



The Economic Value Of Protected Open Space In Erie County, Pennsylvania

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Produced for

**Erie Community Foundation
Erie County Gaming Revenue
Authority**

By

**Lake Erie Regional Conservancy
VanAmburg Group, Inc.**



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Executive Summary

This document analyzes benefits of protected open space to households, businesses, and governments in Erie County, and by extension, the entire the northwestern Pennsylvania and tri-state economy.

Protected open spaces provide significant benefits to local communities. Unfortunately, these benefits are not usually understood or appreciated as communities and investors make critical decisions.

The Erie Community Foundation and Erie County Gaming Revenue Authority have recognized this problem and requested that Lake Erie Regional Conservancy and their consultants, VanAmburg Group, Inc., research and present the impact of open spaces in Erie County, Pennsylvania, to give necessary information to decision makers to understand the economic value generated by protected open space.

Protected open spaces include three categories of land: 1) public parks, 2) private conserved lands, and 3) preserved farmland. It can be publicly or privately owned, and can be productively used and income-generating, such as preserved working farmland, while being protected from future sprawl for our children.

Not including wetlands, total protected land is 47,049 acres, or 9.15% of Erie County's 514,000 acres, involving 639 properties.

Including wetlands, total protected acres are 64,991, or 12.64% of Erie County's 514,000 acres.

This study has identified 639 protected open space properties with **64,991 protected acres, or 12.64% of total land**, ((not counting wetlands, 47,049 acres or 9.15% of total land), including:

- **Private land trust owned and eased lands: 9,559 acres plus 17,942 acres of wetlands**
- **Preserved working farmland: 6,892 acres**

- **Public parks and trails: 30,644 acres, comprised of: 3115 municipal acres and 27,492 state acres**

This study could not have been accomplished without building on the results of previous valuation studies and economic analysis techniques to estimate the four key areas of value generated by protected open space in Erie County:

- Increases in residential property values
- Environmental services values generated
- Recreational activity value and related health-care cost avoidance
- Jobs and revenue created

Benefits created by protected open space in Erie County include:

- Direct revenue streams to individuals or governments
- Asset appreciation value
- Avoided costs

We trust that the estimates offered in this study provide policy makers and the general public with new perspective on the value of protected open space and contribute to informed decisions concerning future development in Erie County.

Key findings include:

- **\$-- billion added to Erie County housing stock value**
- **\$-- million in annual property and transfer tax revenue for local governments**
- **\$-- million in costs avoided as a result of the natural provision of environmental services**
- **\$-- million in annual benefit for residents who recreate on protected open space**

- \$-- million in annually avoided medical costs as a result of recreation that takes place on protected open space
- -- jobs created on or as a result of protected open space in the five-county region

1. Why A Study of Protected Land in Erie County?

Continuing Loss of Open Space to Urban Sprawl

Over the past few decades, several consultants have identified sprawl as being a major economic problem for Erie County. Sighting the Brookings Institution's study as reported in the December 3, 2003, front page article of the Erie Times, "the Erie area developed 4.5 acres for every new household compared to the national average of 1.3" LERC is the only organization to address this issue through its conservation efforts and public education programs and studies.

Sprawl imposes five important costs to the region:

- Increase in the costs of infrastructure

- Increase in the cost of transportation
- Consumption of agricultural land, natural areas, and open space
- Concentration of poverty and acceleration of socio-economic decline in the City and older suburbs
- Increases in pollution and stress

This study addresses the sixth, but often ignored, cost:

- **The economic impact of destroying open space** – to our families, businesses, government, and entire communities.

Enhancing Quality of Life

When referring to "quality of life" issues, a Joint Economic Committee of Congress found that businesses are attracted more by a region's quality of life than purely by business related factors.

The term "quality of life" has been used to embrace many facets of life, but when it is operationally defined it almost always incorporates recreation, parks and open space

opportunities. As noted in "Best Cities: Where the Living is Easy," a 1996 article in Fortune magazine, the following survey question was posed: "If you had virtually identical career opportunities in multiple cities, what would be the most important quality of life factors that would determine your choice?" Education was first followed by recreation, culture and safety.

