The Economic Benefits of the Park and Recreation System of Virginia Beach, Virginia

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A Report by The Trust for Public Land's Center for City Park Excellence

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Cover photos: Left, Sandpiper, Ivy Main; Right, Grommet Island Beach Park and Playground, Virginia Beach Department of Parks and Recreation
All other photos: Virginia Beach Department of Parks and Recreation

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Executive Summary

With more than 33,640 acres of parkland, six state-of-the-art recreation centers, several public campgrounds, and a nationally recognized athletic complex, the park and recreation system of Virginia Beach is a major draw for tourists and residents alike. From the iconic Mount Trashmore—a capped landfill park with an extensive shared-use pathway network, a skate park, and a Boundless®-certified destination playground—to the world-class Princess Anne Athletic Complex and five large state parks and national refuges, Virginia Beach's extensive network of parks has great value.

We can now recognize—and, for the first time, define and measure—how these investments provide the city with economic benefits. Not every aspect of a park system can be quantified—for instance, the mental health dollar value of a walk in the woods has not yet been documented—but seven major factors are enumerated in this study: clean air, clean water, tourism, direct use, health, property value, and community cohesion[1].

Two of the factors provide Virginia Beach with direct income to the city treasury. The first is additional property tax revenue from the increase in value of certain residences because of their proximity to parks. This value came to over $2.2 million in 2010. The second consists of sales tax receipts from spending by tourists who visited Virginia Beach primarily because of its parks. This value came to more than $8.4 million.

Other factors bolstered the collective wealth of city residents—by $10.2 million in added value from property sales and by over $295 million in net income from tourist spending, including $66 million from sports tourism and adventure tourism.

Two other factors provided Virginia Beach residents with direct savings. By far the largest is the money residents save by using the city's free parkland and recreation opportunities instead of having to purchase these benefits in the marketplace. This value came to over $337 million. Second is the health benefit—savings in health care costs from the beneficial effects of exercise in the parks. This came to more than $38 million.

The last three factors provided savings to city government. First, the trees and soil of Virginia Beach parks cut the cost of managing stormwater—a benefit that would not exist if parkland had been developed for residential or commercial purposes. This value came to more than $1 million. Second, vegetation in parks absorbs a variety of air pollutants, saving the city more than $4.5 million. Third is the community benefit of people banding together to improve their neighborhood parks. This "know-your-neighbor" social capital helps ward off antisocial problems that could otherwise cost the city more in police, fire, prison, counseling, and rehabilitation expenses. This value saves the city more than $3.9 million.

In 2010, the park system of Virginia Beach thus provided the city with revenue of $10.6 million, a collective increase in resident wealth of more than $305 million, resident savings of $375 million, and municipal savings of just under $10 million.

Summary: The Estimated Annual Value of the Virginia Beach Park and Recreation System

Revenue-Producing Factors for City Government	
Tax receipts from increased property value	$2,218,740
Tax receipts from increased tourism value	$8,428,688
Total	**$10,647,428**
Wealth-Increasing Factors for Citizens	
Property value from park proximity	$10,249,256
Net profit from tourism	$295,004,064
Total	**$305,253,320**
Cost-Saving Factors to Citizens	
Direct use value	$337,453,874
Health value	$38,472,475
Total	**$375,926,349**
Cost-Saving Factors to City Government	
Stormwater management value	$1,516,239
Air pollution mitigation value	$4,516,704
Community cohesion value	$3,954,359
Total	**$9,987,302**

Background

Cities are economic entities. They are made up of structures entwined with open space. Successful cities have a sufficient number of private homes and commercial establishments to house their inhabitants and give them places to produce and consume goods. Cities also have public buildings—libraries, hospitals, arenas, city halls—for culture, health, and public discourse. They have linear corridors—streets and sidewalks—for transportation. And they have a range of other public spaces—parks, plazas, and trails, sometimes natural, sometimes almost fully paved—for recreation, health provision, tourism, sunlight, rainwater retention, air pollution removal, natural beauty, and views.

