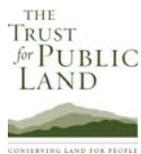


NORTH CAROLINA'S RETURN ON THE INVESTMENT IN LAND CONSERVATION

A Report by The Trust for Public Land



THE TRUST *for* PUBLIC LAND
CONSERVING LAND FOR PEOPLE



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EXECUTIVE SUMMARY

The Trust for Public Land (TPL) conducted an analysis of the return on North Carolina's investment in land conservation through the Agricultural Development and Farmland Preservation Trust Fund (ADFPTF), Clean Water Management Trust Fund (CWMTF), Natural Heritage Trust Fund (NHTF), and Parks and Recreation Trust Fund (PARTF), hereafter referred to as the Conservation Trust Funds. TPL analyzed the past (i.e., 1998 to 2010) and likely future (i.e., over the next ten years) economic returns generated from Conservation Trust Fund land acquisition spending and found that **every \$1 invested returns \$4 in economic value** over this time period from natural resource goods and services alone.

In addition to providing natural goods and services, land conservation contributes to the North Carolina economy in terms of jobs, taxes, tourism, and other revenue.

- **Tourism and outdoor recreation:** State lands are key to local recreation and tourism industries. In 2006, 3.4 million residents and non-residents participated in some form of fish and wildlife-related recreation in North Carolina. Anglers, hunters, and wildlife viewers spent \$2.62 billion in retail sales, creating \$1.26 billion in salaries and wages, and supporting 45,200 jobs. The total economic effect (which employs a multiplier to account for indirect sales and earnings) from fish and wildlife-related recreation is \$4.3 billion.
- **Defense & Conservation:** The state's Conservation Trust Funds help the U.S. military create safe buffer zones around bases in North Carolina, separating growing communities from land needed for vital training missions. The military plays a substantial role in both the economy and environment of North Carolina. In 2007, military activities totaled 7 percent of state's domestic product and translated into 416,000 jobs.
- **Agriculture industry:** Farmland preservation helps sustain the agriculture industry in North Carolina. Farming and its related industries are an important component of the North Carolina economy. In 2009, the agriculture industry added \$32.1 billion in value to the state's economy and employed 120,000 people.
- **Forestry industry:** The economic impact of timber harvesting, production, and manufacturing on North Carolina's economy is substantial. In 2009, forestry, logging, and wood products manufacturing contributed well over \$6 billion to North Carolina's economy and employed nearly 75,000 people in the state.

INTRODUCTION

North Carolina has a long history of investing in land conservation. This investment has yielded real economic benefits that are quantified here for the first time. This analysis focuses on the investments in land acquisition through the following four programs:

Agricultural Development and Farmland Preservation Trust Fund

The North Carolina General Assembly established the Farmland Preservation Trust Fund in 1986. It renamed the program in 2005 as the Agricultural Development and Farmland Preservation Trust Fund and broadened its mission to include not only permanent working farm conservation easements, but also time-limited agricultural agreements and programs to support family farms and agricultural economic development. Revenue is derived from annual appropriations from the General Assembly. This fund provides grants to protect economically valuable farms and improve the economic viability of agriculture. In addition to the direct economic impacts, farms protected by the ADFPTF also help protect water quality and wildlife habitat, as well as the state's rural and cultural heritage. While the funding of conservation easements is an important component of the ADFPTF, the funding of agricultural planning and development is equally significant in terms of the economic impacts of the program. Grants are made to improve opportunities for agricultural producers by making funds available for developing farmland protection plans, purchasing equipment, improving market opportunities, and expanding agricultural processing facilities. To date, ADFPTF has provided 133 grants in 61 counties for a total of \$11.6 million in funding.

Clean Water Management Trust Fund

The General Assembly established the Clean Water Management Trust Fund in 1996. It receives a direct appropriation from the General Assembly to issue grants to local governments, state agencies and conservation non-profits. Grants are distributed to projects that enhance or restore degraded waters, protect unpolluted waters, and/or contribute toward a network of stream buffers and greenways for environmental and recreational benefits. These stated objectives are to the benefit of all of North Carolina, and they depend on the communities and organizations across the state to submit proposals that will protect and restore rivers, lakes, creeks, and estuaries. Competitive grants are made for five specific activities: 1) acquisition of natural areas along waterways (fee simple or conservation easement); 2) acquisition of greenway corridors along streams; 3) restoration and stormwater projects; 4) wastewater infrastructure; and 5) planning for all of the above. To date, CWMTF has provided 1,189 grants in 87 counties for a total of \$950 million in funding.

Natural Heritage Trust Fund

The General Assembly created the Natural Heritage Trust Fund in 1987 to provide supplemental funding to state agencies to protect important natural areas, preserve the state's ecological diversity and cultural heritage, and inventory the natural heritage resources of the state. The NHTF receives funding from a small percentage of the state's portion of the deed stamp tax at 25 cents per \$1,000 dollars of real estate value, or 0.025 percent. The NHTF also receives a portion of the fees for personalized and specialty license plates. These two sources currently generate roughly

\$12 million per year. Specifically, the grants are awarded for: 1) the purchase of lands that represent the state's ecological diversity to ensure their preservation for recreational, scientific, educational, cultural, and aesthetic purposes; 2) the purchase of additions to state parks, trails, forests, wild and scenic rivers, and fish and wildlife management areas; 3) preservation of properties with historic or cultural significance; and 4) the inventory and conservation planning of natural areas by the North Carolina Natural Heritage Program. In addition to granting only to select state agencies, the Board of Trustees requires that qualified lands be dedicated as North Carolina Nature Preserves. To date, NHTF has provided 555 grants in 82 counties for a total of \$310 million in funding.

