language" for building and planning with preferred design elements that would improve quality of urban life: "People find it easier to take a walk if they have a destination. This destination may be real, like a coke shop or a café, or it may be partly imaginary, 'let's walk round the block.' But the promenade must provide people with a strong goal" (Alexander et al. 1977, 172). Whyte and Appleyard also focused on the design of what they characterized as livable streets. Rather than allow domination by vehicles, people on foot or riding a bicycle should be accommodated, and the environment should provide opportunities for socializing, and greenery (Moudon 1987). Much of the focus of both Appleyard and Whyte, though, was on the pedestrian.

In 1965, a local citizen of Davis, California, Frank Child, wrote a letter to the editor stating that Davis should provide a safe environment for bicyclists who were increasing in numbers owing to an ever-expanding college population. Resistance from Davis's Select Board prompted a petition for bicycle provisions that was signed by hundreds of residents; that petition encountered even more official resistance. Reelections brought in two new and sympathetic selectpersons and a variety of designs were tested. One, placing a protected bicycle lane between the sidewalk and parked cars based on the European model, was rejected because the road bicyclists felt unsafe at the intersections with cars making right-hand turns. Bob Sommers and Paul Dorn, both psychologists, obtained funding to gather data on the bicycle facilities. Learning of the successful designs in Davis, many individuals visited the community to learn from the experience (Lott 2003). In 1972, the Federal Highway Administration signed a contact with Deleuw-Cather in San Francisco to write standards for bicycle facilities reflecting research conducted at the University of California–Davis. The report was completed in 1975, ten years after Child wrote his letter to the editor. At that same time, a variety of booklets were

written on bicycle facility design, including *Bikeways: Design and Construction Programs,* published by the National Recreation and Park Association (Jarrell 1974). Bicycle planning spread rapidly among U.S. cities during the 1960s and 1970s. Often, separate provisions were included for local errand-oriented bicyclists and touring bicyclists who favored speed on the roads.

Among bicyclists who rode five times a week, a national survey conducted in the 1970s indicated that 87 percent preferred sidewalk bikeways, 82 percent preferred bike lanes, 91 percent preferred separated bikeways that were not in parks, and 78 percent preferred signed routes, with people able to indicate a preference for more than one option. During the 1970s, the sidewalk bicycle paths and separated bikeways appeared to be favored over bicycling in the road or along signed routes. These preferences varied with individuals who bicycled for pleasure/exercise and those who bicycled to commute to work/school, but all bicycling groups had many travel corridor options that included the sidewalks, bike lanes, separated bikeways, signed routes, and regular roads (Kroll and Sommer 1976). In 1972, a young candidate, Dr. Dietmar Hahlweg, was elected mayor of Erlangen, Germany (Monheim 1990). A Fulbright scholar who had studied Jane Jacobs and Lewis Mumford at the University of Pittsburgh, he campaigned on the promise of providing urban-friendly transit in the historic hospital and university community. Rather than build highways, he fashioned innovative corridors including bikeways on sidewalks, through Woonerfs (streets closed to through traffic), on one-way streets, though parks, and on streets dedicated to buses, bicyclists, and pedestrians. Between 1974 and 1980, after stopping the road building and replacing it with public transportation and bicycle facilities, Erlangen had reduced the use of cars by 35 percent and had increased the use of bicycles by 26 percent 148).

In 1981, the American Association of State Highway and Transportation Officials wrote guidelines for the development of bicycle facilities. The primary components of the guidelines then and still are for bicycling in the road, with some text for distant leisure-based recreation paths. The guidelines do not include aesthetic components, such as adjacent greenery, or destination components, such as the desired location of human-need destinations, but instead focus on safety and engineering. Nonetheless, based on the preferences in communities including Davis, California, and Erlangen, Germany, community-wide systems of separated shared-use paths that connected to purposeful destinations such as stores were being built, tested, and successfully used.

In 1986, the Rails-to-Trails Conservancy was established to create a nationwide network of bike trails on former rail lines. In 1987, *The Report of the President's Commission on Americans Outdoors* suggested that communities should "establish Greenways, corridors of private and public recreation lands and waters, to provide people with access to open spaces close to where they live, and to link together rural and urban spaces in the American Landscape" (President's Commission on

Americans Outdoors 1987, 142). This report was further refined with the accepted principle that greenways should ideally be fifteen minutes from everyone's home. Based on these initiatives, greenways or linear parks were created across the United States, with many created on existing corridors such as railroad beds. Used primarily for recreation purposes during leisure time, these paths may or may not lead to useful destinations.

Deficiencies of Parks and Playgrounds and Design Considerations

The creation of parks in cities such as New York sought to provide open space (not necessarily "limited"), fresh air, sunlight, and alleviation of overcrowding. These parks included school playgrounds that provided opportunities for children to engage in physical activity before, during, and after school. The parks' greenery also provided psychological benefits and mentally restorative views, contributory elements in dense cities with few trees and gardens (Kaplan and Kaplan 1995). The adjacency of greenery in a park might lessen boundary pushing or delinquent behavior, as indicated in research on low-income African American boys. Young boys who lived near trees and parks also did better in school, had better peer relationships, and interacted better with their parents (Obasanjo 1998).

A park could also encourage community social interaction among diverse socioeconomic groups through the provision of urban design features or "social bridges" (Lusk 2002). "Social bridges" are characterized as assist, connect, observe, in absentia, or information. In an *assist* social bridge, someone helps someone else, as when a bicyclist steps aside while a novice in-line skater maneuvers a narrow bridge. A *connect* social bridge is based on Whyte's triangulation in which a third party or element can trigger conversation between two people, including strangers (Whyte 1980). The shared nostalgic environment of a porch, railings, and rocking chairs can foster a conversation between strangers who might not otherwise converse (figure 1). An *observe* social bridge occurs when a kindness is witnessed and humanity is affirmed, as in witnessing an adult helping a child learn to ride a bicycle. *In absentia* social bridges exist when the contribution of an absent party, perhaps the designer of the space, is implicitly acknowledged. For example, if a water element exists in a park that elicits laughter, gratitude is felt for the designer or the community members who provided it. In an *information* social bridge, information is imparted to the other person who might be absent but is present through language. In Paris, diseased historic trees had to be cut down in a park, but the park managers had written a sign that explained the reasons. Humanity was reaffirmed in this connection between an absent tree caretaker and the reader.

These parks, however, required travel time to reach them on foot and also the time to use the parks while there. Today, leisure time is a rare commodity, especially for low-income individuals who may have multiple jobs and limited time. With

Figure 1   Wraparound porch at restored train station on West Orange Trail near Orlando, Florida. (Photo by Anne Lusk.)

issues of crime, children may need to be supervised in public parks, and parents may not have the leisure time to be with their children, especially during daylight hours after school when single parents or dual-income parents are working.

The garden city parks as well as the sports fields were isolated from the shopping areas in Levittown. It was therefore difficult to combine playground time for children with shopping in the same trip. With sports facilities surrounded by residential homes, crime would be less of an issue in a close-knit community. Adult presence, however, is usually required to structure games, prevent bullying, and curtail playground or park damage.

