

THE ECONOMIC BENEFITS OF CLEAN OHIO FUND CONSERVATION



THE TRUST *for* PUBLIC LAND

CONSERVING LAND FOR PEOPLE

THE ECONOMIC BENEFITS OF
CLEAN OHIO FUND CONSERVATION



Cover photos: left, Darcy Kiefel; right, Chris Knopf.

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EXECUTIVE SUMMARY

The Trust for Public Land conducted an economic analysis of the return on Ohio's investment in land conservation through the Clean Ohio Fund and found that every \$1 invested in land conservation returned \$4 in natural goods and services to the Ohio economy. Additionally, projects funded through the program provide a multitude of economic benefits to the people, communities, and business of the state in the form of jobs, tourism and visitor spending, tax revenue, enhanced property values, agricultural output, quality of life, and others.

The Clean Ohio Fund is the state's primary funding source for open space conservation, farmland preservation, brownfield revitalization, and trail creation. It was created in 2000 and renewed by voters in 2008. The \$400 million in bonding authorization created in 2000 has been completely appropriated. The 2008 re-authorization by voters made an additional \$400 million available. Today \$52 million remains to be appropriated for green space conservation, farmland preservation, and recreational trails. This report examines the green space conservation, farmland preservation, and trails program areas only. These programs, commonly referred to as the 'green side' of the Clean Ohio Fund, create and sustain the numerous economic benefits summarized below:



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Green Space Conservation: Protected green space supports a strong tourism and outdoor recreation industry. These areas attract visitors who spend money locally on food, lodging, equipment, and other goods and services.

Visitors in Ohio spend approximately \$26 billion each year. This tourism spending provides an annual economic impact of \$40 billion and accounts for nearly 9 percent of all jobs in the state. These jobs represent wages of \$10.5 billion annually.

- In Ohio, outdoor recreation generates \$17.4 billion in spending, \$1.3 billion in tax revenue, 196,000 jobs, and \$5.1 billion in wages and salaries each year.
- In 2011, over 4.3 million people went hunting, fishing, wildlife watching, or did some combination of the three. These participants spent \$3.59 billion related to those activities. This spending creates tens of thousands of jobs. Sportfishing alone supports close to 20,000 jobs.

Farmland Preservation: Protecting farmland from development contributes to a robust agriculture industry and closely related economic sectors.

- Agriculture is the state's top industry contributing over \$107 billion to the state's economy and providing over one million jobs each year. One out of seven Ohioans are employed in the food and agriculture industry.
- The state's average annual loss of 110,000 acres of farmland accounts for an economic loss of about \$73 million in agricultural output each year.

Recreational Trails: Trails are unique and highly desired amenities that create jobs, raise property values, attract visitors who spend money locally, contribute to a high quality of life, and stimulate economic development.

- Every \$1 million invested in off-street multi-use trails generates 9.6 jobs.
- Trails in just the Miami Valley attract one million visitors every year who spend a combined \$16 million on related goods and services.
- Property values near trails are higher because they are viewed as an amenity. Homes near the Little Miami Trail sell for \$9,300 more than comparable properties ¼ mile further away from the trail.

Maintaining a healthy environment not only provides places for Ohioans to roam and play, it also contributes billions of dollars to the state economy and provides tens of thousands of jobs. Investing in the Clean Ohio Fund is an essential investment in the state's long-term prosperity.



Tom Jones

INTRODUCTION

A healthy Ohio environment provides immense benefits to the state's 11.5 million residents including clean air, clear water, and uncontaminated land. Investing in a healthy environment is also an investment in a strong and healthy economy. The state's diverse natural landscape featuring rich farmland, forested hills, and pristine lakes and rivers helps build strong local communities by creating jobs, attracting visitors, supporting local farmers, boosting property values and municipal revenues, providing valuable natural goods and services, and contributing other significant economic benefits. The Clean Ohio Fund is the state's primary funding source for maintaining healthy lands and waters, while also supporting a healthy economy.

Ohioans recognized the importance of maintaining clean land and water and in 2000 approved the creation of the Clean Ohio Fund. In 2008, the fund was renewed with \$400 million authorized by an overwhelming majority of voters in all 88 counties through a constitutional amendment. Today \$52 million remains to be appropriated for green space conservation, farmland preservation, and recreational trails. The program has continued to be enormously popular among the residents of Ohio. A poll of Ohio voters in 2011 found that a majority agree that elected officials should follow through on maintaining Clean Ohio's funding for protection of natural areas, wildlife habitat, and farmland.¹

The Fund supports projects through four program areas: green space conservation; farmland preservation; trails; and brownfield revitalization. This report examines the green space conservation, farmland preservation, and trails program areas only. These programs, commonly referred to as the 'green side' of the Clean Ohio Fund, are described in further detail below.

CLEAN OHIO GREEN SPACE CONSERVATION PROGRAM

Protecting Ohio's natural lands ensures clean air and water is available across the state while providing places for outdoor recreation including hiking, fishing, hunting, and camping. The Clean Ohio Green Space Conservation Program, administered by the Ohio Public Works Commission, helps fund the preservation of open spaces, sensitive ecological areas, and stream corridors. The program protects natural lands and water bodies through voluntary conservation agreements with private land owners and by purchasing lands outright (fee simple). Since its inception the program has preserved 26,000 acres of open space for Ohioans to enjoy.

¹ Public Opinion Strategies, 2011. Key Findings from a Survey of Ohio Voters Regarding Clean Ohio Funding (May 17, 2011).

CLEAN OHIO AGRICULTURAL EASEMENT PURCHASE PROGRAM

The Clean Ohio Agricultural Easement Purchase Program (AEPP) provides funding to farmers and communities that want to preserve the state's farmland while keeping the land in private ownership. Voluntary agreements through the program provide funds for up to 75 percent of the value of a farm's development rights with a payment cap set at \$2,000 per acre and a maximum of \$500,000 per farm. The agreement prohibits any future non-agricultural development by landowners. The Ohio Department of Agriculture's Office of Farmland Preservation administers the program. Between FY 2002 and FY 2012, the Clean Ohio AEPP protected 246 farms covering 44,813 acres across the state.²

CLEAN OHIO TRAILS FUND

Trail projects maximize investments made in open space protection by providing new opportunities for public access and outdoor recreation. Trail projects funded by the program include purchasing rail lines to convert to trails, completing regional trail systems, and providing links in urban areas to support commuter access and stimulate economic development. Applicants must provide a 25 percent local match, which can include land, labor, or materials. The Ohio Department of Natural Resources administers the Clean Ohio Trails Fund. To date, approximately 337 miles of trails have been conserved through 157 projects that were supported by \$45.5 million from the Clean Ohio Trails Fund.³



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2 Ohio Department of Agriculture Office of Farmland Preservation, 2012. Clean Ohio Agricultural Easement Purchase Program Annual Report. Available at: [http://www.agri.ohio.gov/divs/farmland/docs/2012%20Farmland%20Annual%20Report%20\(5\)_2012_08_01.pdf](http://www.agri.ohio.gov/divs/farmland/docs/2012%20Farmland%20Annual%20Report%20(5)_2012_08_01.pdf)

3 Accurate as of 12/10/2012. Information provided by Ohio Department of Natural Resources.

GREEN SPACE AND FARMLAND

Open space is conserved through the Clean Ohio Green Space Conservation Program while the Clean Ohio Agricultural Easement Purchase Program protects the state's farmland. These lands provide substantial economic benefits to the people, businesses, and communities of Ohio. Among these benefits are natural goods and services, tourism and outdoor recreation spending, a strong agriculture industry, and fiscally healthy communities.

INVESTMENT IN LAND CONSERVATION

From 2002 to 2012, The Clean Ohio Fund invested \$241 million to conserve 92,500 acres of open space and farmland, including both lands protected through conservation easements and fee simple.⁴ During this time an average of 8,410 acres of land were protected annually through state spending, with average spending of \$21.9 million annually (this is nominal spending, that is not in today's dollars). The average expenditure per acre conserved during this period was \$2,610. Exhibit 1 breaks out the historical spending and acres conserved through the Clean Ohio Fund.

Exhibit 1. Annual Clean Ohio Fund Spending on Land Conservation

Year	Acres	Spending
2002	5,580	\$13,400,000
2003	12,600	\$35,300,000
2004	6,590	\$18,800,000
2005	7,220	\$21,600,000
2006	8,530	\$21,200,000
2007	15,800	\$34,200,000
2008	3,740	\$11,700,000
2009	7,860	\$26,000,000
2010	9,480	\$34,100,000
2011	11,700	\$16,700,000
2012	3,320	\$8,260,000
Total	92,500	\$241,000,000
Average Annual Spending (2002-2012): \$21,900,000		
Average Annual Acres Conserved (2002-2012): 8,400		

Source: Ohio Department of Public Works, Ohio Department of Agriculture, and the Ohio Department of Natural Resources.
Note: Figures are based on the year that a conservation transaction closed.