Letting Everyone Decide

Informed decision makers make better decisions.

- Private and public sector executives make better decisions knowing the quantified impacts of their choices. **This study will reveal how many people use our protected open spaces and include tourists and sportsmen, and present**

bottom-line numbers - in home values, dollars and jobs.

An informed electorate is critical.

- **This study will support a planned effort for a ballot referendum** on setting aside County money for future protection of open space.

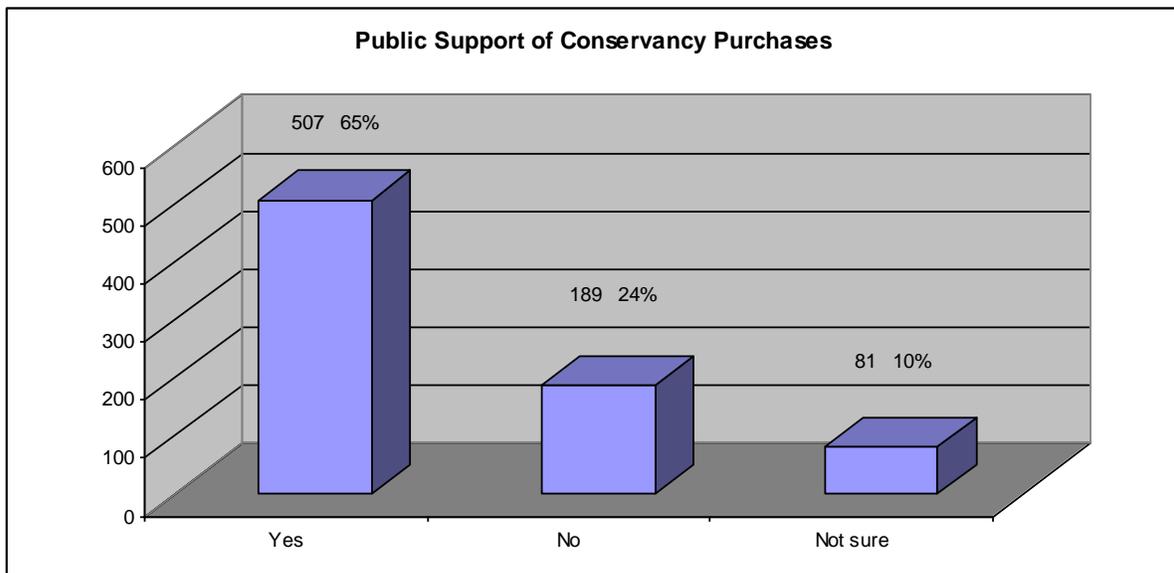
Public Perceptions

Unlike many public issues, there already appears to be strong public awareness and support for conserving public land in Erie County, as displayed in Table 1-1.

Only one recent public opinion survey within Erie County was identified, conducted by GoErie.com

and published May 24, 2012. [10] The poll asked “Do the benefits of protecting wildlife habitat and public access through conservancy purchases outweigh the loss of tax revenue and other benefits of keeping the land private?”

TABLE 1-1 Public Support of Conservancy Purchases		
Do the benefits of protecting wildlife habitat and public access through conservancy purchases outweigh the loss of tax revenue and other benefits of keeping the land private?		
Response	Number Responding	% of Responses
Yes	507	65.25%
No	189	24.32%
Not sure	81	10.42%
Total	777	100.00%



➤ 65% of respondents favor conservancy purchases of land, despite any loss of tax revenue and other benefits of private control.

➤ Assuming randomness in respondents, the sampling error for this survey would be 3.5% with a confidence level of 95%.

2. Introduction

Study Overview

Protected open spaces provide substantial economic, environmental, and health benefits to our communities. It is critical to correctly value these benefits in policy debates and investment decisions. A better understanding of these benefits can demonstrate how protected open space contributes to economic development and fiscal stability, and reverse the common misconception that undeveloped or conserved land is non-productive and non-revenue producing.

This study estimates the economic value of protected open space in Erie County, Pennsylvania.