Although recreation fields provide opportunities for physical activity, parents are often spectators rather than participants, specialized equipment is needed, a level of skill is required, and some school children feel excluded. Furthermore, team and field-based sports are often not continued in adulthood.

Rather than creating an isolated pocket park or sports field that primarily enhances the property values of adjacent properties, a design consideration might be to locate a grocery store next to a park or sports field to allow a parent to combine a utilitarian trip with a child's play. Children might be more motivated to travel to the grocery store, perhaps on foot, if they knew they were also going to be rewarded with time at the playground. If parks also are located close to where people live but include play structures and bicycle paths, the younger child could be monitored

from home, as in Radburn, New Jersey, and the older child could travel a safe distance from home, with distance dependent on their age.

Deficiencies of Walking, Bicycling, and Skating Facilities

Although the existence of sidewalks for pedestrians and roads for bicyclists would suggest that the required thirty to ninety minutes of physical activity most days of the week could be achieved, a fine-grained analysis of these environments reveals design flaws. Pedestrians in community centers often do use sidewalks, but if parallel parking is available, many arrive by car and only walk a few feet to stores or eateries. Neighborhood sidewalks exist, but, especially in suburban tracts, they only circle homes and do not lead to a purposeful neighborhood grocery store. Children are often driven to school even though a sidewalk system might exist. Adults might use the sidewalks for a leisure time evening stroll, but leisure is a precious commodity and might not be spent on a walk.

Motor vehicles and driving habits have changed drastically since parents first let their children bicycle in the road. Although it is still possible to bicycle in the road, bicyclists who travel with vehicular traffic tend to be a certain age, a certain weight, and male with athletic abilities. The population that should engage in physical activity includes people of differing ages, with additional weight, males and females, and the less adroit. Sidewalks could be an option for bicycling or in-line skating, but pedestrian advocates now seek to ban all cycling and skating from sidewalks, leaving the slower bicyclists or skaters with no sanctioned place to travel except the distant leisure-based recreation path that does not lead to purposeful destinations.

Alexander, Lynch, and Whyte all mentioned the value of destinations as motivational components for physical activity. If the major destinations are in downtown community center stores, coffee shops, or movie theaters and there are policies banning bicycling or in-line skating on the sidewalks, the only people who can arrive at the destinations are car drivers, transit riders, pedestrians, and bicyclists capable of bicycling on the road. Even though slower bicyclists and in-line skaters could walk the distance, either with their bike or after locking their bike or by carrying shoes in a backpack, sometimes the distances are too great to walk in spread-out downtowns.

Physical activity cannot currently be a routine part of the day for "all" populations because only pedestrians and road bicyclists can arrive at the purposeful destinations such as a grocery store. The first design option would be to provide new urban forms, or European cycle tracks, in downtown community centers so that slower bicyclists and skaters could arrive at key destinations. Created either as part of the sidewalk or a curb step down from the sidewalk but between parallel parked cars or traffic, the cycle tracks could separate pedestrians from other users

Figure 2   European cycle track for bicyclists in Paris, France. (Photo by Anne Lusk.)

considered wheeled pedestrians (figure 2). Combined with separate shared-use paths and residential streets, a grid could be developed that would enable the physically inactive to bicycle, jog, or skate to preferred destinations, especially to downtown community destinations such as stores, coffee shops, and the post office. The cycle tracks could also be used as part of the Safe Routes to School program on specific streets for safe travel to and from school.

A second urban form design option would be to put purposeful destinations, such as grocery stores, on recreation paths. Existing corridors such as shared-use paths or greenways could have useful destinations added to the corridor. Rather than bicycle only on Saturday when leisure time might be available, routine trips could be made to the grocery store or drugstore located adjacent to a greenway. Research on six of the most preferred greenways in the United States showed that habitual users identified a mean of 3.17 destinations (SD 1.32); the mean distance between destinations was 3.92 miles (SD 2.65, variation due to user type); and the means at the destinations were 46 features, 8.1 activities, and 14.6 meanings. On the Chicago Lakefront Trail where a total of forty-one destinations were identified, individuals still identified three to four destinations. The observations at the destinations indicated that people stop at some destinations, characterized as "social stop." On the Stowe (Vermont) Recreation Path, users commonly stopped at the farmers' market set up each Sunday in a field adjacent to the path where they socialized with friends and also purchased fresh produce (figure 3). Other destina-

Figure 3   Farmers' market destination on the Stowe Recreation Path. (Photo by Anne Lusk.)

tions, characterized as "positive-identity pass-by," exist where people pass by. At theses destinations, the participants would add vocabulary words to the survey forms with a positive reflection. For example, someone wrote, "Doggie Beach where I enjoy seeing the dogs play." Observations at this destination showed that few people actually stopped, although they did look in the direction of the dog beach. Further analysis of the data suggested that some destinations, such as Confluence Park in Denver, were "prowess plazas" that showcased healthy athleticism as kayakers maneuvered the rapids in the South Platte River.

The above two sections are the most significant piece in making the case for new urban forms. We need the European cycle tracks and grocery stores on the leisure-based recreation paths instead of just sidewalks and roads for bicycling. We have lost much ground since the 1970s when people could bicycle on the sidewalks. The literature in the 1980s focused on leisure-based parks and play, not physical activity as a routine part of the day. Not all populations have the leisure time, especially populations suffering the most from obesity.

Design Considerations for the Humane Metropolis

It was not with malice that parks, such as Central Park, were created distant from the low-income population who had only Sunday as a day of rest. The future would bring a variety of affordable transportation forms for all populations to arrive at

Central Park. Parks were intentionally separated from commerce because of the teams of wagons and horses delivering goods to the stores and pollution in association with trades such as the slaughtering yards in Chicago. People were not overweight because of diet and the daily involvement of physical work or mandatory exercise such as walking for transportation, so routine physical exercise for the sake of health was not necessary. For bicycle facilities, the most audible champions have been road bicyclists who choose speed on the road over the chaos of a shared-use path. Six-year-old children and sixty-five-year-old nonbicyclist women have not been invited participants in transportation meetings about urban forms. All the while, rates of obesity increased as did associated diseases.

The humane metropolis requires parks with nearby purposeful amenities such as grocery stores. Rather than isolated pocket parks with only the benefits of greenery, the parks could also be linear and connect with other parks or corridors, facilitating use near home and travel to other locations. Parks, especially with play features, could be located near stores to combine utility with leisure. Safe roads for bicycling, sidewalks for walking, and European cycle tracks could provide all populations with access to important community destinations. Residential areas with less traffic could allow bicycling or in-line skating on the sidewalks or feature traffic-calming devices, such as Woonerfs or semiclosed roads, to permit safe passage on the road for less skilled bicyclists and skaters. Separate, dedicated shared-use greenways could offer human-need destinations, including the places frequented as part of trip chaining in a car, such as grocery stores, banks, and coffee shops.