NATURAL GOODS AND SERVICES

Some of the key economic benefits of conserved green space and farmland come in the form of natural goods and services. Natural lands and water bodies provide important functions that have significant economic value. Protected parks and open space remove air pollutants, protect and enhance water quality, mitigate flooding, provide fish and game habitat, produce food, manage stormwater, and provide other necessary functions.

⁴ Water Resource Restoration Sponsor Program data were unavailable at the time of this report.

The following list qualitatively describes in more detail some of the goods and services provided by different types of ecosystems:

Forests protect water and air quality.

- Forests help purify water by stabilizing soils and filtering contaminants, and regulate the quantity of available water and seasonal flow by capturing and storing water. In fact, forests process nearly two-thirds of the fresh water supply and provide water to about 180 million people across the U.S.⁵
- The soil stability of forests also reduces erosion and stormwater runoff, defraying the costs of erosion-related damage such as repairing damaged roads and structures and treating contaminated water.
- Forests help to improve air quality.⁶ Trees store and sequester air particulates and atmospheric carbon, reducing the amount of carbon a community produces and contributing to breathable air.

Grasslands and shrublands protect water quality and provide pollination services.

- Grasslands and shrublands capture water, minimizing particulate flow to surface water, and filter potential pollutants.⁷
- Grasslands and shrublands provide habitat for native pollinators.

Wetlands hold floodwaters, improve water quality, and support biodiverse habitats.

- A one-acre wetland can typically store about three-acre feet of water, or one million gallons. Trees and other wetland vegetation help slow the speed of flood waters. Water storage and the work of wetland vegetation can lower flood heights and reduce the destructive power of floodwaters.⁸
- Wetlands act as a natural filtration system to improve water quality by absorbing excess nutrients from fertilizers, manure, and sewage. Their role as natural purifiers reduces water treatment and infrastructure costs.⁹
- Wetland habitats support rich food chains and are home to species on microscopic and macroscopic level—from tiny invertebrates to mammals and fish.
- Agricultural lands can help to improve water and soil quality.
- Conservation tillage reduces the runoff of soil particles attached to nitrate, phosphorus, and herbicides, contributing to improved water quality. Tillage practices can also protect the soil surface from the impact of rain and slow water movement.¹⁰
- Recent overall declines in soil erosion and improvements in soil quality in the U.S. are partially attributable to increased soil conservation practices such as crop residue management, land retirement, and conservation tillage.¹¹

5 National Research Council, 2008. Hydrologic Effects of a Changing Forest Landscape. National Academy of the Sciences: Washington D.C.

6 Ibid..

7 Ducks Unlimited. Wetlands and Grassland Habitat. Available at: <http://www.ducks.org/conservation/habitat> (last accessed 2-11-2011).

8 U.S. Environmental Protection Agency, 2006. Wetlands: Protecting Life and Property from Flooding. EPA843-F-06-001. Available at: www.epa.gov/owow/wetlands/pdf/Flooding.pdf.

9 U.S. Environmental Protection Agency, 2006. Economic Benefits of Wetlands. EPA843-F-06-004. Available at: www.epa.gov/owow/wetlands/pdf/EconomicBenefits.pdf.

10 American Farmland Trust, 2005. The Environmental Benefits of Well Managed Farmland. Center for Agriculture in the Environment: DeKalb, Illinois.

11 Ibid..

Open Water

- Water bodies provide flood control and clean drinking water by storing runoff from stormwater, retaining sediment, and recharging groundwater.
- Open water resources provide recreation opportunities and support livelihoods through irrigation for agriculture and drinking water for livestock.
- Water bodies assimilate plant nutrients and are rich in plant varieties that support many plant and animal species including migratory birds.

HIGHLIGHTING THE ECONOMIC VALUE OF NATURAL GOODS AND SERVICES

The following sections describe the economic value of key natural goods and services provided by conserved lands in Ohio.

Flood Control

Conserving natural areas helps prevent costly flood damages by absorbing flood waters and keeping development out of flood prone areas. Federally identified Special Flood Hazard Area (SFHA) designated land accounts for 15 percent of the land area of Ohio. These areas contain over 130,000 buildings and structures with a combined value of more than \$11 billion. These buildings represent only a portion of flood-threatened property. About 26 percent of flood damage claims in Ohio come from outside SFHA designated land.¹²



The Trust for Public Land

The Federal Emergency Management Agency estimates that every \$1 invested in flood risk reduction saves residents and business owners \$4.¹³ Investing in flood control through land conservation is a prudent economic decision given the historical magnitude of flood damages in Ohio. From 2003 to 2007 flooding caused \$1.46 billion in property damages. An additional \$64.2 million in crop damage was caused by flood events.¹⁴ In August 2007, storms and flooding caused more than \$240 million in damages in just over one week. That year insured flood losses totaled over \$40.6 million.¹⁵ Flooding has also resulted in the tragic loss of 27 lives in Ohio according to the Hazards and Vulnerability Research Institute at the University of South Carolina. For these reasons and others the Clean Ohio Green Space Conservation Program places special emphasis on projects that preserve functioning floodplains, high quality wetlands, and stream corridors.

12 Ohio Department of Natural Resources Division of Soil and Water Resources. Floodplain Management Program: Reducing flood damage and promoting natural functions of floodplains. Available at: <http://www.dnr.state.oh.us/portals/12/Pubs/SuccessFS/FloodplainManagement.pdf> (last accessed 11-12-2012).

13 Ibid..

14 Property Damage adjusted for inflation to 2011 dollars. Hazards and Vulnerability Research Institute, 2010. The Spatial Hazard Events and Losses Database for the United States, Version 8.0 [Online Database]. Columbia, SC: University of South Carolina. Available at: <http://www.sheldus.org>

15 U.S. Federal Emergency Management Agency, National Flood Insurance Program, 2011. Ohio Flood Fact Sheet. Available at: http://www.floodsmart.gov/floodsmart/pdfs/Ohio+Flood+Fact+Sheet_2011_02_21.txt (last accessed 11-12-2012).

Farmland Natural Goods and Services

Agricultural crops are a classic example of natural goods. The value of these goods is measured by their market price. An acre of agricultural land can produce over 160 bushels of corn or nearly 50 bushels of soybeans per year. In 2011, an acre's worth of corn added up to just over \$1,000 in market value while soybeans could be sold for about \$624 per acre's worth (Exhibit 2).

Exhibit 2. Ohio Crop Values

Crop	Average Annual Production per Acre	Average 2011 market price per unit	Average Annual Market Value per Acre
Corn	163 Bu.	\$6.40	\$1,040
Soybeans	48 Bu.	\$13.00	\$624
Winter Wheat	61 Bu.	\$6.73	\$411
Hay	2.59 Tons	\$133	\$344
Oats	70 Bu.	\$4.30	\$301

Source: USDA National Agricultural Statistics Service, 2011 Survey

Farmers also receive great value from natural pollination services provided by honey bees and other natural pollinators. Over 70 crops in Ohio depend on bees including apples, peaches, strawberries, and pumpkins.¹⁶ Soybeans are also one of the key crops in Ohio affected by pollination services. Scientists have estimated that 10 percent of a soybean crop depends on insect pollination (half of which is provided by honey bees).¹⁷ We can therefore estimate based on the market price of soybeans that honey bee pollination provides approximately \$13 in annual value per acre of soybean crop. This adds up to statewide total of about \$59.2 million each year or \$118 million when all insect pollinators are considered.

¹⁶ Hoholik, Suzanne. "Hard-hit honeybees can't get a break." The Columbus Dispatch (May 11, 2011). Available at: <http://www.dispatch.com/content/stories/local/2011/05/11/hard-hit-honeybees-cant-get-a-break.html>

¹⁷ Morse, R.A. and N.W. Calderone, 2000. The value of honey bees as pollinators of US crops in 2000. Report Cornell University, Ithaca, New York

Ohio's Urban and Community Parks and Forests

Parks provide a host of valuable but often overlooked services. They capture and store stormwater, remove harmful air pollutants, cool summertime temperatures, and more. These services have measurable and significant economic value. A recent analysis of 47 parks in the city of Cincinnati found that the value of the stormwater management function of park trees totaled nearly \$5.1 million annually. Combined with the value of air pollution removal, these parks provide the city \$5.8 million in value each year in stormwater and air quality benefits alone.¹⁸



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Another study looked at the 1,080 square miles of urban or community forest cover across the state. The results found that these trees remove 24,200 tons of air pollutants every year. The annual value of this service was calculated to be \$178 million annually. These forests also store 28.1 million tons of carbon with a total value of \$581 million.¹⁹

RETURN ON INVESTMENT

The Trust for Public Land conducted an analysis of the return on Ohio's investment in land conservation through the Clean Ohio Fund by comparing the state's investment to the economic value of the natural goods and services provided by conserved lands.

