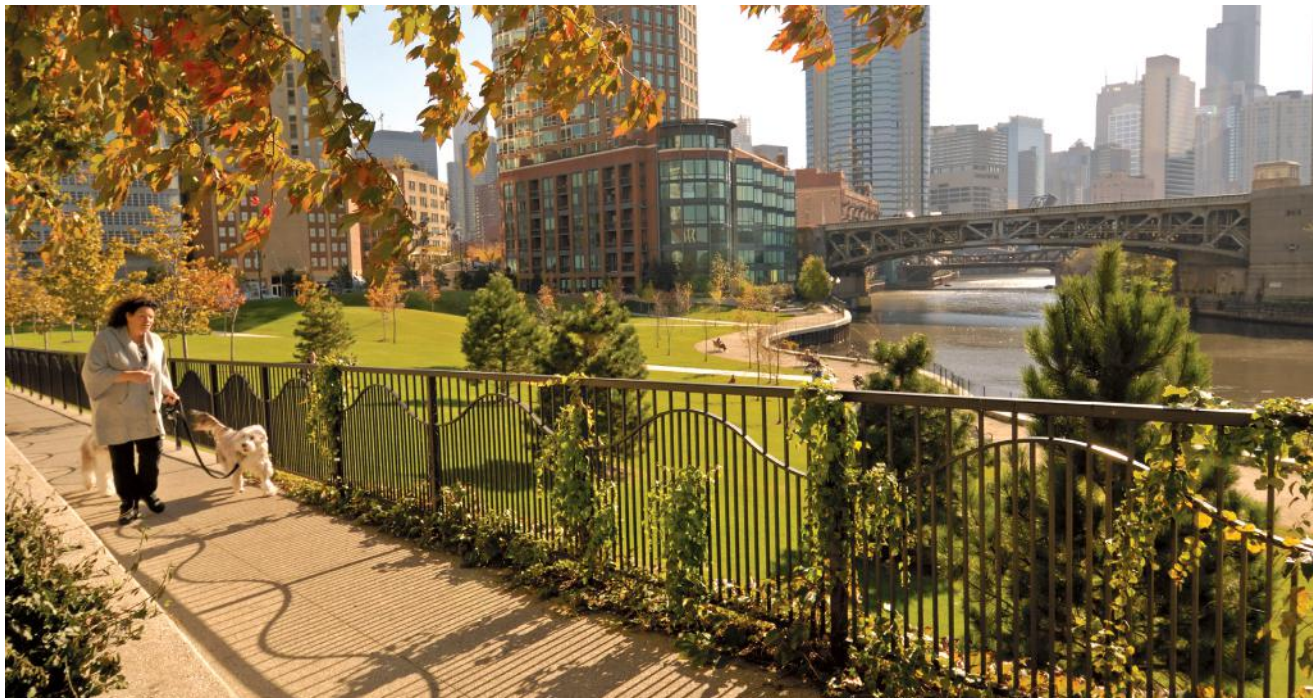


# CONSERVATION: AN INVESTMENT THAT PAYS



THE TRUST *for* PUBLIC LAND

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CONSERVING LAND FOR PEOPLE



# CONSERVATION: AN INVESTMENT THAT PAYS THE ECONOMIC BENEFITS OF PARKS AND OPEN SPACE

WRITTEN BY

Erica Gies

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THE  
TRUST  
*for*  
PUBLIC  
LAND

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# ABOUT THE TRUST FOR PUBLIC LAND

The Trust for Public Land (TPL) conserves land for people to enjoy as parks, community gardens, historic sites, rural lands, and other natural places, ensuring livable communities for generations to come.

## **TPL's CONSERVATION INITIATIVES**

- **Parks for People:** Working in cities and suburbs across America to ensure that everyone—in particular, every child—enjoys close-to-home access to a park, playground, or natural area.
- **Working Lands:** Protecting the farms, ranches, and forests that support land-based livelihoods and rural ways of life.
- **Natural Lands:** Conserving wilderness, wildlife habitat, and places of natural beauty for our children's children to explore.
- **Heritage Lands:** Safeguarding places of historical and cultural importance that keep us in touch with the past and who we are as a people.
- **Land & Water:** Preserving land to ensure clean drinking water and to protect the natural beauty of our coasts and waterways.

## **TPL's CONSERVATION SERVICES**

- **Conservation Vision:** TPL helps agencies and communities define conservation priorities, identify lands to be protected, and plan networks of conserved land that meet public need.
- **Conservation Finance:** TPL helps agencies and communities identify and raise funds for conservation from federal, state, local, and philanthropic sources.
- **Conservation Transactions:** TPL helps structure, negotiate, and complete land transactions that create parks, playgrounds, and protected natural areas.
- **Research & Education:** TPL acquires and shares knowledge of conservation issues and techniques to improve the practice of conservation and promote its public benefits.

Since 1972, TPL has worked with willing landowners, community groups, and national, state, and local agencies to complete more than 3,000 land conservation projects in 46 states, protecting more than 2 million acres. Since 1994, TPL has helped states and communities craft and pass over 330 ballot measures, generating almost \$25 billion in new conservation-related funding.

Visit TPL on the web at [www.tpl.org](http://www.tpl.org)

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# FOREWORD

In 1999, The Trust for Public Land published its first report on the economic benefits of parks and open space. Some of the ideas in the report had been around since at least the mid-19th century, when pioneering landscape architect Frederick Law Olmsted predicted that New York's Central Park would prompt a dramatic increase in the value of real estate on nearby land. But even 150 years later, many people still thought about parks and conservation primarily as a public expense and not an investment.

Much has changed in the last decade. Today communities usually don't ask *whether* parks and open space benefit economies, they ask *how large* those economic benefits might be. They are coming to realize that all of the other benefits brought by parks and open space—improved recreation and health, cleaner water and air, easier access to the outdoors, even stronger communities—also can engender economic benefits in the form of increased tax receipts, stronger economies, a better ability to attract businesses and residents, and reduced costs for environmental services.

*Conservation: An Investment That Pays*—like TPL's other reports on the economic benefits of parks and conservation—is intended to help agency personnel and community conservationists make the case for conservation as a long-term economic investment. Too often, we still hear the argument that creating parks and conserving land is too expensive, especially in hard economic times. We hope that the research and many examples cited in the report will help you to promote conservation for its many benefits, including the boost parks and open space can give to a community's bottom line.

Will Rogers, President  
The Trust for Public Land

## PREFACE

More than 20 years ago, The Trust for Public Land started collecting references and research on the economic benefits of creating parks and conserving natural lands. *Conservation: An Investment That Pays* is the third publication in what has become one of the most downloaded series of offerings on TPL's website. Our goal has been to provide conservation advocates with tools to make the case for conservation as a wise use of the public dollar—an investment rather than a cost.

This paper also is one of a series of white papers on the many and interrelated benefits that parks and conserved lands bring to communities. Other papers in the series include *The Benefits of Parks* and *The Health Benefits of Parks*. All TPL publications on the benefits of parks and open space, including economic benefits, are available in the Research section of [www.tpl.org](http://www.tpl.org).

Information about the economic benefits of parks and open space has burgeoned over the last 20 years. Hardly a week goes by without the appearance of a new academic study or news story illustrating these benefits. It is now widely understood that parks, greenways, and natural lands can boost property values, attract and support businesses, save energy and water-treatment costs, and safeguard the natural systems on which our economic well-being depends.

In addition to *more* information, we have *better* information about the economic benefits of parks and open space. Research, including that sponsored by TPL's own Center for Conservation Finance and Center for City Park Excellence, has focused on new ways of putting dollar values on the many benefits parks and natural lands bring to communities—including benefits that were not even considered two decades ago, such as the sequestration of carbon to mitigate costly climate change.

It is not the intent of this paper to provide an analysis of how the economic benefits of parks and open space are measured. And given the proliferation of studies and news items touching on this topic, we cannot claim that this is an exhaustive treatment of the topic. But we have tried to collect and put into context the most pertinent recent studies and news items on the topic, along with citations of the sources so that curious readers can explore further.