Parks and Recreation Trust Fund

The Parks and Recreation Trust Fund was established by the North Carolina General Assembly in 1994 to fund improvements to the state's park system, to fund grants to local governments, and to increase the public's access to the state's beaches. PARTF is also funded through the state's portion of the deed stamp tax, at 75 cents for every \$1,000 in real estate value or 0.075 percent, along with a portion of the proceeds from specialty and personalized license plates. A Parks and Recreation Authority distributes the grants in a competitive process. The PARTF is the primary source of funds used to acquire land for new and existing parks and in building and renovating facilities in the state parks system. The PARTF is also the primary funding source for the Division of Coastal Management's Public Beach and Coastal Waterfront Access program. Allocation of funds from the PARTF are set so that 65 percent goes to the Division of Parks and Recreation, 30 percent is available for dollar-for-dollar matching grants to local governments for parks and recreation purposes, and the remaining 5 percent is reserved for the Coastal and Estuarine Water Access Program. Eligible applicants include North Carolina counties and incorporated municipalities. To date, PARTF has provided 1,293 grants in all 100 counties for a total of \$449 million in funding.

INVESTMENT IN CONSERVATION LANDS

From 1998 to 2009, an average of 53,600 acres of conservation lands were acquired annually through the Conservation Trust Funds, using an average of \$72.6 million annually in state funding for these acquisitions (this is nominal spending, that is, not in today's dollars).¹ This represents 0.45 percent of the average annual budget of the State of North Carolina from 1998 to 2009.²

Exhibit 1 breaks out the historical spending and acres acquired for the respective Conservation Trust Funds each year. The average cost per acre of acquisition was \$1,350 during this time period.

Exhibit 1. Annual Conservation Trust Fund Spending on Acquisitions								
Year	ADFPTF		CWMTF		NHTF		PARTF	
	Spending	Acres	Spending	Acres	Spending	Acres	Spending	Acres
1998	\$330,000	1,180	\$35,400,000	30,700	\$9,110,000	21,600	\$4,990,000	3,580
1999	\$317,000	1,160	\$20,200,000	20,700	\$12,000,000	21,700	\$10,400,000	7,910
2000	\$1,660,000	1,180	\$34,100,000	25,800	\$12,000,000	17,800	\$13,600,000	6,290
2001	\$239,000	1,260	\$22,600,000	21,500	\$10,800,000	17,700	\$6,530,000	3,760
2002	\$206,000	232	\$32,600,000	21,900	\$9,030,000	22,700	\$5,960,000	2,280
2003	--	--	\$53,100,000	48,600	\$12,800,000	26,900	\$17,300,000	3,470
2004	--	--	\$42,300,000	21,600	\$15,100,000	20,800	\$15,500,000	5,050
2005	--	--	\$53,100,000	37,500	\$21,300,000	16,500	\$42,800,000	7,710
2006	--	--	\$68,200,000	69,400	\$26,000,000	16,800	--	--
2007	\$0	406	\$44,200,000	43,700	\$33,400,000	19,300	--	--
2008	\$1,430,000	2,190	\$52,700,000	17,100	\$65,300,000	22,100	\$51,000,000	6,490
2009	\$0	591	--	--	\$9,450,000	4,350	\$4,260,000	1,830
Total	\$4,180,000	8,200	\$458,000,000	359,000	\$236,000,000	228,000	\$172,000,000	48,400
Average Annual Conservation Trust Fund Spending (1998-2009): \$72,600,000								
Average Annual Acres Conserved (1998-2009): 53,600								
Source: Acres acquired and spending provided by the Conservation Trust Funds.								

Comprehensive spatial and spending data are not available currently for all parcels of lands acquired by the state through the Conservation Trust Funds. That is, not all Conservation Trust Fund lands acquired are mapped. TPL collected the best available information; therefore, we used data from the State Property Office on fee simple acquisitions and conservation easements. These data represent a subset of total acres acquired and spending from 1998 to 2009.³ We analyzed a total of 289,000 acres acquired through the Conservation Trust Funds using \$585

¹ All numbers are rounded to three significant digits unless indicated otherwise.

² North Carolina Office of State Budget and Management, 2009. Authorized General Fund Appropriations. March 2009.

³ 2010 data are only available for NHTF.

million in funding (again this is nominal spending). Exhibit 2 breaks out the acres acquired each year. These projects are sufficiently representative of Conservation Trust Fund activity (i.e., 45 percent of the acres acquired and 67 percent of spending) to estimate the return on investment.

Exhibit 2. Acres Acquired Per Year	
Year	Acres
1998	20,500
1999	32,200
2000	28,900
2001	21,600
2002	21,600
2003	18,600
2004	41,500
2005	23,500
2006	13,200
2007	37,500
2008	23,200
2009	6,670
Total	289,000
Source: State Property Office	

NATURAL GOODS & SERVICES

These protected lands provide a multitude of natural goods and services, such as water quality protection by wetlands and air pollution removal by forests. We considered the natural goods and services provided by 12 distinct ecosystems types found within the lands acquired. As shown in Exhibit 3, the most commonly acquired land cover type was woody wetlands at 44 percent.