Methodology

To determine the natural goods and services provided by conserved lands, The Trust for Public Land analyzed the ecosystem types found within conserved lands using a Geographic Information System (GIS) analysis. We obtained GIS data (i.e., mapped boundaries) of publicly and privately held conservation easements and purchased conservation lands that were protected through the Green Space and Farmland programs. We then determined the underlying ecosystem types using the National Land Cover Dataset (NLCD 2006) which features a 16-class land cover classification scheme.²⁰

Comprehensive spatial and spending data were not available for all parcels of land acquired by the state because not all protected lands have been mapped. The Trust for Public Land collected the best available information, which was provided by the Department of Public Works, the Department of Natural Resources, the Department of Agriculture, and individual grantees across the state. These data represent a subset of total acres protected and spending from 2002 to 2012. We analyzed a total of 74,700 acres protected through the Clean Ohio Fund using \$158 million

18 Hanou, I. 2011, Cincinnati and Hamilton County, Ohio Urban Tree Canopy (UTC) Assessment. Prepared by AMEC Earth and Environmental for Cincinnati Park Board.

19 Nowak, D.J. and E. Greenfield, 2010. Urban and Community Forests of the North Central East Region. USDA Forest Service General Technical Report NRS-54.

20 Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PE&RS, Vol. 77(9):858-864.

in funding (nominal spending, i.e., not adjusted to present value).²¹ Exhibit 3 details the subset of spending and acres protected by the Clean Ohio Fund each year. These projects are sufficiently representative of state land conservation activity (i.e., 81 percent of the acres protected and 66 percent of spending) to estimate the return on investment.

Exhibit 3. Subset of Annual Clean Ohio Fund Spending on Land Conservation

Year	Acres	Spending
2002	5,240	\$7,370,000
2003	9,400	\$23,800,000
2004	5,080	\$11,800,000
2005	4,800	\$14,200,000
2006	7,020	\$13,100,000
2007	11,800	\$18,700,000
2008	3,710	\$9,250,000
2009	6,110	\$17,200,000
2010	7,760	\$22,600,000
2011	11,000	\$14,800,000
2012	2,790	\$5,390,000
Total	74,700	\$158,000,000

Source: Department of Public Works, Department of Natural Resources; Department of Agriculture, and individual grantees.

From this analysis we calculated the number of acres of each of the 15 ecosystem types found within the conservation land. The most commonly acquired land cover type is Cultivated Crops, representing 50 percent of all conserved land. Exhibit 4 breaks out the full results of the land cover analysis.

21 The Ohio Department of Agriculture closed \$35.8 million in farmland easements using Clean Ohio Funds. As a result of the use of the Clean Ohio Funds, ODA was able to leverage an additional \$7.5 million for separate (i.e., new and additional) conservation easements through the U.S. Department of Agriculture, Natural Resources Conservation Service's Farm and Ranchland Protection Program. These easements can therefore be attributed to the Clean Ohio Fund and are included in the analysis.

Exhibit 4. Lands Conserved by Land Cover Type

Land Cover Type	Acres	Percentage
Cultivated Crops	37,500	50.3%
Deciduous Forest	22,300	29.8%
Pasture/Hay	6,000	8.0%
Developed, Open Space	3,190	4.3%
Woody Wetland	1,400	1.9%
Open Water	1,200	1.6%
Grassland/ Herbaceous	848	1.1%
Evergreen Forest	660	0.9%
Developed, Low Intensity	481	0.6%
Shrub/Scrub	407	0.5%
Emergent Herbaceous Wetland	391	0.5%
Mixed Forest	122	0.2%
Developed, Medium Intensity	104	0.1%
Barren Land	78	0.1%
Developed, High Intensity	11	<0.1%
Total	74,700	100%

Source: 2006 National Land Cover Data (NLCD 2006)

Results

Based upon the per-acre values, (see Appendix for values and methodology) 74,700 acres of conserved land provide \$851 million (present value, i.e., the value of past investments in today's dollars) in total economic value from date of purchase (i.e., beginning in 2002) to 2022, (i.e., 10 years into the future) in the form of natural goods and services.

The Trust for Public Land used this value to estimate the return on \$179 million (present value) invested in 74,700 acres of land conserved through the Clean Ohio Fund from 2002 to 2022. The comparison of this investment to the economic value of natural goods and services generated by these lands in the past (i.e., 2002 to 2012) and into the future (i.e., today through 2022) finds that every \$1 invested returns \$4 in economic value. These goods and services will continue to be provided well beyond 2022 increasing the total return on investment beyond that calculated in this analysis.

LEVERAGING FEDERAL, LOCAL, AND PRIVATE FUNDING

Ohio's investment in conservation leverages funding from federal, local (e.g., municipalities), and private (e.g., individual donors) sources. By attracting support from other sources, the state does not have to bear the entire cost burden of a project and therefore maximizes its investment. By leveraging funds more local projects are able to be sponsored creating additional economic benefits.

From 2002 to 2012 Ohio leveraged \$169 million in matching funds from other funding sources including \$7.90 million from federal sources, \$67.8 million from local sources, and \$37.9 million

from private sources for conservation easements and acquisitions.²² That is, every \$1 of state spending on land conservation through the Clean Ohio Fund was matched by \$0.70 in federal, local, and private funding (i.e., the Clean Ohio Fund spent only \$0.59 for every \$1 worth of land conservation).

THE ECONOMIC IMPACT OF GREEN SPACE CONSERVATION

The Clean Ohio Fund helps preserve natural lands and waters across the state for Ohioans to enjoy. These places attract visitors and drive local tourism economies. Both visitors and residents spend significant sums on outdoor recreation in the state. This spending creates jobs and supports local business while maintaining a healthy bottom line for local governments and for the state.

The Clean Ohio Green Space Conservation Program provides funding to a variety of open space conservation projects. The program places a special emphasis on projects that do the following:

- Protect habitat for rare, threatened or endangered species
- Preserve high quality wetlands and other scarce natural resources
- Preserve streamside forests, natural stream channels, functioning floodplains, and other natural features of Ohio's waterways
- Support comprehensive open space planning
- Secure easements to protect stream corridors, which may be planted with trees or vegetation to help reduce erosion and fertilizer/pesticide runoff
- Enhance eco-tourism and economic development related to outdoor recreation in economically challenged areas
- Provide pedestrian or bicycle passageways between natural areas and preserves
- Reduce or eliminate nonnative, invasive plant and animal species
- Provide safe areas for fishing, hunting and trapping in a manner that provides a balanced ecosystem.

Source: Ohio Public Works Commission. Green Space Conservation. <http://clean.ohio.gov/GreenSpaceConservation/> (last accessed 11-12-2012).

Tourism and Visitor Spending

Natural areas support a strong tourism economy by attracting visitors who spend money locally on a variety of goods and services such as food, gas, lodging, and retail goods. In 2011, there were 180 million trips to Ohio. Overnight trips accounted for 36.5 million or 20 percent of these trips. One out of ten overnight visitors in Ohio stayed at a wilderness campsite or rented a site at a campground. "Outdoors" ranked as the second largest type of overnight trip accounting for 15 percent of all Ohio trips. It also accounted for 10 percent of day trips.²³

²² The Trust for Public Land's Conservation Almanac. Available online at conservation.almanac.org.

²³ Longwoods International, 2012. Travel and Tourism in Ohio: 2011 Travel Year.

In 2011, \$26.3 billion of visitor spending in the state generated an overall economic impact of \$40 billion in sales throughout the economy.²⁴ Overnight visitors spent a combined \$11.4 billion while day visitors spent \$14.9 billion. If we apply the percentage of “Outdoors” trips (of all trips taken) to visitor spending then these types of trips generate annual spending of \$1.7 billion by overnight visitors and \$1.5 billion by day visitors.

Visitor spending supports an enormous number of jobs across the state. Tourism accounts for 8.7 percent of all employment in Ohio or one out of every 11.5 jobs. In 2011 these jobs totaled 443,000 representing wage income of \$10.5 billion annually. The state government and local municipalities also benefit directly from this spending. Ohio received \$2.7 billion in state taxes while local governments also collected \$2.7 billion in tax revenues associated with tourism.²⁵

Edge of Appalachia—The Nature Conservancy

At 16,000 acres, the Edge of Appalachia preserve is one of the largest privately protected conservation areas in the Midwest. Cooperatively owned and managed by The Nature Conservancy and the Cincinnati Museum Center, the preserve protects rare cedar barrens, rocky gorges, dramatic promontories, quiet stretches of Ohio Brush creek and extensive stands of eastern deciduous forest. Utilizing the Clean Ohio Fund, The Nature Conservancy has added 24 properties, totaling over 2,300 acres, to the preserve, helping to link the land to the neighboring 62,000 acre Shawnee State Forest. The combined acreage will create one of the premier wild landscapes in Ohio and serve as a nexus for a host of outdoor recreation opportunities.