In successful communities the combination works. Private and public spaces animate each other with the value of the whole greatly surpassing that of its parts. In unsuccessful communities, some aspect of the relationship is awry: production or transportation may be inadequate, housing may be insufficient, or the public realm might be too small or uninspiring.

A park system is crucial to this balance, but there is a lack of research on the topic. Recognizing this, the Center for City Park Excellence in 2003 hosted a two-day colloquium of economists and other experts to determine how parks and open space impact cities[2]. Participants identified seven attributes of parks that provide cities with measurable economic benefits.

In 2010, the City of Virginia Beach requested that The Trust for Public Land carry out a study of its park and recreation system based upon these seven factors. The following report provides a description and estimate of the economic value of each park attribute in Virginia Beach. The underlying formulas can be obtained from the Center for City Park Excellence.

1. Hedonic (Property) Value

Studies consistently demonstrate that parks and open space have a positive impact on nearby residential property values[3]. Evidence shows that people are willing to pay more for a home close to a nice park. Economists call this phenomenon "hedonic value." Hedonic value also applies to other amenities, such as schools, libraries, police stations, and transit stops.

Parks' effect on property values is determined by two main factors: distance from homes and the quality of the park.

While the value of park proximity (i.e., the "nearness" factor) has been documented up to 2,000 feet from a large park, most of the value is within the first 500 feet. To be conservative, we based our calculations on this shorter distance.

Pacific Avenue Trail Boardwalk, part of the South Beach Loop Trail. Parks enhance property values, bringing in additional tax revenue.

As for park quality, beautiful natural resource parks with trees, trails, meadows, and gardens add value to surrounding homes. Excellent recreational facilities are also desirable—though their value can be compromised by problems regarding noise, nighttime lighting, and parking. Less attractive or poorly maintained parks are only marginally valuable. Parks with dangerous or frightening aspects can even reduce nearby property values.

An additional factor in parks' effect on property values is the density of the surrounding neighborhood. Parks in densely settled neighborhoods, where private backyards and gardens are scarce, are valued more highly than parks in sparsely settled areas.

Determining park-by-park, house-by-house property values across the city would be prohibitively time-consuming and costly. Therefore, we formulated an extrapolative methodology to arrive at a reasonable estimate. Using computer-based mapping, we identified all residential properties within 500 feet of a Virginia Beach park: 25,598 residential properties, according to the Virginia Beach Assessor's Office. In 2010, these properties had a combined assessed value of $7.6 billion. (See Table 1.)

After interviews with park professionals, park users, real estate agents, assessors, and law enforcement officials, we determined that there is no practical methodology to measure park quality and its effect on property values. The effect of park proximity in Virginia Beach is complex because of differences between residential neighborhoods and the lack of a defined downtown. To analyze the hedonic value conferred by parks, TPL therefore conducted a regression analysis of residential property sales from 2006 to 2010. We examined sales over this four-year period in order to have a large enough sample size, then applied the resulting coefficient to the assessed value of all the homes in the city.

Our regression showed a 3.26 percent "park effect"—an additional $9,246 in average sale price per park-proximate dwelling unit. Multiplying this amount by the total number of park-proximate dwelling units in Virginia Beach shows the collective gain in personal wealth to homeowners to be just over $249 million.

We then determined the amount of tax revenue generated from the additional property value attributable to parks. Using the same 3.26 percent park-proximate increment and multiplying it by the property tax rate ($0.89 per $100 assessed value), we determined the additional tax received by the city in 2010 to be more than $2.2 million.

There is additional value to the sellers of dwelling units themselves. The value of park-proximate residential properties sold in 2010 was $314,396,427. The percent of that value attributable to parks (3.26 percent) yields more than $10.2 million in personal wealth to the sellers.

We consider these estimates to be conservative for two reasons. First, the estimates leave out all the value of dwelling units located between 500 feet and 2,000 feet from a park. Second, they do not include the potentially very significant effect of parks on the property value of nearby commercial offices.