Exhibit 3. Acreage Acquired by Land Cover Type		
Land Cover	Acres	Percentage
Woody Wetland	128,000	44%
Deciduous Forest	75,100	26%
Evergreen Forest	37,900	13%
Grassland/ Herbaceous	9,440	3%
Emergent Herbaceous Wetland	9,080	3%
Pasture/Hay	6,120	2%
Mixed Forest	5,950	2%
Shrub/Scrub	5,690	2%
Cultivated Crops	5,390	2%
Developed	2,920	1%
Open Water	2,530	1%
Barren Land	1,190	0%
Total	289,000	100%
Source: 2001 National Land Cover Data		

The natural goods and services provided, and their monetary values, were determined using the benefits transfer methodology (see Appendix). That is, TPL conducted a thorough literature review of the types of goods and services provided by the 12 ecosystem types identified above. 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. The following list qualitatively describes some of those goods and services:

- **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 potentially destructive power of floodwaters.
 - 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.
 - Wetland habitats support rich food chains and are home to species on a microscopic and macroscopic level – from tiny invertebrates to mammals and fish.

- **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 country's fresh water supply and provide water to about 180 million people across the U.S.⁴
 - 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 generate cooler temperatures and improved air quality. Trees evaporate water and provide direct shading of buildings and pavement, thereby lowering ambient temperatures in cities as well as reducing ozone production and other smog-related conditions. Trees store and sequester air particulates and atmospheric carbon, reducing the amount of carbon a community produces and contributing to breathable air.
- **Grasslands and shrub lands** protect water quality and provide pollination services.
 - Grasslands and shrub lands capture water minimizing particulate flow to surface water, and filter potential pollutants.
 - Grasslands and shrub lands provide habitat for native pollinators.
- **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.
 - 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.

Based upon the per-acre values (see Appendix for dollar values), 289,000 acres of conserved land provide \$3.67 billion in total economic value from date of purchase (i.e., beginning in 1998) to 2020 (i.e., 10 years from today) in the form of natural goods and services.

⁴ National Research Council, 2008. Hydrologic Effects of a Changing Forest Landscape. National Academy of the Sciences: Washington D.C.

While this study is the first to estimate the State of North Carolina's return on investment in land conservation it is not the first to value the natural goods and services in North Carolina. The following two case studies provide examples of recent valuation of natural goods and services provided by the trees in Mecklenburg County and the county's park system.

Natural Goods & Services: Mecklenburg County Trees

A 2010 American Forests study demonstrates that trees in Mecklenburg County, North Carolina provide considerable economic value, while recent land cover changes have cost the county.

According to the study, as of 2008, Mecklenburg County had 50 percent tree canopy cover, providing:

- Natural stormwater detention services of 1.4 billion cubic feet of stormwater, valued at \$2.8 billion;
- Natural air pollution removal of 14.9 million pounds of air pollutants, valued at \$40 million a year; and
- Natural storage of 7.5 million tons of carbon, and sequestration of 59,000 tons of carbon annually.

Between 1985 and 2008, Mecklenburg County, lost 33 percent of its tree cover canopy and 3 percent of its open space. These changes resulted in the loss of the tree canopy's ability to:

- Naturally manage 252 million cubic feet of stormwater, a loss of \$504 million in value;
- Naturally remove 3.8 million pounds of air pollutants annually, a loss of \$8.8 million per year; and
- Store 192 million pounds of carbon, and sequester another 1.5 million pounds annually.

Source: American Forests, 2010. Urban Ecosystem Analysis Mecklenburg County and the City of Charlotte, North Carolina. April 2010.

Natural Goods & Services: Mecklenburg County Parks

A 2010 TPL study shows that parks in Mecklenburg County, North Carolina generate considerable economic value for the local government and for the county's residents.

According to the detailed analysis by TPL's Center for City Park Excellence, Mecklenburg's parks deliver to the county annual revenue of \$8.3 million and a collective increase of resident wealth of \$28.8 million. These economic values stem from seven different measurable factors provided by the parks – clean air, clean water, tourism, direct use, health, property value, and community cohesion.

The Carolina Thread Trail, which has received considerable support from the state Conservation Trust Funds, will add to this economic return. When completed, the trail will connect 15 counties in a rapidly growing area of North and South Carolina, preserving important natural areas while providing valuable recreational opportunities for the region's 2.3 million residents.

“The Carolina Thread Trail will be a vital link throughout our region,” State Rep. Ruth Samuelson says. “It will provide valuable recreational opportunities and also serve as a catalyst for attracting new business to our region. Businesses want to locate where their employees will have a good quality of life, and providing recreational opportunities is part of that picture.” Rep. Samuelson was instrumental in initiating the discussions among government and nonprofit leaders that led to the creation of the Thread Trail.

Source: Trust for Public Land, 2010. The Economic Benefits of the Park and Recreation System of Mecklenburg County, North Carolina.

RETURN ON INVESTMENT

TPL estimated the return on the present value (i.e., the value of past investments in today's dollars) of \$825 million invested in 289,000 acres of land conservation through the four Conservation Trust Funds from 1998 to 2010 by comparing this investment to the \$3.67 billion in economic value of natural goods and services generated by these lands in the past (i.e., 1998 to 2010) and into the future (i.e., over the next 10 years). That is, every \$1 invested returns \$4 in economic value. These goods and services will continue to be provided well beyond the next 10 years increasing the total return on investment beyond that calculated in this analysis.