The Nature Conservancy

The local Adams County community is taking advantage of this enhanced resource by partnering with The Nature Conservancy to promote birding, hiking, hunting and canoeing opportunities that are provided by this extensive area of conservation land. Plans are underway to reroute road-bound sections of the North Country National Scenic Trail / Buckeye Trail through recently acquired Clean Ohio funded land, providing for a more authentic backcountry experience. Already existing interpretive trails are being enhanced by the acquisition of additional properties that provide for protection of scenic vistas, improved trail head access and a better scenic experience for visitors.

Jeffrey Huxmann, President of the Adams County Travel and Visitors Bureau says, “The Edge of Appalachia Preserve is one of the cornerstones of tourism in the county. The preserve draws visitors from all over the eastern U.S. and is well known for its mountainous views, spring warbler migrations and rare and unique plant communities. The planned corridor with public hiking trails would have long-term economic benefits to the county in addition to its environmental impact, as nature and outdoor tourism is one of Adams County’s strongest tourist attractions.”

²⁴ Tourism Economics, 2012. The Economic Impact of Tourism in Ohio.

²⁵ Ibid.

Outdoor Recreation

Outdoor Recreation provides an enormous boost to the state's economy. According to a recently released report by the Outdoor Industry Association, it generates \$17.4 billion in annual consumer spending in Ohio both by visitors and residents. That spending benefits the state and local municipalities through greater sales tax revenues. The tax revenue attributed to outdoor recreation spending totals \$1.3 billion annually. Spending on outdoor recreation also helps local businesses that hire Ohio residents. Approximately 196,000 jobs in the state are supported by this spending accounting for \$5.1 billion in wages and salaries.²⁶ Much of that earned income is then spent in local communities further magnifying the economic impact of outdoor recreation.

Wildlife-Associated Recreation

The Clean Ohio Fund provides essential habitat for a variety of wildlife species including many fish and game species. People across the state and from out of state enjoy Ohio's wildlife. In 2011, 4.34 million people went wildlife watching, hunting, fishing, or did some combination of all three in the state (Exhibit 5). These participants traveled and spent money at local businesses related to these activities. Altogether wildlife-associated recreation accounted for in-state spending of \$3.59 billion. Equipment and other expenses accounted for \$2.6 billion of that spending. Wildlife watchers spent over \$745



Darcy Kiefel

million while hunters and anglers spent \$2.8 billion. The average wildlife watcher spends \$233 per year related to their activity while the average hunter or angler spends \$1,820 each year.²⁷ This spending creates thousands of jobs. Sportfishing alone supports close to 20,000 jobs according to the Ohio Department of Natural Resources.²⁸ This economic activity depends on publicly accessible natural lands and waters healthy enough to support viable fish and wildlife populations.

Exhibit 5. Participation in Wildlife-Associated Recreation in Ohio - 2011 (Residents and Nonresidents)

Type of Participant	Number of Participants	Expenditures		
		Trip-related	Equipment and Other	Total
Wildlife Watching	3,200,000	\$87,100,000	\$658,000,000	\$745,000,000
Sportsperson (hunters and anglers)	1,560,000	\$915,000,000	\$1,930,000,000	\$2,850,000,000
Total	4,340,000*	\$1,000,000,000	\$2,590,000,000	\$3,590,000,000

*Note that total is lower than sum of participants because some participants engaged in both activities.

Source: U.S. Fish and Wildlife Service, 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.

26 Outdoor Industry Association, 2012. The Outdoor Recreation Economy: Ohio

27 U.S. Fish and Wildlife Service, 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.

28 Ohio Department of Natural Resources Division of Watercraft, 2012. Recreational Boating in Ohio. Available at: <http://www.dnr.state.oh.us/Portals/4/pdfs/reports/rbioBooklet2012.pdf>

East Sandusky Bay–The Trust for Public Land

Located between Cleveland and Toledo, East Sandusky Bay is a naturally functioning freshwater marsh along the Lake Erie shoreline. Within easy access to Cedar Point Amusement Park, the East Sandusky Bay Nature Preserve provides a sanctuary for relaxation and recreation. The Trust for Public Land worked with Erie MetroParks, the Sandusky/Erie County Community Foundation, the Ohio Department of Natural Resources and The Nature Conservancy to create the 1,300-acre East Sandusky Bay Nature Preserve for public use and enjoyment, including a protected three-mile continuous stretch of environmentally diverse and sensitive wetland areas.



Darcy Kiefel

Throughout the state, bird watching contributes to Ohio's \$39 billion tourism industry. The East Sandusky Bay Nature Preserve is an irreplaceable resource, with its hardwood forest, woodland swamp, cattail marsh, nesting bald eagles and open-water habitat. Situated on the Lake Erie Birding Trail, the preserve is a prime location for bird watching to Ohio's 2.4 million birders especially during the migratory seasons. According to Ohio Sea Grant research report from February 2012, bird watching along Ohio's Lake Erie coast contributes more than \$26 million and 283 jobs to northern Ohio's economy. Birders' spending supports salaries, locally-made products and taxes; when local employers and employees earn that money, they turn around and spend it again. This turnover of money has a multiplier effect for the entire region, generating \$1.48 for every dollar that birders spend in northern Ohio.

In the over nine years it took to create the preserve, funding strategies for land acquisition and protection depended on and were heavily supported through the Clean Ohio Greenspace Conservation program and the Ohio EPA Water Resource Restoration Sponsorship program in addition to federal coastal conservation funds.

Sources: Lake Erie Birding Trail, Ohio. Sandusky Bay Loop. Available at: <http://www.dnr.state.oh.us/Home/LakeErieBirdTrailIndex/trailandloop/sanduskybayloop/tabid/21983/Default.aspx>

Xie, Philip F. 2012. Socio-economic Impacts of Birdwatching along Lake Erie: A Coastal Ohio Analysis. School of Human Movement, Sport and Leisure Studies, Bowling Green State University.

Motorized Recreation

Conserved open space lands can also provide opportunities for motorized recreation including all-terrain vehicles (ATVs) and snowmobiles. The state averages 18,000 to 20,000 snowmobile registrations in any given three-year period. In 2003, ATV registrations reached nearly 14,000.²⁹ Snowmobile riders and other motorized recreation enthusiasts spend significant amounts of money related to their sport. A recent study of the southeast Ohio region found that spending

29 Ohio Department of Natural Resources Division of Real Estate and Land Management, 2005. Trails for Ohioans: A Plan for the Future. Available at: <http://ohiodnr.com/Portals/0/trailsplan/pdf/trailsforohioans.pdf>

in the region related to Off-Highway Vehicle (OHV) recreation and tourism totaled \$1.39 million in 2008. Participants spent money on things including fuel, food, lodging, sporting goods, and parts and equipment. The total economic impact of this activity after the secondary effects (i.e., the impacts from the circulation of the initial spending through the local and regional economy) of that spending was considered amounted to over \$1.8 million. Additionally, over 26 jobs are supported by OHV related economic activity in the region representing nearly \$657,000 in wages.³⁰

Green space preservation is important to creating and sustaining these types of economic benefits throughout the state. According to the same study, as shown in Exhibit 6, many of the top ten important attributes associated with OHV recreation and tourism relate directly to land conservation including the highest ranked response, “Getting away from it all.”³¹

Exhibit 6. Top Ten Importance Attributes of OHV Recreation and Tourism in Southeast Ohio

1. Getting away from it all
2. Enjoying some relaxation
3. Preserving the environment for future riders
4. Exciting riding experiences
5. Parking at the trailheads
6. Being with friends and family
7. Feeling in control of the vehicle
8. Other riders’ respect for the environment
9. Being in a natural setting
10. Seeing beautiful countryside

Source: Martin, B., F. Meng, M. Li, and J. Tanzewr, 2010. Economic Impact of Off-Highway Vehicle Recreation and Tourism in Southeast Ohio. Ohio University.