Table 1. Effect of Virginia Beach Parks on Residential Property Values

Value of residential properties within 500 feet of parks	$7,647,187,931
Value attributable to parks (3.26%)	**$249,296,681**
Property tax revenue from properties within 500 feet of parks	$68,059,973
Tax revenue attributable to parks (3.26%)	**$2,218,740**
Value of properties sold in 2009 within 500 feet of parks	$314,396,427
Value attributable to parks (3.26%)	**$10,249,256**

Note: Minor numerical discrepancies are due to rounding.

2. Tourism Value

The parks of Virginia Beach, including state and federal parks and recreation sites, attract two kinds of users—residents and out-of-towners. When calculating tourism income, residents' spending is not counted: while locals may spend money in and around parks, economists treat this as merely a shift in spending from one neighborhood to another.

In Virginia Beach, the primary feature that attracts visitors to parks is also the largest draw for the city as a whole: beaches. Another major attraction is the Princess Anne Athletic Complex. Sports-based tourism (tournaments and competitions) and adventure tourism (recreational boating, observing wildlife, and hiking) also generate significant revenue.

Determining parks' contribution to the tourism economy requires knowledge of the number of tourists, their activities, and their spending. We based our calculations on visitor profiles compiled by Old Dominion University, as well as on expertise from the Virginia Beach Convention and Visitors Bureau.

Approximately 3.15 million tourists visited Virginia Beach in 2010, some of them (700,000) staying for just the day, most of them (2.45 million) staying at least one night. The typical overnight visitor spent over $100 per day and stayed an average of 4.6 days. The typical day visitor spent just over $50 during his or her time in town.

We applied these characteristics to the estimated number of tourists who visit Virginia Beach because of its parks. This includes the 65 percent of total tourists who report travelling to Virginia Beach for its beach parks, another 3 percent estimated to travel for adventure tourism, and nearly 100,000 additional tourists each year who travel to attend sporting events[4].

Mount Trashmore Skate Park's competition-sized vert ramp. Parks are key to Virginia Beach's tourist economy.

Combined, these groups of tourists spent nearly $843 million in Virginia Beach in 2010. City-managed athletic facilities generated roughly $30 million in tourist spending, while natural areas generated $36 million from adventure tourists. Of the total tourist spending, 1 percent was retained by the city as sales tax (the majority of sales tax being appropriated by the state). Thus the total 2010 tax revenue to the city of Virginia Beach from park-based tourism was $8,428,688.

In addition, because 35 percent of every tourist dollar is considered profit to the city economy, the citizenry's collective increase in wealth from park- and beach-based tourism was $295,004,064.

Table 2. Tourism Value of Virginia Beach Parks

Types of park tourists	
Tourists who come to Virginia Beach for beach parks	2,047,500
Spending by beach park tourists	$777, 959,000
Tourists who come to Virginia Beach for adventure tourism	94,500
Spending by adventure tourists	$35,905,800
Tourists who come to Virginia Beach for athletic events	99,654
Spending by athletic-event tourists	$29,003,955
Total spending by park tourists	**$842,868,755**
Total city tax receipts attributable to tourism	**$8,428,688**
Total profit to local businesses	**$295,004,064**

3. Direct Use Value

Virginia Beach's parks are amenities that provide services to residents. Economists call park activities "direct uses"—whether it is softball at Princess Anne Athletic Complex, jogging on the Cape Henry Trail, or picnicking at Chesapeake Bay Beach.

Most direct uses of public parks are free of charge, but economists can still calculate their value by determining the consumer's willingness to pay for the recreation experience in the private marketplace. In other words, if parks were not available in Virginia Beach, how much would the resident (consumer) pay for similar experiences at a commercial facility? Rather than income, the direct use value therefore represents the amount of money residents save by not having to pay market rates for the park activities they enjoy.