North Carolina Thread Trail

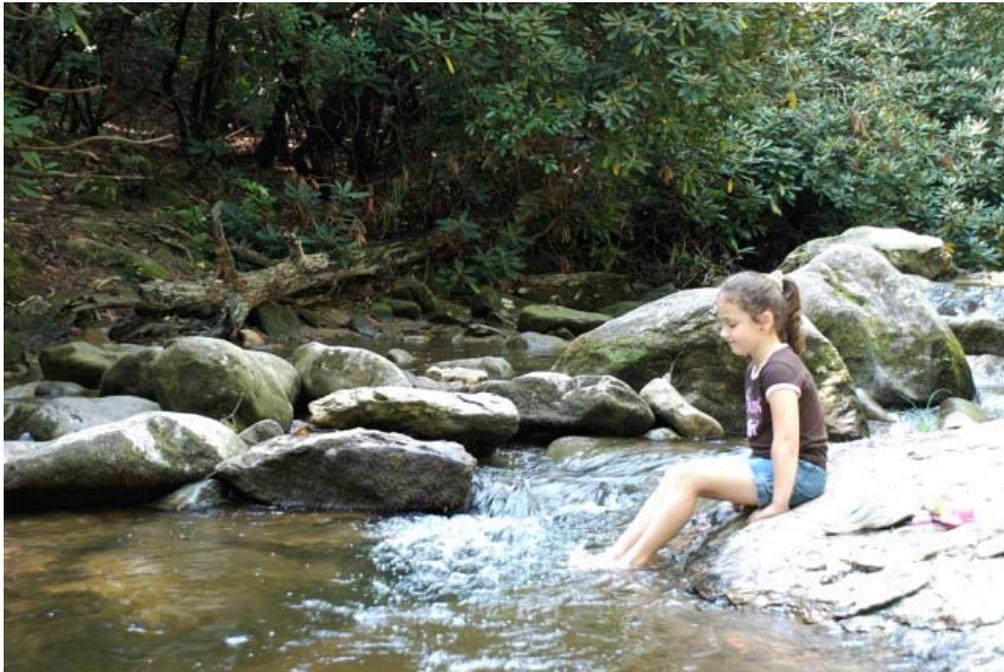


Photo credit: Jason Johnson, Indigo Productions

HIGHLIGHTING ECONOMIC BENEFITS

Below are specific examples of the natural goods and services provided by Conservation Trust Fund lands in North Carolina.

Drinking Water Protection

Water protection and clean drinking water are very important to North Carolina voters. Over the past 10 years, four out of five ballot measures – spanning five counties – were passed to support municipal bonds explicitly funding water quality or watershed protection.⁵ Overall, 64 percent of voters supported bonds totaling \$76 million. Surveys of North Carolina residents also indicate that preference for protection. A 2002 survey and study showed that 2/3 of survey respondents in the Catawba River basin were willing to pay \$135, through increased state income taxes, for a management plan to protect the water quality of the river.⁶ It was also estimated that the return on investment for river basin residents would amount to \$95 million over a ten-year period. Similar efforts across the state reflect a desire to protect drinking water through land conservation.

Local governments and conservation groups in the Triangle are investing in land and water protection to safeguard streams and reservoirs for residents and industries that get their drinking water from the Upper Neuse River Basin.

The Upper Neuse Clean Water Initiative (UNCWI) teams land trusts with landowners and municipal, county, and state agencies to protect drinking water sources in the Upper Neuse River Basin. Partners are guided by a plan that identifies and prioritizes land that is most critical for the long-term health of drinking water supplies in the 770-square mile basin.

Preserving land along lakes and streams is a fundamental step in protecting drinking water. Natural lands filter pollutants and slow runoff from surface water, resulting in cleaner water downstream, less flooding and soil erosion, and greater groundwater reserves.

Through UNCWI, land protection groups leverage government funds with private donations to acquire property or conservation agreements on priority parcels, creating and expanding buffers on streams and the nine water supply reservoirs in the basin that serve more than 500,000 people.

Since UNCWI was formed in 2005, partners have protected 57 miles of stream buffer and 5,460 acres of land worth \$54 million. The City of Raleigh – whose citizens receive drinking water from Falls Lake – has played a pivotal role in UNCWI, helping to form the coalition and providing a total of \$6 million to support its work. Other local governments have contributed significant funding to the effort as well, leveraging millions from the CWMTF. Businesses have also recognized the value of UNCWI's work not just for their own needs but for public health and quality of life.

⁵ Trust for Public Land. Landvote Database. www.landvote.org (last accessed 2-11-2011).

⁶ Kramer, R.A., Eisen-Hecht, J.I., 2002. A Cost-Benefit Analysis of Water Quality Protection in the Catawba Basin. *Journal of the Water Resources Association* 38, 453-465.

“Clean drinking water is essential to attracting growth and new businesses to Wake County,” says Wake County Commissioner Joe Bryan. “Reducing polluted runoff by conserving land along the streams that feed into Falls Lake is a cost-effective way to safeguard drinking water quality. It makes good business sense.”

Children Enjoying Eno River



*Photo credit: Rusty Painter,
The Conservation Trust for NC*

Flood Control

Building in floodplains exacerbates the already devastating effects of floods. A recent study of nearly 400 flooding events in Florida found that the alteration of naturally occurring wetlands significantly increases the property damage caused by floods, all else being equal.⁷ The financial requirements of living on a floodplain are incurred by residents and taxpayers alike: drainage improvements, flood control projects, flood insurance, and disaster relief. Infrastructure projects to alleviate flooding, such as stormwater and levee systems, often increase the damage to residents downstream and are costly. The toll of flooding on North Carolina has been sustained and tragic. According to the Hazards and Vulnerability Research Institute, over the past 20 years, flooding has cost North Carolina the lives of 58 residents, over \$365 million in property damage, and \$134 million in crop damage.