Erie County totals 514,000 acres (799 square miles). This study has identified 83,898 protected acres (130 square miles, 16.32% of total land), including:

- Private land trust owned and eased lands: 46,512 acres

- Preserved working farmland: 6,892 acres
- Public parks and trails: 30,644 acres

The economic value of these 197,000 acres of protected open space is estimated by measuring impact in four areas:

- The effect that protected open space has on residential property values
- The environmental value of southeastern Pennsylvania's protected open spaces
- The value generated through recreation on these spaces
- Jobs and revenue created as a result of activity on and connected to protected open space

Study Approach

There are three ways that protected open space creates economic value:

- **Wealth generation** (e.g., higher property values and earnings from open space-related activities)
- **Tax revenues** (e.g., increased property tax collections due to higher property values)
- **Avoided costs** (e.g., dollars that would be spent on the provision of environmental services such as improving water quality and removing air pollution in the absence of protected open space).

Communities across the Country are realizing that open space preservation is an important component to achieving better places to live. Open space supports smart growth by bolstering local economies, preserving critical environmental areas, providing recreational opportunities, and guiding new growth into existing communities. Preservation of open space can have a profound impact on a community's quality of life, and therefore a region's economic prosperity. The provision of open space and associated recreational and educational opportunities, environmental and cultural preservation, alternative transit modes, and sprawl-limiting characteristics, all contribute positively to the quality of life of a region. Several studies conclude that owners of small companies ranked recreation, parks, and open

space as the highest priorities in choosing a new location for their business.

There are significant fiscal, environmental quality, and health benefits associated with the protection of open space. Open space can increase local property values, thereby increasing property tax bases, provide tourism dollars, and reduce the need for local tax increases by reducing the need for new infrastructure. In addition, management of the quality and supply of open space ensures that prime farmlands are available, prevents flooding, and provides a natural and less expensive alternative for providing clean drinking water. Preservation of open spaces helps protect animal and plant habitats, places of natural beauty, and working lands by removing the development pressure and redirecting new growth to existing communities.

Preservation benefits the environment by combating air pollution, attenuating noise, controlling wind, providing erosion control, and

moderating temperatures. Finally, open space also protects surface and ground water resources by filtering trash, debris, and chemical pollutants before they enter the community's water system.

Political will is increasing to save the places we treasure. Voters across the Country and the State continue a trend of overwhelmingly approving ballot measures to fund open space protection through tax increases with a general approval rate of nearly 80%.

There is a sense of urgency among many to saving critical environmental areas. Once a greenfield is developed it is hard, if not impossible, to return the land to its original state. Land preservation is also becoming more expensive as growth pressures become stronger. Therefore, communities must work with other communities in their region and political leaders to expend the resources and develop the innovative techniques to make open space preservation a reality.

Study Methodology

This study benefitted from the work of multiple previous researchers and studies, many of which are referenced in this document. Most valuable was [2] The Economic Value of Protected Open Space in Southeastern Pennsylvania, 2010, produced for GreenSpace Alliance and Delaware Valley Regional Planning Commission by Economy League of Greater Philadelphia, Econsult Corporation, and Keystone Conservation Trust. The methodologies utilized in that report (referred to as "SEPA study" in this document) provided a model that enabled completion of this analysis with the resources locally available.

The researchers maintained as much simplicity as possible in describing analytical approaches and results for the study, which utilizes multiple analytic techniques and data sources to estimate the impact values. Standard input-output

modeling was used to estimate spending, jobs, and earnings associated with agricultural, tourism, and park management and maintenance uses on protected open space. Where primary data collection was not feasible due to budget or time constraints, value transfer methods were used, drawing upon existing research to estimate economic values and cost savings associated with ecosystem services and recreational use on protected open space.

Where a range of approaches and estimates could have been used to arrive at an economic value, conservative approaches were adopted so as not to overstate values. Even with this conservative approach, however, the analysis is subject to caveats common to any economic valuation or impact analysis regarding substitution effects, double counting, and value estimation.

This study does not does not represent a cost-benefit approach, nor analyze the costs

associated with acquiring, preserving, or maintaining land as protected open space.

Study Interpretation

The economic benefits this study summarizes serve as estimates, not as exact values. They are based on defensible estimation methods and represent a vast improvement over the common and incorrect implication that the economic value of protected open space is zero.