Recreational Boating

Conserved natural areas featuring pristine lakes, ponds, and rivers support water-based recreation activities such as swimming, canoeing, and kayaking. Protecting natural areas also helps protect the water quality of popular water bodies throughout the state. There are over 108,000 registered canoes or kayaks in Ohio. In 2011, 36,800 canoes or kayaks were newly registered in the state. Paddle sports enthusiasts spend money on boats, food, equipment, lodging and other expenses related to their sport.³² One study found that registered canoe and kayakers spend \$55 on food and lodging per trip. Paddling generates enough economic activity to support 56 canoe or kayak rental businesses in the state. There are an additional 626 boat dealers in Ohio.³³

30 Martin, B., F. Meng, M. Li, and J. Tanzewr, 2010. Economic Impact of Off-Highway Vehicle Recreation and Tourism in Southeast Ohio. Ohio University. Available at: http://www.nohvcc.org/docs/economic-impacts/Ohio_OHV_Economic_Impact_Study.pdf?sfvrsn=0

31 Ibid..

32 Ohio Department of Natural Resources Division of Watercraft, 2012. Recreational Boating in Ohio.

33 Ibid..

THE ECONOMIC IMPACT OF FARMLAND PRESERVATION

Ohio is a farm state that depends on its 13.7 million acres of farmland to fuel its economy. Agriculture is the state's number one industry contributing over \$107 billion to the state's economy and providing over one million jobs each year.³⁴ In fact, one out of seven Ohioans are employed in the food and agriculture industry.³⁵ The state's 73,700 farms drive this economic activity by supporting local agri-businesses and agriculture-related manufacturing. Yet Ohio is losing farmland. Ohio ranks second out of all states for farmland converted to developed land but only 31st in population growth.³⁶ The Clean Ohio Fund's Agricultural Easement Purchase Program helps sustain a robust state economy and strong local economies by ensuring the state's farmland remains in active production and by helping farmers invest in and grow their businesses.



Chris Knopf

While the state has millions of acres of farmland, the typical farm is a small operation. The average farm in Ohio is about 183 acres. The majority (62 percent), however, are less than 100 acres. Approximately 77 percent of all farms have annual sales below \$50,000 and nearly nine out of 10 farms are owned by a single individual or family. About 84 percent of farm operators live on their farm and the average farm operator is 56 years old.³⁷ Farmland preservation sustains a healthy agriculture industry by helping many of these small family-owned farms stay operational and profitable.

In a recent survey of farmers who had sold easements through the AEPP program, half of the funds distributed were directly reinvested by farmers. Buying more land was the largest single expenditure accounting for 16 percent of all the funds spent by farmers. Paying off debts was the largest sub-category for funds expended accounting for 32 percent of funds spent. The AEPP also helps farmers expand their business. Nearly 30 percent of program participants have and/or are planning to diversify their operation. Approximately 22 percent are planning to establish new or additional farm businesses or already have.³⁸ The individual farms throughout the state add up to multi-billion dollar industry.

34 Ohio Department of Agriculture. About Us. Available at: <http://www.agri.ohio.gov/divs/admin/aboutus.aspx> (last accessed 11-12-2012).

35 USDA Farm Service Agency. Ohio. Available at: <http://www.fsa.usda.gov/FSA/stateoffapp?mystate=oh&area=home&subject=landing&topic=landing> (last accessed November 8, 2012).

36 Ohio Department of Agriculture, 2012. Farmland Preservation Fact Sheet. Available at: http://www.agri.ohio.gov/divs/farmland/Docs/Farm_FactSheet.pdf

37 USDA Census of Agriculture, 2007

38 Clark, J., 2010. Ohio's Agricultural Easement Purchase Program: From pilot to permanent presence. Center for Farmland Policy Innovation, Department of Agricultural, Environmental, and Development Economics. Available at: http://aede.osu.edu/sites/drupal-aede.web/files/imce/2010_3.pdf

Agriculture Industry

In 2011, Ohio's agricultural output totaled \$9.6 billion (Exhibit 7).³⁹ Crops accounted for 59 percent of all farm income led by corn and soybeans at \$2.8 billion and \$2.7 billion, respectively. These two commodities represent almost 57 percent of all farm receipts in the state.⁴⁰ In 2007 the total value of farmland, farm buildings, and machinery in the state totaled over \$55.9 billion, or approximately \$737,000 per farm.⁴¹

Exhibit 7. Top 5 Agriculture Commodities, 2011

Commodity	Farm Receipts	Farm Receipts Percent of State	Farm Receipts Percent of U.S.
1. Corn	\$2,790,000,000	28.9%	4.4%
2. Soybeans	\$2,670,000,000	27.6%	7.1%
3. Dairy products	\$1,110,000,000	11.5%	2.8%
4. Hogs	\$714,000,000	7.4%	3.3%
5. Chicken eggs	\$491,000,000	5.1%	6.7%
All commodities	\$9,650,000,000		2.6%

Source: USDA Economic Research Service, 2012. Ohio State Fact Sheet.

Impact on Agriculture-Related Industries

The total economic impact of Ohio's farms extends far beyond the direct value of agricultural production. Protecting the state's farmland supports related industries, especially the food and textile manufacturing sectors. Food manufacturing employs over 50,600 workers with an annual payroll of \$2 billion (Exhibit 8). Each year food manufacturing adds \$11.5 billion to the state's economy. When direct agricultural production and textile-related manufacturing is factored in, agriculture helps support 222,000 jobs. Agriculture and related industries add \$15.8 billion in value to Ohio's economy annually. Farms also pump money into local communities when farmers buy inputs used for production including feed for livestock, equipment, and services. In 2007 farmers in the state spent \$2.63 billion on agricultural services, fertilizer and chemicals, fuels, seeds and plants, and supplies and repairs.⁴²

Exhibit 8. Value Added by Agricultural Manufacturing and Production to Ohio Economy

Industry	Jobs	Annual Payroll	Value Added
Food Manufacturing	50,600	\$2,000,000,000	\$11,500,000,000
Agricultural Production of Goods and Services*	170,000	n/a	\$4,240,000,000
Textile-Related Manufacturing	1,120	\$54,100,000	\$68,800,000
Total	222,000	\$2,060,000,000	\$15,800,000,000

*Jobs include farm operators and total number of workers hired including seasonal labor. Source: 2009 Annual Survey of Manufactures, USDA Census of Agriculture, 2007.

39 Excludes services and forestry. USDA Economic Research Service, 2012. Ohio State Fact Sheet. Available at: <http://www.ers.usda.gov/data-products/state-fact-sheets/state-data.aspx?StateFIPS=39&StateName=Ohio>

40 USDA Economic Research Service, 2012. Ohio State Fact Sheet.

41 USDA Census of Agriculture, 2007

42 Ibid..

The Economic Cost of Farmland Loss

The state lost approximately 4,000 farms and one million acres of farmland between 1997 and 2010 representing a significant economic loss. As of 2010, the U.S. Department of Agriculture estimates that Ohio's farmland accounts for 13.7 million acres or 52 percent of the entire state.⁴³ This would indicate a loss of 257,000 acres of agricultural land between just 2007 and 2010 – a rate of 85,500 acres of farmland lost annually.

In the 10-year span between 1997 and 2007, the state lost 781,000 acres of farmland (Exhibit 9). Most of this farmland (80 percent) was lost between 2002 and 2007, indicating a recent uptick in the rate of farmland loss. During that five-year period 115,000 of those acres were lost permanently to development – 72 percent of which were designated prime agricultural lands. Adding the previous five-year period, a quarter of a million acres of Ohio farmland have been covered by buildings, roads, and parking lots between 1997 and 2007.⁴⁴

Exhibit 9. Farmland Loss 1997-2007

Category	Year			
	1997	2002	2007	2010*
Farms	78,700	77,800	75,900	74,700
Farm Loss	2,880 (1997-2007)			4,040 (1997-2010)
Percent Loss	3.7%			5.1%
Agricultural Land (acres)	14,700,000	14,600,000	14,000,000	13,700,000
Average size of farms (acres)	187	187	184	183
Farmland loss (acres)	781,000 (1997-2007)			1,040,000 (1997-2010)
Percent loss	5.3%			7.0%
Farmland developed (acres)	254,000			n/a
Cropland (acres)	11,700,000	11,400,000	10,800,000	n/a
Cropland Loss (acres)	840,000 (1997-2007)			n/a
Percent Loss	7.2%			n/a
Estimated market value of agricultural products sold (adjusted for inflation to 2011 dollars)	\$6,650,000,000	\$5,330,000,000	\$7,670,000,000	\$9,100,000,000
Average per farm	\$84,500	\$68,500	\$101,000	\$122,000
Average per acre of farmland	\$451	\$366	\$550	\$664
Estimated annual loss of agricultural output	\$73,000,000			

*The USDA only provides estimates of the number of farms, acres of agricultural land, and acres of cropland for 2010. Sources: USDA Census of Agriculture, 2007; USDA National Agricultural Statistics Service; Farmland Information Center. Ohio Statistics Sheet.