Destinations could also feature "prowess plazas" and showcase athleticism with an expanded list of culturally inclusive activities, such as basketball, jump rope, and skateboarding Thus, young athletic stars would be witnessed and discussed by neighbors, and "social bridges" among spectators and participants would be enhanced. The design would focus less on the car and more on the people, their health, and interaction with one another.

"Health enterprise zones" could help financially foster the establishment of produce stores, gyms, and other health and fitness-oriented businesses in rundown neighborhood districts or in the vicinity of linear greenways. Created as a healthful form of an economic enterprise zone but with similar objectives of fostering community strengths and building social capital, all businesses encouraged in the health enterprise zone would have to in some way benefit health. Fast-food chains, quick stops, liquor stores, bars, billboards selling unhealthy food, or vending machines with sugar sodas could be banned within the health enterprise zone, whereas special incentives could be offered to attract health-inducing businesses. The creation of the health enterprise zone would change the buying and membership opportunities of neighborhood residents and also raise awareness of the benefits in

different types of establishments, foods, and activities. Connected to or within this zone could be new parks, European cycle tracks, or greenways that all enabled physical activity as a routine part of the day.

In some states, mandatory provision of land for a bikeway or play space may be required of subdivision developers (Platt 2004, 276–78). Building on that precedent, the development approval process may be amended to require "health impact analysis" of proposed development not currently considered in building permit reviews. Such provisions might require the proposed plan to include features that encourage outdoor exercise other than simply walking between the premises and a parked car. A European cycle track could allow for passage to the restaurant by bicycling or in-line skating. Food and beverage consumption could then be balanced by energy burning.

The more humane metropolis should be responsive to the health crisis and should promote routine physical activity for all populations. The needs of all segments of the population, including the elderly, the physically challenged, youth, and nondrivers, should be served through responsive urban forms. Above all, the promotion of fitness and health should be integral to new development and should be added through retrofitting existing parks, streets, recreation paths, shopping areas, downtowns, and residential districts. In addition to diet, physical inactivity is responsible for the current high levels of obesity and resultant health problems. Health-oriented community design could be the twenty-first-century public health equivalent to progressive reformer Edwin Chadwick's studies in the 1830s of sanitary conditions in the industrial slums of England and could help reverse this growing national epidemic of obesity.

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A Metropolitan New York Biosphere Reserve?

William D. Solecki and Cynthia Rosenzweig

By 2025, it is estimated that five billion of the earth's total population of eight billion people will live in urban settlements (United Nations 1995). Urban environments involve complex and intense interaction between ecological and human systems at various geographic scales from the neighborhood to the megalopolis. Yet even though natural functions and phenomena are greatly transformed by urban development, they are not eradicated. Indeed, urban places retain many vestiges of ecological functions and services. For example, coastal wetlands in urbanized settings simultaneously provide areas for active and passive recreation, spawning ground for regional fisheries, places for water quality control, and stopover points for migrating birds.

It is now recognized that the relationship of human and natural systems is in constant flux (see Haughton and Hunter 1994; Platt, Rowntree, and Muick 1994; Bennett and Teague 1999). Urban ecological systems are projected to become even more dynamic in the future, particularly as a result of global climate change. This issue is creating a new relationship between the global scale and local places (Kates and Wilbanks 2003). By the end of the twenty-first century, for example, global climate-related increases in sea-level rise in the New York City region could be up to four times greater than the current rate of rise occurring naturally, which would dramatically affect coastal ecosystems (Gornitz 2001).

The biosphere reserve (BR) concept, as formulated by the UNESCO Man and Biosphere (MAB) program (http://www.unesco.org/mab/), is an approach to regional environmental management that attempts to foster a set of goals, including biodiversity protection, long-term environment monitoring, and sustainability modeling (Batisse 1993). The origin of biosphere reserves was the Biosphere Conference organized by UNESCO in 1968, the first intergovernmental conference to seek to reconcile the conservation and use of natural resources, thereby foreshadowing the present-day notion of sustainable development. The aim of the conference was to establish terrestrial and coastal areas representing the main ecosystems of the planet in which genetic resources would be protected and where research on ecosystems as well as monitoring and training work could be carried out for an intergovernmental program. UNESCO officially launched the MAB program in 1970. One of the program's projects was to establish a coordinated world network of new protected areas, to be designated as biosphere reserves, in reference to the program itself.

The World Network of Biosphere Reserves, now numbering more than four hundred sites, is formally constituted by a statutory framework that resulted from the work of the International Conference on Biosphere Reserves held in Seville, Spain, in March 1995. This statutory framework sets out ground rules of the network and foresees a periodic review of biosphere reserves. Activities of the network are guided by the Seville Strategy for Biosphere Reserves, also drawn up at the Seville conference. At present, not all existing biosphere reserves fully participate in the network, and the goal of these guiding documents is to help improve their functioning in the coming years.

Long conceived as a program for managing locations with high levels of biodiversity in nonurban settings, the MAB program has evolved to include the notion of management of biodiversity within urban places. The Columbia University/UNESCO Joint Program on Biosphere and Society (CUBES) is one effort that has fostered this extension of the biosphere reserve concept (http://earthinstitute.columbia.edu/cubes/). In Cape Town, South Africa, and New York City, CUBES has built a network of urban biosphere groups composed of researchers, policy specialists, and municipal and governmental officials, and in 2003 it hosted the Urban Biosphere and Society Conference as part of its mission to develop sustainable networks of cooperation to support globally relevant local strategies for poverty alleviation, environmental sustainability, social inclusion, and conflict mitigation.

The CUBES activities in New York, fostered discussion of how an urban biosphere reserve might be created in a global city in general and in New York City specifically. The aim of this essay is thus to assess the potential value of the biosphere reserve concept as applied within the greater New York metropolitan region. Although there are many possible ways to delimit this area geographically, this essay will use the Regional Plan Association definition of a thirty-one-county area, lying within the states of New York, Connecticut, and New Jersey, with a 2000 population of approximately 21.5 million.

Urban and Regional Environmental Management

Throughout the historical development of cities, the role and function of nature typically has been defined within the context of its social utility or function. In the United States in the mid-nineteenth century, the importance of promoting nature in cities first emerged with the recognition that parks can provide the social function of enabling urban populations to find relief from the congestion of city life. This goal motivated the work of Frederick Law Olmsted and the development of Central Park and other greenspaces as "green lungs of the city" (Cranz 1982; Burrows and Wallace 1999). More than a century later, the environmental functions of natural areas in urban areas have become recognized as well. Natural areas provide ecological services, such as the following:

- Air quality enhancement (e.g., trees and other vegetation promote cleaner air via pollutant removal)
- Flood protection (e.g., wetlands act as stormwater catchment areas)
- Urban heat island) abatement (e.g., trees help moderate daytime and nighttime temperature increases via shade and evapotranspiration)
- Water quality protection (e.g., stream-corridor vegetation prevent siltation).