Because the estimates in this study represent different types of values – some represent wealth generation via asset appreciation or

earnings, some represent additional tax revenues, some represent avoided costs – they should not be added together to produce a single number representing the total aggregate value of protected open space in Erie County.

This study makes no policy recommendations, but is intended to result in more informed land use and development decisions, and to inform public discussion and policy considerations.

3. A Catalog of Erie County, PA Protected Properties

Numerous organizations, government entities, property owners and developers have been involved in protecting properties throughout Erie County. **While many protected open spaces were identified, there has not been one catalogued directory.**

Therefore, the first step in this project was to create a comprehensive directory of protected open space.

[Attachment A](#) to this report, **Erie County, Pennsylvania Protected Spaces Directory**, lists 431 property groups comprising 639 properties,, including private land trust owned and eased lands, preserved working farmland, and public parks.

Not including wetlands, the study identified 47,049 acres of protected land, or 9.15% of Erie County's 514,000 acres.

Including wetlands, total protected acres are 64,991, or 12.64% of Erie County's 514,000 acres, including:

- 9,550 acres of private land trust owned and eased lands.
- 17,942 acres of privately owned wetlands.

- 6,892 acres of preserved working farmland.
- 30,644 acres of public parks and trails, comprised of 3,115 municipal acres, plus 27,492 state acres.

To give perspective to the critical importance of investing extensive time in cataloging these properties, Erie County is currently developing a long-range regional vision and plan. Prior to release of this analysis, the working draft, *Destination Erie: A Regional Vision* [1] had good estimates of parks and recreation space, as well as farmland preserved through conservation easements, but no estimate of the 46,000 acres of private land trust owned and eased lands, which more than doubles the total amount of protected land in Erie County.

To give comparison, the five counties in southeastern Pennsylvania included in the SEPA study [2] (Bucks, Chester, Delaware, Montgomery and Philadelphia) average 14.2% protected open space. For Erie County to match this percentage would require an additional 7,997 acres.

4. Property Values

Introduction

Homeowners are familiar with the concept that the value of their home is determined in part by its size, number of bedrooms and baths, and also its structural condition.

They also understand that its value fluctuates based on its location, which affects local property tax rates, the public schools their children can attend, and the nearby parks they can play in.

Frontier Park in Erie provides an example of the impact protected open space can have on nearby property values, as homeowners are willing to pay a premium to live in close proximity to it.

Erie County's existing open space adds to the overall value of its residential property. Until completion of this study, we just didn't know by how much.

The increased value is realized by property owners via higher sales values of homes near protected open space, and generates increased government revenues via larger property tax collections plus transfer taxes at time of property sales.

Erie County has 119,138 housing units, of which 110,413 are occupied, 36,566 are renter occupied, and 73,847 are owner occupied.

Key findings include:

- \$535 million added to the value of Erie County's housing stock

The SEPA study determined that homes in southeastern Pennsylvania as far as one mile away from protected open space capture a measurable increase in their value as a result of this proximity. Applying their results to Erie County, and working with a conservative ½ mile distance, we determined that homes in Erie County, as a result of their proximity to open space, benefit with an additional \$535 million in value.

- \$14.7 million in annual property and transfer tax revenues

By increasing the value of homes within a ½-mile radius, protected open space also increases the amount of property taxes and transfer taxes that local governments and school districts receive in Erie County. These increased property and transfer tax revenues equal \$14.7 million in total per year.

Benefits

Who Benefits?

- **Households:** Nearby protected open space increases home values, resulting in increased home equity and wealth captured when the home is sold.

- **Governments:** Property value increases attributed to nearby open space result in higher property and transfer tax revenues for local governments.

Methodology

The SEPA study analyzed 230,000 home sales in the five counties of southeastern Pennsylvania from 2005-2009 to estimate the effect of protected open space on residential property values and the attendant fiscal impacts. Results indicate that proximity to open space contributed a significant positive impact to

residential property values both before and during the economic downturn that began in 2008.

Building on the SEPA study, this study analyzed assessment and tax data provided by the County of Erie Assessment Office to determine valuation and tax revenue impacts.