⁷ Brody, Samuel D., et al., 2007. The Rising Costs of Floods: Examining the Impact of Planning and Development Decisions on Property Damage in Florida. *Journal of the American Planning Association* (Summer) 73, (3), 330-345.

The benefits of conserving open space and wetlands in a floodplain are immense. Open floodplains allow a river to breathe, naturally expanding and contracting with varying levels of precipitation. Floodplains absorb swollen river waters, helping to protect nearby communities from flooding and alleviating the potential of flooding downstream. That means taxpayer savings. The value of conserved lands in combating flood and storm waters is tremendous.

The City of Kinston, North Carolina adopted an open space-based philosophy to address future floods by relocating vulnerable land uses outside the Neuse River floodplain.⁸ In 1999, Hurricane Floyd inundated Kinston with 20 inches of rain causing floods beyond the 100-year floodplain. Due to extensive damage to buildings and businesses, flood mitigation efforts totaled \$140 million. In response to the disaster, the city and Lenoir County purchased properties located within the 100-year floodplain for relocation and demolition.

The losses avoided through acquisition of flood prone properties in Kinston are estimated to be over \$6 million.⁹

- Reduced repair and replacement costs accounted for almost one-half of the avoided loss.¹⁰
- Avoided loss of damaged contents was estimated to total \$1.1 million.
- 25 percent of the savings is attributed to reduced "displacement costs" – the costs allocated to households to support them while their homes are being repaired (\$1,250 per month per household on average).

Charlotte-Mecklenburg public officials are addressing the region's rapid development with smart growth principles, undertaking a major initiative to integrate surface water quality improvement into the flood mitigation program.¹¹ An essential component of that initiative is the acquisition of flood-prone areas to reclaim natural floodplains. The benefits of the acquisition program are substantial: reduction of the threat of loss of life and property, water quality improvement, the protection of wildlife habitat and open space, and new recreational opportunities. Since 2000, Charlotte-Mecklenburg Storm Water Services has purchased nearly 250 flood-prone buildings, moving more than 500 families from areas at the highest risk of flooding.¹²

⁸ Madsen, T., Algosio, D., 2004. The Value of Open Space, How Preserving North Carolina's Natural Heritage Benefits Our Economy and Quality of Life. NCPiRG Education Fund.

⁹ North Carolina Department of Crime Control & Public Safety. Kinston-Lenoir County Acquisition Project - Sustainable Redevelopment. <http://www.nccrimecontrol.org> (last accessed 2-10-2011).

¹⁰ Building repair/replacement cost estimates were based on the average construction costs of the region (\$45 per square foot) and FEMA damage formulas.

¹¹ North Carolina Department of Crime Control & Public Safety. Integrating Water Quality into Floodplain management – Charlotte-Mecklenburg County's Approach. <http://www.nccrimecontrol.org/> (last accessed 2-1-2011).

¹² Mecklenburg County Government Services and Information, 2011. Mecklenburg County Buys Half of the Doral Apartments After Decades of Flooding. <http://charmack.org/mecklenburg/county/Newsroom/Pages/MecklenburgCountyBuysHalfoftheDoralApartmentsAfterDecadesofFlooding.aspx> (January 3, 2011).

Recently, Mecklenburg County bought half of the Doral Apartments, located between Briar Creek and Monroe Road in Charlotte, to combat the high costs of flood damage.¹³ The complex has flooded six times since 1995, amounting to \$8 million in damages. A 2005 engineering study concluded there were no feasible options to prevent further repeated flooding and that the most cost-effective preventative measure was to purchase the highest-risk buildings and demolish them. Overall, the project will cost \$4.7 million for demolition and relocation of residents. A grant from the Federal Emergency Management Agency's hazard mitigation program will cover 75 percent of the cost, while funds from countywide stormwater utility fees will cover the balance.

ADDITIONAL ECONOMIC BENEFITS

In addition to providing natural goods and services, land conservation contributes to the North Carolina economy in terms of jobs, taxes, tourism, and other revenue.

Tourism & Outdoor Recreation

State lands are key to local recreation and tourism industries. Visitors to these areas spend money on things like food and lodging in the region.

Visitation and Spending

A recent study by the North Carolina Department of Environment and Natural Resources reveals that an investment by taxpayers in the form of state park operating budgets provides a positive return for neighboring communities. The study looked at a sample of 14 state park units and found 3.4 million tourists visit these units each year, spending nearly \$80 million in respective local economies annually (Exhibit 4). The overall economic impact generated by the direct expenditures of primary purpose, non-local visitors to 14 state parks amounts to \$125 million in sales, \$46 million in local income, and more than 2,000 jobs. Moreover, net park operating budgets generated more than \$15.5 million in sales, \$10 million in local income, and more than 250 jobs. For each state dollar invested in net operating costs at state parks, \$1.63 is generated in sales and \$1.03 of resident income is created.

¹³ Ramsey, T, 2010. Water Woes: Construction Blamed as Millions Spent to Buy Properties. Mecklenburg Times. <http://mecktimes.com/news/2010/07/19/water-woes-construction-blamed-as-millions-spent-to-buy-properties/> (July 19, 2010).