With increasing recognition of natural area function in urban areas, a significant debate, focusing largely on the size of the parcels and the species composition, has emerged regarding the quality and characteristics of the nature at these sites (Beatley 1994). Several fundamental questions have been raised. For example, how should one establish the environmental value of vastly different-sized parcels, ranging from large city parks such as Central Park to small patches of ground in front of buildings? What species or ecological functions should be the focus of ecological and environmental planners? Should the focus be on all species (including invasive or "alien" species) and functions (e.g., active recreation) found within cities, or just on native species and those that provide "natural" (e.g., passive recreation) functions?

Underlining these questions has been improved understanding of urban ecological and environmental function. Natural systems of highly urbanized places are clearly altered. Ecologists and planners, however, are now recognizing that remnant natural areas may still provide ecological and environmental services. Studies have shown some cities to be richer, biologically speaking, than surrounding suburbs and agricultural areas (Savard, Clergeau, and Mennechez 2000). Increased focus on system-level understanding of the ecology, biodiversity, and environment of urban areas has helped foster the rise of a new wave of regional environmentalism in metropolitan areas (Taylor and Hollander 2003). The following are some examples of programs or strategies in progress in the United States today:

- *Long-term ecological research (LTER) sites for urban areas (http://lternet.edu/).* The LTER program, sponsored by the National Science Foundation, focused on ecological inventory, long-term monitoring, assessment, and research-carried out by public agencies and academic institutions in a cooperative administrative structure at twenty-four specific sites. Two urban LTER sites—Baltimore, Maryland, and Phoenix, Arizona—were designated in the late 1990s. The urban LTER sites have a key function of assessing the impacts of human-environment interactions on ecological processes.
- *U.S. National Estuary Program (http://www.epa.gov/nep/).* This program was established by the U.S. Congress in 1987 to improve the quality of estuaries of national importance. The U.S. Environmental Protection Agency directs the development of plans for attaining or maintaining water quality of estuar-

ies for use as a drinking water source, indigenous species habitat, and recreation resource. Twenty-eight national estuaries have been defined, several of which—Puget Sound, San Francisco Bay, Galveston Bay, and New York/New Jersey Harbor—are in highly urbanized sites.

- *Interagency federal task forces.* Numerous federal interagency task forces were created, particularly during the Clinton administration, to address specific regional environmental issues (e.g., ecosystem restoration of the Florida Everglades). The principal goals of these programs have been to initiate conditions through which the current status and long-term patterns of ecological dynamics of region could be studied by bringing together the suite of federal and other government scientists and stakeholders together. The research brings together analysts from the biological, physical, and social sciences to collect data and synthesize existing information on how the ecological and engineered systems of the region work. These results could be used to generate policy proposals.

- *Regional networks and alliances.* These programs represent an emerging organizational structure that attempts to loosely link many environment-focused institutions in a single area or region and direct them toward a set of common goals and objectives. The Chicago Wilderness is the most prominent urban nature alliance. Chicago Wilderness is defined as "a partnership of more than 180 public and private organizations that have joined together to protect, restore and manage natural lands around Chicago and the plants and animals that inhabit them. The goals of the partnership are to help restore natural communities on public and private lands; prevent the ongoing loss of critical habitat and promoting careful development, and provide opportunities for citizens to become involved in local biodiversity conservation" (www.chicagowilderness.org). This overarching structure is creating a new definition of regional environmental consciousness and citizenship for the Chicago region. Such a program, however, lacks consideration of linkages to larger scales and more contested issues, such as global climate change and environmental justice.

- *Specific watershed-based nongovernmental organizations.* Some local nongovernmental organizations focus on the ecological character and functioning of specific watershed and associated rivers. Many such watershed organizations are present in highly urbanized areas. Although scientific research is occasionally part of their mandate, they are often more focused on the achievement of a specific conservation goal, such as protection of open space or the enhancement of native wildlife in a given area (Cortner and Moote 1999). Some of these initiatives are rather diffuse and are largely presented as planning proposals with more general goals, such as protecting biodiversity, rather than as the foundations of comprehensive new public policies.

The Biosphere Reserve Concept: Promise and Limitations

Another model of regional environmental management is the biosphere reserve concept. This concept has been put into practice at more than four hundred sites in more than ninety countries since 1971 (UNESCO 1996). As of 2003, there were forty-seven designated sites in the United States. To date, the biosphere reserve concept has mostly been applied to wilderness or rural sites away from major settlements, although several reserves already exist in urban fringe locations. For example, the Golden Gate Biosphere Reserve includes thirteen protected areas in the greater San Francisco Bay area, the Everglades National Park borders metropolitan Miami, and the Pinelands National Reserve in southern New Jersey is surrounded by urban and suburban development on three sides. The application of the concept to urban areas is formally under review by the MAB program (UNESCO 2000), and there is continuing lively discussion on the MAB Urban Group Forum (http://www.unesco.org/cgi-ubb/forumdisplay.cgi). Koichiro Matsuura, director-general of UNESCO on the occasion of World Environment Day, June 5, 2005, reported that Canberra, Cape Town, Istanbul, and Rome are actively exploring the application of the UNESCO biosphere reserve concept and that the São Paulo City Green Belt Biosphere Reserve promotes eco-job training for young, poor urban people, covering topics such as water and waste management, recycling, and ecotourism.

As implemented by UNESCO-MAB (UNESCO 2003), biosphere reserves are intended to serve three primary functions that are complementary and mutually reinforcing

- *A conservation function* to contribute to the conservation of landscapes, ecosystems, species, and genetic variation
- *A development function* to foster economic and human development that is socioculturally and ecologically sustainable
- *A logistic function* to provide support for research, monitoring, education, and information exchange related to local, national and global issues of conservation and development.

These goals can be achieved through a diversity of strategies (Alfsen-Norodom and Lane 2002; Bridgewater 2002). A common strategy has been the demarcation of core, buffer, and transition management zones. The *core* of the reserve encompasses the critical habitats and biodiversity resources to be protected. The role of the *buffer* area is to protect the core, and the *transition* area serves as an intermediate zone between the buffer and the surrounding territory. Relatively few of the existing biosphere reserves are composed literally of three concentric rings of management areas. In most cases, the core is not a single site nor is it completely surrounded by a buffer zone. The core areas are often a set of parcels with the most exclusive zoning restrictions. In the New Jersey Pinelands, for example, the core

pinelands protection areas are scattered throughout the central part of the reserve.

Although biosphere reserves encompass very diverse types of landscape, the following criteria usually must be met to quality for designation by UNESCO-MAB (UNESCO 2003):

- Be representative of a major biogeographic region, including a gradation of human intervention
- Contain landscapes, ecosystems, or animal and plant species, or varieties that need to be conserved
- Provide an opportunity to explore and demonstrate approaches to sustainable development within the larger region where they are located
- Be of an appropriate size to serve the three biosphere reserve functions mentioned above
- Have an appropriate zoning system with a legally constituted core area or areas, devoted to long-term protection; a clearly identified buffer zone or zones; and an outer transition area
- Have a management structure to involve all stakeholders, including relevant public authorities, local communities, and private interests.