The model for quantifying direct use benefits is based on the "unit day value" method documented in the U.S. Army Corps of Engineers' Water Resources Council recreation valuation procedure. The unit day value model categorizes park visits by activity, then assigns each activity a dollar value. For example, playing in a playground is worth $3.50 each time to each user. Running, walking, or in-line skating on a park trail is worth $4, as is playing a game of tennis on a public court. For activities for which a fee is charged—such as golf or visiting an arboretum— we considered only the extra value; that is, if a round of golf costs $20 on a public course and $80 on a private course,

the direct use value of the public course would be $60. If an activity is priced at the full market value, the direct use value would be zero.

Under the theory that repetitions of a park activity in a given period are slightly less valuable than the first use (i.e., the value to a child of visiting a playground the seventh time in a week is somewhat lower than the value of the first time), we incorporated a sliding scale of diminishing returns. For example, the value of a playground visit diminishes from $3.50 for the first use to $2.25 for the sixth time in a week.

We also incorporated a timeline for different park uses to take into account reduced participation in different seasons, depending on the activity. Although some people are active in parks all year, our conservative estimates omit some activities in seasons when participation rates drop to low levels. Some activities, such as using an indoor recreation center, are year-round.

U.S. field hockey national training center. Virginia Beach residents receive millions in economic benefit from their access to parks as public amenities.

A professionally conducted, random-digit-dialed telephone survey of 600 Virginia Beach residents provided data on park usage—residents' typical number of visits and preferred activities. This Virginia Beach Resident Park Value Survey had an accuracy level of plus-or-minus 3 percent. Residents were asked to answer for themselves. A representative proportion of adults with children under the age of 18 were also asked to respond for one of their children. To confirm our accuracy, we compared the results of the phone survey to actual registration information at the Park and Recreation Department. Where the comparison indicated that a survey question may have been unclear, the question was restated and fielded again, and the results adjusted accordingly.

From the survey, we learned that there were more than 100 million person-visits to the parks and beach-parks of Virginia Beach. A person-visit (sometimes also known as a user-day) refers to the use by one person of a park facility on one particular day. Thus, a person who runs in the parks every day would result in 365 person-days. A person who hiked in a park monthly and also brought binoculars to birdwatch would result in 24 person-days (12 days times two activities). A couple who ran, played basketball and had a picnic once a year would count as six person-days (two persons times three activities times one day). Based on the results of the phone survey, our calculations determined the total direct use value of park facilities in Virginia Beach to be $337,453,834 in 2010. (See Table 3.)

While it can be claimed that this very large estimate is not as "real" as the figure for tax or tourism revenue, it is nevertheless relevant. Not all park activities would take place if they had to be purchased, but city residents derive pleasure and satisfaction from their use of the parks. If they had to pay and consequently reduced their park use, they would be materially "poorer" from not participating in activities they enjoy.

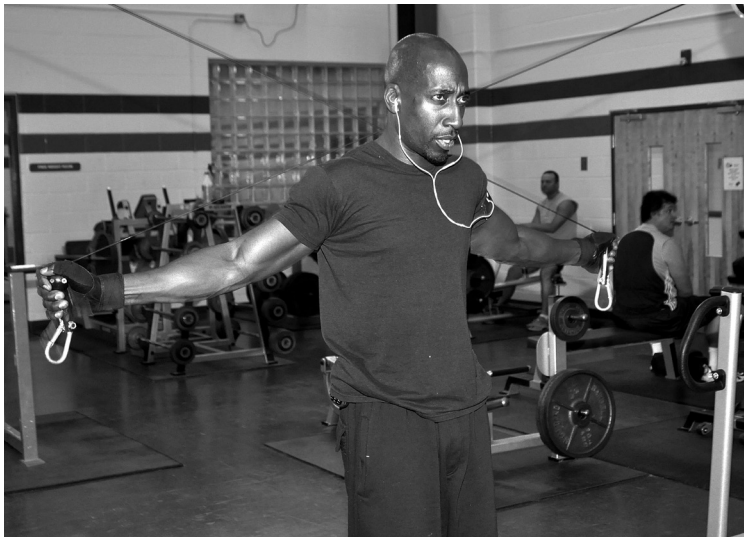
Table 3. Direct Use of Virginia Beach Parks

Facility/Activity	Person-visits	Average value per visit	Total value
Common activities (picnicking, walking on trails, visiting playgrounds, watching sports, etc.)	62,988,218	$2.25	$141,704,055
High-intensity activities (fitness training, running, bicycling, swimming, team sports, etc.)	41,218,463	$3.84	$158,412,661
Special activities (camping, fishing, golf, boating, before- and after-school programs, summer camp, etc.)	6,463,998	$5.78	$37,337,158
Total value of direct use of parks			**$337,453,874**

Note: Minor numerical discrepancies are due to rounding.