43 USDA National Agricultural Statistics Service, 2011. Ohio Agriculture: A Profile. Available at: http://www.nass.usda.gov/Statistics_by_State/Ohio/Publications/pro.pdf

44 Farmland Information Center. Ohio Statistics Sheet. Available at: http://www.farmlandinfo.org/agricultural_statistics/index.cfm?function=statistics_view&stateID=OH

If we consider the farmland lost between 2002 and 2010, then it is possible to estimate an average annual loss of 110,000 acres of farmland. Based on the average 2010 output per acre across the state, this represents an annual economic loss of roughly \$73 million in agricultural output.⁴⁵



Ken Sherman

Not only does the loss of farmland cost the agriculture industry, it also costs local municipal governments and taxpayers when residential land takes the place of farmland. Farmland preservation saves communities money through avoided costs on expensive infrastructure and other municipal services such as schools, police and fire protection, and others required by residentially developed areas. Studies have consistently shown that open space and working lands (e.g., farms) contribute more in taxes than they require in municipal services. Residential

land, however, contributes less in taxes than it receives in municipal services, representing a net loss to local governments. The national median across 151 communities over 25 years is that for every \$1 paid in local taxes, working lands and open space require \$0.35 in services compared to \$1.16 in services for the average home.⁴⁶

A study of eight Ohio communities undertaken by the American Farmland Trust between 1997 and 2008 confirm these findings with open space and working farms and forests requiring on average only \$0.25 in services for every \$1 generated to the community in tax revenues. Residential lands in these communities, meanwhile, require \$1.19 in services for every \$1 in tax revenues received by the municipality.⁴⁷

Mauch Family Farm, Office of Farmland Preservation

In 1942, while still in high school, Chet Mauch inherited an 80-acre farm just west of Fremont in Sandusky County. Chet and his wife Betty went on to raise six children there, and grew the farm to over 4,000 acres between the land they own and rent. Today, their children keep the business going with daughter Judy managing operations. Over the last three years, the Mauch family has worked with ODA's Office of Farmland Preservation and the Black Swamp Conservancy to place 838 acres under protection of agricultural easements, through donation and through the AEPP program. The family has invested the easement proceeds in the purchase of additional acres and in paying down debt, making their enterprise stronger.

Office of Farmland Preservation. Annual Report. Ohio Department of Agriculture. July 2012.
Ohio Department of Agriculture

45 The average 2010 output per acre in Ohio was \$664 per acre (2011 dollars).

46 American Farmland Trust, 2010. Cost of Community Services Fact Sheet. Farmland Information Center, Northampton, Massachusetts.

47 Ibid.

The Clean Ohio AEPP has been effective in combating farmland loss. An overwhelming majority of farmers who sold easements through AEPP agree that the program successfully helps communities preserve Ohio's farmland.⁴⁸ Despite the program's success there is still a long way to go. There are 14 applications submitted for each easement sold. This means there are not enough funds to match demand.⁴⁹ Continued investment in AEPP is necessary to meet this demand and maintain the vitality of agriculture and the economy of Ohio.

Harbage Farms—Tecumseh Land Trust

Farmers, government agencies, and land trusts are working across the state to protect farmland and the viability of farming communities in Ohio. Farming is the #1 industry in Ohio contributing over \$93 billion to the state's economy and employing one-in-seven people. One of the best examples of farmland protection is tucked away in South Charleston, Ohio where a block of eight farms totaling almost 3,000 acres has been preserved.

At the heart of this block sits Brian Harbage of Harbage Farms on his own 62 acre farm preserved by the Tecumseh Land Trust. Tecumseh Land Trust has been pushing hard in this area to save as much farmland as possible to ensure the continuation of farming for future generations, and farmers like Brian are the catalyst that makes it all possible.



William Krueger

Through strategic use of Clean Ohio funds, Brian Harbage has been able to grow and expand his farm - by more than 300 acres -- and plans to put easements on each new tract of land he acquires. By reinvesting his Clean Ohio funds, Brian is able to buy new land to farm and preserve, continuing the cycle. Easements on all the new land he acquires ensure it will be around to farm and provide food for generations to come.

Harbage Farms has been family owned since its inception and Brian has been farming the land for over 19 years. The farm has been 100 percent no till since Brian began to farm. He also engages in many other conservation practices such as vegetated buffer strips, animal release programs, and nutrient management. The farm produces primarily corn and soy beans, as well as some wheat and hay. Brian also raises over 300 head of cattle for dairy and meat production. Surrounding by rolling fields and rustic barns, the Harbage Farm is a shining example of conservation farming done right. The economic benefits brought by Clean Ohio funds and land preservation have secured the future of Brian's farm for himself and for the benefit of future generations. Brian strongly believes in the importance of preserving farmland because "if we don't farm, we don't eat. Asphalt is the last crop and we cannot afford to develop our farmland."

48 Clark, J., 2010. Ohio's Agricultural Easement Purchase Program: From pilot to permanent presence. Center for Farmland Policy Innovation, Department of Agricultural, Environmental, and Development Economics.

49 Keck, G.C. "Clean Ohio impacts Buckeye farms." Ohio Farmer (October 2008). Available at: <http://magissues.farmprogress.com/OFM/OF10Oct08/ofm030.pdf>

RECREATIONAL TRAILS

The Clean Ohio Fund supports trail projects that provide significant economic benefits to local residents, businesses, and governments. Trails are unique and highly desired amenities that create jobs, raise property values, attract visitors who spend money locally, contribute to a high quality of life, and stimulate economic development. Trails also help maximize the state's investment in land conservation by providing new and improved public access and recreational opportunities on conserved lands. In addition to these economic benefits, trails also help reduce congestion, improve air quality, create safe alternative travel routes, and lead to improved health of residents.⁵⁰ To date, approximately 337 miles of trails have been conserved through 157 projects that were supported by \$45.5 million from the Clean Ohio Trails Fund.⁵¹

The Clean Ohio Trails Fund supports a variety of trail projects. The program gives special emphasis to projects that:

- Are consistent with the statewide trail plan
- Complete regional trail systems and links to the statewide trail plan
- Link population centers with outdoor recreation areas and facilities
- Involve the purchase of rail lines linked to the statewide trail plan
- Preserve natural corridors
- Provide links in urban areas to support commuter access and provide economic benefit

Source: Ohio Department of Natural Resources. Recreational Trails. <http://clean.ohio.gov/RecreationalTrails/> (last accessed 11-12-2012).

JOB CREATION

Trail projects create jobs both in urban and rural areas. A recent national study found that investing in off-street multi-use trails generates 9.6 jobs per \$1 million invested.⁵² Jobs not only include construction positions, but also employment created from the design and materials procurement associated with trail projects. Many trail projects feature additional infrastructure such as bicycle facilities. Spending on bicycle infrastructure creates even more jobs – 11.4 per \$1 million.⁵³ The total jobs impact is significantly greater when the employment effects of increased visitor spending and business activity is factored in.

50 Garrett-Peltier, H., 2011. Pedestrian and Bicycle Infrastructure: A National Study of Employment Impacts. Political Economy Research Institute, University of Massachusetts, Amherst. Available at: http://www.peri.umass.edu/fileadmin/pdf/published_study/PERI_ABikes_June2011.pdf

51 Accurate as of 12/10/2012. Information provided by Ohio Department of Natural Resources.

52 Garrett-Peltier, H., 2011. Pedestrian and Bicycle Infrastructure: A National Study of Employment Impacts. Political Economy Research Institute, University of Massachusetts, Amherst.

53 Garrett-Peltier, H., 2011. Pedestrian and Bicycle Infrastructure: A National Study of Employment Impacts. Political Economy Research Institute, University of Massachusetts, Amherst.

TRAIL USER SPENDING AND BUSINESS IMPACT

Studies have consistently shown that trail users spend money in local communities. For example, users of the Little Miami Scenic Trail in Ohio spend \$13.50 per trip on food, drinks, and travel. When the clothing, equipment and accessories related to use of the trail is considered, trail visitors spend approximately \$277 each every year related to trail use.⁵⁴ Spending by trail visitors adds up to a major economic impact because of the large numbers of residents that use trails. Trails in just the Miami Valley attract one million visitors every year who spend \$16 million on related goods and services.⁵⁵ Another analysis by researchers at the University of Cincinnati's Applied Economic Research Institute found that investing in the creation of the Mill Creek Greenway Trail would lead to the creation of 445 jobs and have an overall economic impact of \$52 million.⁵⁶



Darcy Kiefel

Local businesses thrive on this activity. Over 60 percent of business owners near the Little Miami trail reported that the trail increased their business with one out of three business owners claiming over a 20 percent uptick in business. Increased visitor activity and spending is also reflected in the value of commercial real estate near trails. Nearly half of business owners near the Little Miami trail say their property has increased in value because of the trail.⁵⁷

Bicycling activity, which depends on trail networks throughout the state, provides an economic boost to local communities. A regional study of Ohio and four neighboring states determined that bicycling contributes \$17 billion to the regional economy and supports 191,000 jobs. This economic activity generates \$2.2 billion in state and federal tax revenues annually.⁵⁸

54 National Association of Realtors, 2011. The 2011 Community Preference Survey: What Americans are looking for when deciding where to live.