National MAB committees are responsible for preparing biosphere reserve nominations and for involving the appropriate government agencies, institutions, and local interests in preparing the nomination. Each nomination is examined by the UNESCO Biosphere Reserve Advisory Committee, which in turn makes a recommendation to the International Coordinating Council of the MAB program. The council makes the final decision on designation (UNESCO 2003).

Although designation of a biosphere reserve may reinforce environmental protection strategies already existing or proposed for the site in question, it does not involve any mandatory management constraints. There is no of loss of sovereignty over the site to the United Nations or to any other international body (UNESCO 1996).

Still, the implementation of the biosphere reserve concept has provoked controversy. Concerns in periurban areas have focused on the effect of BR designation on economic shifts and declines in traditional industries (e.g., extractive industries such as mining), changes in development patterns (e.g., increased growth of largely low-wage, service-based industries such as tourism), and limitations in institutional capacity of local communities (e.g., hamlets and villages inability to respond to the service needs of second-home, seasonal residents) (Solecki 1994). Another critique is that BR planning has often been a "top-down" process in which local stakeholders have little influence. In recent years, there has been an explicit effort by UNESCO-MAB and the various national MAB committees (e.g., U.S.-MAB, Canada-MAB) to incorporate local stakeholders in the biosphere reserve process.

The mission and functions of biosphere reserves were reexamined at a 1995 UNESCO-MAB conference held in Seville, Spain (UNESCO 1996). The resulting Seville strategy defined a set of mechanisms through which a revised BR strategy could achieve not only the long-held conservation goals of reserves but also carry on research, long-term monitoring, training, and education, while enabling local communities to become more fully involved in the process. There has since been extensive discussion regarding the extension of the BR concept to urban settings where environmental and social issues are often intertwined and particularly acute (e.g., lack of green space in lower socioeconomic neighborhoods) (UNESCO Advisory Committee for Biosphere Reserves 1998). Douglas and Fox (2000) suggest that the concept could integrate multiple environmental initiatives and designations typically found in urban metropolitan regions. For example, BR designation might facilitate the development of new interagency agreement or other similar administrative mechanism, which could foster better connections among existing open space management areas currently managed by different levels of governments (e.g., city parks, county recreation areas, and state and federal wildlife sanctuaries).

Based on a review of experience with biosphere reserves in the United Kingdom, Price, MacDonald, and Nuttall (1999) urge that nominations of potential sites should arise from local communities and other stakeholders. According to Frost (2001, 7): "The overall goal of any new reserve must be to conserve nature by re-connecting people to it and helping them learn more about it, and so contribute to managing it in a sustainable way. It is possible to foresee a day when local communities will campaign for their areas to be designated as biosphere reserves in the same way that communities campaign 'World Heritage' status." Frost (2001, 218) proposes that *urban* biosphere reserves should

1. Be created at the request of and with support from local communities and key stakeholders
2. Have more than one area that is at least of special area of conservation, special protection area, or national nature reserve standard
3. Use local nature reserves, country parks, and local natural areas as buffer zones
4. Draw in the other elements of the urban area's network of open space as transition zones, which might include informal open space, industrial landscaping schemes, transport corridors, elements of the urban forest, and private open space
5. Have a management plan and planning mechanism that integrates the various local and environmental plans across administrative boundaries
6. Maintain stakeholder participation through the use of participatory techniques

7. Involve local education and research establishments in work to monitor and develop all aspects of the reserve, both human and environmental

8. Use the presence of the reserve to create a general focus on sustainability that informs decisions at all levels

9. Continue outreach work to bring all sections of the local community into contact with the reserve to enjoy, and be aware of nature within their daily life.

Urban biosphere reserves, like conventional ones, should provide biodiversity protection, long-term ecological monitoring, and sustainability experimentation and planning. The urban context, however, provides opportunity to examine the interactions of those three functions and their associated effects further. Any measure or indicator of success with respect to any one of these functions must be defined with respect to the other two. This intersection further reflects the spirit and challenge of the Seville strategy and gives urban biosphere reserves a special niche in the spectrum of regional environmental initiatives and planning concepts used in major metropolitan cities. Urban BRs have the potential to incorporate the *biodiversity protection* mission of efforts like Chicago Wilderness and the long-term *ecological monitoring* associated with the Baltimore and Phoenix LTER programs, as well as the BR sustainability function, such as resource use reduction initiatives, currently not developed in these types of initiatives. Some elements of urban BRs such as greenways (sites for wildlife habitat, instrumentation deployment, and urban heat island mitigation) can promote activities associated with all three missions. .

Urban Biosphere Reserve Sites

The integration of the biosphere reserve concept into the urban landscape is underway in several cities throughout the world. Current sites are found in São Paulo, Brazil; Arganeraie, Morocco; California's San Francisco Bay area; Kristianstad, Sweden; Rome, Italy; Cape Town, South Africa; and Melbourne and the Greater Canberra region in Australia. The Chicago Wilderness network is also considering applying for BR status (Sholtes 2003) for the Chicago area, and a movement has developed in Turkey to have an urban biosphere designated there (Matsuura 2005). These efforts take a variety of forms. Some include discrete sites, such as critical habitat or recreation areas, within the city or metropolitan region, whereas others include larger sections of urbanized zone. In several cases, existing urban biosphere reserves have become the impetus for more integrated, regional BR planning efforts (Matsuura 2005), as in the current planning efforts in Rome and Cape Town. In the San Francisco Bay area the Golden Gate Biosphere Reserve was created in 1988. This urban core reserve is connected via an administrative partnership to

twelve other protected areas throughout the greater San Francisco Bay area (Golden Gate Biosphere Reserve Association 2005). The biosphere reserve effort in São Paulo metropolitan region represents one of the most spatially comprehensive set of activities in an urbanized area. The Sao Paulo City Green Belt Biosphere Reserve was recognized in 1994 as part of the larger Atlantic Forest Biosphere Reserve in Brazil. It comprises seventy-three municipal districts within the São Paulo state, including the capital city of São Paulo. The reserve includes critical conservation areas that are seen as providing ecological services such as water supply protection, regional thermal stabilization, hillside and flood control, and recreational amenities for the region's nineteen million inhabitants (Pires et al. 2002; São Paulo Forest Institute 2004). The reserve came into being after protracted negotiations between local nongovernmental organizations, city and state governments, and eventually federal government as well. Since the mid-1990s, its existence has enabled the development of sprawl control and other regionwide management proposals (São Paulo Forest Institute 2004). Local and state officials also have begun to investigate other economic benefits the reserve represents, such as a locus for sustainable eco-tourism (Pires et al. 2002).