TPL is releasing this white paper in the midst of a worldwide economic downturn. In such times, it is especially important that conservationists and park advocates be able to make the case that parks and open space are not amenities but important investments in community well-being—including economic well-being. We hope that the examples and research cited in this paper will help.

William Poole  
Senior Director, Marketing Communications  
The Trust for Public Land

# PARKS BOOST LAND VALUES AND PROPERTY TAXES

According to real estate experts, Chicago's new Millennium Park "is an economic engine powering the East Loop." Homes on or near the park sell for premium prices, and property taxes on those homes help to offset the park's \$475 million cost. A study by the city's Department of Planning and Development estimates that residential units in blocks near the park have increased in value \$100 per square foot. So a 1,400-square-foot condo would be worth \$140,000 more because of its proximity to the park. The same study estimated that in the decade following the park's 2004 opening, the additional value of all residential development attributable to the park in those blocks would be \$1.4 billion.<sup>1</sup>

Millennium Park is only one example of what real estate experts have known for a long time: parks can increase the value of surrounding land and development. In another recent example, when Centennial Olympic Park was built in Atlanta for the 1996 Olympics, prices on condominiums adjacent to the park rose from \$115 to \$250 a square foot.<sup>2</sup>

The increased value in land near parks is passed on to cities in the form of higher property taxes. These additional taxes can be used to pay for building and maintaining the park. This pricing phenomenon and the funding mechanism it enables are known as the "proximate principle."<sup>3</sup>

Pioneering landscape architect Frederick Law Olmsted, designer of New York's Central Park, was one of the first people to suggest that parks could be paid for with increasing tax revenues that resulted from rising land values adjacent to the park.<sup>4</sup>

## STUDIES DEMONSTRATE INCREASED RESIDENTIAL PROPERTY VALUES

In the 150 years since Olmsted designed Central Park, more than 30 studies have demonstrated a positive effect on nearby residential property values.<sup>5</sup> Recent examples include the following:

- In 2007, TPL's Center for City Park Excellence found that Philadelphia properties within 500 feet of parks or recreation land were worth an average of 5 percent more than land without this proximity. Researchers calculated a total increased value of \$688.8 million and additional property taxes of more than \$18.1 million.<sup>6</sup>
- In 2001, as an MIT researcher, Andrew Miller investigated land values in suburban communities in north Texas. He found that homes immediately adjacent to parks were worth 22 percent more than homes 2,600 feet away from a park. About 75 percent of that increased value lay within 600 feet of the park. Miller also found that residents valued large parks more than small ones, but proximity had a greater effect on a home's value than a park's size. In addition, people living on small lots were willing to pay higher premiums to live near parks than people living on larger lots.<sup>7</sup>
- In another 2001 study, Texas A&M University researcher John Crompton looked at property values near what he called "community-sized" parks (i.e., between 20 and 35 acres). He found an increase in property values attributable to the park extended at least 2,000 feet from it.<sup>8</sup>
- A 2002 study compared the value of properties bordering permanently protected forests with those near unpreserved forests in three residential subdivisions in Grand Rapids, Michigan. Studying property sales from the late 1970s through 2000, the researcher Paul Thorsnes concluded that lots bordering permanently conserved forests sold for 19 percent to 35 percent more than lots more distant from the preserves. This was true in all three subdivisions. On the other hand, properties adjacent to unpreserved forests showed no increased value in two of the subdivisions and a much smaller increase in the third one.<sup>9</sup>



Proximity to open space or parks is most likely to increase property values where parks and open space are at a premium (as in cities), where communities are feeling the pressures of suburban sprawl, and around lands that are permanently protected.<sup>10</sup> However, parks with active recreation, such as ball fields or playing courts, may not increase the value of nearby properties as much as what are sometimes referred to as “passive parks” without active recreation.<sup>11</sup>

It is important also that parks be well planned and maintained if they are to increase the value of adjacent lands. Poorly maintained city parks have been shown to lower the value of adjacent properties, especially if areas are not visible from the street and become magnets for crime, or if they reduce the privacy of nearby residents.<sup>12</sup>

### **PARKS INCREASE COMMERCIAL VALUES**

Creating or rehabilitating parks also can spur an increase in the value of nearby commercial properties. One frequently cited example is that of Manhattan’s Bryant Park. This eight-acre park behind the New York Public Library was long considered dangerous and attracted drug use and other crime. Rebuilt and reopened in 1991, the park is today one of the most attractive spots in midtown—a popular lunch venue for workers and students and the location of such high-profile events as New York’s fashion week.<sup>13</sup>

Between 1990 and 2002, rents for nearby commercial office space around Bryant Park increased from 115 percent to 225 percent, while surrounding submarkets saw only a 41 percent to 73 percent increase in similar properties.<sup>14</sup>

Some funding for the privately managed park comes from assessments on surrounding property owners by the Bryant Park Business Improvement District, tapping into this increased value. But much of the park’s current funding comes from concession and usage fees and restaurant and rental income, reducing the need for these assessments.<sup>15</sup>

Boston’s businesses also are benefiting from that city’s investment in park space. The city finished its 16-year Big Dig at the end of 2007, but as early as 2004, commercial properties abutting the project’s proposed Rose Kennedy Greenway were already seeing financial gain. A review of Boston tax-assessing records by the *Boston Globe* showed that the value of commercial properties along the proposed mile-long greenway increased to \$2.3 billion between 1988 and 2003, up 79 percent. That’s nearly double the 41 percent citywide increase in assessed commercial property values during the same period.<sup>16</sup>

Vancouver, Washington’s \$6 million renovation of downtown Esther Short Park attracted \$250 million in new capital investment. This includes the Vancouver Center complex of apartments and condominiums, a 226-room hotel, and a convention center; a 160-unit public housing project; and a six-story office building.<sup>17</sup>

# PARK BOOST LOCAL ECONOMIES BY ATTRACTING BUSINESSES AND RESIDENTS

Today the U.S. economy is dominated by high technology and service businesses selling knowledge and intellectual expertise. Unlike the manufacturing businesses that drove the economy in decades past, enterprises in the emerging knowledge economy are not tied to specific business locations by the need for certain kinds of transportation facilities or raw materials. With more freedom to choose a site, businesses often select one with a high quality of life—including parks, open space, and easy access to the outdoors—in order to compete for the highly trained, in-demand workers of the knowledge economy.

In his 2002 book *The Rise of the Creative Class*, Richard Florida reports how the conventional wisdom in business has shifted. People used to believe that a decrease in environmental quality was one trade-off for economic growth, but in the new economy, business leaders recognize that a good environment is ranked as the most important amenity in attracting high-technology workers—more than housing, cost of living, and good schools. He terms this desirable trait “quality of place.”<sup>18</sup>

According to planning and open space researcher John Crompton, “quality of life is not only important in relocation, expansion, or initiation decisions, it is also important in employee retention and has an economic bottom line . . . If a community commits to a long-term, comprehensive plan to enhance the factors that it can control that positively influence the quality of life, it is likely to have an advantage over other places when recruiting and retaining business.”<sup>19</sup>

In fact, according to Crompton, companies based in less desirable areas must pay “disamenity compensation,” in the form of higher salaries to attract the same caliber of worker. And quality of life plays a role in keeping employees happy and reducing turnover, thus reducing a company’s outlay on the expensive recruiting and training process.<sup>20</sup>

Several researchers have studied how quality of life affects location choices of small businesses, important drivers of the U.S. economy. Small businesses:

- employ about half of all private-sector employees,
- pay more than 45 percent of all U.S. private payroll,
- have generated 60 percent to 80 percent of net new jobs annually over the last decade,
- hire 40 percent of high-tech workers (such as scientists, engineers, and computer workers), and
- made up 97 percent of all identified exporters and produced 28.6 percent of the known export value in FY 2004.<sup>21</sup>