Exhibit 4. Economic Activity Associated with 14 State Parks, In-County Expenditures					
Purpose	Visitors	Direct Expenditures	Impact on Sales	Impact on North Carolina Residents' Income	Jobs Generated
Primary Purpose Visitors	3,390,000	\$79,800,000	\$124,000,000	\$46,300,000	2,120
Net Park Operating Budget	---	\$9,670,000	\$15,800,000	\$10,000,000	257
Total	3,390,000	\$89,500,000	\$140,000,000	\$56,400,000	2,380

Source: Greenwood, J.B., Vickmic, C.G., 2008. Contribution of Visitors to Selected North Carolina State Parks. North Carolina Department of Environment and Natural Resources, Division of Parks and Recreation.

Recreational Use

According to a North Carolina Wildlife Resources Commission study, in 2006, 3.4 million residents and non-residents participated in some form of fish and wildlife-related recreation in North Carolina. Anglers, hunters and wildlife viewers spent \$2.62 billion in retail sales (\$2.05 billion by residents and \$570 million by nonresidents), creating \$1.26 billion in salaries and wages, and supporting 45,200 jobs. The total economic effect (which employs a multiplier to account for indirect sales and earnings) from fish and wildlife-related recreation was estimated at \$4.3 billion.

Exhibit 5. Economic Benefits of Hunting, Fishing and Wildlife Watching in North Carolina						
Activity	Retail Sales	Output	Earnings	Jobs	Federal Tax Revenue	Local & State Revenue
Freshwater Fishing	\$634,000,000	\$1,04,000,000	\$300,000,000	10,600	\$71,500,000	\$62,900,000
Saltwater Fishing	\$559,000,000	\$913,000,000	\$267,000,000	9,740	\$64,800,000	\$58,500,000
Hunting	\$512,000,000	\$856,000,000	\$251,000,000	8,850	\$58,000,000	\$48,700,000
Wildlife Watching	\$917,000,000	\$1,530,000,000	\$439,000,000	16,100	\$103,000,000	\$88,600,000
Total	\$2,620,000,000	\$4,340,000,000	\$1,260,000,000	45,200	\$297,000,000	\$259,000,000

Source: North Carolina Wildlife Resources Commission, 2008. The 2006 Economic Benefits of Hunting, Fishing and Wildlife Watching in North Carolina. Prepared by Southwick Associates.

Parkway Drives Western North Carolina Tourism

The Blue Ridge Parkway is more than a tour of breathtaking mountains. It's the most-visited unit of the National Park Service, pumping more than \$2 billion per year into the economies of the communities through which it passes.

Close to 20 million people visit the Parkway each year, drawn by hiking trails, waterfalls, historic sites, and – above all – spectacular views. National Park Service surveys find that scenery is the primary draw, and that many visitors would be disinclined to return if the views became impaired.

Apple trees provide a picturesque accent for the sweeping view of more than 2,000 acres of lush mountain land visible from Parkway overlooks near The Orchard at Altapass – land that has been protected forever through the cooperative efforts of conservation groups, local landowners, state Conservation Trust Funds and private funders.

The Orchard, at Milepost 328.3, is one of thousands of businesses along the scenic route that depend on magnificent vistas to draw visitors. Approximately 60,000 people stop by during the months The Orchard is open, according to owner Bill Carson. Each group of three or four visitors spends an average of \$15 on gifts and refreshments.

“Sixteen years ago, the Orchard was dying, ripe for development that would ruin a spectacular two-mile stretch along the Parkway. Thanks to our partnership with land trusts and a judicious mix of public and private funding, the Orchard thrives as an agricultural and cultural haven, attracting visitors in large number,” Carson says. “We’re a non-profit, so the income is turned back to the local community. And because we’re a longstanding regional attraction, the Orchard draws people to businesses throughout our area.”

This success story is why the CWMTF and NHTF have played major roles in protecting the Parkway's scenic corridor, helping land trusts work with landowners to place voluntary conservation easements on their property or offer it for permanent public use via donation or bargain sale. State parks, game lands, and other protected areas augment the slender ribbon of land that belongs to the National Park Service, helping to ensure that the Parkway remains a beloved destination for future generations.

Altapass Orchard



Photo credit: Margaret Lillard, The Conservation Trust for NC

Eastern North Carolina Tourism

A major investment by the State of North Carolina helped finalize the largest single conservation land deal in the state's history, resulting in more than 76,000 acres of protected lands once owned by International Paper.

Thanks to a \$54.7 million dollar investment from the state's Conservation Trust Funds, the Roanoke, Upper Tar, Chowan, and Waccamaw river basins received significant protection in 2008.

This deal provided new opportunities across Eastern North Carolina for hunters, fishermen, paddlers, and other recreational users, and capped years of conservation work that has helped to shape new local economies. Nowhere is this more apparent than along the Roanoke River.

Carol Shields, who lives near the Roanoke on a farm that has been in her husband's family for five generations, is active in a number of local organizations including the Roanoke River Partners. The group built its first riverside camping platform in 1999.

"We just celebrated 10,000 camper nights," she says. "We are cultivating entrepreneurs along the river, lots of start-up businesses – people advertising paddling trips, outfitters, musicians playing in venues along the river. Every time we are in a group, I get someone on the list that has a budding river-related business for our region."

The group recently acquired Hamilton's Rosenwald School. The school, which once served young African Americans in a segregated system, will house an interpretive center for African American culture, a visitor's center, and a community center for meetings and functions.

Fishing on the Roanoke



Photo credit: Melissa McGaw, NC Wildlife Resources Commission

Defense & Conservation

The military plays a substantial role in both the economy and environment of North Carolina. In 2007, military activities totaled 7 percent of state's domestic product and translated into 416,000 jobs - 8 percent of total state employment.¹⁴ That impact is expected to grow, increasing GDP by \$2.9 billion and creating 49,000 jobs in 2013.