In Rome, interest in the biosphere reserve concept originated in the 1970s with studies to integrate ecological management strategies appropriate for urban processes and phenomena and to understand the interdependence between ecological systems (e.g., hydrologic, biotic) and the human systems (transportation, energy supply) present within Rome (Bonnes 1991, 1993). In response to findings of this research, Rome city officials endorsed proposing a biosphere reserve comprising the major greenspace areas of Rome. The resulting proposal was designed to (1) outline the development of the MAB-Rome project with a focus on "natural environment" management issues; (2) promote mobilization through collaboration and partnership among environmental decision makers, researchers, and citizens; and (3) apply the Seville strategy (Bonnes 2000; Bonnes et al. 2003).

Melbourne in 2002 decided to nominate a portion of Mornington Peninsula as an urban biosphere reserve (Miller 2002). The 2,100-square-mile reserve is designed to be a model for how sustainable development could be implemented within a relatively urban setting. The reserve contains a population of about 200,000 and is situated on the suburban fringe of Melbourne. Local government agencies and the community regard the biosphere as a catalyst for bringing public and private sectors together to generate a shared vision for the city. Businesses with green practices plan to use the reserve as a marketing tool. Local officials believe that it will become a center for the study of ecologically sustainable development and urban planning (Miller 2002).

Also in Australia, a coalition of organizations has nominated the Australian Capital Territory and Queanbeyan City in Canberra as a single biosphere reserve. Defined as the "bush capital," the Canberra reserve would help promote existing

environmental protection activities in the region, provide a mechanism to voice community interests, and showcase the local biocultural regions to generate regional and national pride, encourage tourism, and promote local products (Australian National Sustainability Centre 2003).

In the Cape Town metropolitan region, the Capetown Urban Biosphere Group is examining how the BR concept may be used in an urban African context for the development of environmental conservation and management programs yielding sustained benefits to the poor (Stanvliet et al. 2004). The geographical focus is on the Cape Flats area as the potential overlapping transition zone for four biosphere reserves making up the proposed Cape Town biosphere reserve cluster. Two of the areas are currently biosphere reserves: Kogelberg and West Coast. The other two areas are proposed reserves: Boland and Table Mountain–Peninsula Chain. Several hundred thousand people live in the reserves as permanent or semipermanent residents. The core of each reserve is composed of important ecological sites with endemic species. In Cape Town, the reserves are seen as valuable for environmental education and ecotourism as well as for critical habitat.

The New York Metropolitan Region: Framework of Environmental Management

The New York Metropolitan Region (NYMR) as defined by the Regional Plan Association encompasses thirty-one counties in three states with a total population of about 21.5 million, of which nearly one-third live in New York City. New York City has a population density of about 10,204 people per square kilometer, as compared with only 422 people per square kilometer for the rest of the region. Jurisdictionally fragmented, in addition to the thirty-one counties, there are some 1,600 cities, towns, and villages in New York, New Jersey, and Connecticut, besides the federal government and several regional organizations (Zimmerman and Cusker 2001).

With 2,413 kilometers (1,500 miles) of tidal shoreline, the region's development has been intimately connected to the ocean (Burrows and Wallace 1999). Four of the five New York City boroughs are located on islands (Brooklyn, Manhattan, Queens, and Staten Island). Large waterways and bays, including the Hudson River, East River, Long Island Sound, Peconic Bay, Jamaica Bay, and the Hackensack Meadowlands, cut deeply into the land area. Given its coastal location, much of the land area is at relatively low elevation. About 1 percent of the land is below three meters in elevation. This 1 percent encompasses some of the most heavily developed land and regionally important infrastructure in the NYMR.

Beginning with the consolidation of its five boroughs in 1898, the NYMR emerged as one of the world's primary economic, cultural, and educational centers. Economic and social changes were reflected in ever greater disparities of wealth

and poverty, high expanding sociocultural diversity, a diminishing stock of affordable housing, and rapid suburbanization but continued dominance and gentrification of the urban core. Despite its power and wealth, the region's social, economic, and environmental fabric is at risk (Yaro and Hiss 1996). The dominant ecological and economic trends have made the region more vulnerable to perturbations such as extreme coastal storms, less sustainable as a result of rising demands on regional resources, and less equitable in terms of pollution exposure and quality of life.

Many of these processes directly result from societal interaction with the natural systems of the region. For example, the region's coastal location makes the highly developed, nearshore areas vulnerable to coastal storms and sea-level rise. The physiography of the region's main river basins (e.g., lower Hudson, Passaic, Raritan, and Hackensack rivers) tends to concentrate pollutants in the densely settled estuarine area of the region (Tarr and Ayres 1990). In addition, suburban sprawl is simultaneously straining local water supplies and increasingly threatening the quality of regional water supply systems, as evidenced by growth in development and associated pollutant runoff in the Croton and trans-Hudson source watersheds serving New York City (National Research Council 2000) as well as suburban development around the Jersey City and Newark water supply catchment areas in New Jersey.

The majority of the region's natural historic wetlands have been lost, and buffer areas around wetlands or rivers typically no longer exist (Hartig et al., 2002). In many areas, smaller rivers and streams have been filled, channelized, or placed into culverts. Surface water and groundwater supplies, particularly in the more heavily urbanized areas, have been compromised and typically exceed federal water pollution standards. There are more than 100,000 leaking underground fuel tanks, spill sites, and former industrial sites included on the federal government's register of known or potential toxic sites (Yaro and Hiss 1996). Many are located in lowland locations where coastal wetlands were historically used as landfill sites.

Even with this history of degradation, the few remaining habitat sites in the region provide critical ecological functions, such as stopping points for migratory bird species. As species have adapted to human disturbances in recent decades, species richness has improved in such major habitat preserves as New Jersey's Hackensack Meadowlands and Great Swamp, and New York's Jamaica Bay has become cleaner (Waldman 1999; New York/New Jersey Harbor Estuary Program 2002).

Environmental management is politically fragmented in the NYMR (Solecki and Shelley 1996). Since the mid-1990s, however, there has been increasing interest in using regional frameworks to address multijurisdictional environmental problems, such as water quality and supply, and open space and biodiversity protection. Some of these regional identifiers have emerged out of federal programs; others

have been developed by nongovernmental organizations. These efforts emerged from three different organizing elements:

1. *Administrative.* Conservation activities are centered on existing special management areas such as New Jersey's Hackensack Meadowlands, New Jersey Highlands, New York State Long Island Pine Barrens, and New York City's Jamaica Bay. These areas often represent remnants of larger ecological zones degraded by land use and land cover change that are now protected via zoning or public ownership.
2. *Hydrological.* Conservation activities are focused on watersheds as the primary unit of analysis and management. Examples include the New Jersey's watershed management strategy; the New York/New Jersey Harbor Estuary Program (http://www.feagrant.sunysb.edu/hep/), which is part of the U.S. EPA National Estuary Program; and the NGO-driven Highlands to Ocean (H_2O) initiative designed to promote open space and habitat protection within the region draining to New York's harbor and estuary (http://www.rpa.org/projects/openspace/) and which is promoted by the Regional Planning Association/Highlands Coalition.
3. *Metropolitan region.* Conservation activities are centered on the larger New York Metropolitan Region, which typically includes a region some 100 to 150 kilometers from New York City. Current activities include the Wildlife Conservation Society Bioscape Program (http://www.nybioscape.org/) and the Nature Network, an incipient alliance of environmental institutions and agencies in the New York area.