For a 1997 study, researchers interviewed 174 small-business decision makers whose businesses had relocated to, expanded in, or been launched in Colorado during the previous five years. Respondents reported that quality of life was the main reason for choosing the area. Specifically, they ranked parks, recreation, and open space amenities as the most important quality-of-life factors influencing these choices.<sup>22</sup>

Communities that do not cultivate this quality of life will lose out to others that do.<sup>23</sup>

Some researchers have tried to put a number on the degree to which quality of life matters in attracting workers. In 1998, the management-consulting firm KPMG surveyed 1,200 technology workers and concluded that a community's quality of life increased the attractiveness of a job by 33 percent.<sup>24</sup>

According to a publication by the American Planning Association, knowledge workers are drawn to cities with easily accessible outdoor recreation, such as walking trails and rock climbing. Among the cities popular with these workers are Seattle; Portland, Oregon; San Francisco; Denver; and Austin, Texas, which are also among the nation's top cycling cities.<sup>25</sup>

### **PARKS AND OUTDOOR ACCESS HELP ATTRACT RETIREES**

According to the U.S. Census Bureau, by 2050, one in every four Americans will be 65 or older. Many communities work actively to attract retirees, especially affluent retirees, since they often bring with them income from pension plans, Social Security, military retirement benefits, or investments and pay more in local taxes than they use in services. For example, retirees rarely send children to the local schools their taxes help support.<sup>26</sup>

In a 1998 study of 270 retirees who had migrated to the Texas Lower Rio Grande Valley in the previous year, respondents were asked to rank 26 items that could push people to relocate upon retirement. "Desire to live in a more recreationally enjoyable area" and "desire to live in a place where recreation opportunities are plentiful" ranked second and third behind "desire to get away from cold weather," suggesting that communities that fail to provide recreation opportunities for retirees are likely to see their tax base erode when retirees leave the community.<sup>27</sup>

As with knowledge workers, quality of life is an important determining factor when retirees and empty nesters (couples whose children are grown) choose a community in which to settle. These groups are particularly attracted to walkable, compact, mixed-use urban areas near parks or more rural communities near open spaces.

# GOOD PARKS ENCOURAGE ECONOMIC DEVELOPMENT

## URBAN PARKS GENERATE TOURIST DOLLARS

Research over many years has demonstrated that showcase urban parks can boost local economies by drawing tourists. For example:

- Chicago's Millennium Park has proved to be a great draw for tourists since it opened in 2004. According to an economic impact study prepared by URS Corporation and the Goodman William Group, the park in its first six months attracted two million people. (Three million are expected annually.) The study found that international visitors to the park spend an average of \$300 per day in Chicago, and domestic visitors who stay in the city overnight spend an average of \$150. From 2005 to 2015, total spending by visitors to Millennium Park is expected to range from \$1.9 billion to \$2.6 billion for hotels, restaurants, and retail purchases.<sup>28</sup>
- Seattle's Olympic Sculpture Park opened to great fanfare in 2007. The nine-acre park showcases works of art by world-renowned sculptors on a sloping, elegantly landscaped downtown site overlooking Elliott Bay. (The Trust for Public Land helped the Seattle Art Museum acquire the parcel—a former oil tank farm—in 1998.) According to a story in the *Puget Sound Business Journal*, even before the park's opening, area restaurants were looking forward to new business from the anticipated 600,000 annual park visitors, and nearby condominium developments were experiencing “an astonishing run-up in prices.”<sup>29</sup>
- TPL's Center for City Park Excellence found that out-of-town tourists who came to Philadelphia primarily because of its parks (including the well-known Independence National Historic Park) spent \$40.3 million in that city in 2007.<sup>30</sup>

## TOTAL VALUE OF A PARK SYSTEM TO A CITY

For several years, TPL's Center for City Park Excellence has been working with economists to develop methods to study the many ways that park and recreation systems contribute economic value to cities. In 2008, at the request of the Philadelphia Parks Alliance, the center used its methodologies to analyze the value of Philadelphia's park and recreation system.

Based on the analysis, the center found that in 2007 the Philadelphia park system provided the city with revenue of \$23.3 million, municipal savings of \$16 million, resident savings of \$1.15 billion, and a collective increase of resident wealth of \$729 million.<sup>31</sup>

These figures included more than \$1.08 billion in what economists call “direct-use value” of parks, including sporting activities, walking, picnicking, and other park visitation. These values are calculated by asking residents what they would be willing to pay for these activities if they were not available free from the park system.<sup>32</sup>

Other economic benefits for Philadelphia are detailed elsewhere in this white paper, including the value of clean air, clean water, tourism, health, and property values.

In 2009, the center released *Measuring the Economic Value of a City Park System*, which lays out its methods for determining the economic value of park systems, including the one in Philadelphia.<sup>33</sup>

## NATIONAL PARKS AND REFUGES BENEFIT SURROUNDING AREAS

National parks and federal lands that support recreation may be one of the greatest bargains in the federal budget. For example, in 2006 recreational use of the National Wildlife Refuge System generated almost \$1.7 billion in total economic activity, almost four times the \$383 million federal appropriation to the refuge system in fiscal 2006.<sup>34</sup> And a 2006 report for the National Parks Conservation Association showed that for every \$1 appropriated in the annual national parks budget, the national park system generates at least \$4 for state and local economies.<sup>35</sup> This figure includes only benefits from direct recreational use, such as money spent on travel, lodging, food, and other goods and services.

Nationwide, national parks support 267,000 private-sector jobs and generate \$13.3 billion in economic activity in nearby communities.<sup>36</sup> The proximity to national parks of so-called gateway communities allows them to attract new businesses and residents, boosting community prosperity. Over the past three decades, the economic growth of gateway communities has averaged 1 percent per year higher than average economic growth in their respective states.<sup>37</sup>

In 2001, economist Thomas Michael Power completed an economic impact assessment for a proposed large national park and preserve in the Maine woods. To do this, he analyzed the economic vitality of counties surrounding 22 national park areas of more than 250,000 acres around the country. He noted that when each park was created, local residents and governments had expressed concern about the park's potential deleterious economic effects. In fact, he found that approximately 90 percent of the areas surrounding the parks had experienced above-average increases in population, job growth, and aggregate real income. Averaged across all 22 areas of study for the 30-year period prior to 1998, job growth was almost three times faster than the national average, while aggregate real income grew twice as fast as the national average.<sup>38</sup>

A 2003 analysis published by the National Parks Conservation Association found that from 1987 to 1997, "gateway counties . . . to national parks enjoyed a 40 percent growth in total personal income (all income received by individual and households)," while "income in non-park counties grew at less than two-thirds that rate. During the same time, total employment (all full- and part-time jobs) in park gateway counties grew almost twice as fast as in counties not adjacent to national parks."<sup>39</sup>

Recent studies have highlighted these benefits in specific gateway communities.

- The same 2003 study focused on economic changes in Flathead County, Montana, home to gateway communities of Glacier National Park. Between 1993 and 2003, employment in the county increased nearly 50 percent with the creation of 15,700 new jobs. Conforming to a trend seen in other gateway communities, most of these jobs were not seasonal or tourist oriented but rather stable positions catering to a growing community, such as health care, business services, construction, and manufacturing. One thousand new businesses were established during this decade, a 44 percent

increase. Per-capita income rose 13 percent. Between 1990 and 2000, the population of Flathead County grew 26 percent. Migrants were attracted by the jobs and a quality of life centered on a small-town, friendly atmosphere and outdoor recreation. County unemployment rates in 2003 were the lowest in three decades.<sup>40</sup>

- In 2004, economist Ray Rasker reviewed economic changes in Kane County, Utah, following the 1996 creation of nearby Grand Staircase-Escalante National Monument. Rasker compared data from the four years prior to the monument's creation with the four years after it was established. During the latter period, unemployment dropped by more than half. Per-job earnings were up 13 percent postmonument. Property values increased, and hotel-room revenues increased about 20 percent.<sup>41</sup>

## REVENUE FROM RECREATION PRODUCTS AND INDUSTRIES

Protected forests, wildlife areas, and natural lands support leisure time and recreational activities—such as hunting, fishing, mountain biking, camping, wildlife viewing, and mountain climbing—that pump dollars into local economies.