55 Chapin, S., RJF Agencies. Economic Impact of Silent Sports-A Regional Case Study. Available at: <http://www.northwoodssummit.com/Silent-Sports.pdf>

56 May, Lucy. "Mill Creek Greenway project could forge path to jobs, growth." Business Courier. September 14, 2009. Available at: <http://www.bizjournals.com/cincinnati/stories/2009/09/14/story3.html?page=all>

57 Little Miami Scenic Trail Economic Study, 1999. Prepared by Pflum, Klausmeier, and Gehrum Consultants, Inc. for The Ohio Greenways Initiative.

58 Chapin, S., RJF Agencies. Economic Impact of Silent Sports-A Regional Case Study.

QUALITY OF LIFE AND ECONOMIC DEVELOPMENT

Trails are also amenities that increase the quality of life for residents. A high quality of life is a critical ingredient for economic development as talented workers are increasingly drawn to places that are attractive to live and work. One survey of high-tech workers showed that a job's attractiveness increases by 33 percent in a community with a high quality of life.⁵⁹ Businesses, in turn, follow these workers to areas with a high quality of life so that they can more easily recruit skilled employees. According to CNBC, air and water quality and perceived livability are the second most important consideration for locating a business after cost of doing business.⁶⁰

Trails contribute to a community's quality of life by providing opportunities for individuals and families to walk, run, and bike. Trails also provide a safe way to get around locally without getting in the car. According to the 2011 National Association of Realtors® community preference survey, "places to take walks" ranked as one of the top four community characteristics that Americans consider when choosing a neighborhood.⁶¹ The National Association of Homebuilders, meanwhile, reports that "trails consistently remain the number one community amenity sought by prospective homeowners."⁶² Ohioans are similar in their view of trails. Nearly nine out of 10 residents living close to the Little Miami Scenic Trail report that the trail has improved and maintained the quality of their neighborhoods.⁶³

ENHANCED PROPERTY VALUES

The connection between trails and a high quality of life translates into higher home values for properties located near trails. In a survey of property owners near the Little Miami Scenic Trail a majority responded they would recommend living near a trail to other landowners.⁶⁴ An analysis done on the property value impact of the Little Miami trail found that properties ¼ mile further away from the trail sold for \$9,300 less than comparable properties closer to the trail.⁶⁵ Furthermore, another study found that 95 percent of nearby property owners feel that the trail has either maintained or increased the value of their property.⁶⁶ The impact on property values also contributes to the fiscal health of local governments, which receive greater property tax revenues as a result.

59 American Planning Association, 2002. How Cities Use Parks for Economic Development. Available at: <http://www.planning.org/cityparks/briefingpapers/economicdevelopment.htm> (last accessed 11-12-2012).

60 CNBC, 2012. "America's Top States for Business 2012, A CNBC Special Report."

61 National Association of Realtors, 2011. The 2011 Community Preference Survey: What Americans are looking for when deciding where to live.

62 National Association of Homebuilders, 2008.

63 Little Miami Scenic Trail Economic Study, 1999. Prepared by Pflum, Klausmeier, and Gehrum Consultants, Inc. for The Ohio Greenways Initiative.

64 Ibid..

65 Karadeniz, Duygu, 2008. The Impact of the Little Miami Scenic Trail on Single Family Residential Property Values. A thesis submitted to the Division of Research and Advanced Studies of the University of Cincinnati.

66 Little Miami Scenic Trail Economic Study, 1999. Prepared by Pflum, Klausmeier, and Gehrum Consultants, Inc. for The Ohio Greenways Initiative.

CONCLUSION

Investing in clean land and water through the Clean Ohio Fund returns numerous economic benefits. Every \$1 invested in green space or farmland conservation by Ohio returns \$4 in economic value through natural goods and services. This finding is consistent with the results of other state analyses conducted by The Trust for Public Land.

In addition to that return on investment, green space, farmland, and trails contribute to the economic well-being of the state by drawing visitors who spend money in local communities, supporting local farmers, acting as a catalyst for rural and urban economic development, and providing other substantial economic benefits. Finally, because the Clean Ohio Fund has been so effective in leveraging additional funds, every dollar invested is maximized in terms of the economic benefits it generates for the people, communities, and businesses of Ohio.



Ken Sherman

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APPENDIX: METHODOLOGY

The natural goods and services provided by the distinct ecosystem types found within Clean Ohio Fund conserved lands, and their monetary values, were determined using the benefits transfer methodology. That is, The Trust for Public Land conducted a thorough literature review of the types of goods and services provided by the 15 ecosystem types identified in conserved lands using recent, relevant, and scientifically sound sources. We then used the economic values of the different ecosystem types identified in that literature to estimate a per-acre economic value of the goods and services provided. Benefits transfer methodology is a common approach in environmental economics because it is a practical alternative to time-intensive and data-intensive original research.



Darcy Kiefel

We followed the steps below in conducting the benefits transfer:⁶⁷

- Step 1. Define the policy context. This definition should include various characteristics of the policy site, what information is needed, and in what units.
- Step 2. Locate and gather original research outcomes. Conduct a thorough literature review, and obtain copies of potentially relevant studies.
- Step 3. Screen the original research studies for relevance. How well does the original research context correspond to the policy context? What is the quality of the original research?
- Step 4. Select a point estimate or average of a range of point estimates. Convert each to dollars per acre.
- Step 5. Transfer the point estimate or average value estimate. Aggregate the point estimate or average value estimate by multiplying it by the total number of acres, providing a total value for the good or service at the policy site.

We considered a broad set of natural goods and services based on the availability of high quality sources. We did not examine each and every natural good and service. We expect that an analysis of additional natural goods and services would reveal further positive benefits, and therefore our numbers are likely to underestimate the “true” economic value and return on investment examined in this study.

Based on existing research we determined the natural goods and services provided and estimated their values for each land cover type as shown in Exhibit A-I.

⁶⁷ Rosenberger, R. and Loomis J, 2003. Benefit Transfer. In P. Champ, K. Boyle, and T. Brown (Eds.), *A Primer on Nonmarket Valuation*. (445-482). Norwell, Massachusetts: Kluwer Academic Publishers.

Exhibit A-1. Estimated Annual Per-Acre Value of Natural Goods and Services by Land Cover Type

Land Cover Type	Ecosystem Services	Annual Value Per Acre*
Woody Wetland	All	\$3,214
Emergent Herbaceous Wetland	All	\$2,720
Deciduous Forest	Stormwater Management, Carbon Storage and Sequestration, Air Pollution Removal, Erosion Control, Pollination Services	\$1,073
Mixed Forest	Stormwater Management, Carbon Storage and Sequestration, Air Pollution Removal, Erosion Control, Pollination Services	\$1,073
Evergreen Forest	Stormwater Management, Carbon Storage and Sequestration, Air Pollution Removal, Erosion Control, Pollination Services	\$1,073
Developed, Open Space (e.g., parks)	Carbon Storage and Sequestration, Stormwater Management, Air Pollution Removal	\$769
Developed, Low Intensity	Carbon Storage and Sequestration, Stormwater Management, Air Pollution Removal	\$769
Developed, Medium Intensity	Carbon Storage and Sequestration, Stormwater Management, Air Pollution Removal	\$769
Developed, High Intensity	Carbon Storage and Sequestration, Stormwater Management, Air Pollution Removal	\$769
Cultivated Crops	Food Production, Pollination Services, Carbon Storage and Sequestration	\$472
Pasture/Hay	Food and Livestock Production, Carbon Storage and Sequestration, Pollination Services, Wildlife Habitat	\$289
Open Water	All	\$232
Shrub/Scrub	Carbon Storage and Sequestration, Pollination Services, Wildlife Habitat	\$214
Grassland	Carbon Storage and Sequestration, Pollination Services, Wildlife Habitat	\$152
Barren (e.g., rock outcrops)	None	--

* All values reported in 2012 dollars.

Forest (deciduous, evergreen, and mixed)

We analyzed six natural services provided by Ohio’s forests: stormwater management, carbon storage, carbon sequestration, air pollution removal, erosion control, and pollination services. The annual value of these services is \$1,073 per acre.

Forests decrease the amount of stormwater runoff that reaches local waters by capturing and storing rainfall and infiltrating rainwater into the soil. This also slows the rate of runoff which helps reduce flooding. We used two studies in the same region to estimate the value of this

service in Ohio based on the avoided cost of stormwater infrastructure.^{68,69} This represents the savings to Ohio because of the water storage capacity of forests across the state.