Analysis

Protected Open Space in Erie County

This study defines protected open space to include 1) public parks and trails, 2) private land trust owned or eased lands, and 3) preserved

farmland. Table 4-1 identifies these three categories of land within Erie County.

TABLE 4-1 Erie County Protected Open Space			
	Acres	Square Miles	% of Erie County
Erie County Area	514,000	799.15	
Private land trust owned and eased lands	9,550	14.92	1.9%
Wetlands	17,942	28.03	3.5%
Preserved farmland	6,892	10.77	1.3%
Public parks	30,607	47.82	6.0%
Total Protected Open Space	64,991	130.68	12.6%
<i>Sources: U.S. Census Bureau, VanAmburg Group, Inc.</i>			

➤ Just over 1/8th (12.6%) of land in Erie County is protected open space. This compares to 14.2% of southeastern Pennsylvania (Bucks, Chester, Delaware, Montgomery, and Philadelphia Counties).

➤ This includes 9,550 acres of private trust land owned and eased lands, 17,942 acres of wetlands, 30,607 acres of public parks, and 6,892 acres of preserved farmland.

Management of Erie County Open Space

Table 4-2 divides the 84,048 acres of protected open space into publicly and privately owned land.

It also categorizes protected open space by the type of managing entity.

TABLE 4-2 Total Acreage of Open Space, by Ownership and Managing Entity Type	
Public Federal	0
State	27,492
County	0
Municipal	3,115
Total Public	30,607
Private Preserved Farmland	6,892
Protected	9,550
Wetlands	17,942
Total Private	16,442
Total Protected Open Space	64,991
<i>Source: Lake Erie Region Conservancy, Commonwealth of Pennsylvania, Erie County Government, Western PA Conservancy, VanAmburg Group, Inc.</i>	

- 34,384 acres are privately owned, and 30,607 acres are publicly held.
- Pennsylvania agencies (PA Fish & Boat Commission, PA Department of Environmental Protection, PA Department of Conservation and Natural Resources, PA Game Commission, and Erie Western PA Port Authority) manage 27,492 acres.
- Erie County does not directly manage any open space.
- Local municipalities manage 3,115 acres of parks.
- Private protected farmlands total 6,892 acres.
- Nonprofit entities (Lake Erie Region Conservancy, Western Pennsylvania Conservancy, Pennsylvania State University and numerous others) manage 9,550 acres.
- Wetlands total 17,942 acres.

Residential Real Estate Valuation and Tax Revenues

Table 4-3 aggregates Erie County residential properties.

It also displays 2011 residential sales.

TABLE 4-3 Erie County Residential Real Estate Valuation & Tax Revenues	
	Value
Total number of residential properties	98,217
Total property sales 2011	\$676,869,855
Total Properties Sold 2011	6,785
% of total properties sold in 2011	6.91%
Average Sales Price	\$99,760
<i>Source: Erie County Assessment Office, VanAmburg Group, Inc.</i>	

- As of 2011, there are 98,217 residential properties in Erie County. 6,785 properties were transferred in 2011, with an average selling price of \$99,760.

Table 4-4 displays 2011 assessed valuations of Erie County residential property, as well as real estate and transfer taxes collected.

TABLE 4-4 Erie County Residential Real Estate Valuation & Tax Revenues	
	Value
Erie County Residential Property Assessment Valuations 2011	\$7,643,489,768
Residential Property Tax Revenue to Erie County Government 2011	\$46,243,113
Residential Property Tax Revenue to Municipal Governments in Erie County 2011	\$32,695,700
Residential Property Tax Revenue to School Districts in Erie County 2011	\$123,886,678
TOTAL Residential Property Tax Revenue to County, Municipalities & School Districts 2011	\$202,825,491
Total Property and Transfer Tax Revenues Added by Open Space	\$14,671,593
Average Per Household Property and Transfer Tax Value Added by Open Space	\$149
<i>Source: Erie County Assessment Office, VanAmburg Group, Inc.</i>	

- Erie County residential properties have a combined valuation of \$7.6 billion.
- Residential properties brought \$202.8 million in tax revenue to local taxing

entities (county and municipal governments, plus school districts).