- A 2006 survey by the U.S. Fish & Wildlife Service reported on the spending habits of hunters, fishers, and wildlife watchers. More than 87 million Americans participated in these activities in 2006, and their spending totaled \$122.3 billion. Of that, \$64.1 billion was spent on sporting equipment, \$27.4 billion was trip related, and \$20.7 billion went to other items.<sup>42</sup>
- According to a report by the Congressional Sportsmen's Foundation in partnership with the National Shooting Sports Foundation, hunters and anglers support more jobs nationwide (1.6 million) than does Wal-Mart (1 million), the country's largest corporation.<sup>43</sup>
- In 1995, U.S. Forest Service economists found that of the \$125 billion generated annually from forest service lands, 75 percent was from recreation and just 15 percent was from extractive activities, such as timber and mining.<sup>44</sup>

The economic importance of wilderness to the \$18 billion outdoor recreation industry was brought home in a 2003 debate over whether the Outdoor Retailer trade show should stay in Salt Lake City, where it had been held since 1996, bringing the city \$24 million in annual revenue. Peter Metcalf, CEO of Black Diamond Equipment—a manufacturer of climbing and skiing equipment—penned an op/ed in the *Salt Lake Tribune* after learning that then governor Mike Leavitt was working to overturn a policy that would have extended Utah's protected federal wilderness by almost six million acres.

“Wild and undeveloped places are the economic backbone of the outdoor recreation industry,” Metcalf wrote. He called upon politicians to “recognize the economic values of public lands as a top priority, not a secondary consideration.”

In the end, Utah allowed the policy to stand, and the show stayed in Salt Lake City. “This discussion is usually presented as wilderness versus jobs,” Scott Groene, director of the Southern Utah Wilderness Alliance, was quoted as saying. “That was the first time we had an honest discussion about wilderness *plus* jobs.”<sup>45</sup>

## CONSERVATION AS A MONEY-SAVING ALTERNATIVE TO SOME DEVELOPMENT

Land conservation is often placed in opposition to development when communities are considering how land should be used. Most often, the assumption is that conservation costs money—both for land acquisition and because land is then removed from the tax rolls—while development is thought to bring communities new taxes.

In fact the situation is much more complex. Many studies have shown that residential development in particular may cost communities more money than they stand to gain in taxes, and that conserving land may make more economic sense over the long term.

Just as important, conservation is an important strategy for communities seeking to create denser, lower-cost, more sustainable development patterns as opposed to low-density sprawl. Setting land aside for recreation and parks makes denser living more attractive.

### SPRAWL DEVELOPMENT IS EXPENSIVE

The latter-20th-century development pattern known as sprawl consumes two million acres of land in the United States each year.<sup>46</sup> This pattern is characterized by spread-out, low-density housing, strip malls, chain restaurants, and big-box chain retailers.

One broad and frequently used measure of sprawl is overall land consumption compared to population density. Using this measure, a 2001 study by the Brookings Institution found that between 1982 and 1997, the amount of urbanized land in the United States increased by 47 percent, from approximately 51 million acres to approximately 76 million acres. During this same period, the nation's population grew by only 17 percent.<sup>47</sup>

Beginning with a landmark 1974 study by the Real Estate Research Corporation, economists and researchers have repeatedly examined the cost of residential sprawl development and concluded that it costs developers, cities, and residents more to build and maintain than compact, mixed-use development.

A 2002 article in the *Journal of the American Planning Association* detailed the costs of providing water and sewer services to homes on larger lots, which require longer, more expensive distribution mains and higher pumping costs. With other factors held constant, an increase in lot size from 0.25 to 1 acre was found to nearly double the cost to a developer for installing sewer and water service. Each household then pays more for water and sewage services: \$392 versus \$204 annually.<sup>48</sup>

At the same time, compact development reduces state and municipal outlay on road maintenance and delivery of services, including water, solid waste, transit, and school bus. Fire departments can reach emergencies more quickly with fewer personnel. Public transit becomes possible when there is a certain density of commuters in a concentrated area because fewer vehicles are required to serve shorter routes.<sup>49</sup>

Dr. Robert Burchell, co-director of the Center for Urban Policy Research at Rutgers University, has headed several studies attempting to quantify the cost of sprawl development. In a 2005

study, *Sprawl Costs: Economic Impacts of Unchecked Development*, Burchell and researchers estimated the financial costs of sprawl to urban areas during the years 2000–2025. The highest anticipated costs were in Los Angeles (\$535 billion), Washington/Baltimore (\$384 billion), and the San Francisco Bay area (\$378 billion). On a per-capita basis, residents of Las Vegas would pay the highest costs, at \$72,697. Shifting only 25 percent of anticipated low-density development to more compact development could save billions of dollars over time, the authors concluded. For example, the Sacramento area would save \$8.2 billion, or more than \$3,600 per resident.<sup>50</sup>

“We are all paying a staggering price for sprawling development in this country, and that price will only go up as gas prices increase,” Burchell has written. “Sprawling communities need longer public roads, increase the cost of new water and sewer hookups by 20 percent to 40 percent, impose higher costs on police and fire departments and schools, and more. These costs are passed on to businesses and residents through higher taxes and fees and sometimes through fewer public services. And in most cases, sprawling residential developments do not generate enough property taxes to cover these added costs.”<sup>51</sup>

### **COSTS OF RESIDENTIAL DEVELOPMENT VERSUS CONSERVATION OF FARMS, RANCHES, AND FORESTS**

Farms, ranches, and forests are among the most common U.S. lands to be developed. For more than 15 years economists have been assessing the net economic benefit to communities of developing such lands. These “costs of community services” (COCS) studies are a subset of a much larger field known as fiscal analysis. The studies weigh anticipated economic benefits from various forms of development against the cost of delivering infrastructure and services to the development, such as schools, roads, and fire and police protection.

The American Farmland Trust (AFT) has conducted many of these studies and continues to promote them. AFT lists 128 COCS studies completed in 25 states between 1989 and 2007. Averaging the results of those studies reveals that for every dollar communities realized from residential development, they had to deliver \$1.16 in services. On average, lands developed for commercial or industrial use required communities to deliver only \$0.29 in services for every dollar realized. But keeping land in agriculture is also cost effective, the research suggests. On average, farms and ranches demanded only \$0.37 in community services for each dollar of economic benefit.<sup>52</sup>

Specific results differ from community to community, of course. But in general, results show that delivering services to residential development almost always costs more than the community can expect to realize in taxes and other benefits. The results also show that keeping the land in ranching, farming, or forestry often produces nearly as much net economic benefit to a community as commercial or industrial development.

More generally, researchers have identified four economic benefits that can come from protecting productive agricultural land. These include:

- a viable, local agricultural industry with employment opportunities,
- rural and environmental amenities, including viewsheds and wildlife habitat,
- local and national food security, and
- orderly and fiscally sound development of urban and rural land.<sup>53</sup>



## **CONSERVATION EASEMENTS TO PROTECT WORKING LANDS**

Farms and ranches are sometimes referred to as “working lands,” because they produce products and value for communities. The category also includes forests that produce timber and other wood products in a sustainable manner.

Agencies and communities often turn to conservation easements as a tool to preserve the economic and other values of working farms, ranches, and forests while preventing environmental and economic costs that may be associated with inappropriate development.

Typically, a conservation easement (known in some states by other names, such as “agricultural preservation agreement” or “purchase of development rights”) keeps ownership of the land in private hands while conveying certain rights associated with that ownership to a third party, such as a nonprofit, land trust, or government agency. Often, the landowner receives payment for the value of those rights.

As a result, the land can be kept in productive agriculture or sustainable forestry while the permanently enforceable easement can stipulate land uses according to community goals. For example, it might forbid or limit development and preserve viewsheds, watersheds, stream corridors, and wildlife habitat.