4. Health Value

Evidence increasingly suggests that obesity and physical inactivity are a major public health problem—one with expensive consequences. A recent report by the federal Centers for Disease Control and Prevention (CDC) estimates that in 2008, $147 billion in health care costs could be attributed to obesity. Research suggests that nearby parks, playground programming, and walkable urban environments can help people increase their level of physical activity and reduce their medical expenses.



Weight lifting at the Bayside Recreation Center. Parks make residents healthier and reduce health care costs by providing a venue for different types of exercise.

The Health Benefits Calculator measures Virginia Beach residents' collective health care savings attributable to parks. We created the calculator by identifying common medical problems whose occurrence is inversely related to physical activity, such as heart disease and diabetes. Based on studies in seven different states, we assigned a value of $351 as the annual difference in health care costs between people who exercise regularly and those who do not. For people over the age of 65, we doubled that value to $702, because seniors typically incur two or more times the medical care costs of other adults. The calculator also applies a small multiplier to reflect the slightly higher medical care costs between Virginia communities and the United States as a whole.

The key data input for determining health care cost savings is the number of park users indulging in a sufficient amount of physical activity to make a difference in their health. The Centers for Disease Control and Prevention defines this as at least 150 minutes of moderate activity or at least 75 minutes of vigorous activity per week.

The same Virginia Beach Resident Park Value Survey used for direct use data (see page 7) was also used to determine the amount, frequency, and type of Virginia Beach residents' physical activity in parks. We eliminated low-heart-rate uses such as picnicking, sitting, strolling, and bird watching. We also dropped all respondents who engaged in strenuous activities fewer than three times per week or less-vigorous activity fewer than four times per week. Thus, in Virginia Beach, we found through the survey that 94,991 residents—82,206 aged younger than 65 and 12,785 aged 65 or older—engaged actively enough in parks to result in a reduction to their health care costs. Virginia Beach residents' combined health care savings attributable to park use in 2010 was $38,472,475. (See Table 4.)

Notably, there is no established metric for calculating the dollar value of exercise to children. Virginia Beach Parks and Recreation is a national leader in active programming for children, with high quality and participation in its before-school, after-school, youth sports, and camp programs. Though not represented in our calculations, these programs increase the frequency of physical exercise among Virginia Beach youth and promote lifelong healthy habits.

Table 4. Health Value of Virginia Beach Parks

Adults Younger Than 65 Years of Age	
Average annual medical care cost difference between active and inactive persons	$351
Number physically active in parks*	82,206
Medical care cost savings subtotal	$28,854,306
Adults 65 Years of Age and Older	
Average annual medical care cost difference between active and inactive persons	$702
Number physically active in parks*	12,785
Medical care cost savings subtotal	$8,975,070
Subtotals combined	$37,829,376
Regional multiplier for health costs	1.017
Total annual value of medical care cost savings attributable to parks	**$38,472,475**

*Calculations based on persons engaging in moderate or vigorous activity as defined by the CDC.

5. Community Cohesion Value

Like schools, churches, and other social gathering places, parks promote a sense of community. Studies show that institutions that foster the web of human relationships can make a neighborhood stronger, safer, and more successful. The social value of people caring about their communities provides economic benefits to neighborhoods and cities.