- Residential property transactions brought \$14.7 million in transfer taxes to local governments.

The Impact of Open Spaces on Property Values and Local Taxes

Technical Attachment A, to the SEPA study, *The Effect of Protected Open Space on Property Values*, offers great detail to that study’s analysis. One of their key conclusions stated:

- "Proximity to open space (being within one mile) is associated with a 14.4% increase in house values in Core Cities,

and a 6.7% increase in house values in Developed Communities."

- A 1-mile distance generates 30% less in house value increase than a 1/4- mile distance

Table 4-5 identifies the property within ½ mile of protected park land in Erie County.

TABLE 4-5 Residential Property Near Erie County Public Parks	
	Value
Total Erie County acres surrounding protected parcels 1/2 mile of protected park land	323,491.70
Erie County acres surrounding protected parcels within a radius of 1/2 mile of protected park land, as a % of total non-protected acreage	67%
<i>Source: Erie County Assessment Office, VanAmburg Group, Inc.</i>	

To be conservative, this analysis:

- Only evaluated residential properties near public parks, ignoring the other two land categories.
- Reduced the 1-mile radius and only evaluated the impact of land within ½ mile of the parks.

- Reduced Erie County acres surrounding protected parcels 1/2 mile of protected park land as a % of total non-protected acreage from 67% to 50%, to account for duplication (nearness to two park properties).

Table 4-6 summarizes the resulting impact.

TABLE 4-6 Impact of Public Parks on Erie County Real Estate Valuation	
	Value
Total Property Value Added by Open Space	\$535,044,284
Average Per Household Property Value Added by Open Space	\$5,448
Residential Property Tax Revenue Attributed to Location Near Public Parks 2011	\$14,197,784
Residential Property Tax Revenue Attributed to Location Near Public Parks as % of All Property Tax Revenue	7.00%
<i>Source: Erie County Assessment Office, VanAmburg Group, Inc.</i>	

- Public parks within Erie County conservatively added \$535 million in property valuation, or an average of \$5,448 to individual property values,

benefitting both property owners and local taxing bodies.

- \$14.1 million, or 7% of all local property tax revenue can be attributed to value added by location near public parks.

Table 4-7 continues the analysis, adding transfer tax revenues from residential transaction attributed to location near public parks.

exception of Edinboro Borough, whose rate is 1.5%. To be conservative, this analysis computed all transactions at 1%.

All Erie County municipalities charge a 1% transfer tax on real estate transactions, with the

TABLE 4-7 Erie County Residential Real Estate Valuation & Tax Revenues	
	Value
Annual Tax Revenue 2011	\$202,825,491
Annual Tax Revenue Attributed to Location Near Public Parks 2011	\$14,197,784
Transfer Taxes Collected by Local Governments From Residential Transactions 2011	\$6,768,699
Transfer Tax Revenue Attributed to Location Near Public Parks	\$473,809
Total Annual Tax Revenue 2011	\$209,594,189
Total Annual Tax Revenue Attributed to Location Near Public Parks 2011	\$14,671,593
<i>Source: Erie County Assessment Office, VanAmburg Group, Inc.</i>	

- Residential property sale transfer tax revenue totaled \$6,767.699, of which \$473,809 is attributable to residence locations near public parks.
- Protected open space accounts for 7% of all local property tax revenues. If Erie

County did not have its public parks, 2011 real estate taxes and transfer taxes would have been \$14.6 million less, a loss of 7%.

Conclusion

Conclusions from the above analysis are direct:

- Property owners benefit in their property values from location near public parks. 7% of Erie County housing values are attributed to public parks - \$535 million.

- Local governments receive 7% of their Annual property and transfer tax revenue because of public parks - \$14.1 million.

5. *Ecosystems Services*

Introduction

Open spaces provide a wide range of ecosystems services, such as cleansing air and water, treating wastes, renewing soil fertility, regulating watersheds, maintaining biological diversity, and providing aesthetic and recreational amenities. Each of these services may be economically important, but it is difficult to determine their monetary value in the traditional marketplace.