¹⁴ Nienow, S., Harder, C., Cole, T., Lea, A., 2008. North Carolina's Military Footprint: Current Economic Impacts and Estimates for 2013. North Carolina Department of Commerce: Raleigh, N.C.

Fort Bragg

Conservation groups and the state's Conservation Trust Funds help the U.S. military create safe buffer zones around bases in North Carolina, separating growing communities from land needed for vital training missions.

The Nature Conservancy transferred 1,260 acres in Cumberland County to the state in 2010 to become part of Carvers Creek State Park, which sits between Fort Bragg and civilian neighborhoods. One-third of the \$11.3 million cost was covered by the Department of Defense (DoD), leveraging dollars from two of the state's Conservation Trust Funds. Through 2009, the DoD, via the Army's Compatible Use Buffer Program, has invested more than \$16.5 million to protect 13,600 acres of ecologically valuable land around Fort Bragg.¹⁵

Mike Lynch, Director of Plans, Training and Mobilization for Fort Bragg, has worked with The Nature Conservancy and its partners to protect more than 15,000 acres of buffer around the base. "Our primary purpose is to protect soldier training by creating buffers on adjoining property," he explains. "Had [this] property turned into commercial or residential use, the loss of habitat would have adversely affected our training. We are also good citizens of the community. Acquiring this land provides green space for our soldiers and their families."

Similar work is occurring around the Marine Corps Air Station at Cherry Point, where the North Carolina Coastal Land Trust has worked with the DoD to protect more than 6,400 acres.

Soldiers Training in Longleaf Conservation Area at Fort Bragg



Photo credit: Cpl. Kissta M. Feldner, 82nd Airborne Division

¹⁵ U.S. Army Environmental Command, 2009. Army Compatible Use Buffer Program: Year End Summary FY09.

Agriculture Industry

Farmland preservation helps sustain the agriculture industry in North Carolina. Farming and its related industries are an important component of the North Carolina economy, adding \$32.1 billion in value to the state's economy and employing 120,000 people (Exhibit 6).

Exhibit 6. Value Added by Agricultural Manufacturing & Production to North Carolina Economy – 2009		
Industry	Employees	Value Added
Agricultural Production of Goods and Services (excluding forestry)	24,800	\$9,510,000,000
Food Manufacturing	53,700	\$8,490,000,000
Tobacco Manufacturing	5,790	\$10,600,000,000
Textile-Related Manufacturing	34,100	\$3,220,000,000
Agricultural Chemical Manufacturing	1,570	\$368,000,000
Total	120,000	\$32,100,000,000

Sources: U.S. Census Bureau. 2009 Annual Survey of Manufactures (ASM). According to the ASM, “value added” is calculated by subtracting the cost of materials, supplies, containers, fuel, purchased electricity, and contract work from the value of shipments (products manufactured plus receipts for services rendered).
 North Carolina Department of Agriculture & Consumer Services. 2010 Agricultural Statistics.
 North Carolina Department of Commerce, 2009. Bureau of Labor Statistics, Economic Development Intelligence System (EDIS) <https://edis.commerce.state.nc.us/EDIS/business.html>.

The state, however, is grappling with significant losses in farms, farmland, and agricultural jobs. In the last decade North Carolina has lost 800,000 acres of cropland and nearly 1 million acres of farmland. The state has seen nearly 15 percent of its cropland and 10 percent of its total farmland disappear. Moreover, over 7 percent of jobs in the agriculture industry have been lost since 1997.

Marks Creek Purchased Using CWMTF



Photo credit: TPL

Farmland preservation programs can have a significant role to play in protecting North Carolina's agricultural industry. In 2006, the average estimated market value of agricultural products sold per acre was \$1,220, while the value per farm was nearly \$195,000. With the state averaging a loss of nearly 100,000 acres of farmland per year between 1997 and 2007, it is possible to estimate a loss of over \$122 million in 2007 due to the year's decrease in farmland.

Exhibit 7. Farmland Loss 1997-2007				
Category		Year		
		1997	2002	2007
Farms		59,100	53,900	52,900
	Farm Loss (1997 –2007)	6,200 farms		
	Percent Loss	10.5%		
Employment*		32,000	31,500	29,600
	Employment Loss (1997 –2007)	2,410 jobs		
	Percent Loss	7.5%		
Farmland (acres)		9,440,000	9,080,000	8,470,000
	Average size of farms (acres/farm)	160	168	160
	Farmland Loss (1997 –2007)	970,000 acres		
	Percent Loss	10.3%		
Cropland (acres)		5,700,000	5,470,000	4,900,000
	Cropland Loss (1997 –2007)	805,000 acres		
	Percent Loss	14.1%		
Estimated market value of agricultural products sold		\$7,830,000,000	\$6,960,000,000	\$10,300,000,000
	Average per farm	\$132,000	\$129,000	\$195,000
	Average per acre of farmland	\$829	\$767	\$1,220
Sources: U.S. Department of Agriculture. 2007 Census of Agriculture. *Employment figures include agriculture, forestry, fishing and hunting from the Employment Security Commission of North Carolina.				

Whitaker Farm

Farmers, government agencies, and land trusts are working in partnership to protect the economic viability of farming communities across the state. One of the best examples of this approach is along the Randleman-Liberty farmland protection corridor in Randolph County, established by the Piedmont Land Conservancy (PLC) in 1999. To date, PLC has protected more than a thousand acres in this area.