This human web, for which urban anthropologist Jane Jacobs coined the term "social capital," can be strengthened by parks. From playgrounds and sports fields to park benches and chessboards, parks offer opportunities for people of all ages to communicate, compete, interact, learn, and grow. Acts of improving, renewing, or even saving a park can build extraordinary levels of social capital in neighborhoods suffering from fear and alienation due in part to the lack of safe public spaces. They help ward off some antisocial problems that would otherwise cost the city more in police, fire, prison, counseling, and rehabilitation costs. In Virginia Beach, groups from churches and schools to community organizations have lent support to local parks.

The economic value of social capital is not easy to isolate or quantify. However, it is possible to tally up a proxy based on real numbers—the amount of time and money that residents donate to their parks. Each year, Virginia Beach has over 10,000 park volunteers who do everything from picking up trash and pulling vines to planting flowers, teaching about the environment, educating public officials, and contributing money.

The city Parks and Recreation Department, along with the state and federally managed parks, track volunteer hours. We combined their figures to determine the total number of hours donated to parks in Virginia Beach. We then multiplied this number by the dollar value assigned to volunteerism by the Points of Light Foundation—$20.85 in 2010. Finally, we added the value of cash donations, corporate sponsorship, and in-kind donations to parks.

The result of the Social Capital Calculator for parks in Virginia Beach is just under $4 million. (See Table 5).

Cherry tree planting ceremony at Red Wing Park. The value of people coming together in parks can be measured in volunteer hours and the contributions of volunteers.

Table 5. Community Cohesion Value of Virginia Beach Parks	
Total value of donations	$85,433
Volunteer hours	185,560
Value per hour	$20.85
Total value of volunteer hours	$3,868,926
Total community cohesion value	**$3,954,359**

6. Air Pollution Removal Value

Air pollution in cities harms human cardiovascular and respiratory systems, with broad consequences for health care costs and productivity. Acid deposition, smog, and ozone also damage structures, increasing the need to clean, repair, and repaint buildings, bridges, and other costly infrastructure. For this reason, federal clean air regulation requires polluters to eliminate certain gases and particulates from smokestacks and tailpipes. The Environmental Protection Agency has determined the economic cost of "scrubbing" each of these chemicals.

Trees and shrubs in Virginia Beach's parks have the ability to absorb air pollutants such as nitrogen dioxide, sulfur dioxide, carbon monoxide, and ozone. Vegetation also improves air quality when particulate matter adheres to plants' surfaces. The vegetation in city parks therefore represents a free green infrastructure that helps urban residents avoid costs associated with air pollution.

In order to quantify the contribution of park vegetation to air quality, the Northeast Research Station of the U.S. Forest Service in Syracuse, New York, designed a calculator to estimate the pollution removal value of trees in urban areas. This calculator, based on the Forest Service's Urban Forest Effects (UFORE) model, is location-specific and takes into account the air pollution characteristics particular to Virginia Beach[5]. Cities generate different results based not only on trees but also on variances in ambient air quality.

We obtained land cover information for all Virginia Beach parks through analysis of the city's tree canopy using a digitized assessment of aerial photography. While Virginia Beach has many trees on streets and private property, our calculations consider only the economic value of trees in public parks. Our analysis determined that 51.8 percent of the city's 33,640 acres of parkland is covered with trees.

Tree Canopy in Virginia Beach Parks

Park acreage	33,640
Canopy acres	17,426
Tree canopy	51.8%

Next, we considered the pollutant flow within a given time period (known as "pollutant flux"), taking into account the concentration of pollutants and the velocity of pollutant deposition. To do so, we used year 2000 hourly pollution concentration data from the Environmental Protection

Lake Smith. Trees in Virginia Beach's parks help clear the air of pollutants.

Agency. Our calculations take into account the resistance of the tree canopy to the air, the behavior of different types of trees and other vegetation, and seasonal leaf variation. We then multiplied the total pollutant flux by tree-canopy coverage to estimate total pollutant removal by trees in the study area.

Finally, we estimated the monetary value of pollution removal by trees using the median U.S. externality values for each pollutant. The externality value refers to the amount it would otherwise cost to prevent a unit of that pollutant from entering the atmosphere. For instance, the externality value of preventing the emission of a short ton of carbon dioxide is $870; the externality value of the same amount of sulfur dioxide is $1,500.