Key to understanding the economic impact of using easements and the purchase of development rights to protect farmland is that economic activity on the land does not stop. Lori Lynch, an economist at the University of Maryland, studied what farmers do with the money they earn from selling development rights as part of farmland preservation. Farmers in Maryland who had participated in conservation programs were more likely than other farmers to have invested in their farm over the past five years and to have attended workshops to learn new technologies and enhance their farming skills. According to the research, money paid to the farmers for the easement purchases circulated back into the local economy via debt reduction (35 percent of respondents), savings or farm investment (28 percent), farm operation financing (18 percent), or retirement investment (12 percent). Some bought more land or equipment.<sup>54</sup>

## **THE COST-EFFECTIVE ATTRACTION OF CONSERVATION SUBDIVISIONS**

One way to conserve land and increase housing density is by creating a conservation subdivision—a residential or mixed-use development where a sizable portion of the land is set aside permanently as undivided open space, with houses clustered on the remainder of the property.

The designs of these developments vary, although they often include trails as well as more developed commons areas such as ball fields or tennis courts. The preserved lands are protected from future development by conservation easements managed by the neighborhood homeowners association, a local land trust, or a public entity. The open space may serve as wildlife habitat and protect water quality and other natural resources while offering a place for interaction among neighbors.<sup>55</sup>

Conservation subdivisions can be cheaper to create than standard residential development. Clustering residences in one section of the building site allows for shorter roadways, sidewalks, water mains, utility lines, and other expensive infrastructure.

- One Texas conservation subdivision saved \$250,000 in grading costs alone compared to what a conventional subdivision on the same site would have cost.<sup>56</sup>

- Developers of Cane Creek, a 380-acre clustered development in Jackson County, Georgia, preserved 90 percent of total area as open space, on the high end for such projects. The designer estimated an infrastructure cost savings of 60 percent over conventional development.<sup>57</sup>
- Prairie Crossing in Grayslake, Illinois, 40 miles northwest of Chicago, features 350 acres of open space in the 677-acre development—including 160 acres of restored prairie, 158 acres of active farmland, 13 acres of wetlands, a 22-acre lake, a village green, and several neighborhood parks. The developers saved \$1 million in infrastructure costs through environmentally sensitive design.<sup>58</sup>

A 2006 study in *Urban Affairs Review* compared developed building lots in conservation subdivisions with those in conventional subdivisions in South Kingston, Rhode Island. Researcher Rayman Mohamed found that homes in conservation subdivisions were not only less expensive to build, they also carried a price premium and sold more quickly than homes in conventional subdivisions.<sup>59</sup>

## **PREVENTING PROPERTY LOSS FROM NATURAL DISASTER**

The first few years of the 21st century have seen dramatic public infrastructure and property losses due to hurricanes, floods, and fires. Hurricanes Katrina and Rita on the Gulf Coast and repeated raging wildfires in the West have made it clear that some lands are particularly prone to damage by natural disaster.

Ultimately, all taxpayers end up bearing the cost to rebuild after a natural disaster. Taxpayers cover damage to homes and businesses through payments from federal disaster insurance, other government rebuilding assistance, and higher premiums for private insurance.

Regulation has an important role to play in decreasing the costs of natural disaster. Regulations may stipulate where homes and businesses can be built and how those buildings should be constructed to decrease risk and damage from a natural disaster. But conservation has a role to play as well. Often, purchasing land for a public park or preventing development through the purchase of a conservation easement may be the most effective way to decrease risk and minimize damage from natural disaster.

## **CONSERVING FLOODPLAINS PREVENTS COSTS FROM FLOODING**

The Army Corps of Engineers spends more than \$1 billion each year on levees and other infrastructure projects designed to control floods and repair destruction from floods. Yet many of these projects actually increase repeated flooding, causing significant property damage.<sup>60</sup>

In 1999, Congress passed the Water Resources Development Act (WRDA). The act established the Flood Hazard Mitigation and Riverine Ecosystem Restoration Program, which allowed the Corps to buy out property owners in the floodplain.

Such an approach could save taxpayers billions of dollars because it would stop the cycle of paying for flood damages to the same buildings following successive floods.<sup>61</sup>

One place in which flooding and development have been studied extensively is around St. Louis, Missouri, which Nicholas Pinter, a researcher at Southern Illinois University Carbondale, calls the “epicenter of floodplain encroachment nationwide.”<sup>62</sup>

Before the historic midwestern flood of 1993, St. Louis County enlarged a small agricultural levee, which resulted in significant commercial and light industrial development in the floodplain. As a result, the tab for the 1993 flood was one of the highest in the region: more than \$200 million. Taxpayers footed the bill through subsidized flood insurance and disaster payments.<sup>63</sup>

On the other hand, adjacent St. Charles County learned an important lesson from the 1993 flood. The county offered to buy out and relocate homeowners in the floodplain. The county used \$5.78 million in funding from the Federal Emergency Management Agency (FEMA) and \$8.8 million from the Community Development Block Grant program to acquire 1,159 properties from willing homeowners, many of whom had experienced repetitive loss during other floods.<sup>64</sup> As a result, when another severe flood struck in 1995, the county’s need for federal disaster relief declined 99 percent as compared to the 1993 flood, from \$26.1 million to less than \$300,000.<sup>65</sup> The county transferred much of the land to the City of St. Charles to use as park and recreation areas, while other areas have been leased as gardens.<sup>66</sup>

Pinter insists that more floods are coming soon and that it makes economic sense to keep floodplains clear for their natural function.<sup>67</sup> “Every taxpayer in the country will pay the price when a flood like the one in 1993 next comes through,” he said.

Other communities also are figuring out that they can save money in property damages by acquiring land in floodplains for parkland, recreational open space, wildlife habitat, or protected watershed.<sup>68</sup>

- Columbus, Indiana, created Mill Race Park, where the Flatrock and Driftwood rivers form the east fork of the White River, an area subject to annual flooding. Dedicated in 1992, the 85-acre park features flood-tolerant native trees, active play spaces, picnic areas, and a popular amphitheater. Pathway material resists flood scouring, and playground equipment was chosen that could be easily replaced if damaged by floods. Buildings such as restrooms and the amphitheater were built of durable materials like steel tubing, wire mesh, concrete, and glass blocks, with plenty of drainage and air circulation built into the design.<sup>69</sup>
- Tulsa, Oklahoma, on the Arkansas River, led the nation with nine federally declared flood disasters in 15 years during the 1970s and 1980s. Two of these floods alone—remembered as the Memorial Day floods of 1976 and 1984—resulted in the deaths of 17 people and combined property damages of \$214 million. But after the 1984 flood, Tulsa launched a comprehensive, fiscally responsible flood-management program that included conservation of previously occupied floodplains. Using local and federal funds, including flood insurance checks, city leaders bought and removed approximately 500 flood-damaged homes and later acquired and relocated an additional 375 vulnerable buildings. Much of the floodplain has been used for recreation, open space, and nature preserves. Stormwater retention basins, dry except during floods, also are used for recreational activities. Along flood-control channels, maintenance lanes are used for hiking and biking trails, which are being linked together with other trails into a community-wide network.<sup>70</sup> Tulsa’s flood insurance rates dropped 25 percent and are now among the lowest in the country. Homeowners pay lower rates and suffer far less flood damage.<sup>71</sup>

- In 2006, the Grand and Chagrin rivers flooded Painesville, Ohio. Water rose in thousands of basements, and some citizens had to be rescued by boat. Following that flood, Painesville decided to use state and federal grants to buy and demolish 80 apartments and condos ruined by the flood. Assistant city manager Doug Elliott said the lowland area would be turned into a public park, paralleling a 55-acre park on the other side of the river. “It’s in a 100-year flood plain and not a place where we should be building any more homes,” Elliott told the *Cleveland Plain Dealer*.<sup>72</sup>
- Houston, Texas, is embracing its natural tendency to flood by creating greenways along its local waterways. The George Mitchell Preserve in The Woodlands, which will be 1,700 acres, twice the size of New York’s Central Park, opened in late 2007, and the 15-acre Brays Bayou Greenway in Houston broke ground at the same time. Twenty-five miles separate them currently, but city leaders plan for them to be linked someday by contiguous stretches of greenway that will serve as both recreation area and natural floodplain.<sup>73</sup> The Trust for Public Land has been helping government agencies in Houston plan for and create the greenway system.