A Metropolitan New York Biosphere Reserve?

To help remedy ecosystem degradation, unite ongoing local efforts, and promote more effective long-term ecological and economic patterns of consumption and greater resilience to future perturbations, one or more biosphere reserves within the New York metropolitan area should be considered. Applying the concept in the region could benefit the local ecology and economy. The socioeconomic benefits of BR planning, such as enhanced water supply protection, flood control, and better recreational amenities, will flow from the improved environmental function of the region's open space and other sites where natural systems function is evident.

Any proposed urban biosphere reserve must reflect the Seville strategy guidelines for reserve development and structure. One crucial element is the inclusion of a wide spectrum of relevant local groups and organizations into the development process. Biosphere management schemes that do not recognize the underlying socioeconomic realities of a region could significantly conflict with and

potentially worsen existing inequities (Solecki 1994). Any proposal should be responsive to the ongoing conservation activities within the region and the interests and understandings of the local populace.

Furthermore, any potential NYMR biosphere reserve must be designed to achieve the three primary functions of biosphere reserves: (1) conservation (restoration in some cases) of natural sites and processes, (2) sustainable development experimentation, and (3) data monitoring and analysis. Each of these elements is intimately linked with the others. The reserve should enable the identification of potential interactions among the three functions (e.g., how sustainable development will promote biodiversity protection).

Operationally, there might be several key programs, campaigns, or foci around which the activities of an NYMR biosphere reserve might be centered. As with most BRs, open space protection and development would likely be a central and initial focus. In the New York urban setting, the goal could be the enhancement of the distribution and connectivity of open spaces. Lessons learned from enhancing open space protection, such as measurement and characterization of long-term benefits and evaluation of the effectiveness of various planning strategies, could provide feedback to assist in the development of the other programs. For example, lessons learned during managing the Hackensack Meadowlands and the Pinelands National Reserves in New Jersey can now be applied to the Highlands Protection Area in the northern part of the state created in 2004.

A New York Metropolitan Region biosphere reserve could be conceived at three different scales as reflective of the varying types of conservation activities already ongoing within the administrative, hydrologic, or metropolitan region. A key geographic question is delineation of the reserve's boundary and its subzones for more specialized planning purposes.

With respect to the outer boundary, BRs most typically have been defined through the use of natural features (e.g., watersheds or relief profiles) and political units (e.g., sets of counties or federal jurisdictions). In terms of composition, BRs either are structured around a central critical conservation core (e.g., Yellowstone Biosphere Reserve) or around a set of smaller, yet still ecologically important, core sites (e.g., Adirondacks–Lake Champlain Biosphere Reserve). Urban biospheres are typically organized in this way, except in cases like Rome where the biosphere planning efforts are centered on the architectural and landscape elements of ancient Rome (e.g., the Coliseum and surrounding area). A physically defined regional BR could be defined for the New York Metropolitan Region. Although the region is centered on the harbor/estuary and the associated local and regional river basins, this condition is not currently reflected in the local political or social culture.

One scenario for a biosphere reserve in the region includes the identification of administratively defined core area around which transition and buffer zones could

be defined, similar to that being done in Canberra and Melbourne. The core could include a single area or multiple existing conservation areas in the region. Large and ecological important conservation areas such as Jamaica Bay and the Hackensack Meadowlands have some identity among local and regional managers but have limited, widespread regional recognition. A possible extension of this effort could incorporate activities like those outlined in the Golden Gate Biosphere Reserve in San Francisco and Green Belt Biosphere Reserve in São Paulo examples. These reserves consist of a series of public open spaces extending through the metropolitan zone. Like the San Francisco example, the New York–New Jersey Harbor Estuary is ringed by numerous publicly owned parcels that are managed as parks, recreation areas, and wildlife refuges run by municipal, state, or federal entities. The largest single parcel is the Gateway National Recreation Area, which includes approximately 20,000 acres. The buffer and transition areas of this scenario would include the properties directly adjacent (i.e., bordering) and near (i.e., no more than one kilometer) to the core parcels. Buffer zone analysis developed in the field of conservation biology could be used to determine specific distances for each area.

A second scenario for a NYMR biosphere reserve core extends the first one to include the waters of the harbor estuary area as well as the adjacent conservation land parcels. This scenario, like the first, mirrors the Golden Gate Biosphere Reserve, which includes a large water component consisting of two national marine Sanctuaries. In the New York case, this possible core area could include the New York Upper and Lower bays and adjacent coastal areas (e.g., Hackensack Meadowlands and Jamaica Bay). The buffer and transition zones in this option would be defined by the watershed of the estuary (like the H_2O initiative), and the transition zone would include areas beyond the boundary of the watershed (i.e., approximately a twenty-kilometer-wide zone) that would provide some opportunity to track transboundary environmental impacts such as interbasin water transfers and region-scale, land use-change-derived climatological shifts.