Forest trees also store and sequester carbon. Storage refers to how much carbon is present or “stored” in trees at present while sequestration is how much carbon is removed from the atmosphere each year. We determined the average carbon stored per acre using the U.S. Forest Service’s Carbon OnLine Estimator (COLE). We determined the average carbon sequestration rate for Ohio’s forests from a recently published academic journal article.⁷⁰ The 2011 average global market price of carbon was used as the dollar value of carbon to calculate an annual per-acre value for carbon storage and sequestration by forests.

Forests provide clean air by naturally removing harmful air pollutants. We considered the removal value of four major air pollutants: ozone, nitrogen dioxide, particulate matter, and sulfur dioxide. The volume of pollutants removed from the air on an annual per-acre basis was derived from a U.S. Forest Service analysis of “community” forests in Ohio. Pollution-removal dollar values on a per-volume basis were obtained for each of the air pollutants from the U.S. Forest Service’s UFORE computer model. These dollar amounts represent the national median externality value of each air pollutant (the estimated costs of pollution to society that is not reflected in the market price of goods and services that produced the pollution).⁷¹

Soil retention is another key service provided by the state’s forests. Forest land keeps soil from being eroded away. The USDA-supported Conservation Reserve Enhancement Program (CREP), an incentive program for farmers seeking to maintain the ecological functions of streams, provides an implicit measure of the value of soil erosion control because forests perform the same function as farmland enrolled in CREP.⁷² We used 2012 Ohio CREP rates to calculate the value of erosion control.

Forests also provide habitat for insect pollinators so it is appropriate to apply the pollination services value calculated for cultivated crops in this analysis to forestland.

Developed, Open Space (e.g., parks)

We analyzed the value of air pollution removal, stormwater management, carbon storage, and carbon sequestration provided by parks in Ohio. Open space near developed areas is typically parkland or characteristically similar to parks. The annual per acre value of these services is \$769.

Our per-acre stormwater management and air pollution removal was adapted from a recent CITYgreen GIS analysis of nearly 50 parks in Cincinnati.⁷³ Carbon sequestration and storage

68 GreenSpace Alliance and Delaware Valley Regional Planning Commission, 2010. The Economic Value of Protected Open Space in Southeastern Pennsylvania.

69 New Jersey Department of Environmental Protection. 2004. The Economic Value of New Jersey State Parks and Forests.

70 Gough, C.M., C.S. Vogel, H.P. Schmid, H.B. Su, and P.S. Curtis. 2008. Multi-year convergence of biometric and meteorological estimates of forest carbon storage. *Agricultural and Forest Meteorology* 148(2):158-170.

71 Nowak, D.J. and E. Greenfield. 2010. Urban and Community Forests of the North Central East Region. USDA Forest Service General Technical Report NRS-54.

72 New Jersey Department of Environmental Protection. 2004. The Economic Value of New Jersey State Parks and Forests.

73 Hanou, I. 2011. Cincinnati and Hamilton County, Ohio Urban Tree Canopy (UTC) Assessment. Prepared by AMEC Earth and Environmental for Cincinnati Park Board.

volumes were provided by a U.S. Forest Service analysis of Ohio's urban and community forests.⁷⁴ We used the 2011 global market price of carbon as the dollar value of carbon and applied that to the volume of carbon stored and sequestered by urban and community forests in the state.

Developed: Low, Medium, High

We applied the Developed, Open Space value (see above) to low, medium, and high developed landcover types because these are likely small urban parcels that have or will be developed into parks. This is a reasonable assumption given the nature of Clean Ohio acquisitions and the resolution of the landcover dataset not being fine-grained enough to determine a small amount of parkland in a largely urban or developed environment.

Cultivated Crops

Ohio receives \$472 in value per acre of cropland each year in agricultural products, pollination services, carbon storage, and carbon sequestration.

The rent paid by farm operators for cropland in 2012 was used as the value of cropland for food production. Rent represents the most accurate value of land compared to values associated with production and income, which reflect a variety of other forces and inputs. Annual per-acre rent data was obtained from an Ohio State University report.⁷⁵

The rate of carbon sequestration for cropland was obtained from a published journal article that provided an estimate for sequestration rates in Ohio.⁷⁶ This rate was converted to the volume of carbon sequestered per-acre each year. The volume of carbon stored by cropland was derived from a recent regional study. We then applied the 2011 global market price of carbon to calculate the dollar value of carbon sequestered and stored by cropland.

The value of pollination services on cropland was estimated based on the expected loss of select Ohio crops without honey bee pollination.⁷⁷ We determined the average per-acre value based on the loss of production per acre and the 2011 average market value of that loss.

Wetlands (Woody and Emergent Herbaceous)

The annual per-acre value of woody wetlands is estimated to be \$3,214 and the value of emergent herbaceous wetlands is estimated to be \$2,720 for all natural goods and services provided by each wetland type. These estimates are derived from the price of wetland mitigation credits provided by 14 mitigation banks across the state. This value is an implicit measure of the value of wetlands because it is what must be paid for damage to existing wetlands.

74 Nowak, D.J. and E. Greenfield. 2010. Urban and Community Forests of the North Central East Region. USDA Forest Service General Technical Report NRS-54.

75 Ward, B., 2011. Western Ohio Cropland Values and Cash Rents 2011-12. The Ohio State University Department of Agricultural, Environmental, and Development Economics.

76 Jarecki, M. and L. Rattan. 2005. Soil Organic Carbon Sequestration Rates in Two Long-Term No-Till Experiments in Ohio. *Soil Science* 170(4):280-291.

77 Southwick, E.S., and L Southwick, Jr. 1992. Estimating the Economic Value of Honey Bees (hymenoptera: Apidae) as Agricultural Pollinators in the United States. *Journal of Economic Entomology* 85 (3):621-633.

Pasture/Hay

We estimated the annual value of the production of food and goods from livestock, wildlife habitat, pollination services, carbon storage, and carbon sequestration to be \$289 per acre of pasture.

We used the rental rate paid for pasture land in Ohio as an implicit value for the production of food and goods from livestock.⁷⁸ The NRCS Grassland Reserve Program (GRP) provides a proxy measure of the value of pasture for wildlife habitat. The program provides landowners financial incentives to conserve their land for wildlife habitat. We used the GRP rental rates to calculate an annual per-acre value.

The volume of carbon storage per acre of pasture was taken from a regional study.⁷⁹ The average volume of carbon sequestered by pastureland was derived from a USDA analysis.⁸⁰ We then applied the 2011 global market price of carbon to calculate the dollar value of carbon sequestered and stored by pasture/hay land.

Grassland

Grassland provides an annual economic value of \$152 in carbon storage, carbon sequestration, wildlife habitat, and pollination services each year in Ohio. The values for each were transferred from the pasture/hay calculation (see above) because of the similar services provided by each.

Shrub/Scrub

We estimate the annual value of carbon sequestration, carbon storage, pollination services, and wildlife habitat services to be \$214 per acre of shrub/scrub land. An average of the forest and grassland carbon storage and sequestration was applied to the shrub/scrub value because of the characteristics of this landcover type in Ohio. Shrub/scrub provides habitat for both insect pollinators and other wildlife species. Therefore, we transferred the pollination services and wildlife habitat values from the grassland and pasture/hay landcover types.

Open Water

The annual value of open (surface) water of \$232 per acre for all ecosystem services was obtained from a published study that calculated a region-specific ecosystem service value for a variety of ecosystem types found on U.S. National Wildlife Refuges.⁸¹

78 Ward, B., 2011. Western Ohio Cropland Values and Cash Rents 2011-12. The Ohio State University Department of Agricultural, Environmental, and Development Economics.

79 Wilson, Sara J. "Lake Simcoe Basin's Natural Capital: The Value of the Watershed's Ecosystem Services". Prepared for Friends of the Greenbelt Foundation Occasional Paper Series. 2009

80 Lewandrowski, J., M. Peters, C. Jones, R. House, M. Sperow, M. Eve, and K. Paustian. 2004. Economics of Sequestering Carbon in the U.S. Agricultural Sector. USDA Economic Research Service. Technical Bulletin No. TB-1909: 69pp.

81 Ingraham, Molly and Shonda Gilliland Foster. 2008. The value of ecosystem services provided by the U.S. National Wildlife Refuge System in the contiguous U.S. *Ecological Economics*. 67:608-618.

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PAM CARSON
OHIO STATE DIRECTOR
THE TRUST FOR PUBLIC LAND
B.F. KEITH BUILDING
1621 EUCLID AVE., SUITE 1600
CLEVELAND, OH 44115
216.928.7518
PAM.CARSON@TPL.ORG