Sandwiched between Greensboro, High Point, and Asheboro, the corridor is under tremendous development pressure, but it is also close to markets for agricultural products. Agriculture can remain economically viable in these areas if a critical mass of productive land is protected. One farm recently protected in the corridor is Whitaker Farms near Climax. Using ADFPTF funds to leverage federal funds from the U.S. Department of Agriculture's Farm and Ranchland Protection Program (FRPP), PLC purchased a permanent agricultural conservation easement on 97 acres of prime farmland on a portion of the land owned by Richard and Faylene Whitaker.

Whitaker Farms at more than 500 acres has diversified from growing tobacco to include greenhouses, pick-your-own strawberries, cantaloupes, pumpkins, and a variety of other crops. Some of the produce is sold at the family's curbside stand and farmers' markets in the region. The family has reinvested the proceeds from the sales of the easement in the farm's operations.

Whitaker farm faced significant development pressure due to its proximity to a four-lane highway. More than 90 percent of the tract's soils are classified as either prime or of statewide importance for agriculture, but the protection of these highly productive soils within this agricultural community will help ensure the long-term economic viability of agriculture in this region of the state.

Forestry Industry

Forest land conservation supports the North Carolina economy and environment. The economic impact of timber harvesting, production, and manufacturing on North Carolina's economy is substantial. In 2009, forestry, logging, and wood products manufacturing contributed well over \$6 billion to North Carolina's economy and employed nearly 75,000 people in the state.

Exhibit 8. Value Added by Forestry-related Manufacturing & Production to North Carolina Economy - 2009		
Industry	Employees	Value Added
Forest-related manufacturing		
Paper	15,300	\$2,420,000
Furniture	36,600	\$2,440,000,000
Wood products	18,750	\$1,500,000,000
Logging-related industry		
----	3,460	N/A
Forestry Production ¹⁶	----	\$934,000,000
Total	74,100	\$6,290,000,000
Sources: U.S. Census Bureau. 2009 Annual Survey of Manufactures (ASM). North Carolina Department of Agriculture & Consumer Services. 2010 Agricultural Statistics. North Carolina Department of Commerce. EDIS.		

¹⁶ Estimates provide information on both stumpage value and delivered value for timber harvested and delivered to mills.

There are roughly 18 million acres of North Carolina timberland¹⁷ (60 percent of the state's total land). This is a gain of 362,000 acres since 2002, reversing significant and consistent declines in timberland acreage for several decades. It is important to note, however, that by 2002 state timberland had fallen to its smallest amount since recording began in 1938. As of 2009, for every acre of timberland in North Carolina, a potential \$700 of value is added to the manufacturing sector of North Carolina's economy.

Tater Hill Lake Basin



Photo credit: Darcy Kiefel

¹⁷ Timberland is forestland capable of growing 20 cubic feet of wood per acre per year and not reserved from cutting.

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APPENDIX

Appendix: Methodology

The benefits transfer method is used to estimate economic values for natural goods and services. That is, we use existing data on the economic value of natural goods and services provided by North Carolina's natural systems. Benefits transfer methodology is a common approach in environmental economics because it is a practical alternative to time-intensive and data-intensive original research.

We followed the steps below in conducting the benefits transfer:¹⁸

- **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.

Based on existing research we determined the natural goods and services provided and their estimated their values for the following land cover types (Exhibit A-1).

¹⁸ 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 Service(s)	Annual Value Per Acre	Source
Woody Wetland	Water quality protection; flood control; wildlife habitat	\$1,150	North Carolina Ecosystem Enhancement Program, 2010
Deciduous Forest	Water quality protection; air pollution removal; carbon sequestration	\$300	American Forests, 2010 Kramer, R. & J. Eisen-Hecht, 2002 Eisen-Hecht, J. & R. Kramer, 2002
Evergreen Forest	Water quality protection; air pollution removal; carbon sequestration	\$300	American Forests, 2010 Kramer, R. & J. Eisen-Hecht, 2002 Eisen-Hecht, J. & R. Kramer, 2002
Grassland/ Herbaceous	Water quality protection; pollination	\$5	Kramer, R. & J. Eisen-Hecht, 2002 Eisen-Hecht, J. & R. Kramer, 2002 Southwick, E. & L. Southwick. 1992
Emergent Herbaceous Wetland	Water quality protection; flood control; wildlife habitat	\$1,150	North Carolina Ecosystem Enhancement Program, 2010
Pasture/Hay	Water quality protection; pollination	\$5	Kramer, R. & J. Eisen-Hecht, 2002 Eisen-Hecht, J. & R. Kramer, 2002 Southwick, E. & L. Southwick. 1992
Mixed Forest	Water quality protection; air pollution removal; carbon sequestration	\$300	American Forests, 2010 Kramer, R. & J. Eisen-Hecht, 2002 Eisen-Hecht, J. & R. Kramer, 2002
Shrub/Scrub	Water quality protection; pollination	\$5	Kramer, R. & J. Eisen-Hecht, 2002 Eisen-Hecht, J. & R. Kramer, 2002 Southwick, E. & L. Southwick. 1992
Cultivated Crops	Water quality protection; pollination	\$5	Kramer, R. & J. Eisen-Hecht, 2002 Eisen-Hecht, J. & R. Kramer, 2002 Southwick, E. & L. Southwick. 1992
Developed	None	N/A	N/A
Open Water	Fresh water regulation and supply; habitat provision	\$224	Ingraham & Foster, 2008
Barren Land	None	N/A	N/A

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