A third biosphere reserve scenario includes the definition of entire metropolitan region as a biosphere reserve. This scenario is motivated by a reconceptualization of the urban biosphere as a tattered yet still intact ecosystem. Satellite images of the region reveal the presence of numerous areas, both large and small, of thriving natural places. On the surface, this regional definition might seem too broad and complex to be useful in potential biosphere reserve planning efforts. To overcome this problem, the county-level scale of government should be the appropriate party to develop this scenario. Throughout the twentieth century, the region was defined via census and regional planning efforts at a county scale. Probably the most recognizable image of the area is the thirty-one-county region defined by the Regional Plan Association (figure 1). Each of these counties has an active parks department that manages protected areas and, importantly, has close and active ties with the citizens, especially those in poorer and less-enfranchised socioeconomic groups.
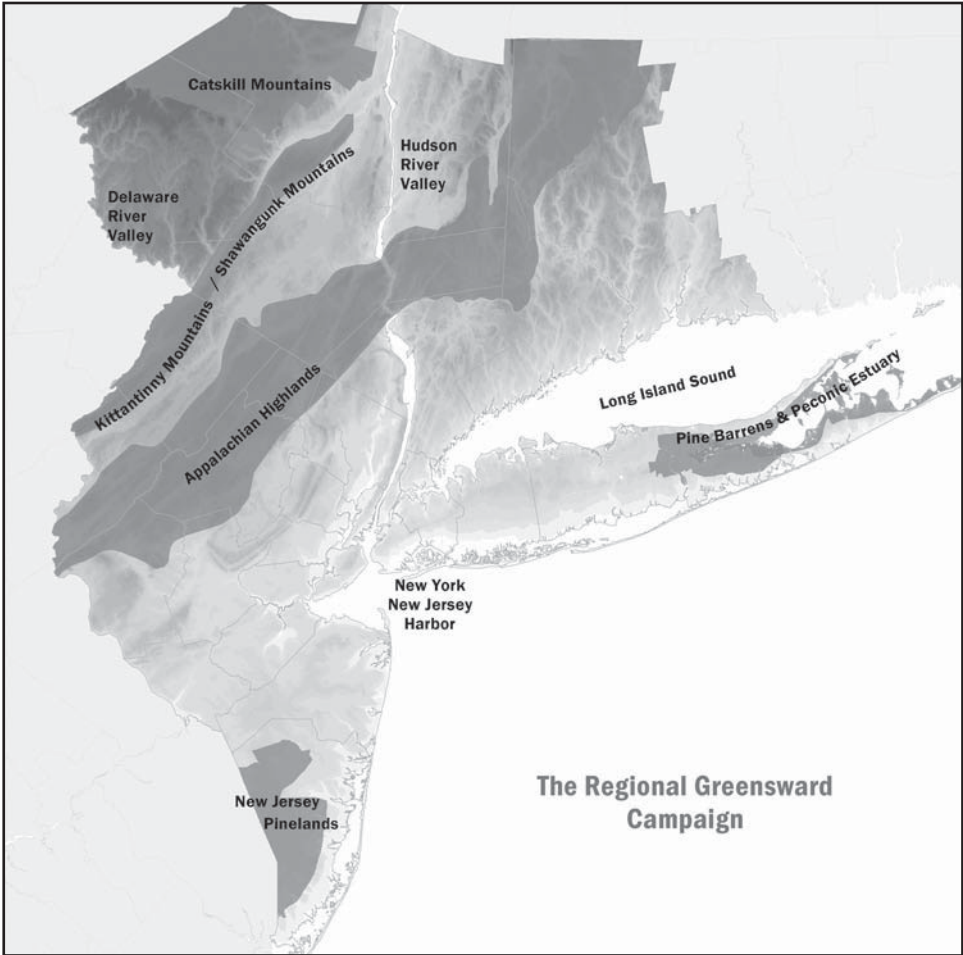
Figure 1　The Regional Greensward Campaign. Dark shaded areas are regional greenspaces proposed for preservation by the New York–based Regional Plan Association. (Map created by Jennifer R. Cox, RPA staff planner, 2006.)

As an example, the Westchester County park system spans more than 17,000 acres in fifty parks and recreational areas. The county government offers a wide range of educational, recreational, entertainment, and sporting events for all citizens. Demonstrating that alliances with higher levels of organization reinforces protected area management goals, the Westchester County Parks Department has the distinction of being the first county in New York State to become accredited by the National Recreation and Parks Association. By extension, a comprehensive biosphere reserve designation weaving together the parks in all thirty-one counties of the NYMR could provide the cohesion, networks, and support needed to transform the region's consciousness and therefore management of its rich though fragmented biosphere.

The principal objective of protecting the core in most biosphere reserves is to preserve critical biodiversity resources. Sustainability is often defined with respect to the level of long-term resource protection. The open space of the New York Metropolitan Region is collectively home to a wide array of species, comparable to similar coastal settings such as the Chesapeake Bay and Delaware Bay. The core of an NYMR reserve will be important with respect to ecological biodiversity and to societal and economic function.

Another important element of this reserve, like other urban BR planning efforts, is that it could become an opportunity for local community groups and other nongovernmental organizations to promote their urban environmental agendas. A New York biosphere reserve could serve as an urban laboratory for sustainability experimentation, such as an urban forestry project for urban heat-island reduction, enhanced use of bicycle commuting along greenways and trails, and the use of conservation areas for flood control. To enhance the societal function of the core for the region as a whole, its ecological function needs to be sustained as well. In turn, to sustain the ecological function of the core, the environmental inputs from the buffer areas (e.g., the surrounding lands directly adjacent to the core areas) and other nearby transition-zone population centers (e.g., within five to twenty kilometers, depending on the BR scenario adopted) need to be better understood as well. Gathering information about these interactions and feedbacks could help foster an increased appreciation of the ecological and environmental interconnections between the various parts of the region among decision makers, stakeholders, and the general public.

Similar to other urban BRs, in the case of the New York reserve, there will be bidirectional connections between the core and adjacent areas. The buffer and transitions areas protect the core, as typically in most BRs, and the core via ecological services and benefits will serve the buffer and transition zones. The protection of the core preserves the ecological integrity of the areas and simultaneously enables it to fulfill its critical role as a social resource of the region.

There are analogous situations in more traditional biosphere reserves where the reserve itself is the center of the social conditions and consciousness of the region; this relationship, however, is rarely described in such explicit terms. For example, what would become of the Greater Yellowstone region without Yellowstone National Park and other protected open space? These lands, like Yellowstone National Park, embody both the ecological and social core of the region. This type of interaction seems to be growing in recognition in São Paulo through the emergence of the Green Belt Biosphere Reserve (São Paulo Forest Institute 2004). Developing this kind of regional consciousness could be the greatest achievement of the New York BR.

Regional planning is challenging in urban areas such as the New York Metropolitan Region where home rule and a splintered political landscape characterize the region (Gunderson, Holling, and Light 1995). Short-term political concerns tend to dominate, and long-term biodiversity and ecological issues are often not understood to have wide-reaching societal effects. Policy responses to biodiversity protection are also hampered by the generally reactive nature of management organizations. Institutional action is often directed at immediate and obvious problems; issues that might emerge fully only after several decades are perceived as less pressing. These issues are compounded by fiscal distress in the region, caused in part by recovery efforts after September 11, 2001, which are focused primarily on rebuilding lower Manhattan.

Several initiatives will help build the necessary foundation for a biosphere reserve strategy: (1) increased communication and cooperation among nongovernmental groups, agencies, and research institutions; (2) methods for defining and entraining potential biodiversity effects into planning decisions, and (3) education and outreach programs. For education programs, a media campaign is needed, with broad dissemination of a carefully written mission statement reflecting the various stakeholder interests involved. Communication and cooperation are developing in the region across a wide range of sectors groups. For example, the H_2O Initiative is encouraging a large-scale watershed approach to understanding the region's ecosystem function (Hiss and Meier 2004). The Nature Network, a coalition of more than three dozen environmental science and education organization of the New York metropolitan area, was launched in April 2005. The goal of this effort is to provide a framework that allows the member organizations to work together to provide the public with a better understanding of the importance of biodiversity and the programs available to protect it.

Designation of a biosphere reserve in the New York metropolitan area could facilitate better understanding of the environmental connections between different parts of the region, be more responsive to potential environmental changes on longer time horizons, and be more flexible in the face of increased environmental uncertainty. By embracing the urban BR strategy, the NYMR could once again

serve as a testing ground for new initiatives to meet the environmental challenges known collectively under the rubric of "the transition to sustainability" (Board on Sustainable Development 1999). The goal is for New York City and its environs to be known not only as the "empire city," but also as the "ecological city," a place where the richness of both biological and societal diversity flourishes.

Acknowledgments

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