For example, a wetland has many natural system values due to its various functions, including flood storage, wildlife habitat and pollution filtration. Economists have tried various techniques to estimate the economic value of any one of these wetland services to a community, but it is difficult to analyze them

separately. When an economist measures a single function value as a discrete phenomenon, the ecosystem's actual worth could be undervalued. On the other hand, if the wetland's functions are double and triple counted, the ecosystem's economic value can be inflated.

Many people argue that economic analysis could never truly capture the intangible values of a wetland, or any ecosystem for that matter. Nevertheless, the benefits of wetland protection remain a compelling argument in many watershed locations compared to the expense of man-made filtration systems or the costs of potential damages resulting from flooding.

Benefits

Who Benefits?

- **Governments:** Local governments avoid having to spend money to artificially replicate the vital environmental functions provided by protected open space.
- **Businesses:** Businesses avoid having to pay additional taxes to replicate

the environmental functions provided by protected open space.

- **Households:** Homeowners avoid having to pay additional taxes to replicate the environmental functions provided by protected open space and to repair damage caused by flooding and air pollution.

Methodology

Values for ecosystem services for protected lands in Erie County, PA were calculated using average "value transfer" estimates and methodology found in Costanza et al. (2006).

Costanza et al. (2006) compiled more than 100 academic studies that estimated the average per-acre value of more than 10 different ecosystem services.

Ecosystem service categories used herein were similar to those of Costanza et al. (2006), with the exception of the "Biological & habitat" category, which included the summed valuations for "pollination," Biological control," and "Habitat/refugia" found in Costanza et al.'s summary tables.

The per acre value of each ecosystem service varies with land cover type; therefore calculating the value for each of the four ownership categories of protected lands required estimates of the percent cover for each category and principle cover type. For “State” lands (state parks and gamelands), assumptions for percent cover were determined by inspection of 2012 aerial photography of Erie County’s largest five gamelands (#’s 314, 101, 109, 162, and 154) and measurement of open land covers (annual crop versus perennial open habitats). Open wetland habitats in state lands were lumped with forests in this analysis, which resulted in more conservative valuation estimates, since most per-acre ecosystem service values of wetlands exceed those of forests in Costanza et al. (2006).

Since the category of “Private-other” included a wide variety of land cover types, we used the general land use percentages for Erie County found in the Erie County 2002 Phase I Stormwater plan, modified using more recent land cover data in the 2008 Lake Erie Watershed Conservation Plan. The “Municipal” category included golf courses and numerous small parks containing athletic fields, so we assumed that these lands would half has as much forest/tree cover as the “private-other” category, and most of the remaining cover in perennial-type open vegetation. Properties in the “Preserved farms” category were assumed to have 1/3 as much forest/tree cover as “private-other” and equal

percentages of the two types of open vegetation (with the annual type including row crops and the perennial type including pasture, vineyards, and hay-fields).

Since the land cover and land use data available for Erie County did not allow separate analysis for wetland habitats independent of vegetation cover types, the calculations for wetland habitats (all protected under state and federal laws regardless of ownership or “protected” status as defined in this report) were carried out separately from the calculations made for the protected properties inventoried herein. An unknown portion of the 17,952 total acres of wetlands reported by DCNR (2011) for Erie County occur within the 47,049 acres of “protected open space” evaluated in this document.

The total valuation estimates for ecosystem services produced by this methodology should be considered conservative for several reasons, including: 1) the per-acre values from Costanza et al. (2006) represent 2004 U.S. dollars, 2) certain higher-value features of many properties (i.e. urban/suburban locations and positions in riparian areas) were not evaluated, and 3) actual service value for a site could be considerably higher than the “average” values extracted from Costanza et al., and 4) other ecosystem services for which values are available (e.g. water regulation, soil formation, and nutrient cycling) were not included in this analysis.

Analysis

The research focused on four major impacts of protected open space on ecosystem services:

- **Air pollution removal:** Poor air quality has become all too common in American urban and suburban areas, including Erie County. Poor air quality is attributed to multiple health problems, such as asthma and other respiratory ailments. These air pollutants have multiple other

negative impacts, including damage to buildings and plants and ecosystem disruption. Trees mitigate significant amounts of air pollution through botanic respiration processes that remove pollutants from the air. This naturally occurring air pollution removal process contributes to environmental quality and health.