The result of the Air Quality Calculator for the park system of Virginia Beach in 2010 was a savings of $4,516,704 (see table 6).

Table 6. Air Pollution Removal Value of Virginia Beach Parks

Pollutant	Tons removed	Savings per ton removed	Pollutant removal value
Carbon dioxide	19.4	$870	$16,863
Nitrogen dioxide	116.5	$6,127	$713,871
Ozone	451.5	$6,127	$2,766,475
Particulate matter	216.3	$4,091	$884,851
Sulfur dioxide	89.8	$1,500	$134,643
Total savings			**$4,516,704**

Note: Minor numerical discrepancies are due to rounding.

7. Stormwater Management Value

When stormwater runoff flows off roads, sidewalks, and other impervious surfaces, it carries pollutants with it. Unfiltered rainwater can flow directly into waterways, causing ecological problems.

Virginia Beach's parks reduce stormwater management costs by capturing precipitation and/or slowing its runoff. Large pervious (absorbent) surface areas allow precipitation to infiltrate and recharge the groundwater. Vegetation intercepts and stores rainwater, allowing some to evaporate before it ever reaches the ground. In effect, urban green spaces function like mini-storage reservoirs—green infrastructure.

The Western Research Station of the U.S. Forest Service in Davis, California, developed a model to estimate the value of retained stormwater runoff from this public green space. Inputs to the model are geographic location, climate region, surface permeability index, park size, land cover percentages, and type of vegetation. This model gives a preliminary indication of the stormwater management value of the Virginia Beach park system.

To calculate the stormwater management value of Virginia Beach parks, we compared actual runoff against the theoretical runoff that would occur if the city had no parks. We began by analyzing types of land cover—pervious surfaces like trees and open grassy areas and impervious surfaces like roadways and asphalt trails. Using GIS computer mapping and data from the City of Virginia Beach, we determined the overall perviousness of Virginia Beach parks.

Next, we determined the perviousness of the rest of Virginia Beach—in other words, the city without its parkland. Pervious land consists largely of residential yards and private areas such as

Thalia Creek Greenway. Parks filter and absorb stormwater otherwise bound for the city's gutters and sewer system.

cemeteries, institutional grounds, and office campuses. Naturally, the city as a whole has a higher proportion of impervious surfaces than its parks.

Pervious Surfaces in Virginia Beach	Percent of area
Pervious surface of parks (not counting water acreage)	95.6%
Pervious surface of city without parks	80.3%

Using weather data, we next determined the amount and characteristics of rainfall in Virginia Beach. The city's typical weather pattern consists of abundant sunshine, an average of 42.33 inches of rainfall distributed throughout the year, and very little snowfall. Using annual precipitation data to estimate annual runoff, we calculated that parks reduce runoff in Virginia Beach by more than 80 million cubic feet each year.

The final step in determining the economic value of the park system's contribution to stormwater management is to calculate what it costs to manage stormwater using "hard" infrastructure (e.g., concrete pipes, sewers, and the like). Since actual stormwater management costs in Virginia Beach were unknown, we used the median cost from seven previous Center for City Park Excellence studies to estimate the per-cubic-foot cost for the City of Virginia Beach.

By considering rainfall, patterns of land cover, and cost factors, we obtained a total stormwater management value of just over $1.5 million for the park system of Virginia Beach in 2010.

Table 7. Stormwater Retention Value of Virginia Beach Parks

Rainfall	5,169,051,756 cu. ft. (42.33 in.)
Runoff from parks	523,982, 657 cu. ft.
Runoff from same acreage if there were no parks (theoretical)	636,296,686 cu. ft.
Runoff reduction due to parks	112,314,029 cu. ft.
Runoff reduction rate	18%
Average cost of treating stormwater ($ per cubic foot)	$0.0135
Total savings due to park runoff reduction	**$1,516,239**

Conclusion

While reams of research have been carried out on the economics of urban housing, manufacturing, retail, and even the arts, few studies exist that evaluate the economic value of city park systems. The Trust for Public Land believes that answering this question—"How much value does a park system bring to a city?"—can be broadly useful.