## PRESERVING THE VALUE OF ECOSYSTEM SERVICES

Intact natural systems perform multiple critical services that have an economic value. These include providing drinkable water, breathable air, and a stable climate; recycling waste; pollinating food crops; and providing physical buffers against storms. Sometimes these values are easy to calculate—for example, when conserving a watershed avoids the need for costly water clean-up technology. Other values of natural systems can be harder to tally, although environmental economists are making strides in this area.<sup>74</sup>

Businesses and industries that gain value directly from ecosystem services include pharmaceutical companies, which use nature's genetic resources, and agriculture, for which nature supplies pollination, soil fertilization, and pest control. Tourism profits from visits to ecosystems worldwide, and the insurance industry relies on natural features like intact wetlands and coral reefs to mitigate losses from storms.<sup>75</sup>

In 1997, Robert Costanza of the University of Vermont and other researchers attempted to put a total value on ecosystem services worldwide. To arrive at an economic value for clean water and air, climate regulation, crop pollination, and other key services, the researchers asked how much it would cost to build mechanical systems to perform the services or what it would cost to restore the natural systems should they fail. Published in the journal *Nature*, their paper estimated that value at \$33 trillion annually. At the time the gross world product—the total value of human economic activity—was approximately half that figure.<sup>76</sup>

Costanza was at the leading edge of economic science when he published his 1997 paper, and the notion that you could put a dollar value on natural services was inherently controversial. In the years since, ecological economists including Costanza have refined the science and more recent studies have employed these principles to judge the value of specific ecosystems. For example, one study pegged the value of Florida's wetlands at \$106,333 per acre per year, just for storm protection; New York's wetlands at \$689,700 per acre per year;<sup>77</sup> and New Jersey's saltwater wetlands at \$208,973 per acre per year.<sup>78</sup>

John Loomis, a Colorado State University economist and researcher, and his doctoral student Robert Richardson estimated the ecosystem services benefit of the 42 million acres of roadless acres in the United States at between \$1 billion and \$1.5 billion.<sup>79</sup>

Conservation of natural lands can be an important way to protect these ecosystem values. When habitat becomes fragmented, natural systems break down and do not deliver the services they once did.<sup>80</sup> The authors of the Millennium Assessment—a four-year, international, scientific appraisal of trends in the earth's ecosystems—found that the ability of ecosystems to perform these services is being diminished as never before. About 60 percent of the ecosystem services in their assessment are being degraded or used unsustainably.<sup>81</sup>

### CONSERVATION FOR WATER QUALITY

Watershed conservation has proved to be a cost-effective alternative to expensive water-treatment technology in keeping drinking water clean. Water sources can become polluted when sediment, pesticides, oil, and other chemicals wash into them from streets, parking lots, and lawns. Conserving land along the sides of streams and other drinking water sources prevents this pollution.<sup>82</sup>

Natural hydrological systems recharge and cleanse the watershed. Roots of wetland plants filter and remove suspended materials. Plants and algae use and remove such nutrients as nitrogen and phosphorus. Bacteria, fungi, and other microorganisms decompose organic material.<sup>83</sup> Forests and wetlands increase the availability of water by absorbing it, storing it, and releasing it slowly during times of scarcity.<sup>84</sup>

Canada's boreal forest, stretching from the Yukon to the eastern seaboard, was estimated in 2005 to offer \$18 million annually in watershed services, according to that country's Pembina Institute.<sup>85</sup>

In 2002, The Trust for Public Land and the American Water Works Association conducted a study of 27 water suppliers and discovered that the more forest cover a watershed has, the fewer dollars suppliers must spend on treatment costs. According to the study, for every 10 percent increase in the source area's forest cover, treatment and chemical costs decreased approximately 20 percent, up to about 60 percent forest cover.<sup>86</sup> For example, when 60 percent of the watershed is forested, average annual treatment costs are \$297,110. When only 10 percent is forested, average annual costs rise to \$923,450.<sup>87</sup>

One of the clearest demonstrations of the economic value of watershed conservation came in 1989, after the Environmental Protection Agency (EPA) ordered New York City to build a \$6 billion to \$8 billion water-filtration plant that would cost \$300 million a year to operate. Instead, the city got EPA's permission to spend \$1.2 billion over the first ten years to restore and protect its watersheds, letting a 2,000-square-mile forest do the work of the water-filtration plant.<sup>88</sup>

Similarly, the city of Auburn, Maine, saved \$30 million in capital costs and an additional \$750,000 in annual operating costs by spending \$570,000 to acquire and protect land in its watershed.<sup>89</sup>

## **CONSERVATION TO CLEAN WASTEWATER**

In 1974, Arcata, California, 280 miles north of San Francisco, with a population at that time of fewer than 13,000, was considering the construction of a \$25 million sewage treatment plant to meet new federal wastewater standards. Residents feared that the plant and the roads and infrastructure to support it would be so expensive that the town would be forced to sprawl outward to create additional revenue, bringing strip malls, big-box stores, and subdivisions to the area, changing the whole tenor of the community.

As an alternative, two professors at local Humboldt State University proposed the idea of converting a coastal brownfield into a marsh to treat wastewater naturally. Today, the Arcata Marsh and Wildlife Sanctuary processes the town's sewage over 154 acres of freshwater and saltwater marshes, tidal mudflats, and grasslands. The land sustains 100 species of plants, six species of fish, and 300 species of birds and mammals. It also hosts 150,000 human visitors annually and serves as a research site for students, who in turn provide technical support, data collection, and monitoring that the town could not have otherwise afforded. The project and the park have become a point of civic pride.<sup>90</sup>

## **CONSERVING URBAN PARKS AND WATERSHEDS REDUCES STORMWATER TREATMENT**

Many urban communities rely on drainage channels, storm sewers, and other expensive infrastructure to deal with localized flooding from sudden storms. They also pay to clean up nonpoint-source pollution caused when water picks up chemicals and contaminants from parking lots and other impermeable surfaces.

Some of these costs can be avoided by conserving parks, open space, and other natural lands. During storms, trees intercept and store rain on their leaves, making water's entry into the ground more gradual, while reducing runoff and peak flows. The permeable surface of unpaved lands absorbs water, where it can percolate down into the natural filtration system. According to the EPA, a typical city block may generate nine times more runoff than a woodland area the same size.<sup>91</sup>

In several cities, researchers have measured tree cover using global positioning systems and satellite imaging to see how decreases and increases in street tree coverage affect cities' stormwater treatment costs.

- Using a model to estimate the value of stormwater retained by Philadelphia parks, TPL's Center for City Park Excellence pegged that city's annual saving in water treatment costs at more than \$5.9 million.<sup>92</sup>
- Since 1992, an Atlanta ordinance—never enforced—has required that additional trees be planted in the city's parking lots. An analysis calculated that enforcing the ordinance in downtown Atlanta's 122 acres of parking lots could, after 30 years, realize \$491,000 in stormwater management benefits.<sup>93</sup>
- Also in Atlanta, American Forests found that heavy tree cover in the 775,000 acres centered on the city decreased from 48 percent to 26 percent between 1974 and 1996. Tree loss during that period increased stormwater runoff by 33 percent. For the city to build stormwater retention facilities to intercept the increase would cost \$1.18 billion.<sup>94</sup>
- As Houston's tree cover has declined 16 percent over the past three decades, the city has lost \$237 million in stormwater management services.<sup>95</sup>
- San Antonio, Texas, lost 22 percent of its tree cover between 1985 and 2001. This has cost the city an estimated \$146 million in stormwater management services.<sup>96</sup>

## **TREES HELP REDUCE AIR POLLUTION COSTS**

Estimates of the human health costs of outdoor air pollution range from \$14 billion to \$55 billion annually.<sup>97</sup>

A substantial portion of that is due to the costs of asthma, a disease associated with air pollution. In the Central Valley of California, an agricultural area that experiences serious air pollution, asthma among children is responsible for an estimated 800,000 school day absences each year. This costs school districts at least \$26 million in compensation from the state, which only pays districts for days when children are in school. According to the local air district, ozone pollution alone accounts for \$270 million annual damage to agricultural crops.<sup>98</sup>

The prime way to reduce air pollution costs is through regulation that prevents or cleans up pollutants at their source. But natural systems also strip pollutants from the air, preventing billions of dollars in additional costs each year.