- **Water supply:** Undeveloped land’s soil stores water that replenishes streams, reservoirs, and aquifers. This natural system provides for the continuous recharge of Erie County’s fresh and clean water supply. Were this ecosystem service to fail, Erie County residents using ground water wells and municipalities south of I-90 would be forced to import water or more extensively treat local water, both of which are costly endeavors. Forests and wetlands are particularly productive land covers for water supply provision.
- **Water quality:** Forests and wetlands filter the impacts of human activities before contaminated or dirty water reaches water supplies. This buffer prevents sediments, excess nutrients, metals, and pathogens from entering the water supply. Without protected open space, Erie County residents would have

to pay for alternative groundwater filtration or water treatment methods.

- **Biological and habitat:** Erie County’s protected open spaces provide habitats plants and animals that are otherwise encroached upon by development and sprawl. Residents often comment on the wild animals now commonly seen in backyards, urban creek beds, and small public spaces in the past few years that previously would have been unthinkable. Intact forests and wetlands harbor species that people value for both aesthetic and functional purposes. Values in this section estimate the minimum amounts of money that people would be willing to pay to preserve wildlife on protected open space in Erie County.

Table 5-1 summarizes the economic value of the above four categories.

TABLE 5-1: Total Value of Ecosystem Services Provided by Protected Open Space Properties in Erie County, PA by Type and Ownership Category					
	State	Municipal	Preserved farms	Private other	Total
Air Pollution Removal	\$1,401,000	\$208,000	\$82,000	\$304,000	\$1,995,000
Water Supply	\$3,988,000	\$137,000	\$202,000	\$841,000	\$5,168,000
Water Quality	\$1,138,000	\$125,000	\$173,000	\$332,000	\$1,768,000
Biological & Wildlife Habitat	\$26,659,000	\$964,000	\$1,470,000	\$5,689,000	\$34,782,000
Totals	\$33,186,000	\$1,434,000	\$1,927,000	\$7,166,000	\$43,713,000

- Protected open space in Erie County provides \$43.7 million of ecosystem services annually. This implies that without current protected open spaces, Erie County residents, directly or through government, would need to expend an additional \$43.7 every year to maintain current water and air quality, plus plant and animal life. This total includes:
 - \$34.8 million in biological and wildlife habitat protection.

- \$5.2 million in water supply.
- \$2.0 million in air pollution removal.
- \$1.8 million in water quality.

Table 5-2 summarizes the parallel impact of wetlands in Erie County on air pollution removal, water supply, water quality and biological and wildlife habitat.

It also includes an assessment of flood control achieved by Erie County wetlands.

TABLE 5-2: Total Value of Ecosystem Services Provided by Wetlands in Erie County, PA	
	Value/ Year
Air pollution removal	\$2,404,000
Flood control	\$65,614,000
Water supply	\$20,831,000
Water quality	\$15,035,000
Biological & habitat	\$2,027,000
Totals	\$105,911,000

- Erie County wetlands provide \$105.9 million of ecosystem services annually. This implies that without current wetlands, Erie County residents, directly or through government, would need to expend an additional \$105.9 million every year to maintain current water and air quality, plus plant and animal life. This total includes:
 - \$65.6 million in flood control.
 - \$20.8 million in water supply.
 - \$15.0 million in water quality.
 - \$2.4 million in air pollution removal.
 - \$2.0 million in biological and wildlife habitat protection.

Conclusions

Protected open space and wetlands provide massive ecosystem benefits to the community,

and save landowners and taxpayers. Table 5-3 shows the total value to Erie County.

TABLE 5-3: Combined Value of Ecosystem Services Provided by Protected Open Space Properties plus Wetlands in Erie County, PA	
	Value/ Year
Air pollution removal	\$4,399,000
Flood control	\$65,614,000
Water supply	\$25,999,000
Water quality	\$16,803,000
Biological & habitat	\$36,809,000
Totals	\$149,624,000

- Protected open space and wetlands Erie County landowners and taxpayers \$149.6 million every year.