For the first time, the worth of parks in Virginia Beach can be understood with the kind of numerical specificity long associated with the military, tourism, housing, and other sectors. Urban analysts will be better able to understand how the city works and how parks fit into the equation. Housing proponents and other urban constituencies may find a new ally in park advocates. And the mayor, city council, chamber of commerce, and other local leaders may more fully appreciate the economic motivation to strategically acquire parkland in balance with other community development projects.

This study demonstrates the beneficial effects of Virginia Beach parks on property values and tourism; on residents' quality of life, health, and sense of community; and on the city's ability to deal with the environmental challenges of air pollution and stormwater management.

Determining the economic value of a city park system is still a young science. More research and analysis are needed regarding park usership, park tourism, property transactions, stormwater, and other factors. In fact, every aspect of local parks—from design and management to programming and funding—would benefit from deeper investigation and analysis. This study is offered as a tool to begin a conversation about the present and future role of parks within the life—and economy—of Virginia Beach.

ENDNOTES

[1] Similar comprehensive park system value studies have been completed for Charlotte-Mecklenburg, North Carolina; Denver, Colorado; Philadelphia, Pennsylvania; Seattle, Washington, and Wilmington, Delaware; among others.
[2] For a listing of studies by participants in the colloquium, see Appendix III.
[3] Parks may also increase the value of nearby commercial space, but no study has yet been able to quantify the effect.
[4] For the purpose of this report, the term "beach park" refers to public beaches. While the majority of them are not formal city parks, the public beach is counted as open space for outdoor recreational use.
[5] Cities generate different results based not only on tree patterns but also on variations in ambient air quality.

Appendix I

Acknowledgments

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Appendix II
Colloquium Attendees

The following individuals took part in the colloquium "How Much Value Does a Park System Bring to a City," in October, 2003.

Susan Baird, Denver Dept of Parks & Recreation, Denver, Colorado
Kathy Blaha, The Trust for Public Land, Washington D.C.
Blaine Bonham, Pennsylvania Horticultural Society, Philadelphia, Pennsylvania
Glenn Brill, Ernst & Young, New York, New York
Valerie Burns, Boston Natural Areas Network, Boston, Massachusetts
Patrice Carroll, Philadelphia Managing Director's Office, Philadelphia, Pennsylvania
Donald Colvin, Indianapolis Dept of Parks and Recreation, Indianapolis, Indiana
Ernest Cook, The Trust for Public Land, Boston, Massachusetts
John Crompton, Texas A&M University, College Station, Texas
Dick Dadey, City Parks Alliance, New York, New York
Nancy Goldenberg, Philadelphia Center City Partners, Philadelphia, Pennsylvania
Peter Harnik, The Trust for Public Land, Washington, D.C.
Nancy Kafka, The Trust for Public Land, Boston, Massachusetts
Alastair McFarlane, U.S. Dept of Housing and Urban Development, Washington, D.C.
Ken Meter, Crossroads Resource Center, Minneapolis, Minnesota
Sarah Nicholls, Michigan State Univerisity, E. Lansing, Michigan
Joan Reilly, Pennsylvania Horticultural Society, Philadelphia, Pennsylvania
Dan Stynes, Michigan State Univerisity, E. Lansing, Michigan
Patrice Todisco, Boston GreenSpace Alliance, Boston, Massachusetts
Susan Wachter, University of Pennsylvania, Philadelphia, Pennsylvania
Guijing Wang, Centers for Disease Control, Atlanta, Georgia
Richard Weisskoff, Everglades Economics Group, N. Miami, Florida
Wayne Weston, Mecklenburg Parks and Recreation Dept., Charlotte, North Carolina
Jennifer Wolch, University of Southern California, Los Angeles, California
Kathleen Wolf, University of Washington, Seattle, Washington
Matt Zieper, The Trust for Public Land, Boston, Massachusetts

Appendix III
Resources Related to the Economic Value of Parks

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