Trees and other vegetation promote air quality by taking up pollutants through their leaves and diffusing them into their cells.<sup>99 100</sup> Pollutants include nitrogen dioxide (NO<sub>2</sub>), carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), ozone (O<sub>3</sub>), and particulate matter of 10 microns or less (PM<sub>10</sub>).

- Using a model created by the U.S. Forest Service, TPL's Center for City Park Excellence concluded that tree-covered parkland in Philadelphia was responsible for more than the \$1.5 million per year in air pollution reduction savings.<sup>101</sup>
- Atlanta's tree cover decreased from 48 percent in 1974 to 26 percent in 1996. Had these trees not been lost, they would have absorbed 11 million pounds of pollutants each year, a service worth \$28 million annually.<sup>102</sup> Researchers have projected that simply increasing the tree cover of Atlanta's 122 acres of downtown parking would result in \$7,534 in annual air pollution removal benefits after 30 years of tree growth.<sup>103</sup>
- Houston's 16 percent decline in tree cover over the past three decades has cost the city \$38 million in annual air pollution removal services.<sup>104</sup>
- San Antonio's 22 percent decline in tree cover over 16 years resulted in a \$9 million annual loss in air pollution reduction.<sup>105</sup>
- In 2004, 28.6 percent of Washington, D.C., was covered by trees, which removed 540 tons of air pollution annually, a service worth \$2.5 million.<sup>106</sup>

## ENERGY SAVINGS FROM NATURAL AIR CONDITIONING

Natural areas with trees can cool the air, reducing the need for expensive mechanical air conditioning. Nationwide, air conditioning for residential buildings alone cost nearly \$16 billion in 2001—almost \$200 per household—and represented close to 16 percent of dollars spent for home electricity.<sup>107</sup>

Trees reduce energy use in buildings by shading them during the summer, thus lowering their indoor temperatures and reducing the need for air conditioning. During the winter, trees block wind and reduce heat loss.<sup>108</sup> This strategy works best if trees are planted on the west and northwest sides; trees planted on the east provide the next greatest benefit. Only deciduous trees should be planted on the south side of buildings so when they lose their leaves in the winter, they will allow in the warming sun. Evergreen trees should be planted as windbreaks.<sup>109</sup>

In general, urban trees reduce local air temperatures through evaporation of water off leaves, stems, and branches, although a complex set of meteorological factors from wind speed to relative humidity factor into the equation.<sup>110</sup>

- A NASA scientist has demonstrated trees' cooling effect by using satellite-based remote sensing of radiant temperatures on the earth's surface. In one instance when air temperature was measured at 76 degrees F, areas with an 80 percent tree canopy experienced surface temperatures of 80 degrees. In areas without trees, surface temperatures reached 100 degrees or more.<sup>111</sup>
- The U.S. Forest Service's Center for Urban Forest Research in Davis, California, has estimated that increasing urban tree cover by 50 million trees nationwide over 15 years could save 6,100 gigawatt hours of energy, the output of seven power plants. That would save consumers \$1 billion a year.<sup>112</sup>
- In San Antonio, Texas, a 22 percent decline in tree cover between 1985 and 2001 was estimated to have added \$17.7 million in residential energy costs each summer.<sup>113</sup>



- It is estimated that the 28.6 percent tree cover in Washington, D.C., saves \$2.6 million per year in building energy use.<sup>114</sup>

## **PREVENTING COSTS ASSOCIATED WITH GLOBAL WARMING**

One ecosystem service very much in the news these days is carbon sequestration by growing plants, in particular trees, and its ability to reduce global warming. Atmospheric carbon in the form of carbon dioxide is one of the key greenhouse gasses associated with global warming. Trees and other plants absorb carbon dioxide as they grow, sequestering the carbon in their cellular structure. Conservation of natural lands helps store carbon in growing plants, removing it from the atmosphere.

Global warming has the potential to do enormous damage to economies worldwide. The 2006 *Stern Review* on the economics of climate change concluded that if the world does not act to mitigate global warming, the costs and risks will be equivalent to losing at least 5 percent and possibly as much as 20 percent of global GDP annually, “now and forever.” On the other hand, the review estimated, the cost of action would be 1 percent of annual global GDP.<sup>115</sup>

Carbon sequestration is one area where establishing an economic value for an ecosystem service has a practical application. One way governments are attempting to reduce atmospheric carbon is to develop carbon mitigation markets through which the emitters of greenhouse gasses can offset their carbon by investing in alternative energy generation, by conserving energy, or by planting and conserving trees. Conservation groups including The Trust for Public Land are beginning to use funds from this emerging market to reforest and conserve lands.

Other researchers have focused on how investments in conservation can be part of the solution to global warming. It is impossible to know in advance how much carbon can be sequestered in a specific place, because actual measurements will vary based on weather, soil conditions, and other factors. Still, estimations can be made based on tree species, region, and habitat.

- Canada’s 1.3-billion-acre boreal forest is estimated to store 67 billion tons of carbon, the amount that nation would generate in 303 years at its 2002 rate of carbon emissions. The estimated value of this carbon storage in the emerging carbon market is \$3.1 trillion.<sup>116</sup>
- While trees in urban parks do not absorb as much carbon as those in rural areas, mostly because they generally do not live as long, they do provide some benefit. Washington, D.C.’s tree cover in 2004 provided annual carbon sequestration services for 16,100 tons, worth \$297,000.<sup>117</sup>

## **LAND CONSERVATION PRESERVES VALUABLE MARINE RESOURCES**

While coastal zones cover just 8 percent of the earth, they provide fully 43 percent of the total value of worldwide ecosystem services.<sup>118</sup> These include provisioning services such as food, clothing, genetic resources, and clean water; regulating services such as air quality, climate regulation, water and erosion management, disease and pest regulation, and pollination; and cultural services such as recreation, ecotourism, aesthetic value, and spiritual significance.<sup>119</sup> By one 1997 estimate, these services were worth more than \$14 trillion annually.<sup>120</sup>

For example, coastal zones yield 90 percent of the world's 100-million-ton harvest of fish—worth \$50 billion to \$100 billion annually.<sup>121 122</sup> Coral reefs, wetlands, and mangrove forests—all found along coastlines—act as nurseries for fish and other marine food species.

Conserving coastal areas can preserve these valuable ecosystem services. Instead, many of the most sensitive areas are being lost. For example, 35 percent of mangrove areas around the world have been harvested over the past several decades to make charcoal or to make way for short-term shrimp farms, and 20 percent of coral reefs have been destroyed and another 20 percent degraded. Forty percent of the human population lives within 60 miles of this rich coastal area, and many human activities jeopardize coastal ecosystem services.<sup>123</sup>

The ecological health of coastal areas—and of marine fisheries in particular—is also threatened by polluted runoff from development on coasts, around estuaries, and along streams that feed into coastal waters. In particular, agricultural fertilizers and pesticides cause algal blooms and dead zones of increasing frequency and size in coastal waters worldwide.<sup>124</sup>

Future ocean-focused businesses include marine tourism, fish harvesting, energy production, bioprospecting, seabed mining, and carbon sequestration.<sup>125</sup>

Conservation of land along the coasts and tributary waterways can prevent loss of these valuable coastal resources.<sup>126</sup>

In 2006, the organization Restore America's Estuaries convened a panel of experts to try to better understand the economic value of coasts and estuaries. The panel concluded that coastal recreation, including beachgoing, fishing, and wildlife viewing, contributes more than \$20.7 billion and perhaps as much as \$104.8 billion to the national economy each year.<sup>127</sup> The report also notes that coasts and estuaries support between 50 percent and 75 percent of the nation's commercial fish landings and that poor land-use practices along estuaries and tributaries result in river and harbor sedimentation that require expensive dredging.<sup>128</sup>

# PARKS REDUCE HEALTH CARE COSTS

Parks, greenways, and open space that support walking, biking, jogging, active sports, and other exercise help keep people healthy, reducing the nation's \$2 trillion annual health care bill.

The United States is currently suffering an epidemic of illnesses associated with obesity and lack of physical activity. According to the Centers for Disease Control (CDC) and Prevention, 66.3 percent of U.S. adults aged 20 and older were obese or overweight in 2003–2004.<sup>129</sup> Young people are at particular risk. The percentage of children who are overweight has quadrupled since the early 1970s, while the percentage of adolescents who are overweight has trebled since that time. Of children aged 6–11, 18.8 percent are now seriously overweight; for those aged 12–19, the figure is 17.4.<sup>130</sup>

Diseases and conditions associated with obesity and lack of physical activity include high blood pressure, high blood cholesterol, congestive heart failure, stroke, gallstones, osteoarthritis, some types of cancer, pregnancy complications, poor female reproductive health, bladder control problems, depression, eating disorders, distorted body image, and low self-esteem.<sup>131</sup>

Certainly these diseases are costly:

- Nationally, the economic costs from these conditions—including preventive, diagnostic, and treatment health care; pharmaceuticals; rehabilitation; disability; and early death—totaled \$117 billion in 2000.<sup>132</sup>
- The California Department of Health Services estimates that physical inactivity costs that state \$13.3 billion per year in medical care, workers' compensation, and lost productivity, and employers pay most of this tab. If Californians increased their physical activity and lost 5 percent of their collective weight over five years, they would save more than \$1.3 billion.<sup>133</sup>
- According to a 2007 report by the Milken Institute, reducing obesity to “reasonable and achievable” levels by using preventive measures could trim the incidence of disease by 14.8 million cases in 2023, saving \$60 billion in treatment costs and improving the nation's economic output by \$254 billion.<sup>134</sup>

## NEARBY PARKS PROMOTE EXERCISE

Evidence shows that when people have access to parks, they are more likely to exercise, which can reduce obesity and its associated problems and costs.

- A group of studies reviewed in the *American Journal of Preventive Medicine* showed that “creation of or enhanced access to places for physical activity combined with informational outreach” produced a 48.4 percent increase in the frequency of physical activity.<sup>135</sup> The same studies showed that easy access to a place to exercise results in a 5.1 percent median increase in aerobic capacity, along with weight loss, a reduction in body fat, improvements in flexibility, and an increase in perceived energy.<sup>136</sup>
- A national study by the RAND Corporation looked at the correlation between physical activity in adolescent girls and proximity to parks and schools. Researchers found that girls who live close to parks participate in more physical activity than those who live farther away.<sup>137</sup> Another RAND Corporation study found that Los Angeles residents who live near parks visit them and exercise more often than people who live greater distances from green spaces.<sup>138</sup>

- For a paper published in *Pediatrics*, researchers studied nearly 20,000 adolescents nationwide, relating access to facilities for physical activity (mapped in distance from their homes) with frequency of exercise and obesity levels. Teens living in high-minority, lower-educated areas were half as likely as those in low-minority, higher-educated zones to have access to a facility in which to exercise. The odds of being overweight declined as the number of exercise facilities increased. Teens who lived in areas with seven facilities were 32 percent less likely to be overweight and 26 percent more likely to be highly active than those who lived in areas with no facilities.<sup>139</sup>

Unfortunately, residents of many American communities do not have easy access to a park or recreation facility. This is especially true in cities and urban areas, where 80 percent of Americans lived in 2000.<sup>140</sup>

For example, more than 2.6 million Los Angeles residents live more than a quarter mile from the nearest park. This is likely a contributing factor to a lack of fitness among Los Angeles schoolchildren. In the 2003–2004 school year, nearly one-third of the schools in the Los Angeles Unified School District had less than 10 percent of students meeting basic fitness levels. In 40 of the district’s 605 schools, not a single student was rated as physically fit.<sup>141</sup>

In 2007, a survey by TPL’s Center for City Park Excellence found that 255,000 Philadelphia residents exercise in that city’s parks with enough frequency to improve their health. The study computed the health savings resulting from that exercise at more than \$69.4 million.<sup>142</sup>

## **GREENWAYS SUPPORT ACTIVE LIVING**

One key way to incorporate exercise into daily activity is to walk or bike for errands near home. National data find that of nonwork trips, which make up the vast majority of travel outside the home, 14 percent are within a half mile and 27 percent are within one mile of home. These are considered walkable distances. A further 63 percent of trips were within five miles of home, considered a bikeable distance.<sup>143</sup>

Even short walks can make a difference. The CDC estimates that a difference of 100 calories of exercise per person per day, a 20-minute walk, could eliminate the nation’s obesity epidemic.<sup>144</sup>

Health professionals promote the benefits of incidental exercise such as gardening, climbing stairs, or biking to do errands, and they note that, whereas people might not maintain enthusiasm for a dedicated exercise program, incidental physical activity requires less motivation.<sup>145 146</sup>

However, many neighborhoods do not facilitate easy exercise. There may be no sidewalks; cul-de-sac designs may extend distances between homes and stores; open spaces, safe walkways, trails, and bicycle paths may be lacking. Urban planners and transportation experts are now working together with public health professionals to design communities that build exercise into everyday life.<sup>147</sup>

A 2008 report from the Rails-to-Trails Conservancy highlights the potential economic benefits of investing in additional trails and other infrastructure to support walking and biking. The report’s authors looked at two scenarios: a “Modest Scenario,” in which cycling and walking for transportation increased from 10 percent of travel to 13 percent nationwide over 2001 levels, and a “Substantial Scenario,” in which it increased to 25 percent. “The financial value of improved

mobility, fuel savings, greenhouse gas reductions, and health care savings amounts to more than \$10 billion annually under our modest Modest Scenario,” the report said. “For the Substantial Scenario, benefits would add up to more than \$65 billion every year.”<sup>148</sup>

Clearly, local zoning laws and land-use regulations have important roles to play in shaping communities where people can easily integrate exercise into daily activity.<sup>149</sup> But conservation has a role, too—especially when land is conserved for greenways that support hiking, biking, and other human-powered transportation.<sup>150</sup>

## CONCLUSION

It can be difficult for a government or community to weigh the ultimate value of creating a park or conserving an open space, farm, or tract of natural land. On the one hand, the costs of a contemplated project are concrete and often immediate. Benefits, however, are usually long term and may seem vague when compared to costs. Instead of dollars and cents, a project might be measured in the very real but harder to determine currency of neighborhood recreation, community character, or connection to nature.

Even when benefits can be measured in dollars and cents—the topic of this paper—often they must be estimated and projected based on research and the experience of other communities. That does not make them any less real, and governments and communities must understand those benefits to make reasonable choices about the future.

Sometimes communities will choose to conserve land for the simple reason that it will save them money—by preventing far higher water treatment costs, for example, or by avoiding the long-term expense of delivering services to ill-planned development. Just as often, the economic benefits of a park or conservation effort will be considered an added incentive by community members who already understand the ways in which a park or conserved open space will enrich their lives.

Each year economists and researchers become more sophisticated in measuring the ways in which good conservation efforts make economic sense. But in a way their work only confirms what conservationists and park builders have understood at least since the mid-nineteenth century, when Frederick Law Olmsted speculated that the cost of New York’s Central Park would be covered by the rise in neighboring land value. Expenditures for parks and land conservation are best understood not as a cost but as an investment that will pay dividends—including economic ones—long into the future.

# ENDNOTES

- <sup>1</sup> John Handley, "Green Stretches Past Park," *Chicago Tribune*, November 4, 2005.
- <sup>2</sup> City Parks Forum. "How Cities Use Parks for Economic Development" (Washington, DC: American Planning Association, 2002), p. 2.
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